UNITED STATES
NATIONAL SEARCH AND RESCUE SUPPLEMENT
to the
International Aeronautical and Maritime Search and Rescue Manual
Version 2.0

April 23, 2018

Department of Homeland Security
Department of Defense
Department of State
Department of Interior
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Department of Transportation
National Aeronautics and Space Administration
Federal Communications Commission

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National Search and Rescue Committee

Letter of Promulgation

United States National Search and Rescue Supplement (Version 2.0) to the International Aeronautical and Maritime Search and Rescue Manual

Washington, D.C.

I am pleased to promulgate the *United States National Search and Rescue Supplement (NSS) to the International Aeronautical and Maritime Search and Rescue (IAMSAR) Manual (Version 2.0).*

With significant changes and additions, this NSS Version 2.0 provides the National Search and Rescue Committee member agencies a general overview and guidance on implementation of the U.S. national search and rescue system, an integral component of the global search and rescue system.

While this NSS was developed to support the National Search and Rescue Committee member agencies, assistance was provided by several State Search and Rescue Coordinators and dedicated search and rescue volunteers that are the backbone of the United States search and rescue system. This collaborative effort demonstrates the very heart of the United States search and rescue: Men and women from all walks of life working together to save lives.

It is for these committed lifesavers that this NSS is dedicated.

On behalf of the National Search and Rescue Committee,

MS. DANA S. TULIS
Chair, National Search and Rescue Committee
U.S. Coast Guard
Director of Incident Management & Preparedness Policy

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Record of Changes

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Foreword

Lifesaving operations are conducted by dedicated SAR professionals and volunteers every day across our nation. Men, women, and children become lost or injured in our national parks and wilderness areas, large and small aircraft crash on land and ditch at sea, people in distress on boats and ships in the marine environment, and major disasters that require the rescue of many survivors, all are conducted by the National Search and Rescue Committee (NSARC) member agencies, as well as by State, Tribal, Territorial/Insular Area (STTIA), and local SAR authorities and volunteers. The U.S. SAR system is SAR professionals and volunteers, from all walks of life, working together to save lives, in many instances at great risk to themselves.

NSARC developed this Version 2.0 of the *National Search and Rescue Supplement (NSS) to the International Aeronautical and Maritime Search and Rescue (IAMSAR) Manual* for SAR Coordinators, planners, and responders. When compared to the original NSS, this version was completely rewritten to provide the SAR professional with a broad overview of general SAR principles and operations, as well as explain the organization of the U.S. SAR system, in support of the National SAR Plan (NSP) and the *IAMSAR Manual.*

The NSS is now truly a U.S. *national* SAR supplement to the *IAMSAR Manual*.

(03/02/12) Kentucky National Guard members engage in a SAR mission for survivors after torrential storms and violent winds destroyed much of the community, West Liberty, Kentucky. (Photo: Spc. David Bolton/Army)

It is for the SAR professional with boots on the ground, in the air, and on the water that NSARC dedicates this NSS (Version 2.0).

Working together to save lives.

National Search and Rescue Committee

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CDC Radiation Dictionary: Centers for Disease Control and Prevention Radiation Dictionary online.

CDC Bioterrorism: CDC Bioterrorism overview; http://emergency.cdc.gov/bioterrorism/overview.asp.

CIA CBR Handbook: *Chemical/Biological/Radiological Incident Handbook* (October, 1998).

CISAR Addendum: *Catastrophic Incident Search and Rescue Addendum to the National Search and Rescue Supplement to the International Aeronautical and Maritime Search and Rescue Manual.*

Cospas-Sarsat: *COSPAS-SARSAT Terms and Acronyms Used in the United States* (June, 1988); *COSPAS-SARSAT Glossary, C/S G.0-04 (Draft)*, Issue 1, Revision 0 (January, 1990); or International Cospas-Sarsat Programme Acronyms and Terminology Website.

DHS RDD/IND: *Planning Guidance for Protection and Recovery Following Radiological Dispersal Device (RDD) and Improvised Nuclear Device (IND) Incidents* (Federal Register, Vol. 73, No. 149, August 1, 2008).

DoD NARP: *Nuclear Weapon Accident Response Procedures (NARP), DoD 3150.8-M* (February 22, 2005).

ESF #9: Emergency Support Function #9 (May, 2013)

FAA AIM: *Aeronautical Information Manual* (April 3, 2014)

FAA Op/Admin: *Facility Operation and Administration*, Order JO 7210.3.

FEMA Be Ready: http://www.ready.gov/document/be-informed-chemical-threat.

FEMA IMH: *FEMA Incident Management Handbook* (B-761).

FEMA NIMS: *National Incident Management System* (December, 2008).

FEMA NIMS Guideline: National Incident Management System Guideline for Mutual Aid (November, 2017)

FEMA Pet: *9523.19 Eligible Costs Related to Pet Evacuations & Sheltering.*

FEMA Glossary: FEMA Glossary online.

IAMSAR: *International Aeronautical and Maritime Search and Rescue Manual*.

JP 1-02: *Department of Defense Dictionary of Military and Associated Terms*, Joint Publication 1-02 (November 8, 2010; as amended through February 15, 2016).

JP 3-28: *Defense Support to Civil Authorities*, Joint Publication 3-28 (July 31, 2013).

NGB: National Guard Bureau.

NIOSH: National Institute for Occupational Safety and Health.

NRF: *National Response Framework* (June, 2016)

NSP: *National Search and Rescue Plan of the United States* (2016)

NSS PGRND: *Planning Guidance for Response to a Nuclear Detonation* (June, 2010)

NWCG Glossary: National Wildfire Coordination Group Glossary online.

NWS Glossary: National Weather Service Glossary online.

SAR Convention: *International Convention on Maritime Search and Rescue* (1979)

Stafford Act: *Robert T. Stafford Relief and Emergency Assistance Act* (42 U.S.C. § 5121-5206).

Type 3 QG: *Type 3 All-Hazard Incident Management System Qualification Guide* (September, 2010)

UAS Roadmap: Federal Aviation Administration, *Integration of Civil Unmanned Aircraft Systems (UAS) in the National Airspace System (NAS) Roadmap* (2013).

USGS Glossary: U.S. Geological Survey Earthquake Glossary online.

Glossary

A

A-Probability: Percentage representing probability that the "A" rather than the "B" solution represents a real position. (Cospas-Sarsat)

A-Solution: Of the two solutions derived from single satellite pass data, the one more likely to be related to the real position. (Cospas-Sarsat)

Aeronautical Drift (D_a): Drift caused by bailout trajectory or aircraft gliding distance. (IAMSAR)

Aeronautical Information Publication (AIP): A publication issued by or with the authority of a State and containing aeronautical information of a lasting character essential to air navigation. (FAA AIM)

Aeronautical Position: Initial position of a distressed aircraft at the time of re-entry, engine failure, aircrew ejection or bailout. (IAMSAR)

Aeronautical Search and Rescue (SAR): Search and rescue operations involving persons in distress aboard aircraft.

Air Burst: A nuclear weapon explosion that is high enough in the air to keep the fireball from touching the ground. Because the fireball does not reach the ground and does not pick up any surface material, the radioactivity in the fallout from an air burst is relatively insignificant compared with a surface burst. (CDC Radiation Dictionary)

Air Route Traffic Control Center (ARTCC): A facility established to provide air traffic control service to aircraft operating on IFR flight plans within controlled airspace and principally during the en route phase of flight. When equipment capabilities and controller workload permit, certain advisory/assistance services may be provided to VFR aircraft. (FAA AIM)

Air Search Area Definition (ASAD): A method of determining the POC for a missing aircraft using statistical information from a 2009 NASA study of crash locations.

Air Traffic Control (ATC): A service operated by an appropriate authority to promote the safe, orderly, and expeditious flow of air traffic. (FAA AIM)

Air Traffic Service: A generic term meaning:

a. Flight Information Service.

b. Alerting Service.

c. Air Traffic Advisory Service.

d. Air Traffic Control Service:

1. Area Control Service,

2. Approach Control Service, or

3. Airport Control Service. (FAA AIM)

Aircraft Coordinator (ACO): A person or team who coordinates the involvement of multiple aircraft SAR operations in support of the SAR mission coordinator and onscene coordinator. (IAMSAR)

Aircraft Glide: Maximum ground distance and aircraft could cover during descent. (IAMSAR)

ALARA (As low as reasonably achievable): A process to control or manage radiation exposure to individuals and releases of radioactive material to the environment so that doses are as low as social, technical, economic, practical, and public welfare considerations permit. (NSS PGRND)

Alert: Cospas-Sarsat report of an apparent distress routed to the search and rescue system. (Cospas-Sarsat)

Alert Notice (ALNOT): A message sent by an FSS or an ARTCC that requests an extensive communications search for overdue, unreported, or missing aircraft. (FAA AIM)

Alert Phase: (1) A situation wherein apprehension exists as to the safety of a person, vessel or other craft. (SAR Convention)

Alerting Post: Any facility intended to serve as an intermediary between a person reporting an emergency and a rescue coordination center or rescue sub-center. (SAR Convention)

Amver: Worldwide ship reporting system for search and rescue. (IAMSAR)

Area Command (Unified Area Command): An organization established to oversee the management of multiple incidents that are each being handled by a separate Incident Command System organization or to oversee the management of a very large or evolving incident that has multiple Incident Management Teams engaged. An Agency Administrator/Executive or other public official with jurisdictional responsibility for the incident usually makes the decision to establish an Area Command. An Area Command is activated only if necessary, depending on the complexity of the incident and incident management span-of-control considerations. (FEMA NIMS)

Assisting Agency: An agency or organization providing personnel, services, or other resources to the agency with direct responsibility for incident management. See **Supporting Agency**. (FEMA NIMS)

Altitude Reservation (ALTRV): Airspace utilization under prescribed conditions normally employed for the mass movement of aircraft or other special user requirements which cannot otherwise be accomplished. ALTRVs are approved by the appropriate FAA facility. (FAA AIM)

Authority Having Jurisdiction (AHJ): An organization, office, or individual having statutory responsibility for enforcing the requirements of a code or standard, or for approving equipment, materials, and installation, or a procedure. (Type 3 QG)

Automatic Direction Finding (ADF): Equipment that determines bearing to a radio station.

Available Datum Effort (Z_a): The amount of effort available for assignment to a particular datum. (IAMSAR)

Awareness Range: distance at which a search scanner can first detect something different from its surroundings but not yet recognize it. (IAMSAR)

Awareness Stage: A period during which the SAR system becomes aware of an actual or potential incident. (IAMSAR)

B

B-Probability: Percentage representing probability that the "B" rather than the "A" solution represents a real position. (Cospas-Sarsat)

B-Solution: Based on single satellite pass data, the solution least likely to represent a real position. (Cospas-Sarsat)

Beacon ID: Information coded into a 406 MHz distress beacon signal containing the beacon identification and other search and rescue information. (Cospas-Sarsat)

Biological Incident: An event in which a biological agent harms or threatens to harm humans, livestock, or agricultural or economic assets.

Bioterrorism: The deliberate release of viruses, bacteria, or other germs (agents) used to cause illness or death in people, animals, or plants. These agents are typically found in nature, but it is possible that they could be changed to increase their ability to cause disease, make them resistant to current medicines, or to increase their ability to be spread into the environment. Biological agents can be spread through the air, through water, or in food. Terrorists may use biological agents because they can be extremely difficult to detect and do not cause illness for several hours to several days. Some bioterrorism agents, like the smallpox virus, can be spread from person to person and some, like anthrax, cannot. (CDC Bioterrorism)

Blast Effect: The impacts caused by the shock wave of energy through air that is created by detonation of a nuclear device. The blast wave is a pulse of air in which the pressure increases sharply at the front, accompanied by winds. (NSS PGRND)

Blister Agent: A chemical agent which injures the eyes and lungs, and burns or blisters the skin. (JP 1-02)

Blood Agent: A chemical compound, including the cyanide group, that affects bodily functions by preventing the normal utilization of oxygen by body tissues. (JP 1-02)

Branch: The organizational level having functional or geographical responsibility for major aspects of incident and accident operations. A branch is organizationally situated between the section and the division or group in the Operations Section, and between the section and units in the Logistics Section. Branches are identified by the use of Roman numerals or by functional area (e.g., medical, security, etc.). (FEMA NIMS)

Buffer Zone: Area of defined width overlapping adjacent search and rescue regions for which alerts will be provided to the Rescue Coordination Centers responsible of both regions. (Cospas-Sarsat)

C

Captive Animals: Captive animals live in zoos or aquariums and that might otherwise be endangered wild animals, and in research facilities, and which are totally dependent on humans for survival.

Catastrophic Incident: Any natural or manmade incident, including terrorism that results in extraordinary levels of mass casualties, damage, or disruption severely affecting the population, infrastructure, environment, economy, national morale, and/or government functions. (NRF)

Catastrophic Incident Search and Rescue (CISAR): Civil SAR operations carried out as all or part of the response to an emergency or disaster declared by the President, under provisions of the NRF and ESF #9 Annex. (CISAR Addendum)

Chemical Agent: A chemical substance which is intended for use in military operations to kill, seriously injure, or incapacitate mainly through its physiological effects. The term excludes riot control agents when used for law enforcement purposes, herbicides, smoke, and flames. (JP 1-02)

Chemical, Biological, Radiological, Nuclear, or High Yield Explosives (CBRNE) Emergency Response Force Package (CERFP): The CERFPs provide a regional response capability comprised of existing traditional National Guard units task organized to respond to Weapons of Mass Destruction (WMD) attacks. The CERFPs are capable of performing search and extraction, casualty/patient decontamination, mass medical triage, and treatment at a CBRNE incident. (NGB)

Chemical, Biological, Radiological, Nuclear, or High Yield Explosives (CBRNE) Incident: An emergency resulting from the deliberate or unintentional release of nuclear, biological, radiological, toxic, or poisonous chemical materials, or the detonation of a high yield explosive. (JP 1-02)

Chemical Attack: The deliberate release of a toxic gas, liquid or solid that can poison people and the environment. (FEMA Be Ready)

Chief: The ICS title for individuals responsible for functional Sections: Operations, Planning, Logistics, and Finance/Administration. (FEMA NIMS)

Coastal Flooding: Flooding which occurs when water is driven onto land from an adjacent body of water. This generally occurs when there are significant storms, such as tropical and extratropical cyclones. (NWS Glossary)

Command Center (CC): Multi-mission center that may perform the function of a rescue coordination center in addition to having staff and capabilities to perform other functions.

Commence Search Point (CSP): Point normally specified by the SMC where a SAR facility is to begin its search pattern. (IAMSAR)

Command Staff: The Command Staff consists of the Public Information Officer, Safety Officer, and Liaison Officer. They report directly to the Incident Commander. They may have an Assistant or Assistants, as needed. (FEMA NIMS)

Commence Search Point (CSP): Point normally specified by the SMC where a search and rescue facility is to begin its search pattern. (IAMSAR)

Common Operating Picture: An overview of an incident by all relevant parties that provides incident information enabling the Incident Commander/Unified Command and any supporting agencies and organizations to make effective, consistent, and timely decisions. (FEMA NIMS)

Complex: Two or more individual incidents located in the same general area and assigned to a single Incident Commander or to Unified Command. (FEMA NIMS)

Composite Solution: Computer generated position based on merging two or more matched single pass solutions. (Cospas-Sarsat)

Conclusion Stage: A period during a search and rescue incident when search and rescue facilities return to their regular location and prepare for another mission. (IAMSAR)

Confined Space: A space which by design has limited openings for entry and exit, unfavorable natural ventilation which could contain or produce dangerous air contaminants, and which is not intended for continuous employee occupancy. Confined spaces include but are not limited to storage tanks, compartments of ships, process vessels, pits, silos, vats, degreasers, reaction vessels, boilers, ventilation and exhaust ducts, sewers, tunnels, underground utility vaults, and pipelines. (NIOSH)

Confinement: A search strategy (with many possible tactics) to limit the possible area into which the search objective might travel undetected, or to establish that the search objective has not already passed a desired search area boundary.

Confirmed Position: A DOA or Doppler position that is confirmed by independent DOA, Doppler or encoded position data that matches within 20 kilometers. (Cospas-Sarsat)

Contamination (radioactive): The deposition and/or absorption of radioactive or other hazardous or toxic material on or by structures, areas, personnel, or objects. (DoD NARP)

Continuity of Government: A coordinated effort within the Federal Government's executive branch to ensure that National Essential Functions continue to be performed during a catastrophic emergency (as defined in National Security Presidential Directive 51/Homeland Security Presidential Directive 20). (FEMA NIMS)

Continuity of Operations: An effort within individual organizations to ensure that Primary Mission Essential Functions continue to be performed during a wide range of emergencies. (FEMA NIMS)

Coordinated Search Pattern: Multi-unit pattern using vessel(s) and aircraft. (IAMSAR)

Cospas-Sarsat System: (1) A satellite system designed to detect distress beacons transmitting on the frequency 406 MHz. (IAMSAR)

Course: The intended horizontal direction of travel. (IAMSAR)

Coverage Factor (C): The ratio of the search effort (Z) to the area searched (A). C = Z/A. For parallel sweep searches, it may be computed as the ratio of sweep width (W) to track spacing (S). C = W/S. (IAMSAR)

Credentialing: The authentication and verification of the certification and identity of designated incident managers and emergency responders. (FEMA NIMS)

Critical Incident Stress: Any event which overwhelms the capacities of a person to psychologically cope with an incident; the normal physical and psychological reactions of normal people experiencing an abnormal event or demand.

Critical Incident Stress Management (CISM): A comprehensive, integrated, systematic, multi-tactic form of crisis intervention that is applied to manage critical incident stress after traumatic events.

Critical Infrastructure: Assets, systems, and networks, whether physical or virtual, so vital to the United States that the incapacitation or destruction of such assets, systems, or networks would have a debilitating impact on security, national economic security, national public health or safety, or any combination of those matters. (FEMA NIMS)

Cumulative Probability of Success (POS_{cum}): The accumulated probability of finding the search object with all the search effort expended over all searches to date. POS_C is the sum of all individual search POS values. (IAMSAR)

Cumulative Relative Effort (Z_{rc}): The sum of all previous relative efforts plus the relative effort for the next planned search effort. This value determines the optimal search factor. $Z_{rc} = Z_{r-1} + Z_{r-2} + Z_{r-3} + \ldots Z_{r\text{-next search}}$. (IAMSAR)

D

Datum: A geographic point, line, or area used as a reference in search planning. (IAMSAR)

Datum Area: Area in where it is estimated that the search object is most likely to be located. (IAMSAR)

Datum Marker Buoy (DMB): Droppable floating beacon used to determine actual total water current, or to serve as a location reference. (IAMSAR)

Datum Point: A point, such as a reported or estimated position, at the center of the area where it is estimated that the search object is most likely to be located. (IAMSAR)

Decontamination: The process of making any person, object, or area safe within acceptable limits by absorbing, making harmless, or removing contaminated material clinging to or around it. (DoD NARP)

Decontamination Station: A building or location suitably equipped and organized where personnel and material are cleansed of radiological and other hazardous or toxic contaminants. (DoD NARP)

Defense Coordinating Officer (DCO): Department of Defense single point of contact for domestic emergencies. Assigned to a joint field office to process requirements for military support, forward mission assignments through proper channels to the appropriate military organizations, and assign military liaisons, as appropriate, to activated emergency support functions. (JP 1-02)

Defense Support of Civil Authorities (DSCA): Support provided by US Federal military forces, Department of Defense civilians, Department of Defense contract personnel, Department of Defense component assets, and National Guard forces (when the Secretary of Defense, in coordination with the governors of the affected states, elects and requests to use those forces in Title 32, United States Code, status) in response to requests for assistance from civil authorities for domestic emergencies, law enforcement support, and other domestic activities, or from qualifying entities for special events. (JP 1-02)

Demobilization: The orderly, safe, and efficient return of an incident resource to its original location and status. (FEMA NIMS)

Deputy: A fully qualified individual who, in the absence of a superior, can be delegated the authority to manage a functional operation or to perform a specific task. In some cases a deputy can act as relief for a superior, and therefore must be fully qualified in the position. Deputies generally can be assigned to the Incident Commander, General Staff, and Branch Directors. (FEMA NIMS)

Direction Finding (DF): Homing on signals to pinpoint a position. (IAMSAR)

Director: The Incident Command System title for individuals responsible for supervision of a Branch. (FEMA NIMS)

Dirty Bomb: A device designed to spread radioactive material by conventional explosives when the bomb explodes. A dirty bomb kills or injures people through the initial blast of the conventional explosive and spreads radioactive contamination over possibly a large area – hence the term "dirty." Such bombs could be miniature devices or large truck bombs. A dirty bomb is much simpler to make than a true nuclear weapon. (CDC Radiological Dictionary)

Distress Beacon: Device operating on 406 MHz intended solely for distress signaling through the Cospas-Sarsat system.

Distress Phase: A situation wherein there is reasonable certainty that a vessel or other craft, including an aircraft or a person, is threatened by grave and imminent danger and requires immediate assistance. (IAMSAR)

Ditching: The forced landing of an aircraft on water. (IAMSAR)

Division: The organizational level having responsibility for operations within a defined geographic area. Divisions are established when the number of resources exceeds the manageable span of control of the Section Chief. See **Group**. (FEMA NIMS)

Difference of Arrival (DOA) Position: A position computed by a MEOLUT using differences in Time of Arrival (TOA) and/or Frequency of Arrival (FOA) data from multiple MEOSAR satellites. (Cospas-Sarsat)

Domestic Event Network (DEN): A 24/7 FAA sponsored telephonic conference call network (recorded) that includes all of the air route traffic control centers (ARTCC) in the United States. It also includes various other Governmental agencies that monitor the DEN. The purpose of the DEN is to provide timely notification to the appropriate authority that there is an emerging air-related problem or incident. (FAA Op/Admin)

Doppler Shift: Change in the apparent frequency of a wave as observer and source move toward or away from each other. Doppler Shift is used by the Cospas-Sarsat system to determine the position of a distress beacon that has been activated.

Dose: Radiation absorbed by an individual's body; general term used to denote mean absorbed dose, equivalent dose, effective dose, or effective equivalent dose, and to denote dose received or committed dose. (NSS PGRND)

Drift: The movement of a search object cause by environmental factors. (IAMSAR)

E

Earthquake: Earthquake is a term used to describe both sudden slip on a fault, and the resulting ground shaking and radiated seismic energy caused by the slip, or by volcanic or magmatic activity, or other sudden stress changes in the earth. (USGS Glossary)

Electromagnetic Pulse (EMP): A sharp pulse of radiofrequency (long wavelength) electromagnetic radiation produced when an explosion occurs near the earth's surface or at high altitudes. The intense electric and magnetic fields can damage unprotected electronics and electronic equipment over a large area. (NSS PGRND)

Elemental Solution: Single satellite pass solution upon which a composite solution is based. (Cospas-Sarsat)

Emergency: (1) Absent a Presidentially declared emergency, any incident(s), human-caused or natural, that requires responsive action to protect life or property. Under the Robert T. Stafford Disaster Relief and Emergency Assistance Act, an emergency means any occasion or instance for which, in the determination of the President, Federal assistance is needed to supplement State and local efforts and capabilities to save lives and to protect property and public health and safety, or to lessen or avert the threat of a catastrophe in any part of the United States. (FEMA NIMS) (2) Any incident, whether natural, technological, or human-caused, that necessitates responsive action to protect life or property. (FEMA NIMS Guideline)

Emergency Locator Transmitter (ELT): Aeronautical radio distress beacon for alerting and transmitting homing signals. (IAMSAR)

Emergency Management Assistance Compact (EMAC): A congressionally ratified organization that provides form and structure to interstate mutual aid. Through EMAC, a disaster-affected State can request and receive assistance from other member States quickly and efficiently, resolving two key issues up front: liability and reimbursement. (FEMA NIMS)

Emergency Operations Center (EOC): The physical location at which the coordination of information and resources to support domestic incident management activities normally takes place. An EOC may be a temporary facility or may be located in a more central or permanently established facility, perhaps at a higher level of organization within a jurisdiction. EOCs may be organized by major functional disciplines (e.g., fire, law enforcement, and medical services), by jurisdiction (e.g., Federal, State, regional, county, city, tribal), or some combination thereof. (FEMA NIMS)

Emergency Operations Plan: The plan that each jurisdiction has and maintains for responding to appropriate hazards. (FEMA NIMS)

Emergency Phase: A generic term, as the case may be, uncertainty phase, alert phase, or distress phase. (IAMSAR)

Emergency Position-Indicating Radio Beacon (EPIRB): A device, usually carried aboard maritime craft, that transmits a signal that alerts search and rescue authorities and enables rescue units to locate the scene of the distress. (IAMSAR)

Emergency Support Function (ESF) Coordinator: The ESF coordinator oversees the preparedness activities for a particular ESF and coordinates with its primary and support agencies.

Emergency Support Function (ESF) Primary Agency: An ESF primary agency has significant authorities, roles, resources, and capabilities for a particular function within an ESF.

Emergency Support Function (ESF) Support Agency: An agency that provides support and/or resource assistance to another agency. (FEMA Glossary)

Emergency Support Functions (ESFs): A grouping of government and certain private-sector capabilities into an organizational structure to provide the support, resources, program implementation, and services that are most likely to be needed to save lives, protect property and the environment, restore essential services and critical infrastructure, and help victims and communities return to normal, when feasible, following domestic incidents. (JP 1-02)

Epicenter: The point on the earth's surface vertically above the hypocenter (or focus), point in the crust where a seismic rupture begins. (USGS Glossary)

Evacuation: Organized, phased, and supervised withdrawal, dispersal, or removal of persons from dangerous or potentially dangerous areas, and their reception and care in safe areas. (FEMA NIMS)

Exposure (Radiation): The level of radiation flux to which a material or living tissue is exposed. (DoD NARP)

Extended Communications (EXCOM) Search: Comprehensive communications search to find information or clues about the location of missing persons. Normally conducted after a PRECOM has yielded no results, or when the mission is upgraded to the Alert phase.

Eye: The relatively calm center in a hurricane that is more than one half surrounded by wall cloud. The winds are light, the skies are partly cloudy or even clear (the skies are usually free of rain) and radar depicts it as an echo-free area within the eye wall. (NWS Glossary)

Eyewall/Wall Cloud: It is an organized band of cumuliform clouds that immediately surrounds the center (eye) of a hurricane. The fiercest winds and most intense rainfall typically occur near the eye wall. VIP levels 3 or greater are typical. Eye wall and wall cloud are used synonymously, but it should not be confused with a wall cloud of thunderstorm. (NWS Glossary)

F

Fallout: The process or phenomenon of the descent to the earth's surface of particles contaminated with radioactive material from the radioactive cloud. The term is also applied in a collective sense to the contaminated particulate matter itself. NSS PGRND)

False Alarm: Distress alert initiated for other than an appropriate test, by communications equipment intended for alerting, when no distress situation actually exists. (IAMSAR)

False Alert: Distress alert received from any source, including communications equipment intended for alerting, when no distress situation actually exists, and a notification of distress should not have resulted. (IAMSAR)

Fault: A fracture along which the blocks of crust on either side have moved relative to one another parallel to the fracture. (USGS Glossary)

Federal Agency: Any department, independent establishment, Government corporation, or other agency of the executive branch of the Federal Government, including the U.S. Postal Service, but shall not include the American National Red Cross. (Stafford Act)

Federal Coordinating Officer (FCO): The official appointed by the President to execute Stafford Act authorities, including the commitment of Federal Emergency Management Agency (FEMA) resources and mission assignment of other Federal departments or agencies. In all cases, the FCO represents the FEMA Administrator in the field to discharge all FEMA responsibilities for the response and recovery efforts underway. For Stafford Act events, the FCO is the primary Federal representative with whom the State Coordinating Officer and other State, tribal, and local response officials interface to determine the most urgent needs and set objectives for an effective response in collaboration with the Unified Coordination Group. (FEMA Glossary)

Finance/Administration Section: The Section responsible for all incident costs and financial considerations. Includes the Time Unit, Procurement Unit, Compensation/Claims Unit, and Cost Unit. (FEMA NIMS)

First Alert: First signal detection notification of a 406 MHz beacon. Typically, an initial 406 MHz unlocated alert is sent prior to position confirmation; however, positions may be confirmed on the first alert by encoded GPS position in the beacon. (Cospas-Sarsat)

First Rescue Coordination Center (RCC): Rescue coordination center affiliated with the shore station that first acknowledges a distress alert, and which should assume responsibility for all subsequent search and rescue coordination unless and until responsibility is accepted by another rescue coordination center better able to take action. (IAMSAR)

Flash Flood: A rapid and extreme flow of high water into a normally dry area, or a rapid water level rise in a stream or creek above a predetermined flood level, beginning within six hours of the causative event (e.g., intense rainfall, dam failure, ice jam). However, the actual time threshold may vary in different parts of the country. Ongoing flooding can intensify to flash flooding in cases where intense rainfall results in a rapid surge of rising flood waters. (NWS Glossary)

Flash Flood Warning: Issued to inform the public, emergency management, and other cooperating agencies that flash flooding is in progress, imminent, or highly likely. (NWS Glossary)

Flash Flood Watch: Issued to indicate current or developing hydrologic conditions that are favorable for flash flooding in and close to the watch area, but the occurrence is neither certain or imminent. (NWS Glossary)

Flight Information Publication (FLIP): Sensitive flight critical mapping and charting type items produced by the National Geospatial-Intelligence Agency (NGA), foreign governments, and commercial vendors that are distributed by Defense Distribution Mapping and varied civilian contractors.

Flight Information Region (FIR): An airspace of defined dimensions within which Flight Information Service and Alerting Service are provided. (FAA AIM)

Flight Plan: Specified information relating to the intended flight of an aircraft that is filed orally or in writing with an FSS or an ATC facility. (FAA AIM)

Flight Service Station (FSS): An air traffic facility which provides pilot briefings, flight plan processing, en route radio communications, search and rescue services, and assistance to lost aircraft and aircraft in emergency situations. FSS also relays ATC clearances, processes Notices to Airmen, and broadcasts aviation weather and aeronautical information. In addition, at selected locations, FSS provides En Route Flight Advisory Service (Flight Watch) and Airport Advisory Service (AAS) and takes airport weather observations. (FAA AIM)

Flood: Any high flow, overflow, or inundation by water which causes or threatens damage. (NWS Glossary)

Flood Warning: (FLW) In hydrologic terms, a release by the NWS to inform the public of flooding along larger streams in which there is a serious threat to life or property. A flood warning will usually contain river stage (level) forecasts. (NWS Glossary)

Flood Watch: Issued to inform the public and cooperating agencies that current and developing hydrometeorological conditions are such that there is a threat of flooding, but the occurrence is neither certain nor imminent. (NWS Glossary)

Frostbite: Human tissue damage caused by exposure to intense cold. (NWS Glossary)

Function: One of the five major activities in the Incident Command System: Command, Operations, Planning, Logistics, and Finance/Administration. A sixth function, Intelligence/ Investigations, may be established, if required, to meet incident management needs. The term *function* is also used when describing the activity involved (e.g., the planning function). (FEMA NIMS)

G

General Staff: A group of incident management personnel organized according to function and reporting to the Incident Commander. The General Staff normally consists of the Operations Section Chief, Planning Section Chief, Logistics Section Chief, and Finance/Administration Section Chief. An Intelligence/Investigations Chief may be established, if required, to meet incident management needs. (FEMA NIMS)

Geographic Information System: A system which captures, stores, analyses, manages and presents data that is linked to a location (IAMSAR).

Geostationary Earth Orbiting Local User Terminal (GEOLUT): A ground receiving station that detects, processes, and recovers the coded transmissions of 406 MHz distress beacons from Geostationary Earth Orbiting Search and Rescue (GEOSAR) satellites, and relays the appropriate information to a Mission Control Center. (Cospas-Sarsat)

Global Maritime Distress and Safety System (GMDSS): A global communications service based upon automated systems, both satellite-based and terrestrial, to provide distress alerting and promulgation of maritime safety information for mariners. (IAMSAR)

Global Navigation Satellite System: World-wide position and time determination system that includes one or more satellite constellations and receivers. (IAMSAR)

Global Positioning System (GPS): A specific satellite-based system used in conjunction with mobile equipment to determine the precise position of the mobile equipment. (IAMSAR)

Governor: The chief executive of any State. (Stafford Act)

Gray (Gy): a unit of measurement for absorbed dose. It measures the amount of energy absorbed in a material. The unit Gy can be used for any type of radiation, but it does not describe the biological effects of the different radiations. (CDC Radiation Dictionary)

Grid: Any set of intersecting perpendicular lines spaced at regular intervals. (IAMSAR)

Grid Cell: A square or rectangular area formed by pairs of adjacent, perpendicular grid lines. (IAMSAR)

Ground Segment: Ground Segment comprises: a) Local User Terminals to receive signals related by the satellites and process them to determine radiobeacon location; and b) Mission Coordination Centers to accept output from the Local User Terminals and convey distress alert and location data to appropriate authorities. (Cospas-Sarsat)

Ground Speed (GS): The speed an aircraft is making relative to the earth's surface. (IAMSAR)

Group: An organizational subdivision established to divide the incident management structure into functional areas of operation. Groups are composed of resources assembled to perform a special function not necessarily within a single geographic division. See **Division**. (FEMA NIMS)

H

Half-Life: The time required for the activity of a given radioactive element to decrease to half of its initial value due to radioactive decay. The half-life is a characteristic property of each radioactive element and is independent of its amount or physical form. The effective or biological half-life of a given isotope in the body is the time in which the quantity in the body decreases to half because of both radioactive decay and biological elimination. (DoD NARP)

H-Hour: H-hour is a hurricane planning factor used to develop plans for pre-hurricane actions and differs from hurricane landfall in that it is based on the onset of tropical storm force winds, not the arrival of the hurricane eye wall ashore. H-Hour provides a determination for when tropical storm force winds arrive ashore, normally requiring the reduction or cessation of operations due to bridge closures, crosswind limits for flight operations, sheltering requirements, and other safety related considerations. Based on the size and intensity of a hurricane, there can be an 8 to 16 hour time difference between H-hour and hurricane landfall.

Hasty Search: Hasty Search (also known as initial reflex task) is a fast paced and methodical search of the assigned area of operation in an attempt to locate survivors that are in immediate need of evacuation from harm. Other considerations for Hasty Search include: 1) Can be accomplished by air, water craft or vehicles; 2) Size and make up of Hasty Search teams are incident driven and flexible; 3) If survivors are located and can be easily evacuated they will be immediately removed and moved to the identified casualty collection point; 4) If survivors are located and cannot be easily evacuated, additional resources will be called up to conduct extrication and or evacuation; and 5) Documentation of areas searched must be recorded and reported. A Hasty Search may be accomplished simultaneously with reconnaissance.

Hazardous Material: Any material that is flammable, corrosive, an oxidizing, explosive, toxic, poisonous, radioactive, nuclear, unduly magnetic, or chemical agent, biological research material, compressed gas, or any other material that, because of its quantity, properties, or packaging, may endanger life or property. For the purposes of ESF #1, hazardous material is a substance or material, including a hazardous substance that has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated (See reference (h)). For the purposes of ESF #10 and the Oil and Hazardous Materials Incident Annex, the term is intended to mean hazardous substances, pollutants, and contaminants as defined by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

Heading: The horizontal direction in which a craft is pointed. (IAMSAR)

Homeland Defense (HD): An activity undertaken for the military protection of the territory or domestic population of the United States, or of infrastructure or other assets of the United States determined by the Secretary of Defense as being critical to national security, from a threat or aggression against the United States (32 USC 901).

Homing: The procedure of using the direction-finding equipment of one radio station with the emission of another radio station, where at least one of the stations is mobile, and whereby the mobile station proceeds continuously towards the other station (IAMSAR).

Household Pet: A domesticated animal, such as a dog, cat, bird, rabbit, rodent, or turtle that is traditionally kept in the home for pleasure rather than for commercial purposes, can travel in commercial carriers, and be housed in temporary facilities. Household pets do not include reptiles (except turtles), amphibians, fish, insects/arachnids, farm animals (including horses), and animals kept for racing purposes. (FEMA Pet)

Hurricane: A tropical cyclone in the Atlantic, Caribbean Sea, Gulf of Mexico, or eastern Pacific, which the maximum 1-minute sustained surface wind is 64 knots (74 mph) or greater. (NWS Glossary)

Hurricane Season The part of the year having a relatively high incidence of tropical cyclones. In the Atlantic, Caribbean, and Gulf of Mexico, and central North Pacific, the hurricane season is the period from June through November; in the eastern Pacific, May 15 through November 30. Tropical cyclones can occur year-round in any basin. (NWS Glossary)

Hurricane Warning: An announcement that hurricane conditions (sustained winds of 74 mph or higher) are expected somewhere within the specified coastal area. Because hurricane preparedness activities become difficult once winds reach tropical storm force, the hurricane warning is issued 36 hours in advance of the anticipated onset of tropical-storm-force winds. The warning can remain in effect when dangerously high water or a combination of dangerously high water and waves continue, even though winds may be less than hurricane force. (NWS Glossary)

Hurricane Watch: An announcement that hurricane conditions (sustained winds of 74 mph or higher) are *possible* within the specified coastal area. Because hurricane preparedness activities become difficult once winds reach tropical storm force, the hurricane watch is issued 48 hours in advance of the anticipated onset of tropical-storm-force winds. (NWS Glossary)

Hypothermia: Abnormal lowering of internal body temperature (heat loss) from exposure to cold air, wind, or water. (IAMSAR); (2) A rapid, progressive mental and physical collapse that accompanies the lowering of body temperature. (NWS Glossary)

I

Image (mirror image): Of the two positions associated with a single satellite pass, the one from which a signal is not emanating. (Cospas-Sarsat)

Improvised Nuclear Device (IND): An illicit nuclear weapon that is bought, stolen, or otherwise obtained from a nuclear State, or a weapon fabricated by a terrorist group from illegally obtained fissile nuclear weapons material and produces a nuclear explosion. (DHS RDD/IND)

Incident: (1) An occurrence or event, natural or human-caused, that requires an emergency response to protect life or property. Incidents can, for example, include major disasters, emergencies, terrorist attacks, terrorist threats, wildland and urban fires, floods, hazardous materials spills, nuclear accidents, aircraft accidents, earthquakes, hurricanes, tornadoes, tropical storms, war-related disasters, public health and medical emergencies, and other occurrences requiring an emergency response. (FEMA NIMS); (2) A SAR case involving investigation and telephone communications searches; generally associated with the Uncertainty Phase of a search.

Incident Action Plan (IAP): An oral or written plan containing general objectives reflecting the overall strategy for managing an incident. It may include the identification of operational important information for management of the incident during one or more operational periods, resources and assignments. It may also include attachments that provide direction and important information for management of the incident during one or more operational periods. (FEMA NIMS)

Incident Air Speed: The aircraft speed shown on the air speed indicator gauge. IAS corrected for instrument effort and atmospheric density equals true air speed. (IAMSAR)

Incident Annex: Incident Annexes describe coordinating structures, in addition to the ESFs, that may be used to deliver core capabilities and support response missions that are unique to a specific type of incident. Incident annexes also describe specialized response teams and resources, incident-specific roles and responsibilities, and other scenario-specific considerations. NRF Incident Annexes address the following contingencies or hazards: Biological Incident; Catastrophic Incident; Cyber Incident; Food and Agriculture Incident; Mass Evacuation Incident; Nuclear/ Radiological Incident; and Terrorism Incident Law Enforcement and Investigation. (NRF)

Incident Command: The Incident Command System organizational element responsible for overall management of the incident and consisting of the Incident Commander (either single or unified command structure) and any assigned supporting staff. (FEMA NIMS)

Incident Command Post (ICP): The field location where the primary functions are performed. The ICP may be co-located with the Incident Base or other incident facilities. (FEMA NIMS)

Incident Command System (ICS): A standardized on-scene emergency management construct specifically designed to provide for the adoption of an integrated organizational structure that reflects the complexity and demands of single or multiple incidents, without being hindered by jurisdictional boundaries. ICS is the combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure, designed to aid in the management of resources during incidents. It is used for all kinds of emergencies and is applicable to small as well as large and complex incidents. ICS is used by various jurisdictions and functional agencies, both public and private, to organize field-level incident management operations. (FEMA NIMS)

Incident Commander (IC): The individual responsible for all incident activities, including the development of strategies and tactics and the ordering and release of resources. The IC has overall authority and responsibility for conducting incident operations and is responsible for the management of all incident operations at the incident site. (FEMA NIMS)

Incident Management: The broad spectrum of activities and organizations providing effective and efficient operations, coordination, and support applied at all levels of government, utilizing both governmental and nongovernmental resources to plan for, respond to, and recover from an incident, regardless of cause, size, or complexity. (FEMA NIMS)

Incident Management Assistance Team (IMAT): An interagency national- or regional-based team composed of subject-matter experts and incident management professionals from multiple Federal departments and agencies.

Incident Management Team (IMT): An Incident Commander and the appropriate Command and General Staff personnel assigned to an incident. The level of training and experience of the IMT members, coupled with the identified formal response requirements and responsibilities of the IMT, are factors in determining “type,” or level, of IMT. (FEMA NIMS)

Incident Objectives: Statements of guidance and direction needed to select appropriate strategy(s) and the tactical direction of resources. Incident objectives are based on realistic expectations of what can be accomplished when all allocated resources have been effectively deployed. Incident objectives must be achievable and measurable, yet flexible enough to allow strategic and tactical alternatives. (FEMA NIMS)

Initial Action Stage: A period during which preliminary action is taken to alert SAR facilities and obtain amplifying information. (IAMSAR)

Initial Planning Point (IPP): The point that is initially used to plan the search incident. The IPP may be the original Point Last Seen (PLS) or the Last Known Position (LKP).The IPP may also be a point entirely separate based on the best available investigative information. IPP does not move after planning begins.

Initial Reflex Search: See **Hasty Search**.

Instrument Flight Rules (IFR): (1) Rules governing the procedures for conducting instrument flight. Also a term used by pilots and controllers to indicate type of flight plan. (FAA AIM); (2) ICAO: A set of rules governing the conduct of flight under instrument meteorological conditions. (FAA AIM)

Instrument Meteorological Conditions (IMC): (1) Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling less than minima specified for visual meteorological conditions. (IAMSAR); (2) Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling less than the minima specified for visual meteorological conditions. (FEMA AIM)

Insular Area: Means any of the following: American Samoa, the Federated States of Micronesia, the Marshall Islands, the Trust Territory of the Pacific Islands, and the Virgin Islands. (42 U.S.C. § 5204)

Intelligence/Investigations: An organizational subset within ICS. Intelligence gathered within the Intelligence/Investigations function is information that either leads to the detection, prevention, apprehension, and prosecution of criminal activities—or the individual(s) involved—including terrorist incidents or information that leads to determination of the cause of a given incident (regardless of the source) such as public health events or fires with unknown origins. This is different from the normal operational and situational intelligence gathered and reported by the Planning Section. (FEMA NIMS)

International Civil Aviation Organization (ICAO): A specialized agency of the United Nations whose objective is to develop the principles and techniques of international air navigation and to foster planning and development of international civil air transport. (FAA AIM)

Inundation: The process of covering normally dry areas with flood waters. (NWS Glossary)

Investigation: The systematic inquiry and examination of all aspects and information surrounding a SAR case; includes all activities outside of the active field search for clues and for the search object.

Isolated Person: In an ESF #9 incident, any non-distressed person or persons stranded within a specific area or residence by incident conditions where immediate assistance is determined not to be required.

J

Joint Field Office (JFO): The primary Federal incident management field structure. The JFO is a temporary Federal facility that provides a central location for the coordination of Federal, State, tribal, and local governments and private-sector and nongovernmental organizations with primary responsibility for response and recovery. The JFO structure is organized, staffed, and managed in a manner consistent with National Incident Management System principles. Although the JFO uses an Incident Command System structure, the JFO does not manage on-scene operations. Instead, the JFO focuses on providing support to on-scene efforts and conducting broader support operations that may extend beyond the incident site. (FEMA NIMS)

Joint Information Center (JIC): A facility established to coordinate all incident-related public information activities. It is the central point of contact for all news media. Public information officials from all participating agencies should co-locate at the JIC. (FEMA NIMS)

Joint Information System (JIS): Integrates incident information and public affairs into a cohesive organization designed to provide consistent, coordinated, timely information during crisis or incident operations. The mission of the JIS is to provide a structure and system for developing and delivering coordinated interagency messages; developing, recommending, and executing public information plans and strategies on behalf of the Incident Commander; advising the Incident Commander concerning public affairs issues that could affect a response effort; and controlling rumors and inaccurate information that could undermine public confidence in the emergency response effort. (FEMA NIMS)

Joint Rescue Coordination Center (JRCC): A rescue coordination center responsible for both aeronautical and maritime search and rescue incidents. (IAMSAR)

Jurisdiction: A range or sphere of authority. Public agencies have jurisdiction at an incident related to their legal responsibilities and authority. Jurisdictional authority at an incident can be political or geographical (e.g., Federal, State, tribal, and local boundary lines) or functional (e.g., law enforcement, public health). (FEMA NIMS)

K

knot (kt): A unit of speed equal to one nautical mile per hour. (IAMSAR)

L

Leader: The ICS title for an individual responsible for a Task Force, Strike Team, or functional unit. (FEMA NIMS)

Landfall: The intersection of the surface center of a tropical cyclone with a coastline. Because the strongest winds in a tropical cyclone are not located precisely at the center, it is possible for a cyclone's strongest winds to be experienced over land even if landfall does not occur. Similarly, it is possible for a tropical cyclone to make landfall and have its strongest winds remain over the water. Compare direct hit, indirect hit, and strike. (NWS Glossary)

Last Known Position (LKP): (1) It is the last substantiated position based on clues or evidence belonging to the missing subject and indicating that the missing subject was known to be at that location. (2) Last witnessed, reported, or computed position of a distress craft. (IAMSAR)

Lateral Range Curve: Graph of the probability of detection as a function of lateral range.

Leeway (LW): The movement of a search object through the water caused by winds blowing against exposed surfaces. (IAMSAR)

Leeway Error (LW_e): The probable error of the leeway estimate. (IAMSAR)

Lilly Pad: A lily pad is an interim stopping point during rescue operations where survivors can be accounted for, possibly have initial basic needs cared for, and from which they can be transported to a place of safety.

Liquefaction: A process by which water-saturated sediment temporarily loses strength and acts as a fluid, like when you wiggle your toes in the wet sand near the water at the beach. This effect can be caused by earthquake shaking. (USGS Glossary)

Livestock (Farm Animals): Livestock refers to horses, mares, mules, jacks, jennies, colts, cows, calves, yearlings, bulls, oxen, sheep, goats, lambs, kids, hogs, shoats and pigs. Mainly provide food for human or animal consumption.

Local Government: Any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under State law), regional or interstate government entity, or agency or instrumentality of a local government; any Indian tribe or authorized tribal organization, or Alaska Native village or organization; and any rural community, unincorporated town or village, or other public entity. (44 C.F.R. § 201.2; Stafford Act)

Local User Terminal (LUT): An earth receiving station, part of the Cospas-Sarsat Ground Segment, established to receive signals relayed by the satellites and process them to determine radiobeacon location. (Cospas-Sarsat)

Location: Exact geographical position of a beacon or other search object. (Cospas-Sarsat)

Locating: The finding of ships, aircraft, units, or persons in distress. (IAMSAR)

Logistics Section: (1) Incident Command: Section responsible for providing facilities, services, and material support for the incident. (FEMA NIMS)

Low Earth Orbit Local User Terminal (LEOLUT): A ground receiving station that detects, processes, and recovers the coded transmissions of 406 MHz distress beacons from Low Earth Orbit Search and Rescue (LEOSAR) satellites, and relays the appropriate information to a Mission Control Center. (Cospas-Sarsat)

M

Major Disaster: any natural catastrophe (including any hurricane, tornado, storm, high water, wind driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, or drought), or, regardless of cause, any fire, flood, or explosion, in any part of the United States, which in the determination of the President causes damage of sufficient severity and magnitude to warrant major disaster assistance under this Act to supplement the efforts and available resources of States, local governments, and disaster relief organizations in alleviating the damage, loss, hardship, or suffering caused thereby. (Stafford Act)

Major Hurricane: A hurricane which reaches Category 3 (sustained winds greater than 110 mph) on the Saffir/Simpson Hurricane Scale. (NWS Glossary)

Manager: Individual within an Incident Command System organizational unit who is assigned specific managerial responsibilities (e.g., Staging Area Manager or Camp Manager). (FEMA NIMS)

Mass Rescue Operations (MRO): Search and rescue services characterized by the need for immediate response to large numbers of persons in distress, such that the capabilities normally available to search and rescue authorities are inadequate. (IAMSAR)

MAYDAY: The international radiotelephony distress signal, repeated three times. (IAMSAR)

MEDEVAC: Evacuation of a person for medical reasons. (IAMSAR)

MEDICO: Medical Advice. Exchange of medical information and recommended treatment for sick or injured persons where treatment cannot be administered directly by prescribing medical personnel. (IAMSAR)

Medium Earth Orbit Local User Terminal (MEOLUT): A ground receiving station that detects, processes, and recovers the coded transmissions of 406 MHz distress beacons from Medium Earth Orbiting Search and Rescue (MEOSAR) satellites, and relays the appropriate information to a Mission Control Center. (Cospas-Sarsat)

Merge: Process of developing composite solutions by combining matched single pass (elemental) solutions. (Cospas-Sarsat)

Meteorological Visibility: The maximum range at which a large object, such as landmasses or mountains, can be seen. Also referred to as Meteorological Range. (IAMSAR)

Mission: A SAR case in which facilities have been committed to actively search; generally associated with the Distress Phase of a search.

Mission Assignment (MA): The mechanism used to support Federal operations in a Stafford Act major disaster or emergency declaration. It orders immediate, short-term emergency response assistance when an applicable State or local government is overwhelmed by the event and lacks the capability to perform, or contract for, the necessary work. (FEMA IMH)

Mission Control Center (MCC): (1) Part of the Cospas-Sarsat system that accepts alert messages from the local user terminal(s) and other mission control centers to distribute to the appropriate rescue coordination center or other search and rescue points of contact. (IAMSAR); (2) Ground system element of Cospas-Sarsat which receives data from Local User Terminals, exchanges information with other Mission Control Centers, and distributes alerts and other Cospas-Sarsat information primarily within its associated service area. (Cospas-Sarsat)

Mitigation: Activities providing a critical foundation in the effort to reduce the loss of life and property from natural and/or manmade disasters by avoiding or lessening the impact of a disaster and providing value to the public by creating safer communities. Mitigation seeks to fix the cycle of disaster damage, reconstruction, and repeated damage. These activities or actions, in most cases, will have a long-term sustained effect. (FEMA NIMS)

Mobilization: The process and procedures used by all organizations-Federal, State, tribal, and local-for activating, assembling, and transporting all resources that have been requested to respond to or support an incident. (FEMA NIMS)

Mobilization Guide: Reference document used by organizations outlining agreements, processes, and procedures used by all participating agencies/organizations for activating, assembling, and transporting resources. (FEMA NIMS)

Multiagency Coordination (MAC) Group: A group of administrators or executives, or their appointed representatives, who are typically authorized to commit agency resources and funds. A MAC Group can provide coordinated decision making and resource allocation among cooperating agencies, and may establish the priorities among incidents, harmonize agency policies, and provide strategic guidance and direction to support incident management activities. MAC Groups may also be known as multiagency committees, emergency management committees, or as otherwise defined by the Multiagency Coordination System. (FEMA NIMS)

Multiagency Coordination System (MAC): A system that provides the architecture to support coordination for incident prioritization, critical resource allocation, communications systems integration, and information coordination. MACS assist agencies and organizations responding to an incident. The elements of a MACS include facilities, equipment, personnel, procedures, and communications. Two of the most commonly used elements are Emergency Operations Centers and MAC Groups. (FEMA NIMS)

Multijurisdictional Incident: An incident requiring action from multiple agencies that each have jurisdiction to manage certain aspects of an incident. In the Incident Command System, these incidents will be managed under a Unified Command. (FEMA NIMS)

Mutual Aid Agreement or Assistance Agreement: Written or oral agreement between and among agencies/ organizations and/or jurisdictions that provides a mechanism to quickly obtain emergency assistance in the form of personnel, equipment, materials, and other associated services. The primary objective is to facilitate rapid, short-term deployment of emergency support prior to, during, and/or after an incident. (FEMA NIMS)

N

National Airspace System: The common network of U.S. airspace – air navigation facilities, equipment, and services; airports or landing areas; aeronautical charts, information and services; rules, regulations, and procedures; technical information; and manpower and material. Included are system components shared jointly with the military. (FAA AIM)

National Essential Functions: A subset of government functions that are necessary to lead and sustain the Nation during a catastrophic emergency and that, therefore, must be supported through continuity of operations and continuity of government capabilities. (FEMA NIMS)

National Incident Management System (NIMS): A set of principles that provides a systematic, proactive approach guiding government agencies at all levels, nongovernmental organizations, and the private sector to work seamlessly to prevent, protect against, respond to, recover from, and mitigate the effects of incidents, regardless of cause, size, location, or complexity, in order to reduce the loss of life or property and harm to the environment. (FEMA NIMS)

National Response Framework (NRF): Guides how the Nation conducts all-hazards response. The Framework documents the key response principles, roles, and structures that organize national response. It describes how communities, States, the Federal Government, and private-sector and nongovernmental partners apply these principles for a coordinated, effective national response. And it describes special circumstances where the Federal Government exercises a larger role, including incidents where Federal interests are involved and catastrophic incidents where a State would require significant support. It allows first responders, decision makers, and supporting entities to provide a unified national response. (FEMA Glossary)

National Search and Rescue Committee (NSARC): Federal committee comprised of the Departments of Homeland Security, Defense, State, Transportation, Interior, and Commerce, the Federal Communications Commission, National Aeronautics and Space Administration. Established to oversee the National Search and Rescue Plan and act as a coordinating forum for national search and rescue matters.

National Search and Rescue Plan (NSP): An interagency agreement providing national arrangements for coordination of search and rescue services to meet domestic needs and international commitments.

National Special Security Event (NSSE): A designated event that, by virtue of its political, economic, social, or religious significance, may be the target of terrorism or other criminal activity. (JP 3-28)

National Track Analysis Program (NTAP): An FAA system for retrieval of computer-stored radar data to locate a missing aircraft's last position.

National Urban Search and Rescue Response System: Specialized teams that locate, rescue (extricate), and provide initial medical stabilization of victims trapped in confined spaces.

National Wildfire Coordinating Group (NWCG): A group formed under the direction of the Secretaries of the Interior and Agriculture to improve the coordination and effectiveness of wildland fire activities and provide a forum to discuss, recommend appropriate action, or resolve issues and problems of substantive nature. (NWCG Glossary)

Natural Disaster*:* Any hurricane, tornado, storm, flood, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, drought, fire, or other catastrophe in any part of the U.S. which causes, or which may cause, substantial damage or injury to civilian property or persons. (42 USC 5195)

Nerve Agent: A potentially lethal chemical agent which interferes with the transmission of nerve impulses. (JP 1-02)

Nongovernmental Organization (NGO): An entity with an association that is based on interests of its members, individuals, or institutions. It is not created by a government, but it may work cooperatively with government. Such organizations serve a public purpose, not a private benefit. Examples of NGOs include faith-based charity organizations and the American Red Cross. NGOs, including voluntary and faith-based groups, provide relief services to sustain life, reduce physical and emotional distress, and promote the recovery of disaster victims. Often these groups provide specialized services that help individuals with disabilities. NGOs and voluntary organizations play a major role in assisting emergency managers before, during, and after an emergency. (FEMA NIMS)

Notice to Airmen (NOTAM): Time-critical aeronautical information which is of either a temporary nature or not sufficiently known in advance to permit publication on aeronautical charts or in other operational publications receives immediate dissemination via the National NOTAM System. (FAA AIM)

Nuclear Detonation: A nuclear explosion resulting from fission or fusion reactions in nuclear materials, such as from a nuclear weapon. (DoD NARP)

Nuclear Radiation: Particulate and electromagnetic radiation emitted from atomic nuclei in various nuclear processes. The important nuclear radiations, from the weapons effects standpoint, are alpha and beta particles, gamma rays, and neutrons. (DoD NARP)

O

Officer: The Incident Command System title for a person responsible for one of the Command Staff positions of Safety, Liaison, and Public Information. (NIMS)

On Scene: The search area or the actual distress site. (IAMSAR)

On Scene Coordinator (OSC): A person designated to coordinate search and rescue operations within a specified search area. (IAMSAR)

On Scene Endurance: The amount of time a facility is capable of spending at the scene engaged in search and rescue activities. (IAMSAR)

Operational Period: The time scheduled for executing a given set of operation actions, as specified in the Incident Action Plan. Operational periods can be of various lengths, although usually they last 12 to 24 hours. (FEMA NIMS)

Operations Section: (1) The Incident Command System (ICS) Section responsible for all tactical incident operations and implementation of the Incident Action Plan. In ICS, the Operations Section normally includes subordinate Branches, Divisions, and/or Groups. (FEMA NIMS)

Operations Stage: A period during a SAR incident when SAR facilities proceed to the scene, conduct search, rescue survivors, assist distressed craft, provide emergency care for survivors, and deliver survivors to a suitable facility. (IAMSAR)

Optimal Search Area: The search area which will produce the highest probability of success when searched uniformly with the search effort available. (IAMSAR)

Optimal Search Factor (f_s): A value, based on the amount of relative effort available, which is used to estimate the optimal area to search so the chances of finding the search object are maximized. See *Optimal Search Area*. (IAMSAR)

Optimal Search Plan: A plan that maximizes the probability of success of finding the search object using the available search effort. (IAMSAR)

Optimal Search Radius: One-half the width of the optimal search area. Optimal search radius is computed as the product of the total probable error of position (E) and the optimal search factor (f_s). Ro = E X f_s. (IAMSAR)

Overdue: A situation where a craft (or search object) has failed to arrive at its intended destination when expected and remains missing. (IAMSAR)

Overlap Zone: Area of predetermined width common to two or more service areas. (Cospas-Sarsat)

P

PAN-PAN: The international radiotelephony urgency signal. When repeated three times, indicates uncertainty or alert, followed by nature of urgency. (IAMSAR)

Person in Distress: There is reasonable certainty that a person is threatened by grave and imminent danger and requires immediate assistance.

Personal Locator Beacon (PLB): Personal radio distress beacon for alerting and transmitting homing signals. (IAMSAR)

Personal Protective Equipment: Includes all clothing and other work accessories designed to create a barrier against hazards. Examples include safety goggles, blast shields, hard hats, hearing protectors, gloves, respirator, aprons, and work boots. (NSS PGRND)

Place of Safety: Location where rescue operations are considered to terminate; where the survivors' safety of life is no longer threatened and where their basic human needs (such as food, shelter and medical needs) can be met; and, a place from which transportation arrangements can be made for the survivors' next or final destination. A place of safety may be on land, or it may be aboard a rescue unit or other suitable vessel or facility at sea that can serve as a place of safety until the survivors are disembarked to their next destination. (IAMSAR)

Planning Section: (1) Responsible for the collection, evaluation, and dissemination of information related to the incident, and for the preparation and documentation of Incident Action Plans. The Section also maintains information on the current and forecasted situation, and on the status of resources assigned to the incident. Includes the Situation, Resources, Documentation, and Demobilization Units, as well as Technical Specialists. (FEMA NIMS)

Planning Stage: A period during a SAR incident when an effective plan of operations is developed. (IAMSAR)

Point Last Seen (PLS): It is the point where the search object was last seen by a witness, or captured on video at a specific time and location.

Position (location): A geographical location normally expressed in degrees and minutes of latitude and longitude (Note: in the U.S.: can be expressed in U.S. National Grid Coordinates). (IAMSAR)

***Posse Comitatus*:** Prohibits search, seizure, or arrest powers to US military personnel. Amended in 1981 under Public Law 97-86 to permit increased

Department of Defense support of drug interdiction and other law enforcement activities (18 U.S.C. 1385). (JP 1-02)

Possibility Area: (1) The smallest area containing all possible survivor or search object locations. (2) For a scenario, the possibility area is the smallest area containing all possible survivor or search object locations that are consistent with the facts and assumptions used to form the scenario. (IAMSAR)

Preliminary Communication (PRECOM) search: Initial limited communications check, normally directed by the SMC during the Uncertainty phase, of areas where the missing persons may be.

pre-plan: Guidelines and current information established before a search that allow a quick, effective response, allow strategic decisions to be made outside the heat of the moment, and allow flexibility within a well thought-out boundary of reasonable actions. Decisions specific to a particular search, including tactical operations, should be contained in a search action plan or incident action plan, as opposed to a search pre-plan.

Pre-Scripted Mission Assignment (PSMA): A mechanism used by the Federal Government to facilitate rapid Federal resource response. Pre-scripted mission assignments identify resources or capabilities that Federal departments and agencies, through various Emergency Support Functions (ESFs), are commonly called upon to provide during incident response. Pre-scripted mission assignments allow primary and supporting ESF agencies to organize resources that will be deployed during incident response.

Preparedness: A continuous cycle of planning, organizing, training, equipping, exercising, evaluating, and taking corrective action in an effort to ensure effective coordination during incident response. Within the *National Incident Management System*, preparedness focuses on the following elements: planning; procedures and protocols; training and exercises; personnel qualification and certification; and equipment certification. (FEMA NIMS)

Prevention: Actions to avoid an incident or to intervene to stop an incident from occurring. Prevention involves actions to protect lives and property. It involves applying intelligence and other information to a range of activities that may include such countermeasures as deterrence operations; heightened inspections; improved surveillance and security operations; investigations to determine the full nature and source of the threat; public health and agricultural surveillance and testing processes; immunizations, isolation, or quarantine; and, as appropriate, specific law enforcement operations aimed at deterring, preempting, interdicting, or disrupting illegal activity and apprehending potential perpetrators and bringing them to justice. (FEMA NIMS)

Primary Agency: See Emergency Support Function (ESF) Primary Agency.

Primary Mission Essential Functions: Government functions that must be performed in order to support or implement the performance of National Essential Functions before, during, and in the aftermath of an emergency. (FEMA Glossary)

Primary Rescue Coordination Center (RCC): Rescue Coordination Center with an associated Search and Rescue Region into which a position falls. (Cospas-Sarsat)

Principal Federal Official (PFO): The federal official designated by the Secretary of Homeland Security to act as his/her representative locally to oversee, coordinate, and execute the Secretary's incident management responsibilities under Homeland Security Presidential Directive 5 for incidents of national significance. (JP 3-28)

Private Sector: Organizations and individuals that are not part of any governmental structure. The private sector includes for-profit and not-for-profit organizations, formal and informal structures, commerce, and industry. (FEMA NIMS)

Probability Along Track (P_T): The likelihood the missing craft is located between the last known position and the given percentage of the distance of the intended or expected route of flight; based on ASAD statistical data and assumes the entire length of the route of flight from last known position to intended destination, not just the portion being searched.

Probability Density (pDen): Probability of containment per unit area; often POC/mi^2. pDen is constant throughout any given region.

Probability Map: A set of grid cells covering a scenario's possibility area where each grid cell is labeled with the probability of the search object being in that grid cell. That is, each grid cell is labeled with its own POC value. (IAMSAR)

Probability of Area (POA): See probability of containment (POC). *(Note: POA and POC are synonymous.)*

Probability of Containment (POC): The probability that the search object is contained within the boundaries of an area, sub-area, or grid cell. (IAMSAR)

Probability of Detection (POD): The probability of the search object being detected, assuming it was in the areas that were searched. POD is a function of coverage factor, sensor, search conditions and the accuracy with which the search unit navigates its assigned search pattern. Measures sensor effectiveness under the prevailing search conditions. (IAMSAR)

Probability of Offset (P_o): The likelihood the missing aircraft is located within the given offset distance from the centerline of the intended or expected track or route of flight; based on ASAD statistical data and assumes equal likelihood left and right of track centerline.

Probability of Success (POS): The probability of finding the search object with a particular search. For each sub-area searched, POS = POC x POD. Measures search effectiveness. (IAMSAR)

Protection: The capabilities necessary to secure the homeland against acts of terrorism and manmade or natural disasters. (NRF)

Protective Action Guide (PAG): (1) The projected dose to a reference individual, from an accidental or deliberate release of radioactive material at which a specific protective action to reduce or avoid that dose is recommended. (DHS RDD/IND); (2) A guide that tells state and local authorities at what projected dose they should take action to protect people from exposure to unplanned releases of radioactive material into the environment. (CDC Radiation Dictionary)

Public Information: Processes, procedures, and systems for communicating timely, accurate, and accessible information on an incident's cause, size, and current situation; resources committed; and other matters of general interest to the public, responders, and additional stakeholders (both directly affected and indirectly affected). (FEMA NIMS)

Public Information Officer: A member of the Command Staff responsible for interfacing with the public and media or with other agencies with incident-related information requirements. (FEMA NIMS)

R

Rad (radiation absorbed dose): A basic unit of absorbed radiation dose. It is a measure of the amount of energy absorbed by the body. The rad is the traditional unit of absorbed dose. It is being replaced by the unit gray (Gy), which is equivalent to 100 rad. One rad equals the dose delivered to an object of 100 ergs of energy per gram of material. (CDC Radiation Dictionary)

Radiation: Energy moving in the form of particles or waves. Familiar radiations are heat, light, radio waves, and microwaves. Ionizing radiation is a very high-energy form of electromagnetic radiation. (CDC Radiation Dictionary)

Radiation Absorbed Dose (rad): A unit expressing the absorbed dose of ionizing radiation. Absorbed dose is the energy deposited per unit mass of matter. The units of rad and gray are the units in two different systems for expressing absorbed dose. 1 rad = 0.01 gray (Gy); 1 Gy = 100 rad. (NSS PGRND)

Radioactive Contamination: the deposition of unwanted radioactive material on the surfaces of structures, areas, objects, or people. It can be airborne, external, or internal. (CDC Radiation Dictionary)

Radiological Incident: An event or series of events, deliberate or accidental, leading to the release, or potential release, in to the environment of radioactive material in sufficient quantity to warrant consideration of protective actions. Use of an RDD or IND is an act of terror that results in a radiological incident. (DHS RDD/IND)

Radiological Dispersal Device (RDD): Any device that causes the purposeful dissemination of radioactive material, across an area with the intent to cause harm, without a nuclear detonation occurring. (DHS RDD/IND)

Ramp Check: Telephone call requesting the responsible agency at an airport physically check the field and hangars for a specific aircraft being sought.

Recovery: The development, coordination, and execution of service- and site-restoration plans; the reconstitution of government operations and services; individual, private-sector, nongovernmental, and public-assistance programs to provide housing and to promote restoration; long-term care and treatment of affected persons; additional measures for social, political, environmental, and economic restoration; evaluation of the incident to identify lessons learned; post incident reporting; and development of initiatives to mitigate the effects of future incidents. (FEMA NIMS)

Region: A delineated portion or subset of the search area within which there is a nearly uniform distribution of likelihood for containing the missing object; that is, the missing object is equally likely to be at any point in a given region, although different regions may have different likelihoods of containment. Thus, probability density (pDen) is constant within any given region. Regions and region boundaries are based solely on the factors that affect the location and POC of the missing object; factors affecting searchers are considered in defining segments, not regions. Often, regions are further subdivided into segments in order to be effectively searched. Region boundaries should be distinguishable by searchers (e.g., stream, drainage, ridge, natural geographical feature, etc.). See also **Segment**.

Region POC: The probability of containment of an individual region; often determined by a consensus of the on-scene leadership team.

Regional Response Coordination Center (RRCC): Located in each Federal Emergency Management Agency (FEMA) region, these multiagency agency coordination centers are staffed by Emergency Support Functions in anticipation of a serious incident in the region or immediately following an incident. Operating under the direction of the FEMA Regional Administrator, the RRCCs coordinate Federal regional response efforts and maintain connectivity with State emergency operations centers, State fusion centers, Federal Executive Boards, and other Federal and State operations and coordination centers that have potential to contribute to development of situational awareness.

Relative Effort (Z_r): The amount of available search effort (Z) divided by the effort factor. The relative effort relates the size of the effort available for a particular search to the size of the search object's location probability distribution at the time of the search. $Z_r = Z/f_z$. (IAMSAR)

Rem: A unit of absorbed dose that accounts for the relative biological effectiveness of ionizing radiations in tissue (also called equivalent dose). Not all radiation produces the same biological effect, even from the same amount of absorbed dose; rem relates the absorbed dose in human tissue to the effective biological damage of the radiation. The units of rem and Sievert are the units in two different systems of expressing equivalent dose. 1 rem = 0.01 Sieverts (Sv); 1 Sv = 100 rem. (NSS PGRND)

Rescue: An operation to retrieve persons in distress, provide for their initial medical or other needs, and deliver them to a place of safety. (IAMSAR)

Rescue Coordination Center (RCC): A unit responsible for promoting efficient organization of search and rescue services and for coordinating the conduct of search and rescue operations within a search and rescue region. (IAMSAR)

Rescue Coordination Center (RCC) Controller: The SAR mission coordinator's duty officer in the RCC.

Rescue Sub-Center (RSC): A unit subordinate to a Rescue Coordination Center, established to complement the latter according to particular provisions of the responsible authorities. (IAMSAR)

Responder: A person designated by a responsible authority, that is trained, equipped, and qualified in a position to perform a specific task.

Response: Activities that address the short-term, direct effects of an incident. Response includes immediate actions to save lives, protect property, and meet basic human needs. Response also includes the execution of emergency operations plans and of mitigation activities designed to limit the loss of life, personal injury, property damage, and other unfavorable outcomes. As indicated by the situation, response activities include applying intelligence and other information to lessen the effects or consequences of an incident; increased security operations; continuing investigations into nature and source of the threat; ongoing public health and agricultural surveillance and testing processes; immunizations, isolation, or quarantine; and specific law enforcement operations aimed at preempting, interdicting, or disrupting illegal activity, and apprehending actual perpetrators and bringing them to justice. (FEMA NIMS)

Responsible Authority: The government agency or agencies who have legal responsibility for finding missing persons and have jurisdiction over the area where the person becomes missing.

Richter scale: The Richter magnitude scale was developed in 1935 by Charles F. Richter of the California Institute of Technology as a mathematical device to compare the size of earthquakes. The magnitude of an earthquake is determined from the logarithm of the amplitude of waves recorded by seismographs. Adjustments are included for the variation in the distance between the various seismographs and the epicenter of the earthquakes. On the Richter scale, magnitude is expressed in whole numbers and decimal fractions. For example, a magnitude 5.3 might be computed for a moderate earthquake, and a strong earthquake might be rated as magnitude 6.3. Because of the logarithmic basis of the scale, each whole number increase in magnitude represents a tenfold increase in measured amplitude; as an estimate of energy, each whole number step in the magnitude scale corresponds to the release of about 31 times more energy than the amount associated with the preceding whole number value. (USGS Glossary)

Robert T. Stafford Disaster Relief and Emergency Assistance Act ("Stafford Act"; PL 100-707): Stafford Act was signed into law November 23, 1988; amended the Disaster Relief Act of 1974, PL 93-288. This Act describes the programs and processes by which the Federal Government provides disaster and emergency assistance to State and local governments, tribal nations, eligible private nonprofit organizations, and individuals affected by a declared major disaster or emergency. The Stafford Act covers all hazards, including natural disasters and terrorist events.

Roentgen (R): A unit of exposure to x-rays or gamma rays. One roentgen is the amount of gamma or x-rays needed to produce ions carrying 1 electrostatic unit of electrical charge in 1 cubic centimeter of dry air under standard conditions. (CDC Radiation Dictionary)

S

Safety Officer: A member of the Command Staff responsible for monitoring incident operations and advising the Incident Commander on all matters relating to operational safety, including the health and safety of emergency responder personnel. (FEMA NIMS)

Saffir-Simpson Hurricane Wind Scale: The Saffir-Simpson Hurricane Wind Scale is a 1 to 5 categorization based on the hurricane's intensity at the indicated time. The scale provides examples of the type of damage and impacts in the United States associated with winds of the indicated intensity. In general, damage rises by about a factor of four for every category increase. The maximum sustained surface wind speed (peak 1-minute wind at the standard meteorological observation height of 10 m [33 ft] over unobstructed exposure) associated with the cyclone is the determining factor in the scale. The scale does not address the potential for other hurricane-related impacts, such as storm surge, rainfall-induced floods, and tornadoes. (NWS Glossary)

Sea: Condition of the surface resulting from waves and swells. (IAMSAR)

Sea Current (*SC*): The residual current when currents caused by tides and local winds are subtracted from local current. It is main, large-scale flow of ocean waters. (IAMSAR)

Sea Current Error (SC_e): The probable error of the sea current estimate. (IAMSAR)

Search: An operation, normally coordinated by a rescue coordination center or rescue sub-center using available personnel and facilities to locate persons in distress (IAMSAR). *Note: in the U.S., a search can also be coordinated through the Incident Command System*.

Search Action Plan: Message, normally developed by the Search and Rescue Mission Coordinator, for passing instructions to search and rescue facilities and agencies participating in a search and rescue mission. (IAMSAR)

Search and Rescue Case: Any potential or actual distress about which a facility opens a documentary file, whether or not SAR resources are dispatched. (IAMSAR)

Search and Rescue Coordinator (SC): One or more persons or agencies within an Administration with overall responsibility for establishing and providing SAR services, and ensuring that planning for those services is properly coordinated. (IAMSAR)

Search and Rescue Facility: (1) Any mobile resource, including designated search and rescue units, used to conduct search and rescue operations. (IAMSAR)

Search and Rescue Incident: Any situation requiring notification and alerting of the search and rescue system and which may require search and rescue operations. (IAMSAR)

Search and Rescue Mission: Any SAR situation involving dispatch of SAR resources.

Search and Rescue Mission Coordinator (SMC): The official temporarily assigned to coordinate response to an actual or apparent distress situation. (IAMSAR)

Search and Rescue Plan: A general term used to describe documents which exist at all levels of the national and international SAR structure to describe goals, arrangements, and procedures which support the provision of SAR services. (IAMSAR)

Search and Rescue Point of Contact (SPOC): Rescue Coordination Centers and other established and recognized national points of contact which can accept responsibility to receive Cospas-Sarsat alert data to enable the rescue of persons in distress. (IAMSAR; Cospas-Sarsat)

Search and Rescue Region (SRR): An area of defined dimensions, associated with a rescue coordination center, within which search and rescue services are provided. (IAMSAR)

Search and Rescue Service: The performance of distress monitoring, communication, coordination, and search and rescue functions, including provision of medical advice, initial medical assistance, or medical evacuation, through the use of public and private resources, including cooperating aircraft, vessels, and other craft installations. (IAMSAR)

Search and Rescue Stage: Typical steps in the orderly progression of search and rescue missions. These are normally Awareness, Initial Action, Planning, Operations, and Mission Conclusion. (IAMSAR)

Search and Rescue Sub-Region (SRS): A specified area within a search and rescue region associated with a rescue sub-center. (IAMSAR)

Search and Rescue Unit (SRU): A unit composed of trained personnel and provided with equipment suitable for the expeditious conduct of SAR operations. (IAMSAR)

Search Area: The area, determined by the search planner that is to be searched. This area may be sub-divided into search sub-areas for the purpose of assigning specific responsibilities to the available search facilities. (IAMSAR)

Search Effort (Z): A measure of the [effective] area a search facility can effectively search within the limits of search speed, endurance, and sweep width. Search effort is computed as the product of search speed (V), search endurance (T), and sweep width (W). Z = (V) X (T) X (W). (IAMSAR)

Search Endurance (T): The amount of "productive" search time available at the scene. This figure is usually taken to be 85% of the on scene endurance, leaving a 15% allowance for investigating sightings and navigating turns at the ends of search legs. (IAMSAR)

Search Facility Position Error (*Y*): Probable error in a search craft's position, based on its navigation capabilities. (IAMSAR)

Search Object: A ship, aircraft, person or other craft missing or survivors or related search objects or evidence for which a search is being conducted. (IAMSAR)

Search Pattern: A trackline or procedure assigned to a search and rescue unit for searching a specified area. (IAMSAR)

Search Radius: The actual search radius used to plan the search and to assign search facilities. It is usually based on adjustments to the optimal search radius that are needed for operational reasons. (IAMSAR)

Search Speed (*V*): The speed (or velocity) with which a search facility moves over the ground when searching. (IAMSAR)

Search Sub-Area: A designated area to be searched by a specific assigned search facility or possibly two facilities working together in close coordination. (IAMSAR)

Search Subject: The person being searched for, commonly referred to as the "Subject". Searches focusing primarily on the discovery of objects as opposed to person, e.g. aircraft or vessels, commonly utilize the term "search object."

Secondary RCC: Rescue Coordination Center other than a Primary RCC receiving a copy of an alert. (Cospas-Sarsat)

Secretary of Homeland Security: Principal Federal official for domestic incident management. The Secretary coordinates preparedness activities within the United

States to respond to and recover from terrorist attacks, major disasters, and other emergencies. As part of these responsibilities, the Secretary coordinates with Federal entities to provide for Federal unity of effort for domestic incident management. The Secretary's responsibilities also include management of the broad "emergency management" and "response" authorities of FEMA and other DHS components. (NRF)

Section: The organizational level having responsibility for a major functional area of incident management, e.g., Operations, Planning, Logistics, Finance/Administration, and Intelligence (if established). The section is organizationally situated between the Branch and the Incident Command. (FEMA NIMS)

Segment: (1) A delineated portion or subset of the search area bounded and sized to be searchable by assigned facilities. Segments and their boundaries are based on factors that affect the searchers. For the purposes of tracking POC and search progress, it is generally inadvisable to allow a segment to cross-region boundaries. See also **Region.**

Segment POC: The probability of containment of an individual segment; determined as a proportion of its region POC, based on the ratio of the area of the segment to the area of the region. Segment POC cannot be reliably established if a segment crosses region boundaries.

Sensors: Human senses (sight, hearing, touch, etc.), those of specially trained animals (such as dogs), or electronic devices used to detect the object of a search.

Service Animal: Any guide dog, signal dog, assistive dog, seizure dog, or other animal individually trained to do work or perform tasks for the benefit of an individual with a disability, including but not limited to guiding individuals with impaired vision, alerting individuals with impaired hearing to intruders or sounds, providing minimal protection or rescue work, pulling a wheelchair, or fetching dropped items. (FEMA Pet)

Service Area: Geographic area for which a mission control center accepts responsibility to forward alerts to RCCs and SAR Points of Contact. (Cospas-Sarsat)

Set: Direction towards which a current flows. (IAMSAR)

Single Pass: Portion of a satellite orbit during which it is within view of a given position. (Cospas-Sarsat)

Single Pass Solution: One of two positions equidistant on each side of a satellite ground track, one position corresponding to a real location and the other being its image, computed using Doppler data from a single pass, sometimes referred to informally as a "single hit." (Cospas-Sarsat)

Situation Report (SITREP): Document that contains confirmed or verified information and explicit details (who, what, where, and how) relating to an incident. (FEMA NIMS)

Solution: Position determined by Cospas-Sarsat ground processing using DOA, Doppler data or encoded location. (Cospas-Sarsat)

Sortie: Individual movement of a resource in conducting a search or rendering assistance. (IAMSAR)

Sound Search: Synonymous with Sound Sweep, with the latter being the proper term for the specific grid-type technique. The use of sound (e.g. calling a subject's name), in conjunction with other types of direct searching tactics is common, but should not be referred to as a “sound search”.

Sound Sweep: An effective search technique that combines a sound attraction tactic with the direct tactic of wide spaced grid searching. The use of sound, typically whistle blasts, is closely choreographed with simultaneous blasts followed by a uniform listening period for subject response. The use of this technique presumes a responsive subject and, thus, is most effectively utilized in the early stages of a search.

Space Segment: Space Segment is made up of satellite assemblies each comprising two basic units: a) a platform moving in either low earth polar orbit, medium earth polar orbit or geostationary earth orbit as a mounting for the other units; and b) a receiver-processor and memory unit designed to receive, process and store signals received on 406 MHz for retransmissions. (Cospas-Sarsat)

Special Needs Population: A population whose members may have additional needs before, during, and after an incident in functional areas, including but not limited to: maintaining independence, communication, transportation, supervision, and medical care. Individuals in need of additional response assistance may include those who have disabilities; who live in institutionalized settings; who are elderly; who are children; who are from diverse cultures, who have limited English proficiency, or who are non-English-speaking; or who are transportation disadvantaged. (FEMA NIMS)

Stafford Act: This act authorizes the President (assisted by DHS/FEMA) to declare major disasters and emergencies in the United States and provide assistance to local, state, tribal, territorial, and insular area governments. The President may use the services of local, state, tribal, territorial, and insular area governments for the purposes of the act, which includes addressing immediate threats to life and property (e.g., SAR operations). (ESF #9)

Staging Area: Temporary location for available resources. A Staging Area can be any location in which personnel, supplies, and equipment can be temporarily housed or parked while awaiting operational assignment. (FEMA NIMS)

State: When capitalized, refers to any State of the United States, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, and any possession of the United States. See Section 2 (14), Homeland Security Act of 2002, Pub. L. 107-296, 116 Stat. 2135 (2002). (FEMA NIMS)

Storm Surge: An abnormal rise in sea level accompanying a hurricane or other intense storm, and whose height is the difference between the observed level of the sea surface and the level that would have occurred in the absence of the cyclone. Storm surge is usually estimated by subtracting the normal or astronomic high tide from the observed storm tide. (NWS Glossary)

Strategy: The general plan or direction selected to accomplish incident objectives. (FEMA NIMS)

Strike-slip fault: Vertical (or nearly vertical) fractures where the blocks have mostly moved horizontally. If the block opposite an observer looking across the fault moves to the right, the slip style is termed right lateral; if the block moves to the left, the motion is termed left lateral. (USGS Glossary)

Supervisor: The Incident Command System title for an individual responsible for a Division or Group. (FEMA NIMS)

Support Agency: An agency that provides support and/or resource assistance to another agency. See **Assisting Agency**. (FEMA NIMS)

Support Annex: The NRF Support Annexes describe other mechanisms by which support is organized among private sector, NGO, and Federal partners. Federal departments and agencies designated as coordinating and cooperating agencies in NRF support annexes conduct a variety of activities to include managing specific functions and missions and providing Federal support within their functional areas. The Support Annexes include: Critical Infrastructure; Financial Management; International Coordination; Private Sector Coordination; Tribal Coordination; Volunteer and Donations Management; and Worker Safety and Health. (NRF)

Surface burst: a nuclear weapon explosion that is close enough to the ground for the radius of the fireball to vaporize surface material. Fallout from a surface burst contains very high levels of radioactivity. (CDC Radiation Dictionary)

Surface Drift: Vector sum of total water current and leeway. Sometimes called Total Drift. (IAMSAR)

Sweep Width (*W*): A measure of the effectiveness with which a particular sensor can detect a particular object under specific environmental conditions. (IAMSAR)

Swift Water: Water moving at a rate greater than one knot (1.15 mph).

Swift Water Rescue: Swift water rescue (also called “whitewater rescue”) is a subset of technical rescue dealing in whitewater river conditions. Due to the added pressure of moving water, swift water rescue involves the use of specially trained personnel, ropes and mechanical advantage systems that are often much more robust than those used in standard rope rescue. The main goal is to use or deflect the water’s power to assist in the rescue of the endangered person(s), as in most situations there is no easy way to overcome the power of the water.

System Elements: The Cospas-Sarsat System elements include: a) Space Segment elements – Cospas and Sarsat satellites; b) Ground Segment elements: Mission Control Centers and Local User Terminals; and c) Distress Beacons. (Cospas-Sarsat)

T

Tactics: The deployment and directing of resources on an incident to accomplish the objectives designated by strategy. (FEMA NIMS)

Task Force: Any combination of resources assembled to support a specific mission or operational need. All resource elements within a Task Force must have common communications and a designated leader. (FEMA NIMS)

Temporary Flight Restriction (TFR): A TFR is a regulatory action issued by the FAA via the U.S. NOTAM System, under the authority of United States Code, Title 49. TFRs are issued within the sovereign airspace of the United States and its territories to restrict certain aircraft from operating within a defined area on a temporary basis to protect persons or property in the air or on the ground. While not all inclusive, TFRs may be issued for disaster or hazard situations such as: toxic gas leaks or spills, fumes from flammable agents, aircraft accident/incident sites, aviation or ground resources engaged in wildlife suppression, or aircraft relief activities following a disaster. TFRs may also be issued in support of VIP movements; for reasons of national security; or when determined necessary for the management of air traffic in the vicinity of aerial demonstrations or major sporting events. NAS users or other interested parties should contact a FSS for TFR information. Additionally, TFR information can be found in automated briefings, NOTAM publications, and on the internet at http://www.faa.gov. The FAA also distributes TFR information to aviation user groups for further dissemination. (FAA AIM)

Territory: Territories are one type of political division of the U.S., overseen directly by the Federal Government and not any part of a U.S. State. Under the Stafford Act, Puerto Rico, the U.S. Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands are included in the definition of "State." Stafford Act assistance is also available to two sovereign nations under the compact of free association: (1) Federated States of Micronesia (FSM); and the (2) Republic of the Marshall Islands (RMI).

Terrorism: As defined in the Homeland Security Act of 2002, activity that involves an act that is dangerous to human life or potentially destructive of critical infrastructure or key resources; is a violation of the criminal laws of the U.S. or of any State or other subdivision of the U.S.; and appears to be intended to intimidate or coerce a civilian population, to influence the policy of a government by intimidation or coercion, or to affect the conduct of a government by mass destruction, assassination, or kidnapping. (FEMA NIMS)

Threat: Natural or manmade occurrence, individual, entity, or action that has or indicates the potential to harm life, information, operations, the environment, and/or property. (FEMA NIMS)

Tidal Current (TC): Near-shore currents caused by the rise and fall of the tides. (IAMSAR)

Tidal Current Error (TC_e): The probable error of the tidal current estimate. (IAMSAR)

Time of Closest Approach (TCA): Time during a satellite pass when the satellite is closest to a signal source. (Cospas-Sarsat)

Tornado: A violently rotating column of air, usually pendant to a cumulonimbus, with circulation reaching the ground. It nearly always starts as a funnel cloud and may be accompanied by a loud roaring noise. On a local scale, it is the most destructive of all atmospheric phenomena. (NWS Glossary)

Tornado Emergency: An exceedingly rare tornado warning issued when there is a severe threat to human life and catastrophic damage from an imminent or ongoing tornado. This tornado warning is reserved for situations when a reliable source confirms a tornado, or there is clear radar evidence of the existence of a damaging tornado, such as the observation of debris. (NWS Glossary)

Tornado Warning: This is issued when a tornado is indicated by the WSR-88D radar or sighted by spotters; therefore, people in the affected area should seek safe shelter immediately. They can be issued without a Tornado Watch being already in effect. They are usually issued for a duration of around 30 minutes. A Tornado Warning is issued by your local National Weather Forecast Office (NWFO). It will include where the tornado was located and what towns will be in its path. If the tornado will affect the nearshore or coastal waters, it will be issued as the combined product—Tornado Warning and Special Marine Warning. If the thunderstorm which is causing the tornado is also producing torrential rains, this warning may also be combined with a Flash Flood Warning. If there is an ampersand (&) symbol at the bottom of the warning, it indicates that the warning was issued as a result of a severe weather report. After it has been issued, the affected NWFO will followed it up periodically with Severe Weather Statements. These statements will contain updated information on the tornado and they will also let the public know when warning is no longer in effect. (NWS Glossary)

Tornado Watch: This is issued by the National Weather Service when conditions are favorable for the development of tornadoes in and close to the watch area. Their size can vary depending on the weather situation. They are usually issued for a duration of 4 to 8 hours. They normally are issued well in advance of the actual occurrence of severe weather. During the watch, people should review tornado safety rules and be prepared to move a place of safety if threatening weather approaches. A Tornado Watch is issued by the Storm Prediction Center (SPC) in Norman, Oklahoma. Prior to the issuance of a Tornado Watch, SPC will usually contact the affected local National Weather Forecast Office (NWFO) and they will discuss what their current thinking is on the weather situation. Afterwards, SPC will issue a preliminary Tornado Watch and then the affected NWFO will then adjust the watch (adding or eliminating counties/parishes) and then issue it to the public. After adjusting the watch, the NWFO will let the public know which counties are included by way of a Watch Redefining Statement. During the watch, the NWFO will keep the public informed on what is happening in the watch area and also let the public know when the watch has expired or been cancelled.
(NWS Glossary)

Total Available Search Effort (Z_{ta}): The total amount of search effort available at the scene; equal to the sum of the search efforts available from each of the search facilities at the scene. (IAMSAR)

Total Drift Error (D*e*): Also *total probable drift velocity error*. The total probable error in the datum position that is contributed by the total drift velocity error (DV_e). De = DV_e X t, where t is the length of the drift interval hours. (IAMSAR)

Total Probable Error (*E*): The estimated error in the datum position. It is the square root of the sum of the squares of the total drift error, initial position error, and search facility position error. (IAMSAR)

Total Water Current (TWC): The vector sum of currents affecting search objects. (IAMSAR)

Total Water Current Error (TWC_e): Also total probable water current error. The total probable error of the total water current based on either (a) the probable error of the measured total water current or (b) the probable errors of the wind current, tidal or sea current, and any other current that contributed to the total water current. (IAMSAR)

Track Spacing (S): The distance between adjacent parallel search tracks. (IAMSAR)

Triage: The process of sorting survivors according to medical condition and assigning them priorities for emergency care, treatment, and evacuation. (IAMSAR)

Tribal: Any Indian tribe, band, nation, or other organized group or community, including any Alaskan Native Village as defined in or established pursuant to the Alaskan Native Claims Settlement Act (85 Stat. 688) (43 U.S.C.A. and 1601 et seq.), that is recognized as eligible for the special programs and services provided by the United States to Indians because of their status as Indians. (FEMA NIMS)

Tribal Assistance Coordination Group (TAC-G): Governments at the Federal, State, and local levels foster effective government-to-government working relationships with Tribes to achieve the common goal of responding to disasters impacting Tribal lands. The TAC-G comprises multiple Federal organizations that are dedicated to cooperation and collaboration to strengthen emergency management as it relates to the over 560 federally-recognized Tribal nations. (NRF)

Tribal Government (Indian): Any Federally recognized governing body of an Indian or Alaska Native Tribe, band, nation, pueblo, village, or community that the Secretary of Interior acknowledges to exist as an Indian Tribe under the Federally Recognized Indian Tribe List Act of 1994, 25 U.S.C. 479a. This does not include Alaska Native corporations, the ownership of which is vested in private individuals. (44 CFR 201.2)

Tribal Leader (Indian): Individual responsible for the public safety and welfare of the people of that tribe.

Tropical Cyclone: A warm-core, non-frontal synoptic-scale cyclone, originating over tropical or subtropical waters with organized deep convection and a closed surface wind circulation about a well-defined center. (NWS Glossary)

Tropical Depression: A tropical cyclone in which the maximum sustained surface wind speed (using the U.S. 1-minute average) is 33 kt (38 mph or 62 km/hr) or less. (NWS Glossary)

Tropical Disturbance: A discrete tropical weather system of apparently organized convection – generally 100 to 300 mi. in diameter – originating in the tropics or subtropics, having a nonfrontal migratory character, and maintaining its identity for 24 hours or more. It may or may not be associated with a detectable perturbation of the wind field. (NWS Glossary)

Tropical Storm: A tropical cyclone in which the maximum 1-minute sustained surface wind ranges from 34 to 63 knots (39 to 73 mph) inclusive. (NWS Glossary)

Tropical Storm Warning: An announcement that tropical storm conditions (sustained winds of 39 to 73 mph) are *expected* somewhere within the specified coastal area within 36 hours. (NWS Glossary)

Tropical Storm Watch: An announcement that tropical storm conditions (sustained winds of 39 to 73 mph) is *possible* within the specified coastal area within 48 hours. (NWS Glossary)

Tropical Wave: (formerly known as inverted trough) A trough or cyclonic curvature maximum in the trade wind easterlies. The wave may reach maximum amplitude in the lower middle troposphere or may be the reflection of an upper tropospheric cold low or an equatorward extension of a mid-latitude trough. (NWS Glossary)

True Air Speed (TAS): The speed an aircraft is traveling through the air mass. TAS corrected for wind equals ground speed. (IAMSAR)

Tsunami: A series of long-period waves (on the order of tens of minutes) that are usually generated by an impulsive disturbance that displaces massive amounts of water, such as an earthquake occurring on or near the sea floor. Underwater volcanic eruptions and landslides can also cause tsunamis. While traveling in the deep oceans, tsunami have extremely long wavelengths, often exceeding 50 nm, with small amplitudes (a few tens of centimeters) and negligible wave steepness, which in the open ocean would cause nothing more than a gentle rise and fall for most vessels, and possibly go unnoticed. Tsunamis travel at very high speeds, sometimes in excess of 400 knots. As tsunamis reach the shallow waters near the coast, they begin to slow down while gradually growing steeper, due to the decreasing water depth. The building walls of destruction can become extremely large in height, reaching tens of meters 30 feet or more as they reach the shoreline. The effects can be further amplified where a bay, harbor, or lagoon funnels the waves as they move inland. Large tsunamis have been known to rise to over 100 feet. The amount of water and energy contained in tsunami can have devastating effects on coastal areas. (NWS Glossary)

Tsunami Advisory: 1) Products of the Pacific Tsunami Warning Center (PTWC - Pacific (except Alaska, British Columbia and Western States) Hawaii, Caribbean (except Puerto Rico, Virgin Island, and Indian Ocean): The third highest level of tsunami alert. Advisories are issued to coastal populations within areas not currently in either warning or watch status when a tsunami warning has been issued for another region of the same ocean. An Advisory indicates that an area is either outside the current warning and watch regions or that the tsunami poses no danger to that area. The Center will continue to monitor the event, issuing updates at least hourly. As conditions warrant, the Advisory will either be continued, upgraded to a watch or warning, or ended. 2) Products of the West Coast/Alaska Tsunami Warning Center (WC/ATWC - Alaska, British Columbia and Western States, Canada, Eastern and Gulf States, Puerto Rico, U.S Virgin Islands): A tsunami advisory is issued due to the threat of a potential tsunami which may produce strong currents or waves dangerous to those in or near the water. Coastal regions historically prone to damage due to strong currents induced by tsunamis are at the greatest risk. The threat may continue for several hours after the arrival of the initial wave, but significant widespread inundation is not expected for areas under an advisory. Appropriate actions to be taken by local officials may include closing beaches, evacuating harbors and marinas, and the repositioning of ships to deep waters when there is time to safely do so. Advisories are normally updated to continue the advisory, expand/contract affected areas, upgrade to a warning, or cancel the advisory. (NWS Glossary)

Tsunami Information Statement: Issued to inform emergency management officials and the public that an earthquake has occurred, or that a tsunami warning, watch, or advisory has been issued for another section of the ocean. In most cases, information statements are issued to indicate there is no threat of a destructive tsunami and to prevent unnecessary evacuations as the earthquake may have been felt in coastal areas. An information statement may, in appropriate situations, caution about the possibility of destructive local tsunamis. Information statements may be re-issued with additional information, though normally these messages are not updated. However, a watch, advisory or warning may be issued for the area, if necessary, after analysis and/or updated information becomes available. (NWS Glossary)

Tsunami Warning: 1) Products of the Pacific Tsunami Warning Center (PTWC - Pacific (except Alaska, British Columbia and Western States) Hawaii, Caribbean (except Puerto Rico, Virgin Is.), and Indian Ocean): The highest level of tsunami alert. Warnings are issued due to the imminent threat of a tsunami from a large undersea earthquake or following confirmation that a potentially destructive tsunami is underway. They may initially be based only on seismic information as a means of providing the earliest possible alert. Warnings advise that appropriate actions be taken in response to the tsunami threat. Such actions could include the evacuation of low-lying coastal areas and the movement of boats and ships out of harbors to deep water. Warnings are updated at least hourly or as conditions warrant to continue, expand, restrict, or end the warning. 2) Products of the West Coast/Alaska Tsunami Warning Center (WC/ATWC – Alaska, British Columbia and Western States, Canada, Eastern and Gulf States, Puerto Rico, U.S Virgin Islands): A tsunami warning is issued when a potential tsunami with significant widespread inundation is imminent or expected. Warnings alert the public that widespread, dangerous coastal flooding accompanied by powerful currents is possible and may continue for several hours after arrival of the initial wave. Warnings also alert emergency management officials to take action for the entire tsunami hazard zone. Appropriate actions to be taken by local officials may include the evacuation of low-lying coastal areas, and the repositioning of ships to deep waters when there is time to safely do so. Warnings may be updated, adjusted geographically, downgraded, or canceled. To provide the earliest possible alert, initial warnings are normally based only on seismic information. (NWS Glossary)

Tsunami Watch: For products of the Pacific Tsunami Warning Center (PTWC - Pacific (except Alaska, British Columbia and Western States) Hawaii, Caribbean (except Puerto Rico, Virgin Is.), Indian Ocean): The second highest level of tsunami alert. Watches are issued based on seismic information without confirmation that a destructive tsunami is underway. It is issued as a means of providing an advance alert to areas that could be impacted by destructive tsunami waves. Watches are updated at least hourly to continue them, expand their coverage, upgrade them to a Warning, or end the alert. A Watch for a particular area may be included in the text of the message that disseminates a Warning for another area. For products of the West Coast/Alaska Tsunami Warning Center (WC/ATWC – Alaska, British Columbia and Western States, Canada, Eastern and Gulf States, Puerto Rico, U.S Virgin Islands): A tsunami watch is issued to alert emergency management officials and the public of an event which may later impact the watch area. The watch area may be upgraded to a warning or advisory - or canceled - based on updated information and analysis. Therefore, emergency management officials and the public should prepare to take action. Watches are normally issued based on seismic information without confirmation that a destructive tsunami is underway. (NWS Glossary)

True Air Speed (TAS): The speed an aircraft is traveling through the air mass. TAS corrected for wind equals ground speed. (IAMSAR)

Type: An Incident Command System resource classification that refers to capability. Type 1 is generally considered to be more capable than Types 2, 3, or 4, respectively, because of size, power, capacity, or (in the case of Incident Management Teams) experience and qualifications. (FEMA NIMS)

Typhoon: A tropical cyclone in the Western Pacific Ocean in which the maximum 1-minute sustained surface wind is 64 knots (74 mph) or greater. (NWS Glossary)

Typhoon Season: The part of the year having a relatively high incidence of tropical cyclones. In the western North Pacific, the typhoon season is from July 1 to December 15. Tropical cyclones can occur year-round in any basin. (NWS Glossary)

U

Uncertainty Phase: A situation wherein uncertainty exists as to the safety of a person, a vessel or other craft. (IAMSAR)

Unified Area Command: A Unified Area Command is established when incidents under an Area Command are multijurisdictional (See Area Command and Unified Command). (FEMA NIMS)

Unified Command (UC): An application of ICS used when there is more than one agency with incident jurisdiction or when incidents cross political jurisdictions. Agencies work together through the designated members of the Unified Command, often the senior person from agencies and/or disciplines participating in the Unified Command, to establish a common set of objectives and strategies and a single Incident Action Plan. (FEMA NIMS)

Unified Coordination Group (UCG): The Unified Coordination Group (UCG) is the structure within a Joint Field Office that executes unified command and leads incident activities at the field level in order to achieve unity of effort. Its purpose is to establish and achieve shared objectives. The UCG is comprised of senior leaders representing State and Federal interests and in certain circumstances tribal governments, local jurisdictions, or the private sector. The Federal Coordinating Officer (FCO) is responsible for establishing the UCG. (FEMA IMH)

Unit: The organizational element with functional responsibility for a specific incident planning, logistics, or finance/administration activity. (FEMA NIMS)

Unit Leader: The individual in charge of managing Units within an Incident Command System (ICS) functional Section. The Unit can be staffed by a number of support personnel providing a wide range of services. Some of the support positions are preestablished within ICS (e.g., Base/Camp Manager), but many others will be assigned as technical specialists. (FEMA NIMS)

United States: The fifty States, the District of Columbia, Puerto Rico, the Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands. (Stafford Act)

Unity of Command: The concept by which each person within an organization reports to one and only one designated person. The purpose of unity of command is to ensure unity of effort under one responsible commander for every objective. (FEMA NIMS)

Unmanned Aircraft (UA): A device used or intended to be used for flight in the air that has no onboard pilot. This device excludes missiles, weapons, or exploding warheads, but includes all classes of airplanes, helicopters, airships, and powered-lift aircraft without an onboard pilot. UA do not include traditional balloons (see 14 CFR Part 101), rockets, tethered aircraft and un-powered gliders. (UAS Roadmap)

Unmanned Aircraft System (UAS): An unmanned aircraft and its associated elements related to safe operations, which may include control stations (ground, ship, or air-based), control links, support equipment, payloads, flight termination systems, and launch/recovery equipment. UAS consists of three elements: Unmanned Aircraft; Control Station; and Data Link. (UAS Roadmap)

Urban Search and Rescue (US&R): Operations for natural and manmade disasters and catastrophic incidents, as well as other structural collapse operations that primarily require Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA) US&R task force operations. (ESF #9)

Urban Search and Rescue (US&R) Incident Support Team (IST): ISTs provide coordination and logistical support to US&R task forces during emergency operations. They also conduct needs assessments and provide technical advice and assistance to local, State, Tribal, Territorial, and Insular Area government emergency managers. (ESF #9)

Urban Search and Rescue (US&R) Task Forces: A framework for structuring local emergency services personnel into integrated disaster response task forces. The 28 National US&R Task Forces, complete with the necessary tools, equipment, skills, and techniques, can be deployed by the Federal Emergency Management Agency to assist State and local governments in rescuing victims of structural collapse incidents or to assist in other search and rescue missions.

V

Vector: (1) An agent, such as an insect or rat, capable of transferring a pathogen from one organism to another. (CIA CBR Handbook); and (2) A graphic representation of a physical quantity or measurement, such as wind velocity, having both magnitude and direction. (IAMSAR)

Visual Flight Rules (VFR): (1) Rules governing procedures for conducting flight under visual meteorological conditions. In addition, used by pilots and controllers to indicate type of flight plan. (IAMSAR); (2) Rules that govern the procedures for conducting flight under visual conditions. The term “VFR” is also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate type of flight plan. (FAA AIM)

Visual Meteorological Conditions (VMC): Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling equal to or better than specified minima.
(IAMSAR; FAA AIM)

Volunteer: For purposes of the *National Incident Management System*, any individual accepted to perform services by the lead agency (which has authority to accept volunteer services) when the individual performs services without promise, expectation, or receipt of compensation for services performed. See 16 U.S.C. 742f(c) and 29 CFR 553.101. (FEMA NIMS)

W

Warning: A warning is issued when a hazardous weather or hydrologic event is occurring, is imminent, or has a very high probability of occurring. A warning is used for conditions posing a threat to life or property. (NWS Glossary)

Watch: A watch is used when the risk of a hazardous weather or hydrologic event has increased significantly, but its occurrence, location, and/or timing is still uncertain. It is intended to provide enough lead time so that those who need to set their plans in motion can do so. (NWS Glossary)

Waterspout: In general, a tornado occurring over water. Specifically, it normally refers to a small, relatively weak rotating column of air over water beneath a Cb or towering cumulus cloud. Waterspouts are most common over tropical or subtropical waters. The exact definition of waterspout is debatable. In most cases the term is reserved for small vortices over water that are not associated with storm-scale rotation. But there is sufficient justification for calling virtually any rotating column of air a waterspout if it is in contact with a water surface. (NWS Glossary)

Weapons of Mass Destruction (WMD): Chemical, biological, radiological, or nuclear weapons capable of a high order of destruction or causing mass casualties and exclude the means of transporting or propelling the weapon where such means is a separable and divisible part from the weapon. (JP 3-40 WMD)

Weapons of Mass Destruction - Civil Support Team (WMD-CST): Joint National Guard (Army National Guard and Air National Guard) team established to deploy rapidly to assist a local incident commander in determining the nature and extent of a weapons of mass destruction attack or incident; provide expert technical advice on weapons of mass destruction response operations; and help identify and support the arrival of follow-on state and federal military response assets. (JP 1-02)

Wildlife: Wildlife primarily lives independent of human control and rely on individual ability to obtain food or water.

Wind-Corrected Heading: The actual heading an aircraft is required to fly to make good an intended course. (IAMSAR)

Wind Current (WC): The water current generated by wind acting upon the surface of water over a period of time. (IAMSAR)

Wind Current Error (WCe): The probable error of the wind current estimate. (IAMSAR)

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List of Acronyms

A

A	Search Area (can be subscripted for regions and segments)
AARC	Airspace Access Response Cell
ACO	Aircraft Coordinator
A/C	Aircraft
ADA	Americans with Disabilities Act
ADF	Automatic Direction Finding
ADS	Air Defense Sector
AFRCC	Air Force Rescue Coordination Center
AFTN	Aeronautical Fixed Telecommunication Network
AHJ	Authority Having Jurisdiction
AIP	Aeronautical Information Publication
AIS-R	Aeronautical Information System – Replacement
AKRCC	Alaska Rescue Coordination Center
ALARA	As Low As Reasonably Achievable
ALCOM	Alaska Command
ALNOT	Alert Notice
AMDR	Average Maximum Detection Range
AMVER	Automated Mutual Assistance Vessel Rescue
ANG	Air National Guard
ANS	Air Navigation Services
AOB	Air Operations Branch
AOPA	Aircraft Owners and Pilots Association
AOR	Area of Responsibility
ARCC	Aeronautical Rescue Coordination Center
ARSC	Aeronautical Rescue Sub-Center
ARTCC	Air Route Traffic Control Center
ASAD	Air Search Area Definition
ATC	Air Traffic Control
ATCT	Air Traffic Control Tower
ATM	Air Traffic Management
ATO	Air Traffic Organization
ATS	Air Traffic Service
ATV	All Terrain Vehicle
AWLD	Aircraft Wreckage Locator Database

B

BOB	Boat Operations Branch

C

C	Coverage Factor
CAP	Civil Air Patrol
CB	Citizens Band
CBRNE	Chemical, Biological, Radiological, Nuclear, and High-Yield Explosives
CDC	Centers for Disease Control
CDRNORTHCOM	Commander, U.S. Northern Command
CDRUSPACOM	Commander, U.S. Pacific Command
CERFP	CBRNE Emergency Response Force Package
CERT	Community Emergency Response Team
CFR	Code of Federal Regulations
CFS	Cubic Feet per Second
CGAUX	Coast Guard Auxiliary

CIKR	Critical Infrastructure and Key Resources
CIS	Critical Incident Stress
CIS	Catastrophic Incident Supplement
CISAR	Catastrophic Incident Search and Rescue
CISM	Critical Incident Stress Management
CONUS	Continental United States
COP	Common Operating Picture
COSPAS	Cosmicheskaya Sistyema Poiska Avariynych Sudov ("Space System for Search of Vessels in Distress")
CPG	Comprehensive Preparedness Guide
CS	Creeping Line Search
CSP	Commence Search Point
CST	Civil Support Team

D

DCO	Defense Coordination Officer
DECO	Disaster Emergency Communications Officer
DEN	Domestic Events Network
DF	Direction Finding
DHS	Department of Homeland Security
DMB	Data Marker Buoy
DNDO	Domestic Nuclear Detection Office
DOA	Difference of Arrival
DOC	Department of Commerce
DoD	Department of Defense
DOI	Department of the Interior
DOS	Department of State
DOT	Department of Transportation
DSC	Dual Status Commander
DSCA	Defense Support of Civil Authorities

E

EADS	Eastern Air Defense Sector
EICC	Emergency Incident Coordination Center
EMAC	Emergency Management Assistance Compact
ELT	Emergency Locator Transmitter
EMAC	Emergency Management Assistance Compact
EMP	Electromagnetic Pulse
EMS	Emergency Medical System
EMT	Emergency Medical Technician
EOC	Emergency Operations Center
EPLO	Emergency Preparedness Liaison Officer
EPIRB	Emergency Position Indicating Radio Beacon
ESF	Emergency Support Function
ESW	Effective Sweep Width
ETA	Estimated Time of Arrival
ETD	Estimated Time of Departure
EU	European Union
EXCOM	Extended Communication Search

F

FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FBI	Federal Bureau of Investigation
FCC	Federal Communications Commission
FCO	Federal Coordinating Officer
FDOA	Frequency Difference of Arrival
FE	Functional Exercise
FEMA	Federal Emergency Management Agency

FIOP	Federal Interagency Operational Plan
FIR	Flight Information Region
FLIP	Flight Information Publication
FLIR	Forward Looking Infrared
FM	Frequency Modulation
FSARCG	Federal SAR Coordination Group
FSE	Full Scale Exercise
FSH	Flight Service Hub
FSS	Flight Service Station

G

GA	General Aviation
GARS	Global Area Reference System
GEO	Geostationary Earth Orbit
GEOLUT	Geostationary Earth Orbit Local User Terminal
GIS	Geospatial Information System]
GMDSS	Global Maritime Distress and Safety System
GMT	Greenwich Mean Time
GNSS	Global Navigation Satellite System
GOES	Geostationary Operational Environmental Satellite
GPS	Global Positioning System

H

HAV	Hepatitis A Virus
HD	Homeland Defense
HEPA	High-Efficiency Particulate Air
HSPD	Homeland Security Presidential Directive

I

IA	Indian Affairs
IAA	Incident Assessment and Awareness
IAMSAR	International Aeronautical and Maritime Search and Rescue
IAP	Incident Action Plan
IC	Incident Commander
ICAO	International Civil Aviation Organization
ICISF	International Critical Incident Stress Foundation
ICP	Incident Command Post
ICS	Incident Command System
IDEA	Integrated Detection Experiment Assistant
IFF	Identification, Friend or Foe
IFR	Instrument Flight Rules
IHDB	Incident History Database
IHS	Indian Health Service
IMC	Instrument Meteorological Conditions
IMO	International Maritime Organization
IND	Improvised Nuclear Device
INREQ	Information Request
IPP	Initial Planning Point
IPS	Integrated Planning System
IST	Incident Support Team
INSARAG	International Search and Rescue Advisory Group

J

JAC	Joint Analysis Center
JFO	Joint Field Office
JIC	Joint Information Center
JPRC	Joint Personnel Recovery Center
JRCC	Joint Rescue Coordination Center
JTF	Joint Task Force

K

KHz	Kilohertz
Km	Kilometers

Kt	Knot

L

L	Length
LKP	Last Known Position
l	search sub-area length
LEO	Low Earth Orbit
LEOLUT	Low Earth Orbit Local User Terminal
LUT	Local User Terminal

M

m	Meters
MCC	Mission Control Center
MEO	Medium Earth Orbit
MEOLUT	Medium Earth Orbit Local User Terminal
MEOSAR	Medium Earth Orbit Search and Rescue
MGRS	Military Grid Reference System
MHz	Megahertz
MOA	Memorandum of Agreement
MOA	Military Operating Area
MOG	Maximum on Ground
MOU	Memorandum of Understanding
MRA	Mountain Rescue Association
MRCC	Maritime Rescue Coordination Center
MRO	Mass Rescue Operation
MRSC	Maritime Rescue Sub-Center

N

n	Number of Required Track Spacings
N	Number of Search and Rescue Resources
NAD	North American Datum
NAS	National Airspace System
NASA	National Aeronautics and Space Administration
NASAR	National Association for Search and Rescue
NAWAS	National Alert Warning System
NDART	National Disaster Animal Response Team
NGO	Nongovernmental Organization
NIFOG	National Interoperability Field Operations Guide
NIMS	National Incident Management System
NIUSR	National Institute for Urban Search and Rescue
nm	Nautical Mile
NOCR	Notification of Country of Registry
NOAA	National Oceanic and Atmospheric Administration
NOK	Next-of-kin
NOTAM	Notice to Airmen
NPS	National Park Service
NRCC	National Response Coordinator Center
NRF	National Response Framework
NSARC	National Search and Rescue Committee
NSP	National Search and Rescue Plan
NSS	National Search and Rescue Supplement
NSSE	National Security Special Events
NTA	National Track Analysis
NTAP	National Track Analysis Program
NTSP	National Transportation Safety Board
NVOAD	National Voluntary Organizations Active in Disaster
NWFO	National Weather Forecast Office

O

OFDA	Office of U.S. Foreign Disaster Assistance

OPA	Overall Primary Agency
OPOS	Overall Probability of Success
$OPOS_{CUM}$	Cumulative Overall Probability of Success
OSC	On Scene Coordinator
OSE	On Scene Endurance

P

P	Parallel Pattern
PA	Primary Agency
pDen	Probability Density
PDD	Presidential Disaster Declaration
PFD	Personal Flotation Device
PIC	Pilot in Command
PIO	Public Information Officer
PLB	Personal Locator Beacon
POA	Probability of Area
POB	Persons On Board
POC	Probability of Containment
POD	Probability of Detection
POD_{CUM}	Cumulative Probability of Detection
POS	Probability of Success
POS_{CUM}	Cumulative Probability of Success
PPE	Personal Protective Equipment
PR	Personnel Recovery
PRECOM	Preliminary Communication Search
PS	Parallel Sweep Search
PSR	Probable Success Rate

Q

QALQ	Data Request On Aircraft
QCG	Quality Control Group

R

RADES	Radar Evaluation Squadron
RANPs	Regional Air Navigation Plans
RAP	Rescue Action Plan
RCC	Rescue Coordination Center
RDD	Radiological Dispersion Device
RDF	Radio Direction Finder
REAC	Radiation Emergency Assistance Center
RF	Radio Frequency
RGDB	Beacon Registration Database
RHIB	Rigid Hull Inflatable Boat
RRCC	Regional Response Coordination Center
RSC	Rescue Sub-Center

S

S	Track Spacing
SA	Support Agency
SAP	Search Action Plan
SAR	Search and Rescue
SARSAT	Search and Rescue Satellite Aided Tracking
SATCOM	Satellite Communications
SBTF	Small Boat Task Force
SC	Search and Rescue Coordinator
SDSA	Subjective Deductive Search Area
SEND	Satellite Emergency Notification Device
SGS	Strategic Guidance Statement
SITREP	Situation Report
SMC	Search and Rescue Mission Coordinator
SME	Subject Matter Expert
SOSC	System Operations Support Center
SPOC	Search and Rescue Point of Contact
SRR	Search and Rescue Region
SRS	Search and Rescue Sub-Region
SRU	Search and Rescue Unit
SRT	Special Response Team

SRU Search and Rescue Unit
SS Expanding Square Search
SSA Statistical Search Area
STTIA State, Tribal, Territorial/Insular Area
SURPIC Surface Picture

T

T Search Time Available
TAC-G Tribal Assistance Coordination Group
TACAN Tactical Air Navigation
TCA Time of Closes Approach
TDOA Time Difference of Arrival
TFR Temporary Flight Restriction
TRACON Terminal Radar Approach Control
TSO Technical Standing Order
TTX Table Top Exercise

U

UA Unmanned Aircraft
UAS Unmanned Aircraft System
UC Unified Command
UCG Unified Coordinating Group
UHF Ultra High Frequency
USAF United States Air Force
USAR Urban Search and Rescue (may also be written US&R)
USC United States Code
USCG United States Coast Guard
USGS United States Geological Survey
USMCC United States Mission Control Center
USN United States Navy
USNG United States National Grid
USNORTHCOM United States Northern Command
UTC Coordinated Universal Time
UTM Universal Transverse Mercator Grid
UTV Utility Vehicle

V

V Search and Rescue Facility Ground Speed
VCC Volunteer Coordination Center
VFR Visual Flight Rule
VHF Very High Frequency
VIP Very Important Person
VMC Visual Meteorological Conditions
VOAD Voluntary Organizations Active in Disasters
VRC Volunteer Reception Center
VS Vector Search

W

w Search Sub-Area Width
W Sweep Width
WADS Western Air Defense Sector
WGS World Geodetic System
WMD Weapons of Mass Destruction
WMD-CST WMD Civil Support Team

Z

Z Effort; Effective Area Swept
Zt Total Available Effort

Introduction:
United States National Search and Rescue Supplement
(Version 2.0)

Welcome to Version 2.0 of the U.S. *National Search and Rescue Supplement (NSS) to the International Aeronautical and Maritime Search and Rescue (IAMSAR) Manual.*

(09/09/12) A California Air National Guard 129th Rescue Wing MC-130P Combat Shadow aircraft refuels two HH-60G helicopters while participating in a long range over water search and rescue mission, 1,400 miles off the coast of Acapulco, Mexico, saving the lives of two injured Ecuadorians. (Photo: John Pharr/USAF)

When the reader compares NSS Version 2.0 with the 2000 version, you will find a completely new manual. This complete overhaul was necessary to provide Federal Agencies and Departments that conduct and/or support SAR operations, as well as other STTIA, local, and volunteer SAR partners, with a broad overview of the U.S. SAR system. In addition, with the development of several addenda that provide important specificity concerning the organization, coordination, and conduct of maritime, land-based, and catastrophic incident SAR operations, the National SAR Committee (NSARC) was able to focus on developing a truly national supplement that expresses the U.S. commitment to the support of lifesaving in the U.S., and as a partner in the global SAR system.

Lessons learned from many SAR cases and disasters such as Hurricanes Katrina, Irene, and Sandy, the Fukushima tsunami, new technology that has improved distress alerting, and improved SAR policy and guidance have significantly changed how SAR is conducted both globally and internationally.

(11/04/13) A rescue swimmer from Coast Guard Air Station Borinquen, Puerto Rico, is lowered aboard the bulk carrier AS VINCENTIA to provide medical attention to a man rescued more than 400 nautical miles northeast of Puerto Rico. (Photo: AS Vincentia)

The most important lesson to be learned concerning the cooperation, coordination, and conduct of SAR is that no single Agency or organization can *go it alone*. Lifesaving is a team effort. Federal SAR agencies must work with other organizations to effectively save lives both in the U.S. and globally. With limited budgets, personnel, and training, SAR agencies and organizations must work together to save lives in the 21st century.

NSS Version 2.0 reflects this emphasis.

(07/09) Yosemite Search and Rescue technicians perform a climber rescue at Royal Arches, Yosemite National Park, California. (Photo: Dave Pope/NPS)

In particular, this NSS with its companion Addenda:

- Provides comprehensive information and guidance for Federal, STTIA, and local SAR Coordinators and authorities information on the implementation of the U.S. national SAR system as detailed in the *National Search and Rescue Plan* (NSP);
- Details how the U.S. will fulfill its international SAR obligations as a Party to the *International Convention on Maritime Search and Rescue* and the *Convention on International Civil Aviation*;
- Serves as the U.S. supplement to the *IAMSAR Manual* for aeronautical and maritime SAR; and
- Provides the national framework for NSARC member agencies in support of Catastrophic Incident SAR responsibilities as detailed in the *National Response Framework* (NRF) and its *Emergency Support Function (ESF) #9* – Search and Rescue Annex.

This NSS is subsidiary to, and provides implementing guidance for the NSP. In particular, for aeronautical and maritime SAR, this NSS builds upon, as appropriate, the baseline established by the *IAMSAR Manual*, and is written for use in conjunction with the *IAMSAR Manual*.

(12/13/04) The 738 foot freighter SELENDANG AYU ran aground near Skan Bay off Alaska's Unalaska Island. The ship snapped in two and spilled an estimated 41,000 gallons of oil into the ocean. This image of the wrecked freighter was captured by NASA’s QuickBird satellite. (Photo: NASA)

Part 1: SAR Organization

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Section 1-1: Global and U.S. SAR Systems

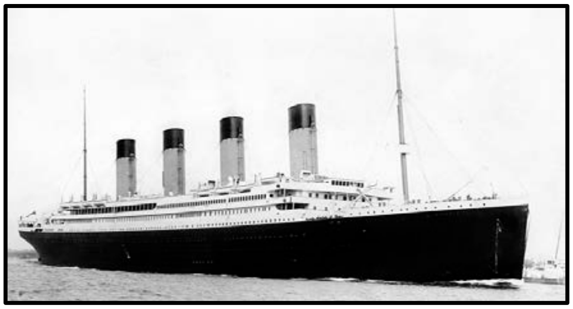
Introduction

The world's oceans are a perilous environment, covering approximately seventy percent of the earth's surface. People, ships, and aircraft that use the maritime environment always face the risk that something may go wrong and require assistance. In the early 20th century, large-scale disasters at sea, many with significant loss of life, continued to plague the international community. It was realized that an international system for organizing and improving transportation safety and security, which would reduce the frequency of disasters and minimize the loss of life and spread of pollution, was necessary.

A critical component of improving the safety and security of people and nations that use the world's oceans was the organization and implementation of an international Search and Rescue (SAR) system that would allow for the rescue of any person in distress, regardless of nationality, status, or circumstances in which a person is found.

Two United Nations (UN) organizations were created for the purpose of improving the safety of shipping and aviation transportation globally:

- International Maritime Organization (IMO); and
- International Civil Aviation Organization (ICAO).



(04/10/12). *The RMS Titanic* departed Southampton on its maiden voyage. *RMS Titanic* sank after colliding with an iceberg on April 15, 1912, with a loss of 1,502 passengers and crew. (Photo: F.G.O. Stuart)

IMO and ICAO provide the framework for the organization, regulation, and standardization of the global aeronautical and maritime transportation system, as well as the organization and implementation of a global SAR system. Through this global SAR framework, each national SAR system becomes an integral component of the overall system. The result: nations organized and more effectively working together to save lives.

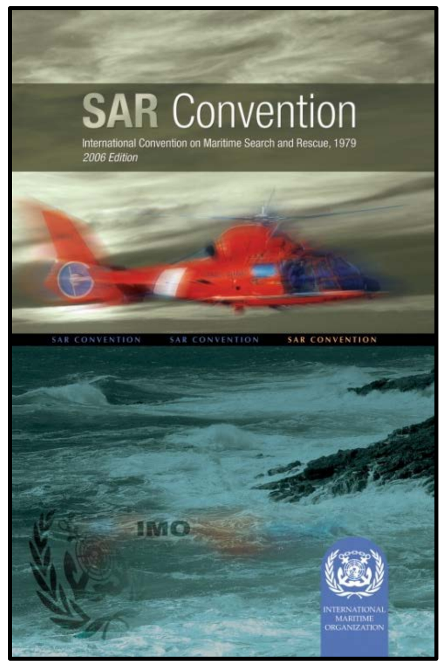
A practical and humanitarian effect of having a standardized aeronautical and maritime global SAR system is that it eliminates the need for each State to provide SAR services for its own citizens everywhere they travel world-wide. Instead, the world is divided into Search and Rescue Regions (SRRs), each with a Rescue Coordination Center (RCC) and associated SAR services, which assist anyone in distress within the SRR.

International Maritime Organization (IMO)

Because shipping, by its very nature is an international activity, in 1948 the UN adopted by convention the establishment of IMO as an international body dedicated to maritime safety and security. Since the *IMO Convention* entered into force in 1958, the organization has promoted the adoption of approximately 50 conventions and protocols, and adopted more than 1,000 codes and recommendations concerning maritime safety and security, the prevention of pollution, and other related matters.

IMO's overall objectives can be summed up in the IMO slogan: *safe, secure and efficient shipping on clean oceans.*

SAR Convention



In 1979, IMO concluded the *International Convention on Maritime Search and Rescue* ("SAR Convention"). While the obligation of ships to go to the assistance of persons in distress has been preserved both in maritime tradition and in international treaties (e.g., SOLAS), the adoption of the SAR Convention, for the first time, provided for the establishment of a global, maritime SAR framework that organized the conduct of maritime SAR operations internationally. The SAR Convention's primary emphasis is on developing an international SAR system: no matter where a person is in distress, the rescue will be coordinated by a SAR service, or in coordination with neighboring SAR services.

In particular, the SAR Convention:

- Established preparatory measures nations must implement, including the establishment of RCCs (and Rescue Sub-Centers (RSCs); and
- Outlined operational procedures to be followed when alerted of a distress and during the conduct of SAR operations.

In addition, Parties to the SAR Convention are:

- Required to ensure that arrangements are made for the provision of adequate SAR services in their SRR;
- Required to ensure the closest practicable coordination between maritime and aeronautical services;
- Encouraged to enter into SAR agreements with neighboring nations to establish SRRs, the pooling of facilities, establishment of common procedures, training, and liaison visits; and
- Encouraged to take measures to expedite entry into its territorial seas of rescue units from other Parties.

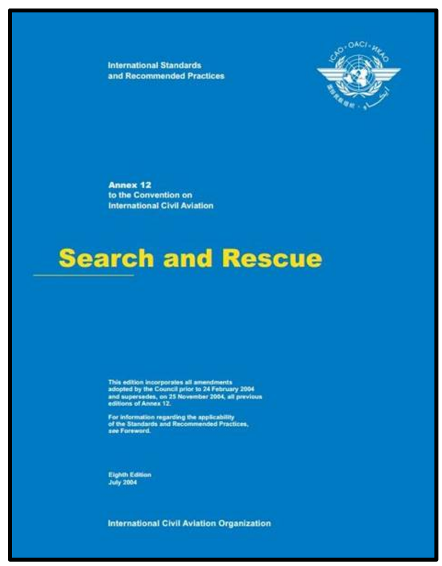
International Civil Aviation Organization (ICAO)

A specialized agency of the UN, ICAO was created in 1944 by the adoption of the *Convention on International Civil Aviation* ("Chicago Convention") to promote the safe and orderly development of international civil aviation throughout the world. ICAO sets standards, regulations and recommended practices necessary for aviation safety, security, efficiency and regularity, as well as for aviation environmental protection.

(10/16/56) Life rafts pull away from the *Sovereign of the Skies* just before sinking in the Pacific Ocean. (Photo: William Simpson/USCG)

The Chicago Convention sets forth the purpose of ICAO, namely, to develop a safe and orderly international civil aviation system and to ensure that international air transport services are established on the basis of equality of opportunity and operated soundly and economically.

Annex 12 – Search and Rescue



Comparable to IMO's SAR Convention, *Annex 12 – Search and Rescue* is ICAO's primary guidance that provides the international framework for the organization and coordination of the global aeronautical SAR system, supporting SAR operations involving aircraft.

Unlike the SAR Convention which provides the framework for nations to organize and implement a maritime global SAR system, Annex 12 is applicable to the establishment, coordination, maintenance, and operation of SAR services in the Contracting State's sovereign territory *and* Flight Information Region (FIR) on the high seas.

Nations, by being Party to the SAR and Chicago Conventions, have accepted the obligation to provide aeronautical and maritime SAR coordination and services for their respective territories, territorial seas, and, where appropriate, the high seas. SAR services are to be available on a 24-hour basis.

International Aeronautical and Maritime Search and Rescue (IAMSAR) Manual

IMO and ICAO are primarily responsible for international maritime and aviation safety and security. Both organizations continue to foster close SAR cooperation between themselves, nations, and maritime and aeronautical SAR authorities and industry stakeholders in order to standardize and harmonize SAR services worldwide. One product of this cooperative effort is the *International Aeronautical and Maritime Search and Rescue (IAMSAR) Manual*, which is published in three volumes:

- *Organization and Management (Volume I)*: Provides information on the global SAR system concept, establishment and improvement of national and regional SAR systems, and cooperation with neighboring States to provide effective and economical SAR services;
- *Mission Co-ordination (Volume II)*: Assists personnel who plan and coordinate SAR operations and exercises; and
- *Mobile Facilities (Volume III)*: Developed for carriage onboard rescue units, aircraft, and vessels, Volume III provides guidance to help with the performance of search, rescue, or on-scene coordinator duties, and with aspects of SAR that pertain to their own emergencies.

Jointly developed and published by both IMO and ICAO, the IAMSAR Manual provides guidelines for a common approach to organizing and providing SAR services. As participants in the global SAR system, nations are encouraged to develop and improve their respective SAR services and to cooperate with neighboring nations in the coordination and conduct of lifesaving operations.

In addition, the IAMSAR Manual emphasizes timeliness of SAR response and emphasizes that reducing the time between when the incident occurs and when persons in distress are rescued is the most important factor in a successful rescue operation. Any SAR operation must consider the planning, transit time of SAR resources, location of the distress and the actual rescue operation to reduce the response time. Initial actions should be taken within minutes of distress notification and SAR response should begin as quickly as possible.

SAR Agreements

While the SAR and Chicago Conventions provide the framework for the global SAR system, nations working together implement this system through their respective national SAR organizations. A critical organizational component of the global SAR system is for nations with contiguous SRRs to conclude a SAR agreement that will serve as the basis for future SAR cooperation and coordination.

When possible, SAR agreements should

include, at a minimum, the following information:

- A list of coordinates that delimits each nation's respective SRRs;
- Identify the national agency and RCC responsible for coordinating SAR operations within the SRR; and
- Provide general coordination and cooperation guidance in the conduct of SAR operations.

An example of nations fulfilling the requirement to conclude a SAR agreement is the *Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic* (May 2011). This 8-nation regional agreement, in addition to setting the foundation for future cooperation and coordination of SAR operations in the Arctic, also delimited Arctic aeronautical and maritime SAR regions, establishing areas of SAR coordination responsibility (Figure 1-1-1).

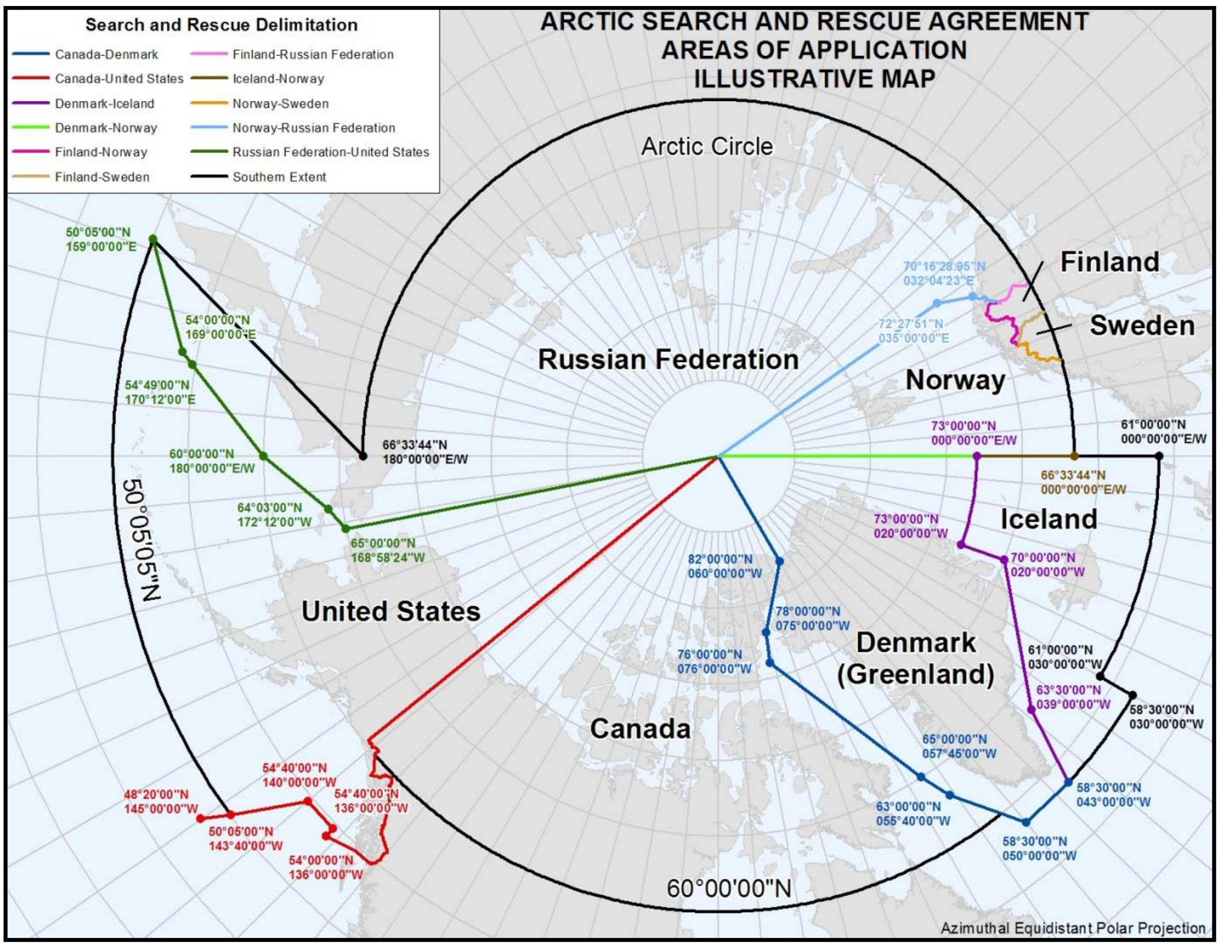


Figure 1-1-1: Arctic Aeronautical and Maritime SAR Regions

Note: In the context of SAR, it is customary to use terms such as "limits" or "lines of delimitation" when referring to the division of SRRs as opposed to "boundaries." The term "boundaries" carries a political connotation related to the division of sovereign territory between nations and is not appropriate in the context of SAR. The

SAR Convention (paragraph 2.1.7) states, "The delimitation of search and rescue regions is not related to and shall not prejudice the delimitation of any boundary between states." Lines separating SRRs of neighboring nations should be negotiated, documented in an official manner, and reflected in the relevant IMO and ICAO reference documents.

SAR Regions (SRRs)

The surface of the globe is divided into a patchwork of regions for aeronautical SAR, and a similar arrangement of regions for maritime SAR. A nation or group of nations is responsible for coordinating SAR operations for each of these regions. Any person in distress within a SRR is assisted on a non-discriminatory basis, not just the citizens of the responsible nation who may need SAR assistance.

SRRs are established to ensure provision of adequate land-based communications infrastructure, efficient distress alert routing, and proper operational coordination to effectively support SAR services. SRRs provide clarity concerning those geographic regions where nations have accepted primary responsibility for coordinating or providing SAR services. However, SRR limits should never be viewed as a basis to restrict, delay, or limit in any way the prompt and effective action necessary to respond to distress situations.

A SRR may have one or more sub-divisions, each of which is internationally identified as a *Search and Rescue Sub-Region (SRS)*. Within the SRS, all or part of the RCC's functions is assumed by a *Rescue Sub-Center (RSC)* under the oversight of the RCC.

There is one RCC or RSC associated with each SRR or SRS in which SAR services are provided. The RCC/RSC coordinates SAR operations within its respective SRR/SRS, as well as the coordination of other SAR operations with other RCCs/RSCs.

ICAO Regional Air Navigation Plans (RANPs) depict aeronautical SRRs for most of the world. Nations have an area of responsibility which is usually composed of one aeronautical SRR. Maritime SRRs are published in IMO's global SAR plan, and are similar, but not necessarily identical, to aeronautical SRRs.

The U.S. SRRs and SRSs are provided in Appendix B. Figures 1-1-2 and 1-1-3 are excerpts from the SAR and Chicago Conventions detailing the requirements for maritime and aeronautical SRRs.

International Convention on Maritime Search and Rescue

Chapter 2 – Organization and co-ordination

2.1.3 To help ensure the provision of adequate shore-based communication infrastructure, efficient distress alert routeing, and proper operational co-ordination to effectively support search and rescue services, Parties shall, individually or in co-operation with other States, ensure that sufficient search and rescue regions are established within each sea area in accordance with paragraphs 2.1.4 and 2.1.5. Such regions should be contiguous and, as far as practicable, not overlap.

2.1.4 Each search and rescue region shall be established by agreement among Parties concerned. The Secretary-General shall be notified of such agreements.

2.1.5 In case agreement on the exact dimensions of a search and rescue region is not reached by the Parties concerned, those Parties shall use their best endeavours to reach agreement upon appropriate arrangements under which the equivalent overall co-ordination of search and rescue services is provided in the area. The Secretary General shall be notified of such arrangements.

2.1.6 Agreements on the regions or arrangements referred to in paragraphs 2.1.4 and 2.1.5 shall be recorded by the Parties concerned, or in written plans accepted by the Parties.

2.1.7 The delimitation of search and rescue regions is not related to and shall not prejudice the delimitation of any boundary between States.

Figure 1-1-2: SAR Convention Excerpt – SAR Regions

International Convention on Civil Aviation – Annex 12 (Search and Rescue)

Chapter 2 – Organization

2.2 Search and rescue regions

2.2.1 Contracting States shall delineate the search and rescue regions within which they will provide search and rescue services. Such regions shall not overlap and neighbouring regions shall be contiguous.

Note 1. – Search and rescue regions are established to ensure the provision of adequate communication infrastructure, efficient distress alert routing and proper operational coordination to effectively support search and rescue services. Neighbouring States may cooperate to establish search and rescue services within a single SAR region.

Note 2. – The delineation of search and rescue regions is determined on the basis of technical and operational considerations and is not related to the delineation of boundaries between States.

2.2.1.1 Recommendation. – Search and rescue regions should, in so far a practicable, be coincident with corresponding flight information regions and, with respect to those areas over the high seas, maritime search and rescue regions.

Figure 1-1-3: Chicago Convention Excerpt – SAR Regions

U.S. SAR System

The U.S. SAR system is a component of the aeronautical and maritime global SAR system (Figure 1-1-4). Generally, the U.S. SAR system is organized and implemented in a layered approach:

- Federal agencies with the authority and resources are responsible for coordinating and conducting SAR in the U.S. aeronautical and maritime SAR regions, as well as coordinating SAR operations with other nations;

(05/22/13) FEMA Federal US&R teams from Nebraska Task Force 1 continue search operations with local first responders in a ravine. A tornado destroyed many parts of the community on May 20, 2013. (Photo: Jocelyn Augustino/FEMA)

- States, Tribes, and Territories/Insular Areas coordinate and conduct SAR operations within their respective geographic areas of responsibility, coordinating their efforts with Federal and local SAR authorities;
- Local SAR authorities are the "tip of the spear," conducting SAR operations within their local jurisdictions and coordinating their efforts with other State and Federal SAR authorities, as appropriate; and
- Volunteers, Non-Governmental Organizations (NGOs), religious organizations, and commercial, aviation, and shipping industry SAR stakeholders are the "backbone" of the U.S. SAR system. These dedicated SAR professionals support the entire U.S. SAR system.

Figure 1-1-4: U.S. SAR System

The U.S. SAR System is based on the U.S. National Search and Rescue Plan (NSP), which assigns SAR responsibilities to Federal Agencies with the authority to conduct SAR operations.

National SAR Plan

The NSP, for which this Supplement provides additional guidance, is an executive, interagency agreement signed by the National SAR Committee (NSARC) member agencies (Appendix A).

The NSP focuses on the following four key concepts:

- Implements provisions of relevant conventions, standards, and recommended practices of ICAO, IMO, and other international organizations. In particular, both the SAR and Chicago Conventions require the establishment of a national SAR system with internationally-recognized aeronautical and maritime SAR coordination responsibilities;

- Includes provisions to satisfy national SAR requirements;
- Establishes the principle that SAR authorities should use "all available" resources, including Federal, STTIA, local, private, and volunteer resources, to assist persons in distress; and
- Serves as the primary implementing plan for the National Response Framework (NRF) Emergency Support Function (ESF) #9, for which the Federal government provides Federal SAR support to STTIA and local authorities.

(12/12/11) Rescue workers from the National Park Service and Townsend Volunteer Fire Department recover a pickup truck from the Little River, Tennessee, that plunged into the water, leaving the 48-year-old driver in critical condition. (Photo: NPS)

National SAR Supplement (NSS) to the IAMSAR Manual

This NSS provides guidance on the implementation of the NSP, as well as national-level information concerning the organization and implementation of the U.S. SAR system, in addition to the provisions in the *IAMSAR Manual*. The *IAMSAR Manual* and this NSS together are the primary, complementary references regarding implementation of the NSP.

(Note: This NSS does not contain specific policies, procedures, and information specific to a single Federal Agency, but provides general guidance information concerning the overall implementation of the U.S. SAR system in support of the NSP.)

Addenda to the NSS

NSARC has developed addenda to this Supplement to support specific types of SAR operations, including the:

- *Land SAR Addendum to the NSS*;
- *Catastrophic Incident SAR Addendum to the NSS*; and
- *Unmanned Aerial System (UAS) Search and Rescue (SAR) Addendum to the NSS.*

While these addenda are not policy that mandates specific NSARC member agency actions, they do provide invaluable guidance in the conduct of specific types of SAR operations.

(09/08/13) U.S. military personnel give emergency medical aid to an accident survivor whose vehicle had rolled over during a motor vehicle accident, Donnelly Training Area, Alaska. (Photo: Sgt. 1st Class Miguel A. Baltazar/Army)

NSARC member agencies are encouraged to develop agency-specific addenda to provide SAR information, policies, and procedures consistent with the provisions of the

IAMSAR Manual, NSP, and this NSS. For example, the U.S. Coast Guard promulgated the *U.S. Coast Guard Addendum to the NSS* that provides agency specific maritime SAR policies and procedures in support of the requirements of the *IAMSAR Manual*, NSP and this NSS.

Figure 1-1-5 provides an overview of U.S. national and international SAR organization guidance.

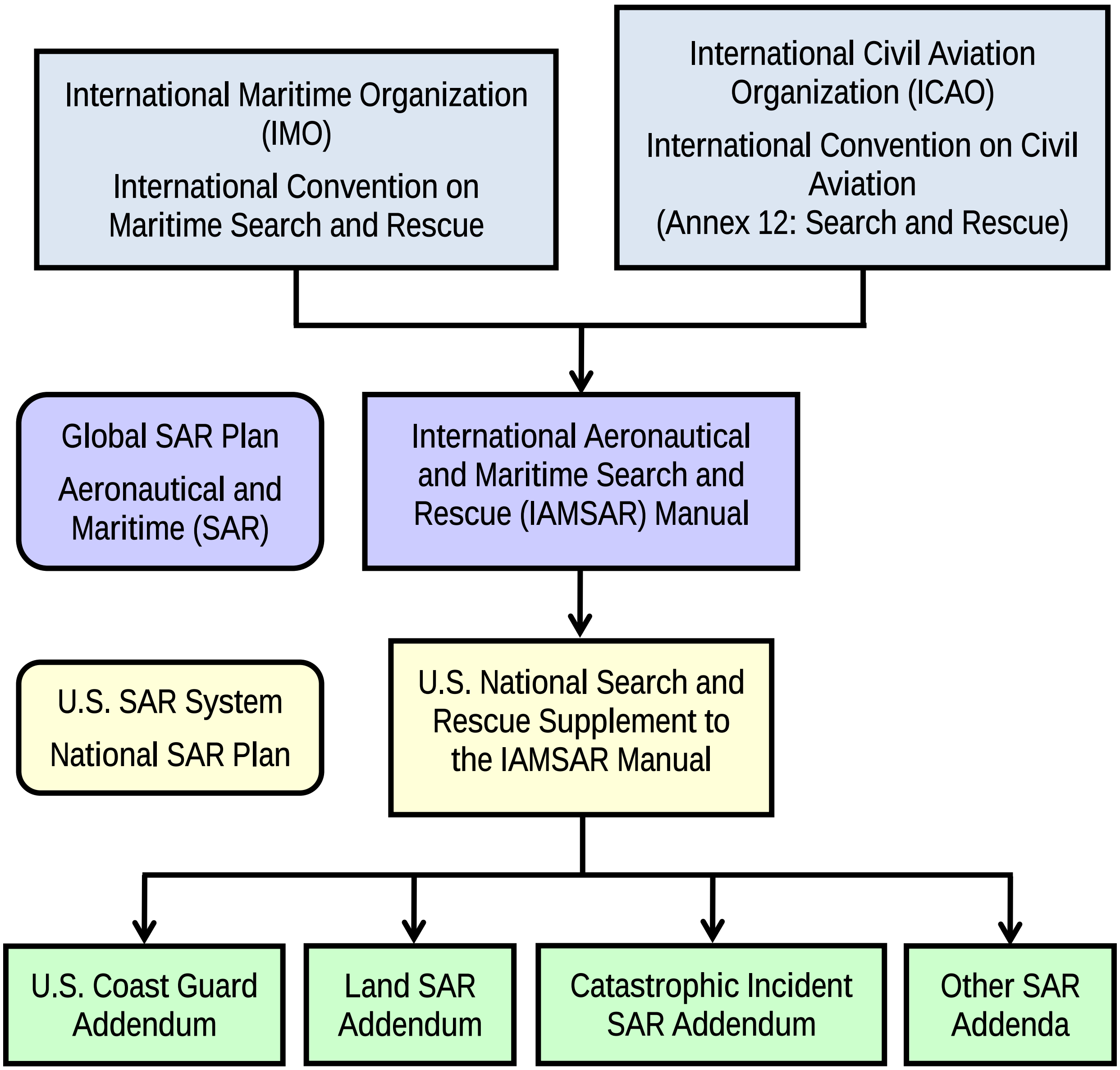


Figure 1-1-5: SAR Organizational Documents

Section 1-2: National SAR Committee (NSARC)

Overview

NSARC History

NSARC Member Agencies

NSARC Objectives and Responsibilities

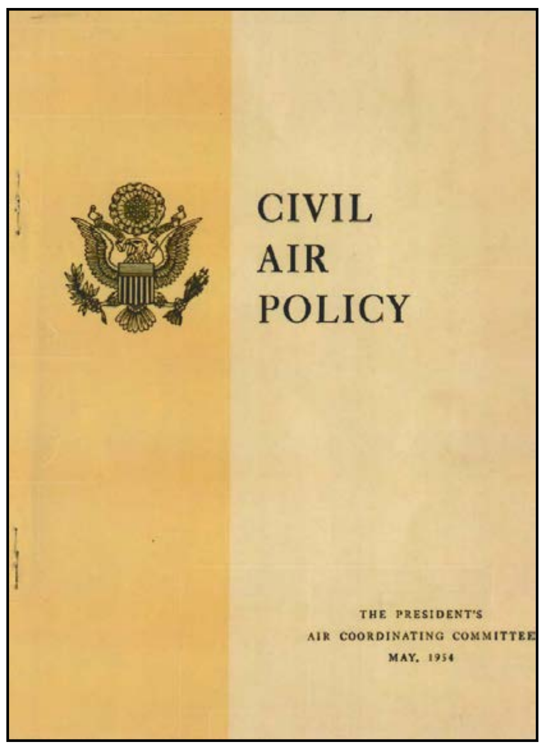
Overview

NSARC is the coordinating committee of Federal Agency representatives that share a common interest for the national support and improvement of U.S. civil SAR policy, procedures, effectiveness, and standardization. NSARC's purpose is to:

- Coordinate and provide guidance for the implementation of the NSP, consistent with applicable laws and executive orders; and
- Oversee the establishment and implementation of SAR services provided by Federal Agencies to meet domestic requirements and international commitments.

NSARC History

In 1954 under the direction of President Eisenhower, the Air Coordinating Committee released a report on Civil Aviation Policy indicating a need for the establishment of "…an overall search and rescue plan for effective utilization of all available facilities to include provisions for the control and coordination of all types of search and rescue missions." However, the report did not identify a responsible agency that would provide oversight for the administrative management of the plan.



The President's Air Coordinating Committee, *Civil Air Policy* (May, 1954)

During the National SAR Conference of 1973, participants recognized the administrative void and concluded that a permanent committee was required to oversee the administrative safeguarding of the NSP. This committee would also act as a coordinating medium for discussions involving national SAR related matters.

Acting upon the 1973 conference conclusion, the Secretary of Transportation, under DOT order 1120.28 of 21 May 1974 (Figure 1-2-2), established through a written inter-agency agreement the Interagency Committee on Search and Rescue (ICSAR).

DEPARTMENT OF TRANSPORTATION

Office of the Secretary

INTERAGENCY COMMITTEE ON SEARCH AND RESCUE (SAR)

Notice of Establishment

This notice announces the establishment of the Interagency Committee on Search and Rescue (SAR) under the sponsorship of the Commandant of the Coast Guard, Department of Transportation.

The purpose of the Committee is to oversee the National Search and Rescue Plan and to act as a coordinating forum for national search and rescue matters.

The Department Order establishing the Committee is set forth below.

This notice is issued under authority of sections 4 and 9, Department of Transportation Act, 49 U.S.C. 1653, 1657.

Issued in Washington, D.C. on May 21, 1974.

CLAUDE S. BRINEGAR,
Secretary of Transportation.

INTERAGENCY COMMITTEE ON SEARCH AND RESCUE

[DOT Order 1120.28]

MAY 21, 1974.

Notice of Establishment, Interagency Committee on Search and Rescue; Excerpt from the *Federal Register*, Volume 39, Number 14 – Wednesday, June 12, 1974

The title of the inter-agency SAR committee remained in effect from 1974 until 1999 when the inter-agency cooperation agreement was revised and the committee's name was changed to the "National Search and Rescue Committee" (NSARC).

NSARC Member Agencies

The following eight Federal Agencies (Figure 1-2-1) are signatories to both the NSP and the NSARC Interagency Agreement:

- Department of Homeland Security (DHS) – represented by the USCG and Federal Emergency Management Agency (FEMA);
- Department of Defense (DoD) – represented by the Office of the Under Secretary of Defense for Policy (ASD/(SO/LIC));
- Department of State (DOS) – represented by the Office of Ocean and Polar Affairs;
- Department of Transportation (DOT) – represented by the Federal Aviation Administration (FAA);
- Department of Commerce (DOC) – represented by the National Oceanic and Atmospheric Administration (NOAA);
- Department of Interior (DOI) – represented by the National Park Service (NPS);
- Federal Communications Commission (FCC); and
- National Aeronautics and Space Administration (NASA).

Further information on the NSARC member agencies can be found in Part 2.

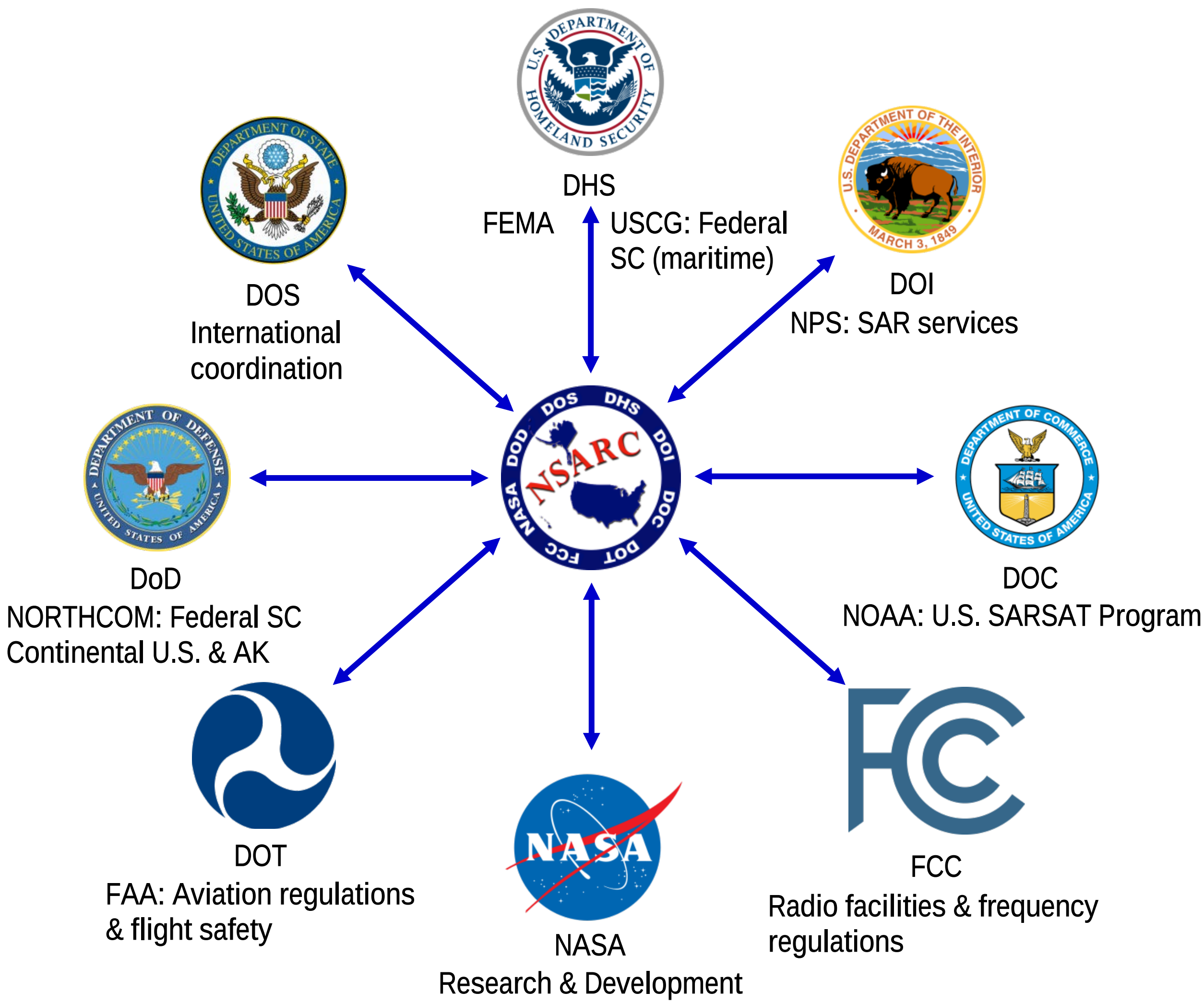


Figure 1-2-1: NSARC Member Agencies

NSARC Objectives and Responsibilities

NSARC's objectives and responsibilities include the following:

- Recommend implementation strategies and actions that ensure the United States meets domestic requirements and international commitments to provide effective SAR services;
- Responsibility for the provisions of the NSP;
- Serve as the primary coordinating forum within the Federal Government for the conduct and support of SAR operations under the NSP, and for matters relating to national SAR policies and positions;
- Develop and promulgate this NSS to the *IAMSAR Manual* for interagency guidance on implementing the NSP;
- Seek to ensure compatibility between the NSP and NRF so that the NSP can be implemented independently or concurrently with the NRF during the response to a catastrophic incident;

- Promote application of research and development, improved standards and procedures, new technologies, regulations, and education to improve the effectiveness and efficiency of distress alerting and other SAR services, and to reduce any associated risks;
- Help coordinate the SAR efforts of the NSARC member agencies with other national and international government, private, and volunteer organizations;
- Promote the effective use of all available resources to support SAR;
- Foster appropriate use of SAR agreements and other arrangements and plans to improve cooperation and mutual support among the various national and international SAR communities;
- Promote close cooperation among civil and military authorities and organizations for the provision of effective SAR services;
- Promote analysis and initiatives to help citizens avoid or cope with distress situations; and
- Consider, as appropriate, contingency plans for use of SAR resources in emergencies other than SAR.

(08/12/02) A Coast Guard Air Station Sitka helicopter crew airlifts a severely injured hiker from Coast Guard Cutter MUSTANG, Dundas Bay, Alaska. (Photo: Petty Officer Jorge M. Rullan/USCG)

Section 1-3: Olive SAR Model

Overview

Normal SAR

Mass Rescue Operations (MROs)

Catastrophic Incidents SAR (CISAR)

Overview

For planning purposes, the types of SAR operations identified in the NSP can be categorized into three categories as depicted in Figure 1-3-1 below.

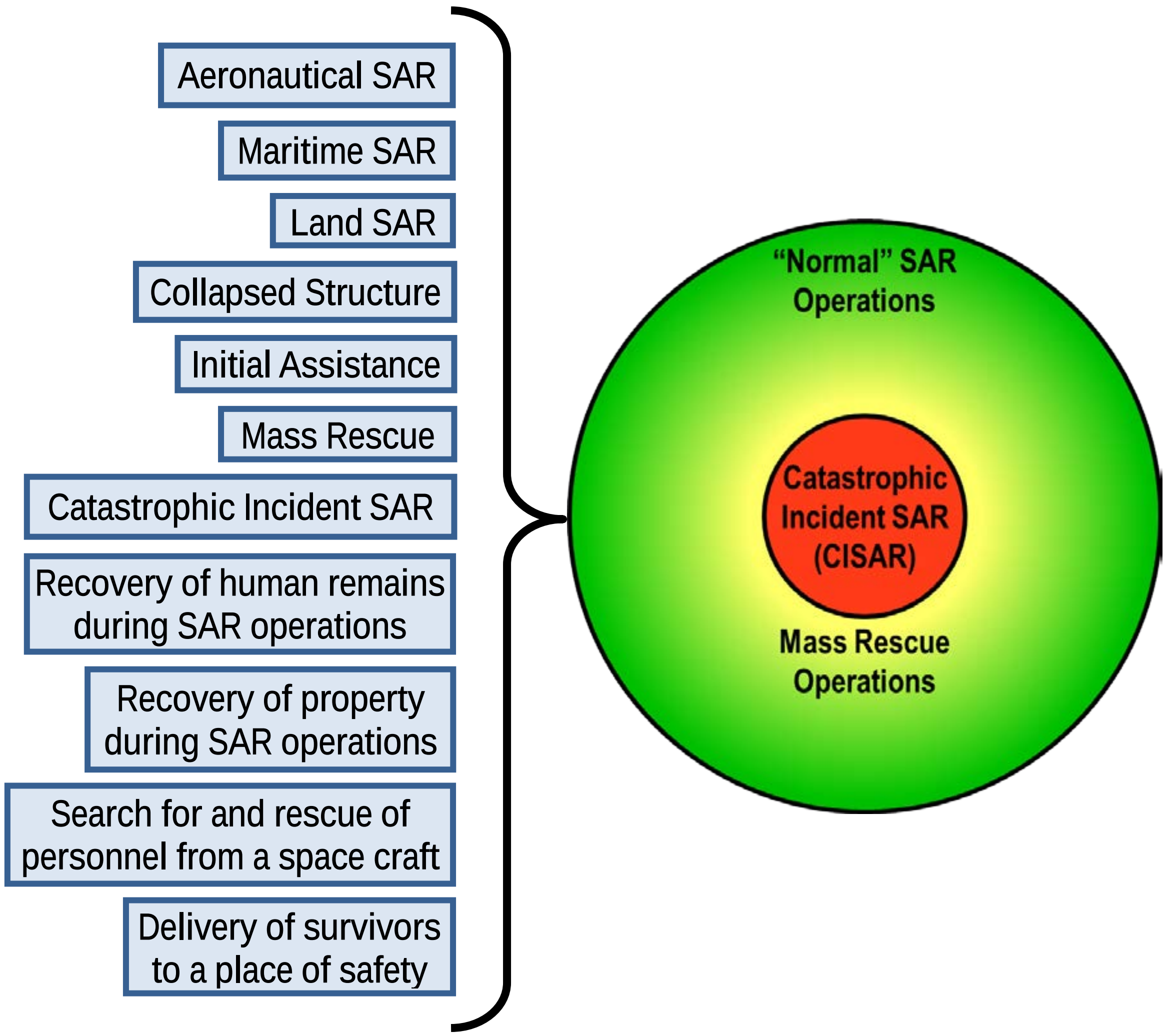


Figure 1-3-1: Types of SAR and Olive SAR Mode

"Normal" SAR Operations

Operations conducted every day through the established national SAR system.

"Normal" SAR are the thousands of operations coordinated and conducted every day by Federal, STTIA, and local SAR authorities and volunteers established under provisions of the NSP and other SAR plans. Most SAR operations other than mass rescue operations (MROs) are considered to be normal SAR, although they may involve a great variety of possible distress situations.

In support of these operations, NSARC developed the Land SAR Addendum for the coordination and conduct of land-based SAR operations; the Coast Guard maintains maritime SAR policy and operational guidance in the Coast Guard Addendum.

Mass Rescue Operations (MROs)

"MROs are characterized by the need for immediate response to large numbers of persons in distress, such that the capabilities normally available to SAR authorities are inadequate."

IAMSAR Manual

Comparable normal SAR operations, MROs are carried out under provisions of the NSP. An MRO requires SAR resources beyond those normally available to SAR authorities to rescue large numbers of persons in distress.

MROs are in response to transportation disasters (e.g., passenger aircraft, trains, ships, ferries, etc.)

MROs are further discussed in *Section 2-6: Mass Rescue Operations* and *Appendix E: Guidance for Mass Rescue Operations (COMSAR/Circ.31).*

(04/21/10) Fireboat response crews battle the blazing remnants of the off shore oil rig Deepwater Horizon, Gulf of Mexico. In the mass rescue operation, 110 lives were rescued. (Photo: U.S. Coast Guard Atlantic Area)

Catastrophic Incident SAR (CISAR)

"A catastrophic incident is defined as any natural or manmade incident, including terrorism that results in extraordinary levels of mass casualties, damage, or disruption severely affecting the population, infrastructure, environment, economy, national morale, and/or government functions."

National Response Framework

CISAR is also a type of SAR addressed by the NSP.

CISAR operations are normally conducted and associated with all or part of a response to an emergency or disaster declared, or likely to be declared and implemented under the *Robert T. Stafford Disaster Relief and Emergency Assistance Act* (Stafford Act). An emergency or disaster that involves a Stafford Act declaration may or may not involve the need for SAR operations, but if required, those operations are considered to be CISAR, regardless of how many people are in distress.

(08/28/05) Hurricane Katrina. (Photo: NASA/GSFC)

Because CISAR operations often involve several Federal SAR agencies assisting in the overall response to a disaster, NSARC developed specific additional guidance in support of these specialized, multijurisdictional/multiagency operations. The Catastrophic Incident SAR Addendum describes the Federal coordination and conduct of CISAR operations in support of STTIA and local governments requesting SAR assistance as requested under the Stafford Act.

Depending on the type of incident, severity, and whether it was a “notice” or “no notice” event, CISAR may involve a limited number of persons in distress or require the conduct of a large scale MRO.

In addition, SAR during a disaster may not be the main factor in making a Stafford Act disaster declaration. For some disasters, the declaration could be based on the need for assistance other than SAR, although CISAR may be a component of the overall response.

ESF #9 provides Federal Agencies with an overview of their CISAR responsibilities in a disaster response (Appendix C).

(01/14/10) Members of Fairfax County US&R Task Force conduct a rescue operation in a collapsed section of the Hotel Montana, Port-au-Prince, Haiti, during a search for survivors of a 7.0 magnitude earthquake. Eight people were rescued from the hotel rubble. (Photo: Chief Petty Officer Joshua Kelsey/USCG)

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Section 1-4: General SAR Principles

Due to the number of interagency relationships, types of SAR operations, mix of military and civilian SAR authorities, jurisdictions, agreements, emergency response systems involved, traditional practices, and the mix of international and national obligations, SAR responsibilities can be confusing.

A fully understood continuum of responsibilities is required among SAR agencies to avoid gaps in providing SAR services. For example, aeronautical SAR coordination responsibilities (e.g., the rescue of persons from an aircraft accident/incident) flow from the Federal to local SAR authorities, whereas land SAR responsibilities generally flow from local to Federal SAR authorities.

Table 1-4-1 provides general SAR principles that assist SAR managers in understanding the NSP, NRF, and related responsibilities and relationships among the various levels of government responsible for coordinating and conducting SAR operations.

Table 1-4-1: General SAR Principles
1. Persons in distress are assisted without regard to their nationality, status, or circumstances.
2. The governing and guiding SAR reference documents generally apply in descending order of precedence from international to local, but take into account National, State, Tribal, and Territorial/Insular Area sovereignty.
3. Jurisdictional and lifesaving concerns must be balanced: political, economic, jurisdictional, or other such factors should normally remain secondary when conducting lifesaving operations.
4. SAR plans and services in the United States emphasize cooperation and supporting relationships among agencies rather than legislation.
5. SAR responsibilities under the NSP are generally based on geography and utilize the international SAR system (SAR Mission Coordinator, On Scene Commander, Aircraft Coordinator, etc.) coordinated by an RCC/RSC. Land and CISAR operations are generally incident specific and utilize NIMS/ICS in which SAR is a component of the overall response.
6. Provisions of the NSP are intended to support fulfilling both legal and humanitarian SAR obligations.
7. Rather than establishing SRRs, the NSP recognizes already established international aeronautical SRRs for land SAR.
8. SRRs are established to help ensure adequate provision of SAR services and are not intended to obstruct prompt assistance to persons in distress.
9. SAR Coordinators are responsible for the administration and management of the SAR system within their respective SRRs, or other areas of responsibility (e.g., NPS coordinating and conducting SAR operations in national parks; States, Tribes, Territories/Insular Areas, and local SAR authorities coordinating and conducting SAR within their respective jurisdictions).

10. In accordance with the NSP, SAR Coordinators should delegate authority to the RCC/RSC to plan and coordinate SAR operations in recognition of the extensive expertise required for SAR and its extremely time-critical nature.
11. SAR relationships and responsibilities can be re-aligned or clarified by various types of agreements, as long as the agreements are consistent with higher level policies and guidance and the parties are the proper authorities that would be responsible for the issues identified.
12. Arrangements between Federal, military, and SAR authorities should provide for the fullest practicable cooperation, consistent with statutory authorities and individual agency mandates and responsibilities.
13. Aeronautical and maritime SAR in the U.S. internationally recognized SRRs must be organized and carried out in accordance with provisions that apply to the international SAR system.
14. The provisions of NIMS/ICS are applied as warranted by the nature of the operations and normal practices of the authorities involved in an emergency response.
15. Absent alternative arrangements, authorities fulfilling SAR responsibilities under the NSP generally do so at their own expense, and those fulfilling SAR obligations under Emergency Support Function (ESF) #9 can may be reimbursed.
16. When a presidential declaration authorizes actions to be implemented within the NRF, provisions of the NRF supplement rather than replace those of the NSP.

Table 1-4-2 provides additional general principles for STTIA and local SAR authorities in the coordination of SAR services:

Table 1-4-2: General Principles for States, Tribes, Territories/Insular Areas (STTIA), and Local Authorities Concerning SAR Responsibilities
1. While identified in the NSP, STTIA and local SAR authorities are not held responsible for its requirements.
2. When States, Tribes, Territories/Insular Areas, and local authorities request Federal SAR assistance, they should coordinate that assistance through prearranged agreements, or through the Mission Assignment (MA) process under ESF #9.
3. States are not responsible for the actions necessary to comply with international SAR treaties, guidance, and agreements.
4. STTIA and local SAR authorities will generally retain SAR responsibilities within their jurisdictions for incidents primarily local or intrastate in character. In such cases, appropriate agreements are generally made between Federal SAR Coordinators and relevant State SAR authorities to coordinate the use of requested Federal SAR assistance.
5. STTIA and local SAR authorities are generally responsible for land-based SAR and normally accept these responsibilities through legislation, plans, agreements and other means, and are encouraged to designate a person to serve as SAR Coordinator to oversee SAR services.
6. States should develop cooperative arrangements with other SAR authorities (e.g., Federal, military, STTIA, local and volunteer SAR responders) and encourage collaborative planning efforts to ensure that SAR services can be effectively provided within their area of responsibility.

Section 1-5: SAR Coordination Systems

International SAR System

The international SAR system, as identified in the *IAMSAR Manual*, is implemented through the RCC/RSC and is based on responsibilities assigned to a specific SRR. Figure 1-5-1 provides an overview of the international SAR system general responsibility levels.

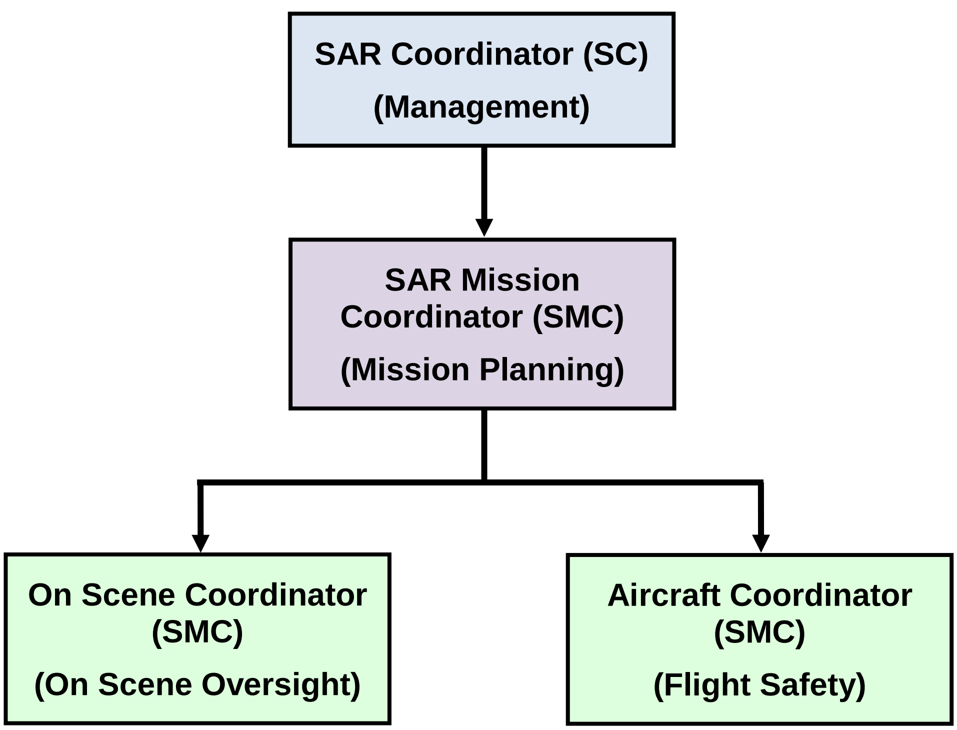

Figure 1-5-1: Overview: International SAR System

Under the international SAR system, SAR resources on scene are typically coordinated by an On Scene Coordinator (OSC) supporting the SMC/Incident Commander (IC) by implementing the SMC/IC's SAR Action Plan, coordinating SAR facilities on scene, ensuring safety, providing reports to the SMC, etc.

For example, when a Coast Guard RCC is notified of a mariner in distress at sea, the Coast Guard will normally coordinate the SAR operation using the international SAR system via an RCC/RSC. Further information on the international SAR system positions and responsibilities can be found in Section 1-7.

(09/18/04) Coast Guard Petty Officer 3rd Class Aaron Raines, Aviation Training Center Mobile, comforts an elderly women in critical condition during a rescue flight from a church in Monroeville, AL. (Photo: Petty Officer Mike Lutz/USCG)

National Incident Management System (NIMS)/Incident Command System (ICS)

The *National Incident Management System* (NIMS) provides a systematic, proactive approach to guide departments and agencies at all levels of government, nongovernmental organizations, and the private sector to work seamlessly to prevent, protect against, respond to, recover from, and mitigate the effects of incidents, regardless of cause, size, location, or complexity, in order to reduce the loss of life and property and harm to the environment. NIMS provides the template for the management of incidents, while the NRF provides the structure and mechanisms for national-level policy for incident management.

The components of NIMS are adaptable to any situation, from routine, local incidents to incidents requiring the activation of interstate mutual aid to those requiring a coordinated Federal response, whether planned (e.g., major sporting or community events), notice (e.g., hurricane) or no-notice (e.g., earthquake). This flexibility is essential for NIMS to be applicable across the full spectrum of potential incidents, including those that require multiagency, multijurisdictional (such as incidents that occur along international borders), and/or multidisciplinary coordination. Flexibility in the NIMS framework facilitates scalability of emergency management and incident response activities. NIMS also provides the flexibility for unique implementation in specified areas around the Nation.

NIMS/ICS emphasizes:

- A single set of objectives;
- A collective, strategic approach;
- Optimizing information flow and coordination;
- Understanding joint priorities;
- Respecting legal authorities and jurisdictions; and
- Maximizing probability of success under a single plan.

For SAR operations in particular, the international SAR system is geographically based, with SAR operations coordinated by an SMC in an RCC or RSC; SAR operations conducted under NIMS/ICS, however, are incident specific and designed for use in *any* type of emergency response.

NIMS/ICS and SAR

When NIMS/ICS is implemented, the SMC/IC function will be placed under the umbrella of the NIMS/ICS organizational structure. Typically, the SAR Branch Director or SAR Group Supervisor is placed in the Operations Section, where the SAR response is integrated into the ICS (Figure 1-5-2). The SAR response may also require the designation of an OSC and/or Aircraft Coordinator (ACO) to assist managing SAR resources.

In some cases, the person serving as IC may also be designated as the SMC.

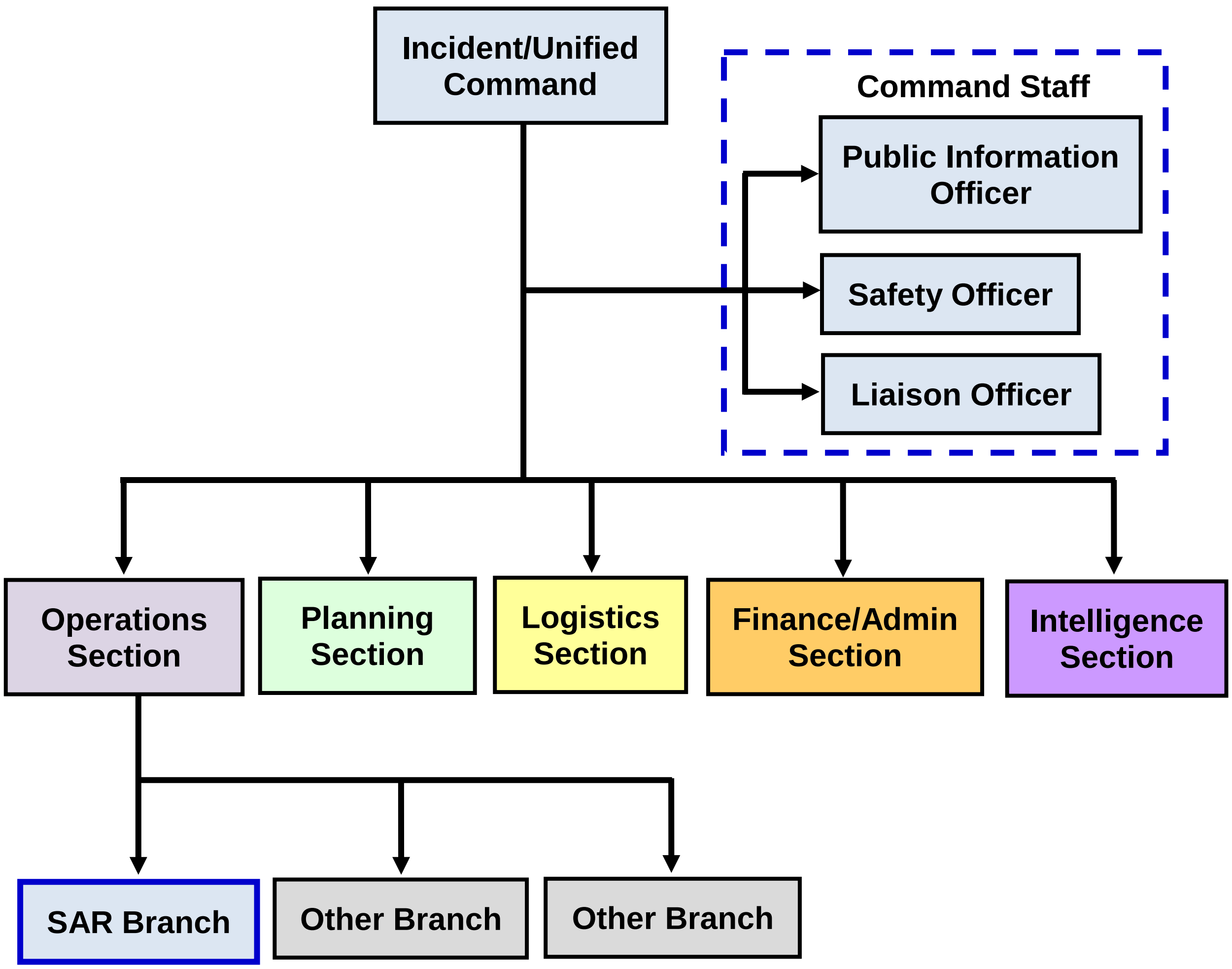

Figure 1-5-2: Incident Command with SAR Branch

International SAR System – NIMS/ICS Comparison

- The international SAR system will normally be utilized to coordinate and conduct SAR operations in the U.S. maritime SRRs and in coordination with other international SAR authorities. Most emergency responders, especially for land SAR, rarely need to know about or use the international SAR system (a possible exception may be an SMC/IC handling a major or international aeronautical or maritime SAR case);
- The international SAR system, based on the *IAMSAR Manual*, is used worldwide, while NIMS/ICS, as a command and control system that originated in the United States, is less well known and adopted outside the United States;
- The international SAR system is primarily used to coordinate and respond to persons in distress; NIMS/ICS can be utilized for any type of emergency, including SAR;
- The SMC in an RCC is normally responsible for coordinating the SAR response under the international SAR system, while an IC (with or without the support of an SMC) would be responsible when NIMS/ICS is used;
- Both the international SAR system and NIMS can accommodate distress incidents of any size;
- The international SAR system uses ICS to supplement international procedures as appropriate, whereas NIMS uses ICS consistently along with the international SAR system as appropriate; and
- The international SAR system and ICS are mutually compatible.

When should the international SAR system or NIMS/ICS be used to coordinate SAR operations?

- In the U.S., when an RCC/RSC is not coordinating the overall SAR response, NIMS/ICS will normally be used to coordinate a SAR operation.
- For aeronautical and maritime SAR operations coordinated by an RCC/RSC, the international SAR system will normally be used. However, for large scale SAR operations (e.g. mass rescue) it may be advantageous to use NIMS/ICS shore side to coordinate survivor logistics, public affairs, transportation, medical services, etc.
- When an RCC/RSC is coordinating SAR operations with another nation, the international SAR system will normally be used.
- When SAR responders are conducting SAR operations in another nation, normally that nation's emergency response system, or the international SAR system, will be used.

International SAR System and NIMS/ICS: Working Together to Save Lives

Sometimes SAR responders not familiar with both the international SAR system and NIMS/ICS conclude that one or the other should be abandoned. However, for both legal and practical reasons this cannot and should not be done. The international SAR system and NIMS/ICS are fully compatible and work well in combination.

For example, when a disaster is declared by the President and CISAR operations are conducted under the NRF's ESF #9, the NSP still applies, and the provisions of the NRF (and NIMS) come into play as additional (but compatible) requirements.

This process essentially takes the international SAR system and plugs it into NIMS by linking it with one or more appropriate SAR representatives supporting the IC in the Operations Section of the Incident Command.

SAR personnel can perform functions such as supporting the IC, serving as the IC's liaison with the international SAR system, helping to coordinate use of resources for the overall response (typically with priority given to lifesaving), and requesting support for SAR from the IC without significantly changing the way either the international SAR system or NIMS operates. Often one of these SAR personnel can serve as the SAR Branch Director or SAR Group Supervisor for the IC within the command structure.

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Section 1-6: International SAR System: U.S. Organization

Introduction

IAMSAR Manual (Volume 1) discusses the global SAR system concept and the establishment of national SAR systems.

SAR operations conducted under the international SAR system are geographically based with the United States having responsibility for coordinating SAR operations in the U.S. internationally recognized aeronautical and maritime SRRs (Appendix B). By comparison, Federal responsibilities for other types of SAR (e.g., land, US&R, CISAR, etc.) are event specific and coordinated under NIMS/ICS.

Federal SAR Coordinator (SC)

SC roles and responsibilities are detailed in the *IAMSAR Manual (Volume 1)* and the NSP.

A SC is a Federal person or agency with overall responsibility for establishing and providing SAR services for a U.S. SRR. The SC is an executive-level responsibility; as such, leaders and managers who have SC responsibilities are normally not personally involved in actual SAR coordination or provision of SAR services for ongoing SAR operations.

As identified in the NSP, the United States has two Federal SCs (Figure 1-6-1):

(08/05/13) Coast Guard rescue swimmer deployed into the water from a Coast Guard MH-65 Dolphin helicopter to search for two missing boaters from a capsized catamaran, 30 miles east of Ocean City, Maryland. (Photo: USCG)

National SAR Plan

Federal SAR Coordinators

U.S. Northern Command

Federal SAR Coordinator for the aeronautical SAR regions corresponding to the continental U.S. and Alaska

U.S. Coast Guard

Federal SAR Coordinator for all other U.S aeronautical and maritime SAR regions. This includes the State of Hawaii as well as waters over which the U.S. has jurisdiction, such as the navigable waters of the U.S.

Figure 1-6-1: Federal SAR Coordinators (SCs)

SC responsibilities include establishing, managing, and operating RCCs, as well as providing or arranging for the provision of SAR services within the SC's respective SRRs. SC duties are described in Figure 1-6-2 below:

SAR Coordinator (Management)

One or more persons or agencies within an Administration with overall responsibility for establishing and providing SAR services and ensuring that planning for those services is properly coordinated. SC responsibilities include:

- Establish, staff, equip, and manage the SAR system
- Provide appropriate legal and funding support
- Provide or arrange for SAR facilities and SAR resources
- Coordinate SAR training and exercises
- Promulgate SAR policies and supporting documents

Figure 1-6-2: SAR Coordinator (SC) Duties

In addition to the designated Federal SCs, the NSP also affirms the SAR responsibilities of the National Park Service and each State, as detailed in Figure 1-6-3 below:

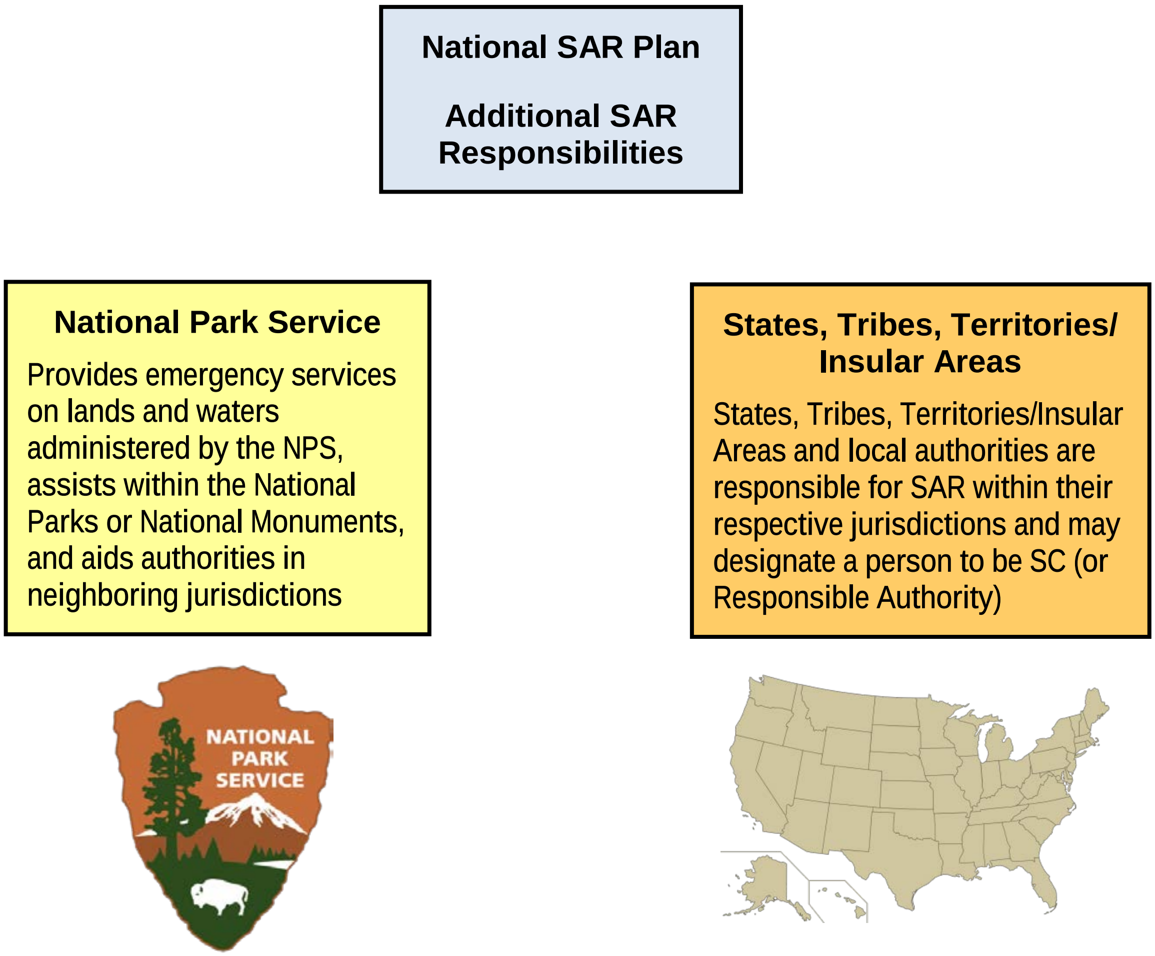

Figure 1-6-3: National Park Service and State SAR Responsibilities

SAR Mission Coordinator (SMC)

Under the international SAR system, the SMC is the person designated and responsible for coordinating a specific SAR operation under the SC's operational authority.

For aeronautical and maritime SAR operations, the SMC provides oversight and supervision to the RCC in the planning, conduct, and coordination of an ongoing SAR operation.[1] All SAR missions coordinated through an RCC should have a designated SMC, either on a case-by-case basis, or in accordance with standing procedures.

Handoff of the SMC function to other persons for a particular incident should be

[1] For CISAR and land SAR operations where an IC is established, the SMC functions must be closely coordinated in the Operations Section of the IC, as discussed in the CISAR and Land SAR Addenda.

kept to a minimum. The SMC must use good judgment to modify, combine, or bypass SAR stages and procedures to cope with unique, unusual, or changing circumstances.

SMC duties may be provided by an agency other than the SC's organization when that agency is in a better position to coordinate a particular SAR operation. Any agency likely to be assigned SMC functions should ensure that responsible personnel are properly identified, trained, and that adequate communications capability is maintained.

As detailed in Section 1-6, the role of SMC can be utilized in the NIMS/ICS system to coordinate SAR operations as part of an overall response effort. The SMC would normally be in the SAR Branch of the Operations Section.

SMC responsibilities for a particular SAR operation may be divided geographically with other SAR authorities when appropriate. The involved SMCs must ensure that the operation is closely and effectively coordinated.

Specific SMC duties are described in Figure 1-6-4 below.

SAR Mission Coordinator

(Mission Planning)

Official temporarily assigned to coordinate the response to an actual or apparent distress situation. SMC duties include, but are not limited to:

- Obtain and evaluate emergency data
- Plot search areas and develop search action plans
- Coordinate activities with other RCCs/IC, as appropriate
- Evaluate incoming reports, modify action plan as appropriate
- Issue progress reports
- Coordinate logistics support for SAR assets
- Coordinate SAR reporting activities
- Prepare final results reports

Figure 1-6-4: SAR Mission Coordinator (SMC) Duties

On-Scene Coordinator (OSC)

The *IAMSAR Manual (Volume 3)* provides guidance for the OSC.

Note: Specific guidance for land SAR OSCs is provided in the Land SAR Addendum.

The SMC designates an OSC to manage SAR operations at the scene when two or more SAR units are working together on the same mission. The OSC is usually the best qualified person or unit available on scene. In such cases the SMC must assess and take into account the OSC's capabilities when assigning OSC duties.

The OSC may be assigned by name or position, or a particular SAR facility may be named as OSC for a SAR operation. An OSC is not required for all operations, although one is usually assigned if two or more facilities on scene are involved in SAR operations.

An OSC should be designated if by doing so it improves on-scene coordination. If an OSC is not designated, the first facility on scene should assume OSC duties and advise the responsible RCC. An advanced staging base may serve as an OSC to relieve a SAR facility of that burden.

The OSC should be the most capable person, facility, or other unit available, taking into consideration SAR training, communications capabilities, and the length of time that the facility can stay in the search area.

An OSC conducts the SAR mission on scene using SAR facilities made available by the SMC, implementing the search or rescue action plan. If the SMC does not provide a sufficient action plan, the OSC should develop a plan and notify the SMC. The OSC retains OSC responsibilities from the time of designation until relieved or until the mission is completed.

Multiple OSCs may be assigned, especially when the search area is large and can be divided for OSC assignments.

OSCs should have adequate available resources and, if possible, be familiar with the *IAMSAR Manual (Volume 3)* and this Section. However, the OSC function may need to be performed by a unit of opportunity that is not familiar with these documents.

For best continuity of operations, OSCs should be able to remain on scene for an extended duration and be capable of communicating with all on scene facilities and the SMC.

Large fixed-wing SAR aircraft make excellent OSC platforms because of their communications capabilities, on-scene endurance, and adequate space for planning, plotting, and coordination duties. For extended searches, the flight crew should be augmented to assist with OSC (or ACO) duties.

In the maritime environment, merchant ships, Coast Guard cutters and Navy vessels make excellent OSC platforms. A suitable ground facility may serve as an OSC if communications and adequately trained personnel are available.

OSC duties are further described in Figure 1-6-5 below.

On Scene Coordinator
(On Scene Oversight)
→

Person designated to coordinate SAR operations within a specified area. Duties which the SMC may assign to the OSC include any of the following:

- Assume operational coordination of SAR facilities on scene
- Receive and implement the search action plan
- Modify the search action plan based on prevailing conditions; keep SMC advised of any changes to the plan (in consultation with the SMC, if possible)
- Provide relevant information to the other SAR facilities
- Monitor the performance of other search units

Figure 1-6-5: On Scene Coordinator (OSC) Duties

Aircraft Coordinator (ACO)

The *IAMSAR Manual (Volumes 2 and 3)* discuss ACO duties and responsibilities. The purpose of the ACO (normally designated by the SMC or OSC) is to maintain flight safety and to assist in the coordination of aircraft in the conduct of a SAR operation.

Generally, the ACO is responsible to the SMC; however, ACO duties on scene must be closely coordinated with the OSC. If there is no SMC or OSC, then the ACO should remain in overall charge of the on scene operation.

It is important to note that the ACO is a cooperating, supporting, and advisory service. In complex SAR operations, it may be prudent to split on scene coordination responsibilities between a surface OSC and an ACO. Assignment of an ACO may be appropriate when there are no communications links between the OSC and participating aircraft.

As discussed in the *CISAR Addendum*, for CISAR operations, the ACO should be located within the Incident Command, either with the SMC, or in the Operations Section Air Support Group.

ACO duties are further described in Figure 1-6-6 below.

Aircraft Coordinator (ACO)

(Flight Safety)

A person or team who coordinates the involvement of multiple aircraft SAR operations in support of the SMC and OSC. Duties the SMC may assign to the ACO include:

- Coordinate airborne resources in a defined geographical area;
- Maintain flight safety – issue flight information;
- Organize flow planning (i.e., point of entry; pint of exit);
- Prioritize and allocate tasks;
- Coordinate the coverage of search areas;
- Coordinate safety of flight for SAR aircraft; and
- Make consolidated situation reports to the SMC.

Figure 1-6-6: Aircraft Coordinator (ACO) Duties

OSC/ACO Duties and Authority

OSCs and ACOs have full operational authority of the SMC, and together coordinate SAR facilities on scene. The parent agency retains operational control of a SAR facility en route to and from the scene.

If an agency must withdraw a SAR facility from a mission, it should advise the SMC as early as possible to ensure suitable reliefs can be dispatched to maintain adequate on scene resources.

In addition to duties discussed in the *IAMSAR Manual*, OSCs, and ACOs should normally:

- Establish and maintain communications with SAR facilities using assigned on-scene frequencies;

- Establish a common altimeter setting for on scene aircraft;
- Obtain information from arriving facilities, provide initial briefing and search instructions, and provide advisory air traffic service for maintaining aircraft separation;
- Receive and evaluate sighting reports, and divert facilities to investigate sightings;
- If the OSC must depart, consult with the SMC if practicable, and shift OSC duties to the remaining facility best able to perform OSC duties; and
- Submit situation reports to the SMC at regular intervals. The first situation report should be submitted immediately upon arrival on scene or upon assuming OSC.

Frequent changes in OSC or ACO assignment are not desirable. Any individual arriving on scene that is senior to the OSC or ACO should normally not assume those duties without SMC concurrence. If the senior person concludes that such a change is important to mission success, or if the OSC/ACO requests to be relieved and the SMC concurs, a change may take place. The relieved OSC or ACO should report the relief to the SMC.

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Section 1-7: Rescue Coordination Centers (RCCs) and Rescue Sub-Centers (RSCs)

Rescue Coordination Centers (RCCs)/Rescue Sub Centers (RSCs)

RCC Coordination Principles and Responsibilities

RCC Communications

RCC Watchstander

Rescue Coordination Centers (RCCs)/Rescue Sub Centers (RSCs)

As detailed in the *IAMSAR Manual (Volume 1)*, the RCC is internationally recognized as the operational facility with the responsibility for promoting efficient organization of SAR services and for coordinating the conduct of SAR operations within an SRR. To the extent practicable, aeronautical, maritime, and land SRRs should be geographically aligned. SRRs that are geographically harmonized should ideally be served by a *Joint RCC* (JRCC), i.e., an RCC responsible for more than one type of SAR.

Air Force Rescue Coordination Center (AFRCC), Tyndall Air Force Base, Florida (Photo: AFRCC/USAF)

Many nations either do not have their SRRs aligned to facilitate use of JRCCs, or for other reasons have separate RCCs, such as an aeronautical RCC (ARCC) and a maritime RCC (MRCC) serving the same SRRs.[2]

The RSC is internationally recognized as a facility established where the RCC cannot exercise direct and effective control over SAR facilities in remote areas, or where local facilities can be directed only through local authorities. There are two RSCs in the United States, both are operated by the Coast Guard: RSC San Juan, within the Coast Guard Seventh District and RSC Guam, within the Coast Guard Fourteenth District.

The Coast Guard maintains nine RCCs and two RSCs that are internationally recognized as JRCCs that coordinate aeronautical and maritime SAR operations in the U.S. SAR regions in the Pacific and Atlantic Oceans and Gulf of Mexico. U.S. Northern Command is responsible for the administration, management, and oversight of two aeronautical RCCs corresponding to the continental United States and Alaska.[3] Table 1-7-1 lists the U.S. RCCs and RSCs.

[2] This NSS will use the general term "RCC" for JRCCs, ARCCs, MRCCs, and RSCs.

[3] In addition to aeronautical SAR, the AFRCC and AKRCC also coordinate some types of land SAR operations as detailed in the *Land SAR Addendum*.

U.S. RCCs and RSCs
JRCC Boston
JRCC Norfolk
JRCC Miami
JRSC San Juan
JRCC New Orleans
JRCC Cleveland
JRCC Alameda
JRCC Seattle
JRCC Juneau
JRCC Honolulu
JRSC Guam
ARCC Langley ("AFRCC")
ARCC Elmendorf ("AKRCC")

Table 1-7-1: U.S. RCCs and RSCs

RCC Coordination Principles and Responsibilities

While not all-inclusive, the following are internationally recognized RCC coordination principles and responsibilities:

- The RCC that receives a distress alert will normally assume SMC and coordinate the SAR response.
- There may be times when the first RCC to receive the distress alert will not be the responsible RCC, such as when the distress is in another SRR.

(Note: The IAMSAR Manual (Volume 2) details the "first RCC" principle: The RCC affiliated with the shore station that first acknowledges a distress alert should assume responsibility for all subsequent SAR coordination until responsibility is accepted by another RCC better able to take action and coordinate a response.)

- When the position of a person or craft in distress is known, the RCC in whose SRR the distress is located should assume SMC.
- The RCC affiliated with an *alerting post*[4] that first acknowledges a distress alert should assume responsibility for all subsequent SAR coordination until responsibility is accepted by another RCC better able to take action.
    - If it is not immediately clear which RCC has become the first RCC because more than one alerting post has acknowledged the alert, the RCCs concerned should, as soon as possible, agree which is to become the first RCC to ensure the distress is acted upon properly.
- If, for any reason, the responsible RCC informs the first RCC that it cannot assume SMC, the first RCC should, until the responsible RCC makes alternative arrangements, retain SMC, maintain communications with the person(s) or craft in distress, alert shipping or aircraft in the vicinity of the distress, and seek assistance from other RCCs, if appropriate.
- If the location of a person or craft in distress is outside an established SRR, the first RCC should assume SMC. If another RCC appears better able to assume SMC, inform that RCC of the alert and request it to assume SMC.
- When it is likely that other RCCs have received alerts from the same person or craft in distress, any RCC receiving an alert should assume SMC until coordination with the other RCCs can

[4] An alerting post is any facility intended to serve as an intermediary between a person reporting an emergency and a RCC/RSC.

take place and the appropriate RCC assumes responsibility.

(04/12/12) RCC Honolulu, Hawaii. The RCC is responsible for coordinating SAR operations for 14.2 million square miles of open ocean, atolls, and island nations.

- When the RCC that assumed SMC recognizes that a distressed craft is continuing its flight or voyage and may leave the SRR for which it is responsible, it should take the following actions:
    - Alert the RCCs associated with the planned or intended route of the distressed craft and pass all available information;
    - Continue coordination of the SAR operation until notified by an adjacent RCC that the distressed craft has entered its SRR and has assumed SMC;[5] and
    - Remain available to support the response until informed that assistance is no longer required.
- When the position of a person or craft in distress is unknown, the RCC that assumed SMC should consult adjacent RCCs along the craft's route to determine if another RCC would be more suitable to assume SMC for the response. Unless otherwise agreed, the RCC that should assume SMC should be determined as follows:
    - If the last reported position of the person or craft in distressed falls within an SRR, the RCC responsible for that SRR should assume SMC for coordinating the response;
    - If the last reported position of the person or craft in distress falls on the line separating two adjacent SRRs, the RCC responsible for the SRR toward which the distressed craft was proceeding should assume SMC; or
    - If the person or craft in distress was not equipped with suitable two-way radio communication, or not under obligation to maintain radio communication, the RCC responsible for the SRR containing the distressed craft's intended destination should assume SMC.

RCC Communications

The *IAMSAR Manual (Volume 1)* discusses RCC communications equipment and procedures. Effective communications are vital to the ability of an RCC to become aware of a distress situation and coordinate the response. The following general requirements for RCC communications equipment are provided below:

- Communications linking SAR facilities should be rapid, reliable, and redundant;
- Communications should access major military commands, adjacent RCCs, SAR facilities, other agencies that can supplement SAR resources, Air Traffic Control (ATC), military air/ground stations and communications centers, coast radio stations (CRSs), SARSAT

[5] When an RCC transfers SMC of a SAR case to another RCC or RSC, the transfer should be documented in the RCC/RSC log.

U.S. Mission Control Center (USMCC), other alerting posts, and regional weather, radar, and direction-finding (DF) stations, as required;

- Communications, including RCC telephones, should have recording functions with a timing capability to archive voice and data so the RCC/RSC can review and, if necessary, resolve questions or disputes about information received. Archived information should be retained in accordance with agency directives.

(10/26/00) A Coast Guard rescue crew attempts to free a man from a plane wreck, Kodiak, Alaska. (Photo: USCG LT. Eric Gandee/USCG)

RCC Watchstander

RCC watchstanders should be properly trained, qualified, certified, and be fully competent to perform SAR coordination duties unless he or she is assisting or being trained by a qualified person who is also on watch.

All watchstanders should be thoroughly familiar with the *IAMSAR Manual*, NSP, this NSS and addenda, local SAR plans, and available communications capabilities for SAR operations.

Watchstanders should maintain an effective and efficient RCC watch and be able to rapidly perform all SAR coordination duties, often without complete information. Additionally, knowledge is required of SAR communications, means of preventing false alerts, ship reporting systems, radio medical services, International Code of Signals, Standard Marine Communication Phrases, and the English language.

(08/24/11) Personnel from FEMA and other Federal Agencies work side-by-side in FEMA's National Response Coordination Center, helping manage preparations for Hurricane Irene, Washington, D.C. (Photo: Aaron Skolnik/FEMA)

Section 1-8: National Incident Management System (NIMS)/Incident Command System (ICS)

SAR Mission Management

National Indent Management System (NIMS)

Incident Command System (ICS)

Incident Commander (IC)

Incident Command Post (ICP)

NIMS and CISAR Operations

SAR Mission Management

Aeronautical and maritime SAR missions coordinated by an RCC/RSC normally use the international SAR system for command and control, as discussed in Section 1-7 and the *IAMSAR Manual*. However, for land-based or CISAR operations, NIMS/ICS is the preferred method of coordinating a SAR operation, especially when the SAR response is only one component of the overall incident response (e.g., natural disasters).

(09/16/13) Morning briefing for US&R teams at Boulder Airport, Boulder, Colorado. US&R teams assisted in the Colorado Flood response. (Photo by Michael Rieger/FEMA)

National Incident Management System (NIMS)

The *National Response Framework (NRF)* guides how the nation conducts all−hazards incident management, and is particularly relevant to CISAR operations as discussed in the CISAR Addendum. Homeland Security Presidential Directive (HSPD) – 5 requires Federal Departments and Agencies to adopt the *National Incident Management System* (NIMS) in their individual incident management programs and activities, as well as in support of all actions taken to assist STTIA and local governments.

NIMS is a system that provides a proactive approach in guiding Federal, STTIA, and local governments, the private sector, and nongovernmental organizations to work seamlessly to prepare for, prevent, respond to, recover from, and mitigate the effects of incidents, regardless of cause, size, location, or complexity, in order to reduce the loss of life or property and harm to the environment.

NIMS enables unity of command to be effective in coordination and management of an incident. It provides standard command

and management structures that apply to incident response. This common system enables responders from different jurisdictions and disciplines to work effectively together in response to natural disasters and other emergencies.

NIMS may be viewed as an expanded ICS or type of ICS, but while ICS is used in various forms by other countries, NIMS is currently used only within the United States.

NIMS supports a response through the following elements of unified command:

(1) Developing a single set of measurable objectives;

(2) Using a collective, strategic approach;

(3) Improving information flow and coordination;

(4) Creating common understanding of joint priorities and restrictions;

(5) Ensuring that no agency's legal authorities are compromised or neglected; and

(6) Optimizing the combined efforts of all agencies under a single plan.

These elements make NIMS particularly suitable for use with most CISAR operations, and possibly large-scale MROs. It is important that SAR personnel, especially RCC/RSC staff, be trained sufficiently to use NIMS when required.

Incident Command System (ICS)

Depending on the situation (i.e., incident duration, type of response, location, potential for pollution, etc.), use of the *Incident Command System* (ICS) may be appropriate.[6]

ICS is an important element across multijurisdictional/multiagency incident management activities. It provides a structure to enable agencies with different legal, jurisdictional, and functional responsibilities to coordinate, plan, and interact effectively on scene. As a team effort, a unified command allows all agencies with jurisdictional authority and/or functional responsibility for the incident to provide joint support through mutually developed incident objectives and strategies established at the command level.

(08/27/13) Rescue workers in Grand Teton National Park tend to a climber after he was caught in a rockslide in Garnet Canyon, Wyoming. (Photo: Jenny Anzelmo-Sarles/NPS)

As a management system, ICS is designed to enable effective incident management by integrating a combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure, in order to effectively manage resources during an incident. It is used for all kinds of emergencies and is applicable to small as well as large and complex incidents, regardless of whether SAR operations are involved. ICS is used by various jurisdictions and functional agencies, both public and private, to organize field-level incident management operations.

ICS is based upon a flexible, scalable response organization providing a common

[6] ICS is discussed in *IAMSAR Manual (Volume 2).*

framework within which personnel from multiple agencies can work together effectively. ICS is designed to give standard response and operation procedures to reduce the problems and potential for miscommunication on such incidents.

How does NIMS/ICS "mesh" with the International SAR System?

If SAR operations are a subset of a larger scale emergency response (especially when involving multiple jurisdictions and authorities) where ICS is being used, the SMC may consider operating under the overall coordination of, or even serve as IC.

In such cases, the SAR system should coordinate its activities in accordance with the *IAMSAR Manual*, this NSS, and other pertinent directives, but, in addition, should work within the NIMS parameters with respect to the IC and facilities performing emergency response activities other than SAR.

Incident Commander (IC)

Under NIMS/ICA, the *Incident Commander* (IC) is the person responsible for all aspects of an emergency response. IC duties may include developing incident objectives, managing incident operations, and application of resources, as well as responsibility for all persons involved in the response. If an IC is assigned, the role of the SMC will mainly be to support the IC for the SAR portion of the incident response.

Incident Command Post (ICP)

An ICP is a temporary facility used for tactical-level, on-scene incident command and management organization when ICS is utilized. The ICP typically comprises the IC and immediate staff and may include other designated incident management officials and responders from Federal, STTIA, and local agencies, as well as private-sector, nongovernmental, and volunteer organizations.

(10/12/16) FEMA Region III's Incident Management Assistance Team (IMAT) working with the Virginia Department of Emergency Management (VDEM), Richmond, Virginia. (Photo: Corey Rigby)

Since the IC has overall responsibility for an incident response, the SAR system will be supporting the IC for SAR aspects of the incident. The SMC may be physically located at the ICP, but co-location is not necessary.

Typically, the ICP is located at or in the immediate vicinity of the incident site and is the focus for the conduct of direct, on-scene control of tactical operations. Incident planning is also conducted at the ICP; an incident communications center would normally be established at this location. The ICP may be collocated with the incident base, if the communications requirements can be met.

NIMS and CISAR Operations

In any catastrophic incident, SAR is only one component of the overall response. The lead agency typically activates an ICP with an IC in charge. Appropriate Federal, STTIA, and local agencies and non-governmental organizations have representatives assigned to serve at or in close association with the ICP.

CISAR operations are challenging. Some CISAR planning and management considerations include:

- The scope of CISAR operations will vary, from a limited number persons in distress to a mass rescue operation that is a significant component of the overall response.
- Even if CISAR is the only type of on scene operation, its complexity and diversity of authorities involved typically requires use of NIMS/ICS to ensure an effective multiagency response.
- In a CISAR operation, NIMS/ICS does not take responsibility, control, or authority away from the SAR service. Rather, the SMC, OSC, or someone designated by the SMC serves as the coordinator of the SAR response (or SAR "agency representative") in support of the IC.

(Note: Reference the CISAR Addendum for additional planning and management considerations.)

Section 1-9: National Response and Emergency Support Function (ESF) #9

Introduction

Federal SAR resources used in the conduct of CISAR operations, in support of a State, Tribe, Territory/Insular Area, or FEMA Region requesting the assistance, is the responsibility of the four ESF #9 Primary Agencies (Appendix D):

- DHS/FEMA;
- DHS/USCG;
- DoD; and
- DOI/NPS.
- Detailed guidance on the coordination and response to these large-scale SAR operations can be found in the ESF #9 Annex and *CISAR Addendum*.

It is important for SAR managers and responders to understand how the nation responds to disasters. This Section and Figure 1-9-1 provides a brief outline of the U.S. national preparedness and response system and ESF #9.

Presidential Policy Directive (PPD)-8: National Preparedness

PPD-8 is aimed at strengthening the security and resilience of the United States through systematic preparation for the threats that pose the greatest risk to the security of the United States, including acts of terrorism, cyber-attacks, pandemics, and catastrophic natural disasters. ESF #9 is the vehicle in which Federal SAR responsibilities are assigned and resources provided to a State, Tribe, Territory/Insular Area and/or FEMA Region requesting Federal SAR assistance.

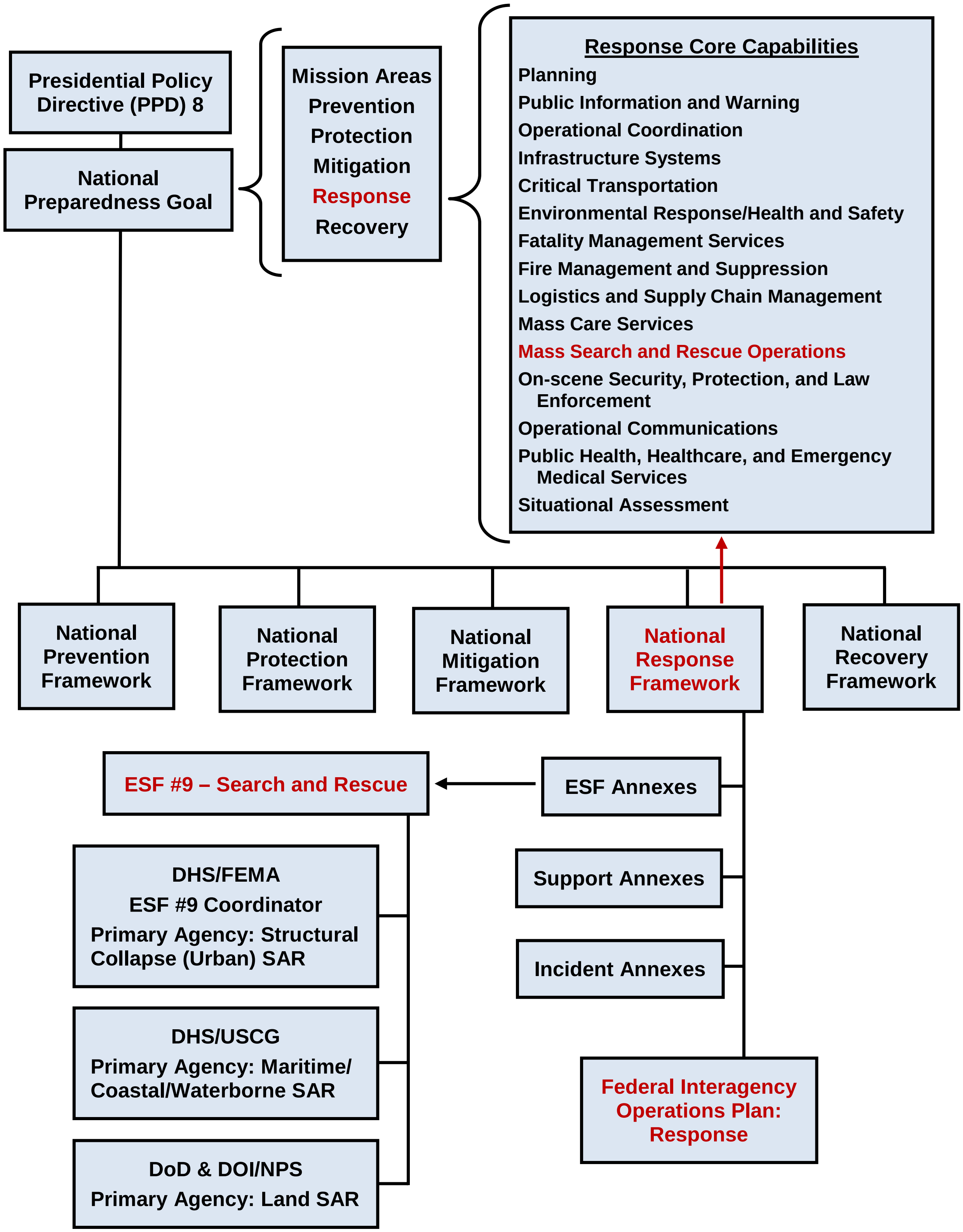

Figure 1-9-1: National Preparedness System and ESF #9

PPD-8 directs incident response coordination from a whole community[7] perspective, development of a National Preparedness Goal, and a series of implementing frameworks and plans.

(08/30/12) The 256th Brigade Special Troops Battalion evacuates a child from the flood waters caused by Hurricane Isaac, Louisiana. (Photo: Louisiana Army and Air National Guard)

National Preparedness Goal

The National Preparedness Goal implements PPD-8 by standardizing the whole community approach to disaster and emergency preparation:

A secure and resilient nation with the capabilities required across the whole community to prevent, protect against, mitigate, respond to, and recover from the threats and hazards that pose the greatest risk.

The National Preparedness Goal identifies a series of 31 National Preparedness Elements, and core capabilities, required to achieve the National Preparedness Goal. The core capabilities are organized into five mission areas: Prevention, Protection, Mitigation, Response, and Recovery.

In particular, the Response mission area:

- Focuses on responding effectively to all types of incidents that range from those that are adequately handled with local assets to those of catastrophic proportion that require marshaling the capabilities of the entire nation; and
- Describes the capabilities necessary to save lives, protect property and the environment, meet basic human needs, stabilize the incident, restore basic services and community functionality, and establish a safe and secure environment moving toward the transition to recovery.

National Preparedness System

While PPD-8 describes the United States approach to national preparedness, and the National Preparedness Goal is the cornerstone for implementation of PPD-8, the National Preparedness System is the instrument the United States employs to build, sustain, and deliver the core capabilities in a disaster response.

The guidance, programs, processes, and systems that support each component of the National Preparedness System enable a collaborative, whole community approach to national preparedness.

The National Preparedness System is comprised of the following six components:

- *Identifying and Assessing Risk*: The collection of historical and recent data

[7] The whole community includes individuals, families, and households; communities; the private and nonprofit sectors; faith-based organizations; and local, STTIA, and Federal Agencies and Departments. Whole community focuses on enabling the participation in national preparedness activities of a wide range of participants from the private and nonprofit sectors, including nongovernmental organizations and the general public, in conjunction with the participation of Federal, State, and local governmental partners in order to foster better coordination and working relationships.

on existing, potential and perceived threats and hazards;

- *Estimating Capability Requirements*: The determination of the specific capabilities and activities to best address the identified risks;
- *Building and Sustaining Capabilities*: The determination of the best way to use limited resources to build capabilities. The risk assessment can be used to prioritize resources to address the highest probability or highest consequence threats;
- *Planning to Deliver Capabilities*: Coordinating plans with other organizations, including all parts of the whole community;
- *Validating Capabilities*: Evaluating activities, including participation in exercises, simulations, or other activities to assist in identifying gaps in plans and capabilities; and
- *Reviewing and Updating*: The regular review and update of available capabilities, resources and plans.

National Response Framework (NRF)

The NRF is one of five frameworks that present the guiding principles, roles and responsibilities, and coordinating structures for delivering the core capabilities required to respond to an incident. In addition, it describes how response efforts integrate with those of other mission areas. In particular, the NRF:

- Is always considered in effect, with elements that can be implemented at any time;
- Has structures, roles, and responsibilities that can be partially or fully implemented in the context of a threat or hazard, in anticipation of a significant event, or in response to an incident; and
- Provides selective implementation of structures and procedures for a scaled response, delivery of specific resources and capabilities, and coordination appropriate to each incident.

Included in the NRF are the ESF Annexes, Support Annexes, and Incident Annexes. The annexes provide information to assist with NRF implementation (Figure 1-9-2).

ESF Annexes →	Federal coordinating structures that group resources and capabilities into functional areas most frequently required in a national response.
Support Annexes →	Other mechanisms in which support is organized among private sector, NGO, & Federal Departments and Agencies. Support Annexes include: Critical Infrastructure; Financial Management; International Coordination; Private Sector Coordination; Tribal Coordination; Volunteer and Donations Management; and Worker Safety and Health.
Incident Annexes →	Coordinating structures, in addition to ESFs, that may be used to deliver core capabilities and support response missions that are unique to a specific type of incident. Incident Annexes include: Biological Incident; Catastrophic Incident; Cyber Incident; Food and Agriculture Incident; Mass Evacuation Incident; Nuclear/Radiological Incident; Terrorism Incident and Law Enforcement Incident.

Figure 1-9-2: NRF Annexes

(09/06/05) Members of the Coast Guard Disaster Response Team and Miami-Dade US&R Team mark a house to show that it has been searched for survivors of Hurricane Katrina, New Orleans, Louisiana. (Photo: Petty Officer Robert Reed/USCG)

Core Capabilities

Core capabilities are distinct critical elements that achieve the National Preparedness Goal by describing significant functions that must be developed and executed across the whole community. In particular, the Response mission area includes 15 core capabilities (Figure 1-9-1).

Primarily, ESF #9 supports the "Mass Search and Rescue Operations" core capability:

Deliver traditional search and rescue capabilities, including personnel, services, animals, and assets to survivors in need, with the goal of saving the greatest number of endangered lives in the shortest time possible.

The Mass Search and Rescue Operations core capability critical tasks include the following:

- Conduct SAR operations to locate and rescue persons in distress, based on the requirements of State and local authorities;
- Initiate community-based SAR support operations across a wide geographically dispersed area; and
- Ensure the synchronized deployment of local, regional, national, and international teams to reinforce ongoing SAR efforts and transition to recovery.

Emergency Support Functions (ESFs)

The Federal and many State governments organize their resources and capabilities, as well as those of certain private-sector and NGOs, under 14 ESF Annexes:

- ESF #1 – Transportation;
- ESF #2 – Communications;
- ESF #3 – Public Works and Engineering;
- ESF #4 – Firefighting;
- ESF #5 – Information and Planning;
- ESF #6 – Mass Care, Emergency Assistance, Temporary Housing, and Human Services;
- ESF #7 – Logistics;
- ESF #8 – Public Health and Medical Services;
- **ESF #9 – Search and Rescue;**
- ESF #10 – Oil and Hazardous Materials Response;
- ESF #11 – Agriculture and Natural Resources;
- ESF #12 – Energy;
- ESF #13 – Public Safety and Security;
- *[ESF #14 – Superseded by the National Recovery Framework]*; and
- ESF #15 – External Affairs.

ESFs are a critical mechanism to coordinate functional capabilities and resources provided by Federal Departments and Agencies, along with certain private-sector and NGOs. ESFs may be selectively activated for both Stafford Act and non-Stafford Act incidents where State, Tribal, or Territorial/Insular Area authorities request Federal assistance.

(06/16/09) National Park Service and Coast Guard personnel transported an injured, 35-year-old, rock climber from Otter Cliff, Acadia National Park, Maine. (Photo: National Park Service.)

ESF Primary Agency

An ESF Primary Agency (PA) is a Federal Agency with significant authorities, roles, resources, or capabilities for a particular function within an ESF. PAs are responsible for:

- Orchestrating support within their functional area for the appropriate response core capabilities and other ESF missions;
- Notifying and requesting assistance from Support Agencies (SAs);
- Managing Mission Assignments (MAs) and coordinating with SAs, as well as appropriate officials, operations centers, and other stakeholders;
- Coordinating resources resulting from MAs;
- Working with all types of organizations to maximize the use of all available resources;
- Monitoring progress in achieving core capability targets and other ESF missions, and providing that information as part of situational and periodic readiness or preparedness assessments; and
- Maintaining trained personnel to support interagency emergency response and support teams.

ESF #9 Coordinator

DHS/FEMA is designated the ESF #9 Coordinator and is responsible for ESF #9 management oversight. For every incident, the ESF #9 Coordinator assesses the specific SAR requirements and assigns one of the four PAs as the Overall Primary Agency (OPA) for that particular incident. Designation is dependent upon incident SAR environment and the type of response required.

ESF #9 – Search and Rescue

ESF
#9
SAR

During incidents or potential incidents requiring a unified SAR response, Federal SAR responsibilities reside with ESF #9 PAs that provide timely and specialized SAR capabilities. In particular, the ESF #9 Annex details the overall coordination for the Federal provisioning of lifesaving assistance to local, State, Tribal, and Territorial/Insular Area SAR authorities when there is an actual or anticipated request for Federal SAR assistance.

The ESF #9 response is scalable to meet the specific needs of each incident, based upon the nature and magnitude of the event, the suddenness of onset, and the capability of local SAR resources. Response resources are drawn from ESF #9 PAs and SAs.

Federal responsibilities under ESF #9 are based on SAR operational environments, as per the following:

- *Structural Collapse (Urban) SAR (US&R)*. PA: DHS/Federal Emergency Management Agency (FEMA). US&R includes operations for natural and manmade disasters and catastrophic incidents, as well as other structural collapse operations that primarily require DHS/FEMA US&R task force operations;
- *Maritime/Coastal/Waterborne SAR*. PA: DHS/ USCG. Maritime/coastal/ waterborne SAR includes operations for natural and manmade disasters that primarily require DHS/USCG air, cutter, boat, and response team operations; and
- *Land SAR*. PAs: Department of Interior (DOI)/National Park Service (NPS); Department of Defense (DoD). Land SAR includes operations that require aviation and ground forces to meet mission objectives, other than maritime/coastal/waterborne and structural collapse SAR operations.

(12/23/03) Fairfax County US&R squad inspect earthquake damage in Bam, Iran. (Photo by Marty Bahamonde/FEMA)

When considering the NSARC Olive SAR model, where does ESF #9 fit? As described in Figures 1-9-3 and 1-9-4, ESF #9 SAR operations may be implemented in response to a MRO and/or catastrophic incident.

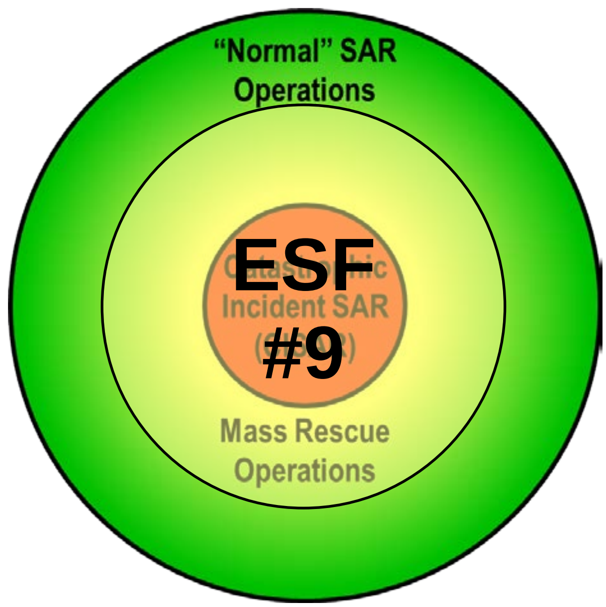

Figure 1-9-3: NSARC Olive SAR Model with ESF #9

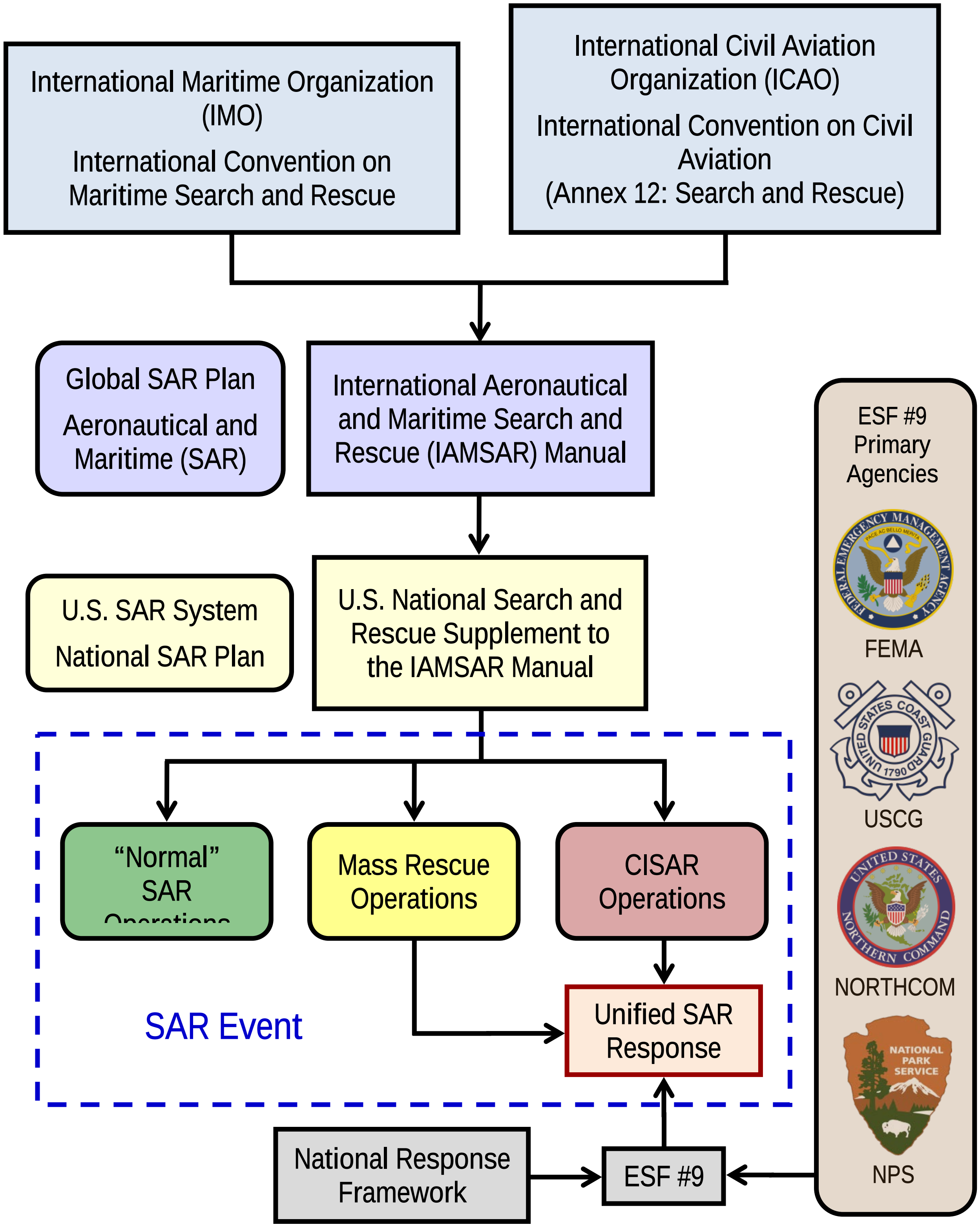

Figure 1-9-4: ESF #9 and National SAR Documents

Response Federal Interagency Operational Plan (FIOP)

As an integral component to national preparedness, PPD-8 required the development of a national planning system that would integrate planning across all levels of government and with private and nonprofit sectors around key capabilities that can be mixed and matched, as required, to provide a flexible approach to the five mission areas (Prevention, Protection, Mitigation, Response, and Recovery).

(09/27/01) California Task Force-3 personnel work on cutting steel and clearing rubble at the collapsed World Trade Center, New York City. (Photo: Michael Rieger)

The Response FIOP:

- Describes the concept of operations for integrating and synchronizing existing national-level Federal capabilities to support Federal, STTIA, and local response plans;
- Describes how the Federal Government delivers core capabilities for the Response mission area;
- Provides an integrated approach to synchronizing planning efforts, clarifies roles and responsibilities, and serves as a foundation for more detailed Federal Department and Agency specific plans and operating procedures;
- Is built on the National Incident Management System (NIMS) concepts and principles and reflects the whole community concept; and
- Is composed of the following three sections:
  - *Base Plan* that describes the policies and concept of operations for how the Federal Government will support STTIA and local government response efforts, as well as Federal responsibilities, planning assumptions, response operations, and short term recovery operations;
  - *Functional Annexes* that describe the overarching mission, concept of operations, tasks, and coordinating structure for each of the 14 Response core capabilities identified in the National Preparedness Goal (In particular, the National Preparedness Goal provides a Functional Annex for the conduct of ESF #9 operations in support of the Mass Search and Rescue Operations core capability); and
  - *Incident-Specific Annexes* that expand the concepts within the Response FIOP to better describe the missions, policies, responsibilities, and coordination processes across incident management and emergency response operations for a wide spectrum of potential notice or no-notice incidents, which require specialized or unique responses.

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Section 1-10: State SAR Coordinator (SC)

State SAR Coordinator (SC)

The State SC fills a unique role in the national SAR system by supporting local jurisdictions with training and mission response for routine SAR operations, and may in some States serves as the State-to-Federal ESF #9 interface during catastrophic or declared events. It is important to note, that not all States have a designated State SC; State SAR responsibilities may be divided among two or more State agencies.

Every State has an agency that fulfills the emergency management role and function, and most will organize under the FEMA ESF model as described in the NRF for ease of State and Federal interface during catastrophic events. The individual or State agency that fulfills the role of SAR under ESF #9 may, or may not be the designated State SC for routine SAR operations. While common models may exist, there is no uniform system for the structure of SAR that can be applied equally across the nation. It is essential for the Federal ESF #9 primary agencies to identify and understand each State SAR system and points of contact.[8]

(02/06/14) Maryland State Police Trooper 3 picking up a patient for transport to shock trauma unit, Hampstead, Maryland. (Photo: Cole Brown/Maryland State SC)

[8] The State SC Council advocates that every State should designate a State SC.

State SC Responsibilities

State SC responsibilities generally include:

- Administration of the State SAR system;
- SAR training;
- Response;
- Aeronautical SAR;
- CISAR;
- Land SAR;
- Maritime (Waterborne) SAR; and
- MROs.

Administration of the State SAR System

State SCs are frequently assigned State SAR responsibilities as a collateral responsibility to their primary job. Some States have a full-time SC that may have a small support staff to aid in the delivery of SAR coordination and support services. Common administration functions may include:

- Staffing;
- Planning;
- Budget;
- Policy;
- Resource database;
- Mission tracking database; and
- Stakeholder meetings.

SAR Training

Most State SCs provide, or at least facilitate SAR personnel training. Training may take the form of classes, conferences, exercises, or workshops. Those States with a dedicated budget for SAR training tend to build greater capacity, and as a result, posses a more robust Statewide SAR system. The State SC may actively manage an established program to include a cadre of instructors, or may contract with third-parties to provide training courses.

SAR Response

Most State SCs assume a supporting role to local jurisdictions for SAR operations and a more pronounced role in managing CISAR operations if they coordinate Federal ESF #9 SAR support at their respective State EOC. Mission response may be divided by types of SAR environments:

- Aeronautical SAR;
- Land SAR;
- Maritime (Waterborne) SAR;
- CISAR; and
- MROs.

Aeronautical SAR

Depending on a State's legal authority and SAR policy, a State agency is typically responsible for investigating reports of missing aircraft and responding to crash scenes. The State SC may play an active role in coordinating SAR assets for a missing aircraft, as the search area may be large and encompass many local jurisdictions or even adjacent States.

The State SC may also play a pivotal role in coordinating a response to an emergency distress beacon. The State SC should be the primary point of contact for coordinating missing aircraft and distress beacon SAR response operations within the State.

Land SAR

SAR operations involving missing and overdue hikers, hunters, children, and those who suffer from Alzheimer's or dementia, are typical examples of land SAR operations that occur throughout the United States on a daily basis. These events are normally coordinated and conducted by local SAR authorities.

However, if the search grows beyond the capacity of the local authorities, mutual aid from adjacent jurisdictions or support from the State may be requested. The State SC may be required to assist local SAR authorities with providing additional SAR resources, or arranging for logistical support. In certain circumstances, the State may be tasked to manage and coordinate the search for and rescue of persons in distress. The State SC may assume a direct role as SMC/IC.

Maritime (Waterborne) SAR

Traditionally, the maritime environment, including coastal areas and other major bodies of water has been the primary responsibility of the U.S. Coast Guard. Coastal States and States with major lakes and rivers normally have State agencies that patrol the waters and would respond to persons in distress. In addition, many local waterfront jurisdictions also maintain water rescue capability. These State and local entities typically coordinate directly with the Coast Guard for coordinated operations, and may not require any additional assistance from the State SC.

Catastrophic Incident SAR (CISAR)

Catastrophic incidents are those events, either natural or manmade, that will rise to the level of a Federal disaster declaration. The State SC will likely be engaged in supporting large-scale operations long before the event is declared a disaster at either the State or Federal level.

Catastrophic incidents may include the use of US&R, wide-area SAR, swiftwater, helo-aquatic, or other SAR capabilities as necessary to rescue as many people as possible in the shortest amount of time.

Ideally, the State SC will be the lead for State-to-Federal ESF #9 interface for such events.

Mass Rescue Operations (MROs)

Planning considerations for a MRO response include the following:

- For the State SC, functionally, there is very little difference between a catastrophic event and a MRO.
- While a MRO response may not require State-to-Federal ESF #9 coordination and assistance, it will require the State SC (or IC) to coordinate among multiple agencies and/or municipalities.
- A MRO will always be an impromptu event with the primary focus saving as many lives as possible in the shortest amount of time.

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Section 1-11: SAR Volunteers

Introduction

Volunteers are usually on the front line helping to search for and rescue persons in distress, assist disaster survivors, and support ongoing SAR operations. Some volunteers bring invaluable experience, specialized skills, and expertise; others offer an extra pair of hands to assist with the work. Volunteers want to help and make a difference – and they do. In many instances, SAR volunteers bring much needed assets such as boats, aircraft, and other critical SAR equipment to a mission that can make the difference in saving someone's life.

Volunteers often provide the opportunity to increase the level of available search effort, which tends to increase the probability of a successful search, or at least potentially reduce the critical time to rescue.

Federal, STTIA, and local SAR authorities:

- Should learn to use volunteers wisely to help in lifesaving operations;
- Pursue innovative ways to organize and train SAR volunteers to be an effective lifesaving force; and
- Be familiar with the capabilities of local volunteer organizations and procedures to facilitate their use during a SAR operation.

(03/05/10) Members of a USCG investigation and salvage team, accompanied by the Wasatch County Sheriff's Department, representatives from the Parks and Recreation Department, and SAR volunteers, investigated the downed USCG MH-60T helicopter crash site. (Photo: Petty Officer 3rd Class Caleb Critchfield/USCG)

Volunteer Expertise and Capability

Volunteer expertise and capability in the United States is wide-ranging. Typically, volunteer coordination, training, and experience are a reflection of the respective State's SAR system structure, emphasis, and support. There are States with robust volunteer SAR programs that include credentialing, formalized mutual aid agreements, and structured response policies; some with limited or no influence over the management and conduct of SAR operations or volunteer responders; and there are States that fall between these two extremes.

SAR volunteers can be generally organized into three groups:

- Spontaneous volunteers;
- Unaffiliated volunteers; and
- Affiliated volunteers.

(03/29/09) Cass County Sheriff's Dept., U.S. Fish and Wildlife and local Search and Rescue volunteers check on isolated residents in remote farm communities along the Wild Rice river, Cass County, North Dakota. (Photo: Andrea Booher/FEMA)

Spontaneous Volunteers

Spontaneous volunteers typically have limited or no SAR training, skills, or experience, but assist persons in distress during an incident. Due to the nature and risk involved in SAR missions, it is inconsistent to task spontaneous volunteers with active SAR field assignments. The best practice is to redirect spontaneous volunteers and have them respond through the local government volunteer plan, either through a Volunteer Reception Center (VRC) or Volunteer Coordination Center (VCC). This is the most efficient process to match spontaneous volunteer capabilities with appropriate response tasking.

If spontaneous volunteers are required for a SAR response, special attention will be required for logistics and sustainment support to meet their basic needs. Consideration should also be given to address spontaneous volunteer liability and injury exposure during a SAR/disaster response.

Unaffiliated Volunteers

Unaffiliated SAR volunteers normally participate on an organized SAR team, but are typically not affiliated with a law enforcement agency or agency having SAR jurisdiction within their community. Unaffiliated volunteers:

- Will normally require screening to validate individual and team experience, training, and capabilities;[9]
- Develop in-house training that may meet or exceed known standards the host team is willing to accept;
- Are typically not self-sustaining and will require logistical support for food, shelter, potable water, fuel, medical support, security, etc.;
- Are not typically in possession of advanced communications equipment, although many may possess valid FCC ham radio licenses; and
- Do not typically have self-decontamination capability, and will require this sort of advanced logistical support from the host agency.

The best use of unaffiliated team members that meet the required standards for mission tasking is to integrate them into other teams and task forces with known SAR capabilities.

Affiliated Volunteers

Affiliated volunteers that respond will

[9] The only nationally recognized national SAR standard for volunteer SAR training and certification is the National Association for Search And Rescue (NASAR) based on ASTM standards.

typically do so under the authority of the local government agency having SAR jurisdiction in their community.

Affiliated volunteers:

- Typically meet a standard of care that meets or exceeds nationally accepted standards; however this should be confirmed by the host agency during the request process;
- In many cases are uniformed, and well-equipped for the first 72 hours of their assignments;
- Typically are trained in NIMS/ICS, basic first aid and CPR, and the fundamentals of SAR operations;
- Are typically a component of a formal response and mutual aid system and should be requested via EMAC.
- Although affiliated with a local government agency, may not be self-sustainable (need food, water, shelter, fuel, medical support, security), and may not benefit from on scene logistical support by their home agency;[10]
- May have special resource skills (K-9, technical rescue, etc.), communications capability, equipment and vehicles;
- Typically do not have self-decontamination capability and will require logistical support for similar advanced care; and
- Can be utilized as an independent SAR team or SAR task force or participate on existing strike teams and task forces.

(AUG 05) SAR volunteers conducting search for missing hiker, vicinity of San Francisco Bay, California. (Photo: Chris Boyer/NASAR)

[10] Logistical requirements and agreements will need to be addressed during the request process.

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Section 1-12: SAR Plans

Introduction

SAR plan is the general term used to describe Federal, STTIA, or local plans that describe the authorities, organization, coordination, and execution of SAR operations. Whether strategic, operational, or tactical in nature, SAR plans provide appropriate level guidance and/or procedures in order to properly prepare for, coordinate, and safely conduct SAR operations that span the full spectrum of SAR (day-to-day through CISAR) throughout the many types and varying levels of all-hazard response scenarios.

SAR plans may provide overarching guidance for multiple agencies or remain organic to a specific organization or agency and may be directive in nature. In all cases, SAR plans should be prepared to achieve SAR objectives, facilitate supported and supporting relationships, enable integrated planning and interoperability among Federal, STTIA, and local SAR authorities when required, and ensure the efficient and effective use of available resources. In contrast, tactical assignments and specific instructions for SAR facilities and agencies participating in a SAR mission are normally developed by an RCC or IC and transmitted by the SMC/IC in the form of a Search Action Plan (SAP) or contained within State, Federal, or combined Incident Action Plans (IAP).

At all levels, it is encouraged that SAR plans, particularly MRO and CISAR plans, be routinely exercised and continually improved to ensure seamless coordination and a rapid, unfettered response to real world operations.

State SAR Plans[11]

Each State should have a specific SAR plan or other emergency plan that organizes State SAR planning, coordination, responsibilities and execution. These plans should not only support SAR, but address the coordination of integrated Federal – State SAR planning efforts and the efficient and effective utilization of available SAR resources.

States, counties, and other local municipalities plan, organize, and conduct SAR operations differently. Most States have efficient and effective plans for day-to-day/routine SAR, and to a degree, MROs. States that have a higher probability toward encountering catastrophic disasters such as tornadoes, hurricanes, earthquakes, etc., will also likely have well organized, exercised, and practiced CISAR plans.

Based on the risks within a particular State, each should have SAR plans that take into account the coordination and conduct of:

- Normal SAR;
- Mass Rescue Operations; and
- Catastrophic Incident SAR.

The State SAR plan may not be a standalone plan and will likely be incorporated into an "All- Hazards" or "Response Coordination Plan."

State SAR Plans and the SAR Coordinator (SC)

Each State will normally designate a person or agency to be the State SC who would be responsible for the State SAR plan. A State may designate an agency as the State SC (e.g., State Department of Emergency Management, State Department of Public Safety, State Police, State Fish and Game, etc.) or an individual. It is also not uncommon for the county Sheriff(s) to be either designated as the State SC or be the SC for SAR within their respective counties for day-to-day SAR missions under an overarching State SC plan.

For Federal authorities, it should be emphasized that by written SAR agreement or by appropriate request, the State/local SCs are the *supported* entity for SAR operations conducted within their respective jurisdiction(s); from day-to-day through CISAR.

State SAR Plans should be developed in cooperation and when requested, with collaborative assistance from Federal SAR authorities in order to address and prepare for SAR requiring a Federal or unified Federal response.

For MRO CISAR, or an incident requiring a Federal SAR support, the State SC will likely be the overall SMC for the incident, supported by other assisting State and Federal Agencies and resources. For SAR over a large geographic area, several Incident Commands may be established (normally by county) and will conduct SMC responsibilities within their respective jurisdictions. Normally, overall coordination and support, whether a single IC for routine SAR or multiple ICs during a disaster, would be provided by the State SC under the respective State's SAR and/or Emergency Response Coordination Plan(s).

State SAR plans should consider the risks within the State and if necessary, plan for these possible multi-IC type scenarios.

An outline of a State SAR Plan is provided in Appendix D.

[11] This Section also applies to Tribes and Territories/Insular Areas.

Effective SAR Planning

As previously stated, SAR plans should be prepared to:

- Optimally use available SAR resources;
- Identify and achieve SAR objectives;
- Facilitate supported and supporting relationships; and
- Enable integrated planning and interoperability among Federal, State, Tribal/Insular Area, local, and volunteer SAR partners.

Routine SAR planning is generally focused on *locating* persons in distress as quickly as possible. This is accomplished through the employment of SAR resources based on the SMC/IC developed Search Action Plan (SAP) that meets SAR objectives. The effectiveness of the SAP is normally subject to the experience of the SAR planner(s), the efficient use of search planning tools, and the selection of and correct employment of available SAR resources.

Subsequently, the actual *rescue* and transport of survivors to a place of safety during day-to-day SAR operations seldom requires extensive planning and is normally accomplished uneventfully through agency specific policies, practices, and standard operating procedures. The challenge for SAR planners will be the timely rescue and transport to safety of large numbers of persons in distress during the response to a catastrophic incident, which may be hampered by damage to critical infrastructure and key resources.

During an MRO, or CISAR operation which includes an MRO, the overwhelming number of survivors requiring rescue will likely dominate the immediate operational requirement. As such, the *search* portion of SAR mission and the prerequisite search planning effort may be of limited value. Therefore, the development of a thorough, all domain (e.g., land, waterborne, and air) multi-agency integrated plan to efficiently rescue large numbers of survivors, provide for their medical treatment, and transport them to places of safety, will require the full attention of SMC/IC.

Goal of CISAR Planning

To enable a collaborative, interagency planning process and achieve standardized interoperability among all agencies and resources across all domains; to locate, rescue, and safely transport persons in distress within an unbroken operational chain of events in the timeliest manner possible.

Federal, STTIA, and local SAR plans should describe each respective SAR authority's approach to SAR operations. Because these levels of government all provide support to operations conducted at the local level, their SAR plans should address similar and overlapping functions. Planning must be coordinated among all levels of government to ensure a singular operational focus.

Since Hurricane Katrina, many lessons learned have been identified from the SAR response to national disasters. Improvements and efficiencies have been developed and applied to each subsequent response. Whether planning day-to-day SAR that may involve more than one agency or as part of the planning effort for a unified Federal response to a disaster, the following areas have been acknowledged as key areas to address in a SAR plan.

Centralized State Lead

Regardless of the number and type of SAR facilities employed during a SAR response, a successful, efficient and effective SAR plan stems from the coordination efforts of the SMC/IC.

In addition, this proven concept also applies to a unified Federal response in the conduct of MRO or CISAR operations. These types of SAR operations are too large, may involve a significant number of agencies and resources, and are too dynamic and time sensitive to expect acceptable results from anything other than management from a central SMC/IC supported by participating agencies with the required SAR resources and enabling capabilities. For incidents that require MRO or CISAR operations over large geographic areas, span of control can be maintained by delegating SMC responsibilities to individual ICs within their respective boundaries and ensuring coordinated operations with adjacent ICs, with overall coordination retained and provided by the State SC or at the Unified Command.

Centralized Integrated Planning

The SMC/IC is responsible for developing a well-integrated SAP and the employment of the most efficient and effective use of available SAR resources.

Or operations that required a State requested unified Federal SAR response, the SAR plan should be prepared with the assistance of SAR representatives from the involved ESF #9 Primary and Support Agencies, and other Federal, STTIA, and local SAR authorities, the private sector, and NGOs that will participate in executing the plan. Several States have created "Federal/State Combined SAR Cells" to facilitate such plans. This integrated, centrally planned, and managed capabilities-based approach can significantly improve SAR operational unity of effort.

Interagency Coordination

Strategic, operational, and tactical coordination between Federal, STTIA, and local SAR authorities continues to improve the efficiency and effectiveness of the national SAR system. For example, collaboration among Federal SAR authorities within ESF #9 has greatly enhanced the nation's ability to get the right SAR resource, to the right place, at the right time as may be anticipated or requested by State or FEMA Region.

In addition, during a SAR response, effective interagency coordination must be immediately established. The goal is to work together to save lives. Participating SAR planners must strive to establish and foster a supporting relationship with the State SMC/IC to ensure effective SAR planning is conducted and available SAR resources are effectively utilized.

Air Coordination Plan

Just as each State's SAR plan varies based their respective risk and available SAR capabilities, Air Coordination Plans (ACP) will also vary by State and support the entire response, in addition to the SAR operation. Unfortunately, it is not uncommon for both State and Federal Agencies to develop conflicting ACPs during an incident. This practice has caused confusion and safety concerns. Safe and efficient ACPs must be developed with the collaborative assistance of all potential stakeholders and support the operational requirements of the SMC/IC.

(Note: States must ensure that airspace portion of their ACP be coordinated through the FAA's System Operations Security (AJR-2) to avoid potential conflicts and ensure it is consistent with the FAA's Airspace Management Plan for Disasters (AMP) (e.g., altitude stratification, air route coordination, etc.).

Consistent with the merits of integrated planning, having one or more FAA air management specialists within a State's

SAR/air planning group has proven to be invaluable in the development and management of an ACP.

Additionally, every effort should be made to plan, coordinate, and standardize air operations across multiple ICs, and where appropriate, State or national borders.

Compatible Communications

Interoperable communications during SAR operations, particularly during a unified Federal SAR response continues to improve with each incident. However, there continues to be opportunities for improvement, particularly toward achieving full interoperability among multiple Federal, STTIA, and local SAR authorities, and volunteers. Working with both State and Federal ESF #2 (Communications) personnel and collaborating with communications experts from agencies anticipated to provide SAR resources will help to ensure reliable communications are available to SAR responders.

Additional methods for addressing SAR communications issues could include increased dialog through Regional Emergency Communications Coordination Working Groups (RECCWGs), requests for clarifications of relevant rules, and, for significant issues that are outdated or not otherwise addressed, by requesting regulatory action from the FCC.

Standardized Practices and Procedures

Standardizing practices, procedures, terminology, and the collective use of NIMS/ICS continues to improve the overall response to routine, MRO, and CISAR operations. Standardization allows SAR responders not from the local area begin operations with little ramp-up time required. The use of web-based SAR planning and management systems continues to increase, giving SAR planners and responders access to critical information.

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Part 2: SAR Operations

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Section 2-1: SAR Operations – General

Introduction

Search

Search Planning

Search Facilities

Conducting the Search

Rescue

Care of Survivors

Introduction

Search and rescue (SAR) operations include two unique functions.

- *Search*. An operation, normally co-ordinated by a rescue co-ordination center or rescue sub-center, using available personnel and facilities to locate persons in distress;[1] and
- *Rescue*. An operation to retrieve persons in distress, provide for their initial medical or other needs, and deliver them to a place of safety. [2]

Resources used for both the search and rescue functions may be the same, but the objectives and tools are often different. Additionally, when national sovereignty issues are taken into account, the legal factors that apply to searching may differ from those that apply to rescue operations.

(03/11/12) Members of the California Air National Guard 129th Rescue Wing participate in a long-range SAR mission, 1,400 miles off the coast of Acapulco, Mexico. This mission saved the lives of two injured Chinese fishermen, one of which received burns to 80% of his body in a diesel fire. (Photo: Airmen 1st Class John Pharr/USAF)

Search and Rescue Service is the performance of distress monitoring, communication, coordination, and SAR functions, including the provision of medical advice, initial medical assistance, or medical evacuation, through the use of public and private resources, including cooperating

[1] SAR Convention, paragraph 1.3.2.

[2] Ibid., paragraph 1.3.2.

aircraft, vessels and other craft and installations.[3]

Nations establish national (or regional) SAR systems to provide SAR services as part of the global (worldwide) SAR system. SAR services help nations meet domestic (national) needs and international commitments. For example, the United States is obligated to provide SAR services as a Party to the Maritime SAR and Chicago Conventions, as well as other international treaties and agreements.

SAR authorities should be familiar with not only the U.S. national SAR system, but also with how it is integrated into the global SAR system (Part 1). In the United States, SAR services are established, implemented and maintained consistent with international law, principles, concepts, and terminology.

International harmonization of SAR services not only enables SAR authorities of various nations to cooperate with each other in the coordination of SAR operations, but also enables the standardization of SAR terminology, processes, and procedures.

Search

The type of search, on scene location and conditions, and other variables are factors in determining who coordinates, organizes, and executes a search. Generally:

- In the international SAR system, an SMC will normally be assigned when an RCC/RSC is coordinating the search; under NIMS/ICS, the SMC will normally coordinate the search operation in support of the IC (see Section 1-6: SAR Coordination Systems);
- Until an SMC is designated, an OSC or SAR facility on scene would normally coordinate the search;
- SAR operations that involve minimal searching may be conducted by a local SAR facility; in such cases, the RCC/SAR authority should be informed for record keeping purposes, but also in case its assistance becomes needed; and
- For types of SAR not coordinated by an RCC, an IC would normally be responsible for search planning, often with support of an SMC or other expert working with the IC at an incident command post (ICP).

(09/14/08) FEMA US&R Indiana Task Force 1 marks a house as they conduct a search in neighborhood impacted by Hurricane Ike, Sabine Pass, Texas. (Photo: Jocelyn Augustino/FEMA)

Search Planning

Generally, search planning involves the following steps:

- Evaluating the situation, including the results of any previous searches;
- Estimating the distress incident location and probable error of that location;
- Estimating the survivors' post-distress movements and probable error of that estimate;
- Using the results to estimate the most probable location of survivors and the uncertainty (probable error of the position) about that location;

[3] Ibid., 6; xi.

- Defining search sub-areas and search patterns for assignment to specific SAR facilities;
- Providing a search action plan that includes a current description of the situation, search object description(s), assignment of SAR facility search responsibilities, on scene coordination procedures, and SAR facility reporting requirements; and
- Repeat these steps until either the survivors are located or evaluation of the situation shows that further searching would be futile.

Further general information on search planning is detailed in *Section 2-4: Search Planning Considerations*; specific maritime and land-based search planning information is found in the *Coast Guard Addendum* and *Land SAR Addendum*.

Search Facilities

The types and numbers of available search facilities determine how much search effort will be available at the scene.

(2011) Searchers are briefed before using probe poles to search an avalanche debris field in Grand Teton National Park. (Photo: Mike Nicklas, NPS)

Since survival times may be limited and locating survivors almost always becomes more difficult as time passes, it may be necessary to seek additional search facilities early in the search planning process. It is usually preferable to use larger rather than smaller numbers of search facilities for the first few searches. By doing this, survivors are often located sooner rather than later, and the need for a much larger, prolonged search effort may be avoided.

Remember that no matter how many search facilities the search planner requests, it is unlikely that so many will be made available that they cannot be used effectively.

Conducting the Search

There are a number of activities which are important to the conduct of search operations. These activities may include:

- Conducting risk assessments;
- Briefing of search personnel;
- Procedures to be followed when entering, operating in, and departing the search area; and
- Debriefing search personnel.

The importance of briefings, debriefings, and following standard or prescribed procedures should not be underestimated, especially when several search facilities may be operating simultaneously in adjacent search sub-areas. For safety reasons, each search facility should be briefed on the intended locations of all other nearby search facilities at all times, including periods of transit to or from the search area.

The SMC/IC should continue the search until all reasonable hope of rescuing survivors has passed. As the search progresses it may be necessary to reevaluate scenarios and redefine the search area. Plots of search sub-areas covered should be maintained in order to plan future search efforts.

Additional information on the conclusion of search operations can be found in *Section 2-13: Conclusion of SAR Operations, Coast*

Guard Addendum, and *Land SAR Addendum*.

Rescue

When the search object has been located, the SMC/IC must determine the method of rescue and SAR facilities to be used. The following factors should be considered:

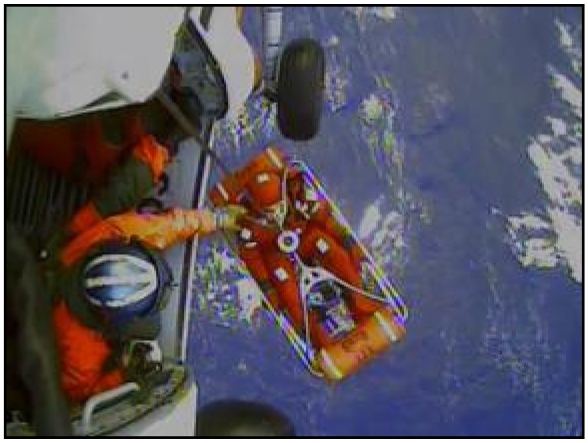
- Action taken by the sighting craft and the action which can be taken by other SAR facilities on scene;
- Location and disposition of survivors;
- Medical condition of survivors;
- Number of persons reported to be in distress and the number of persons actually located;
- Environment/weather conditions;
- SAR facilities state of readiness and capabilities;[4]
- Time of day (remaining daylight) and other visibility considerations; and
- Risks to SAR responders, such as hazardous materials.

It is important to understand that a rescue operation is a process may include several steps:

- Briefing of SAR personnel;
- Planning the rescue operation;
- Dispatch of SAR facilities and en route travel;
- On scene operations;
- Survivor transport and debriefing;
- SAR facility return to base or prior tasking; and
- Debriefing of SAR personnel.

Rescue operations end only when all distressed persons are rescued or accounted for and the safe return of SAR facilities and personnel. Since search operations continue until the survivors or distressed craft are located or the search is suspended by the SMC/IC, there may be more than one rescue operation for the same SAR mission if multiple distressed persons or craft are in different locations.

SAR responders should be thoroughly briefed in preparation for SAR operations and debriefed at the conclusion to improve SAR system performance.



(09/21/12) HMS BOUNTY crewmember is hoisted to a Coast Guard rescue helicopter, 90 miles southeast of Cape Hatteras, North Carolina. The Coast Guard rescued 14 people from life rafts after the ship sank in the rough seas due to Hurricane Sandy. (Photo: U.S. Coast Guard)

Care of Survivors

After rescue, survivors may require medical treatment. This must be provided as quickly as possible. The SMC/IC should consider having EMS and hospital facilities ready for the receipt of injured survivors or SAR responders. In addition, SAR responders should ensure that rescued survivors are not left alone, particularly if injured or showing signs of hypothermia or of physical or mental exhaustion.

[4] To minimize delay, SAR facilities which are likely to be used should be alerted and deployed to a suitable location while the search is in progress.

When selecting the method of transport of survivors to medical facilities, the following factors should be considered:

- Condition of survivors;
- Capability of the SAR facility to reach the survivors in the shortest time possible;
- Medical training, qualifications, and operations; capabilities of the SAR responders;
- SAR facilities' capabilities to transport survivors without aggravating injuries or producing new complications;
- Difficulties that may be encountered by SAR responders (e.g., available shelter, food, water, weather conditions, etc.);
- Availability of medical personnel among the survivors, SAR responders, nearby SAR facilities, etc.; and
- Communications availability between the SAR responders and the SMC/IC.

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Section 2-2: SAR Emergency Phases

Overview

As defined in the Maritime SAR and Chicago Conventions, emergency phases are based on the level of concern for the safety of persons or craft which may be in danger. Upon initial notification, a SAR incident is classified as being in one of three emergency phases: Uncertainty, Alert, or Distress (Figure 2-2-1). The emergency phase may be reclassified by the SMC/IC as the situation develops. The emergency phase should be used in all communications about the SAR incident as a means of informing all interested parties of the current level of concern for the safety of persons or craft which may be in distress.

Uncertainty Phase →	A situation wherein uncertainty exists as to the safety of a person, a vessel or other craft
Alert Phase →	A situation wherein apprehension exists as to the safety of a person, a vessel or other craft
Distress Phase →	A situation wherein there is a reasonable certainty that a person, a vessel or other craft is threatened by grave and imminent danger and requires immediate assistance

Figure 2-2-1: Emergency Phases

Uncertainty Phase

The Uncertainty Phase is said to exist when there is knowledge of a situation that may need to be monitored, or to have more information gathered, but that does not require dispatching of SAR facilities. When there is doubt about the safety of an aircraft, ship, other craft, or persons the situation should be investigated and information gathered.

For aircraft, an Uncertainty Phase is declared when:

- No communication has been received from an aircraft within a period of thirty minutes after the time a communication should have been received, or from the time an unsuccessful attempt to establish communication with such aircraft was first made, whichever is the earlier; or,
- An aircraft fails to arrive within thirty minutes of the last estimated time of arrival (ETA) last notified to or estimated by air traffic services (ATS) units, whichever is the later, except when no doubt exists as to the safety of the aircraft and its occupants.

For ships or other craft, an Uncertainty Phase is declared when it has:

- Been reported overdue at its intended destination; or
- Failed to make an expected position safety report.

(09/14/08) Air National Guardsmen from the 129th Rescue Wing deployed for Hurricane Ike SAR support operations near Galveston, Texas. (Photo: Tech. Sgt. Brock Woodward, U.S. Air Force)

Alert Phase

The Alert Phase exists when an aircraft, ship, or other craft or persons on board are having some difficulty and may need assistance, but are not in immediate danger. Apprehension is usually associated with the Alert Phase, but there is no known threat requiring immediate action. SAR facilities may be dispatched or diverted to provide assistance if it is believed that conditions might worsen or that SAR facilities might not be available or able to provide assistance if conditions did worsen at a later time.

For overdue craft, the Alert Phase is declared when there is a continued lack of information concerning the progress or position of a craft. SAR facilities should begin or continue communications searches, be dispatched to investigate high-probability locations, or overfly the craft's intended route should be considered. Vessels and aircraft passing through areas where the concerned craft might be located should be asked to maintain a sharp lookout, report all sightings and render assistance if needed.

An Alert Phase is declared when:

- Following the Uncertainty Phase, subsequent attempts to establish communication with the aircraft, ship, or other craft have failed, or inquiries to other relevant sources have failed, to reveal any news of that craft;
- An aircraft has been cleared to land and fails to land within five minutes of the estimated time of landing and communication has not been re-established with the aircraft;
- Information has been received which indicates that the operating efficiency of the aircraft, ship, or other craft has been impaired, but not to the extent that a forced landing or distress situation is likely, except when evidence exists that would allay apprehension as to the safety of that craft and its occupants; or
- An aircraft is known or believed to be the subject of unlawful interference.

Distress Phase

The Distress Phase exists when there is reasonable certainty that an aircraft, ship, or other craft or persons on board is in danger and requires immediate assistance. For overdue craft, a distress exists when communications searches and other forms of investigation have neither succeeded in locating the craft or revising its ETA so that it is no longer considered overdue.

If there is sufficient concern for the safety of a craft and the persons aboard to justify search operations, the incident should be classified as being in the Distress Phase.

For aircraft, a Distress Phase is declared when:

- Following the Alert Phase, further unsuccessful attempts to establish communication with the aircraft and more widespread unsuccessful inquiries point to the probability that the aircraft is in distress;
- The fuel on board is considered to be exhausted, or to be insufficient to enable the aircraft to reach safety;
- Information is received which indicates that the operating efficiency of the aircraft has been impaired to the extent that a forced landing is likely;
- Information is received or it is reasonably certain that the aircraft is about to make or has made a forced landing, except when there is reasonable certainty that the aircraft and its occupants do not require immediate assistance; or,
- A downed aircraft is inadvertently located as the result of a sighting or of homing on an ELT transmission.

For ships or other craft, a Distress Phase is declared when:

- Positive information is received that a ship or other craft or a person is in danger and needs immediate assistance;
- Following the Alert Phase, further unsuccessful attempts to establish contact with the ship or other craft and more widespread unsuccessful inquiries point to the probability that the ship or craft is in distress; or,
- Information is received which indicates that the operating efficiency of the ship or other craft has been impaired to the extent that a distress situation is likely.

(09/14/08) Sabine Pass, TX, September 14, 2008 – FEMA US&R Indiana Task Force 1 conducts searches in neighborhoods impacted by Hurricane Ike, Sabine Pass, Texas. (Photo: Jocelyn Augustino/FEMA)

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Section 2-3: SAR Operations Stages

Overview

Awareness Stage

Initial Action Stage

Planning Stage

Operations Stage

Conclusion Stage

Overview

In the international SAR system, the success of a SAR mission often depends on the speed with which the operation is planned and carried out. The prompt receipt of all available information by the RCC is necessary for thorough evaluation of the situation, immediate decision on the best course of action, and a timely activation of SAR facilities.

While no two SAR operations follow the same pattern, SAR operations do generally pass through defined stages, which can be used to help organize response activities. These five stages include the following and are discussed in general terms in Figure 2-3-1 and in the *IAMSAR Manual (Volume 2)*:

- Awareness;
- Initial Action;
- Planning;
- Operations; and
- Conclusion.

The SAR operations stages should be interpreted with flexibility, as many of the actions described may be performed simultaneously or in a different order to suit specific circumstances. For example, the Planning and Operations Stages may be repeated as many times as necessary as a pair (e.g., plan, operate; plan, operate, etc.) to reach the Conclusion Stage.

Further information on SAR operations stages can be found in the U.S. Coast Guard and Land SAR Addenda.

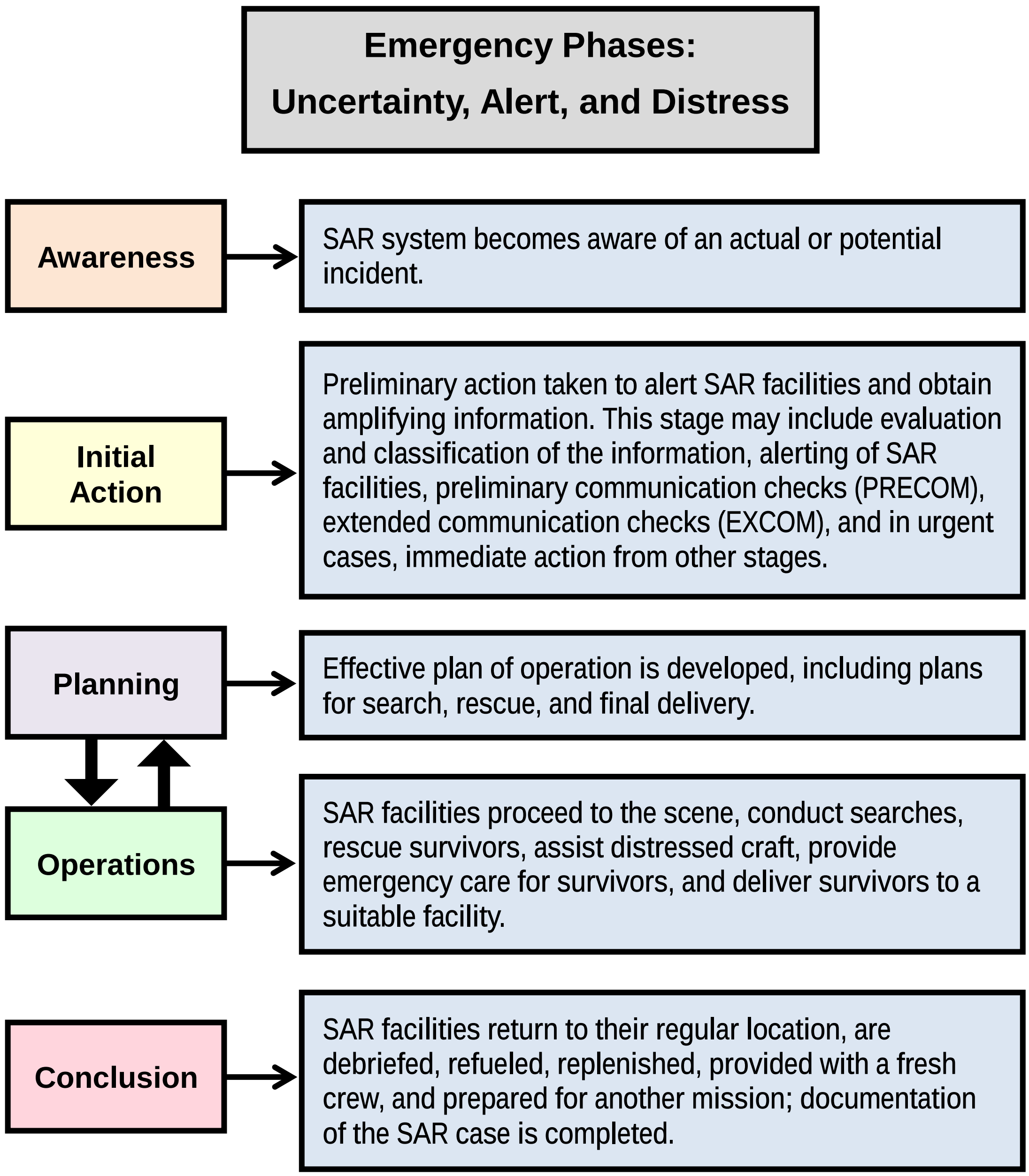

Figure 2-3-1: SAR Operations Stages

Awareness State

SAR authorities cannot respond to an incident until it becomes aware that people or craft need assistance. The general public should be encouraged to report any possible distress situation. SAR authorities must ensure that notification of a distress situation can reach an RCC or other SAR authority from any source, either directly or via an alerting post.

Initial Action Stage

Once an RCC receives an initial report about persons or craft in distress, some immediate action often is appropriate pending receipt and evaluation of more complete information.[5] RCCs/SAR authorities usually have in their plans of operation a checklist of steps to accomplish for each type of possible SAR incident it may become involved in.

After evaluating all available information and taking into account the degree of emergency, the SMC/IC should declare the appropriate emergency phase and immediately inform all appropriate centers, personnel and facilities.

Three emergency phases (see Section 2-2) have been established for classifying incidents and to help in determining the actions to be taken for each incident:

- Uncertainty Phase;
- Alert Phase; and
- Distress Phase.

Depending on how the situation develops, the incident may have to be reclassified.

All reports received before and during a SAR operation must be carefully evaluated to determine their validity, the urgency for action, and the extent of the response required. While evaluation of reports may be difficult and time-consuming, decisions must be made and action taken as quickly as possible. If uncertain information cannot be confirmed without undue delay, the SMC/IC should act rather than wait for verification.

Planning State

Comprehensive planning of SAR response tasks is essential, especially when the location of the distress situation is unknown. Proper and accurate planning is critical to SAR mission success; if the wrong area is searched, there is no hope that search personnel will find the survivors, regardless of the quality of their search techniques or the amount of their search effort. This requires proper training of the SMC/IC and other RCC watchstanders/SAR authorities.

Operations State

The SAR operations stage encompasses all activities that involve searching for the distressed persons or craft, providing assistance, and removing them to a place of safety. In this stage, the SMC/IC assumes a monitoring and guidance role, ensuring the search plan is received, understood, and followed by SAR facilities. The RCC/SAR authorities normally plan subsequent searches, based on updated information and the assumption that the present search will be unsuccessful.

(09/17/13) FEMA's US&R Nebraska Task Force 1 work their way across a river to search a home, using poles to help find hazards in the water; Boulder, Colorado flooding. (Photo: Michael Rieger/FEMA)

Conclusion Stage

SAR operations enter the conclusion stage when:

- Information is received that the aircraft, ship, or persons who are the subject of the SAR operation are not in distress;

[5] The RCC should also retain the reporting source contact information for follow up during and after the SAR mission.

- The aircraft, ship or persons for whom SAR facilities are searching have been located and the survivors rescued; or
- During the distress phase, the SMC or other proper authority determines that further search operations would be to no avail because additional effort cannot appreciably increase the probability of successfully finding any remaining survivors or because there is no longer any reasonable probability that the distress persons have survived.

When SAR operations are terminated, all authorities, facilities, or services which have been activated must be immediately notified.

Section 2-4: SAR Planning Considerations

Search Planning

Factors Influencing Search Object Detection

- *Color*
- *Brightness*
- *Motion*
- *Time*

Rescue Planning

Survivability

Cold Weather

Swamp

Rescue Methods and SAR Facilities

Safety Considerations

Search Planning

Many equate SAR with actions such as daring efforts undertaken by helicopters or rescue swimmers. However, a critical component of the SAR process for many operations takes place well before SAR facilities arrive on scene: search planning.

In a land SAR operation, to effectively plan a search and potentially narrow the projected search area can reduce search time and the rescue of persons in distress. An open ocean case with a long drift interval (the time between a search object's Last Known Position (LKP) and the searcher's on-scene time) can easily require the expenditure of hundreds of search hours and hundreds of thousands, even millions, of dollars.

Consequently, determining how and where to place available search facilities and teams to maximize overall search effectiveness is the objective of search planning.

The most effective search plan is the one that continuously maximizes the probability of finding the search object (also known as Probability of Success, or POS).

Search planning consists of:

- Situational awareness (ascertaining what happened where and when);
- Search object movement modeling (how has wind and water current affected the search object over a drift interval, where an aircraft went after the end of its radar track, where a lost person walked, etc.); and

- Effort allocation (how best to spread finite resource hours over a search area).

All search planning methods use the same types of information, but depend on incident complexity and available planning capabilities. For complex incidents, sophisticated computer programs can aid in data analysis, and are preferred if initial information is incomplete or conflicting, many variables exist, or searching continues for more than one day. For less complex operations, or if computer aids are not available, a manual search planning method can be used.

Further discussion on maritime and land search planning can be found in the *Coast Guard Addendum*, *Land SAR Addendum*, and *CISAR Addendum*.

(01/18/10) A woman is rescued alive from rubble by U.S. Office of Foreign Disaster Assistance (OFDA) USA 2 (FEMA US&R California Task Force 2) several days after the 2010 Haiti earthquake. (Photo: U.S. Navy Mass Communication Specialist 2nd Class Justin Stumberg)

Factors Influencing Search Object Detection

IAMSAR Manual (Volumes 2 and *3)* discuss how search object characteristics and search conditions affect its detection. Search planners and lookouts should be aware of such characteristics and conditions, and their effect, especially for visual searches.

Color

The color of the search object helps in detection because it contrasts with the surrounding or background colors. A small search object that contrasts with the background can often be seen more easily than a larger search object that blends with surroundings. However, small search objects can be seen only at limited distance regardless of the color contrast. For color to be effective, the eye must look directly at the search object because the color receptors are concentrated in the center of the retina and objects seen out of the corner of the eye are unlikely to be detected by color contrast.

In the maritime environment, white, yellow, red, and orange colors provide good contrast against a water background, but yellow and white objects are not easily seen against whitecaps. Under whitecap conditions, red and orange appear to be the easiest colors to detect.

Color of the search object can be a critical issue in conducting a search for a person in distress. (10/25/10) Small Plane Crash, Wind River Mountains, Wyoming (Photo: Fremont County Coroner's Office)

Brightness

Brightness will also influence a search object's contrast with its surroundings. For example, fluorescent colors (such as international orange) are typically sighted at greater distances than flat or dyed colors. The density of color in fluorescent paint and tapes is so great that brightness contrast combines with color contrast to improve search object detection probability by reflecting greater amounts of light.

In general, water wakes and colors are more easily sighted when looking away from the sun, whereas a craft's silhouette is likely to be sighted first if viewed looking towards the sun. Thus, color and brightness contrasts are most influential when the search object is down-sun.

Liferaft in the water. Contrasting color helps SAR facilities locate persons in distress.

Note the contrasting color. (02/09/13) Ice rescue crews participating in the Icy Resolve 2013 mass rescue full-scale exercise deploy from Coast Guard Station Marblehead, Ohio. (Photo: U.S. Coast Guard Air Station Detroit)

Motion

Search object motion influences detection range by contributing to the "something different" in a look-out's visual field and by disturbing the water.

For example, in the maritime environment, as a vessel moves faster, its wake is larger and the detection range from the air increases due to the effective increase in search object size. Any movement by an object in light seas is likely to attract attention. Conversely, a stationary search object can sometimes be detected among whitecaps because search object position remains the same while the whitecaps "blink" on and off.

Time

The relative amount of time a search object is exposed to the observer affects search object detectability. Search object shape, particularly a boat's freeboard in the maritime environment, can influence duration of exposure because waves and swells may hide the search object intermittently. Small search objects are especially difficult to detect in high seas and swells because of this effect.

Rescue Planning

SAR personnel should ensure the rescue of persons trapped in a hazardous environment who can be rescued without unduly compromising the survival of others.

Rescue planning addresses preparedness, based on factors such as:

- Risk assessments;
- Potential rescue scenarios, including mass rescues and catastrophic incidents;
- Staffing, training, qualification, and certification;
- Facilities, equipment, and supplies;

- Other available resources that might be used in the search;
- Communications;
- Exercises;
- Policies, standards and procedures;
- Advance arrangements; and
- Partnerships and agreements.

Incident planning factors include:

- The type of casualty or incident;
- The urgency and magnitude of the situation;
- Survivability and the environmental conditions;
- Results of an aerial survey if conducted;
- Available access routes to the scene and the most suitable available SAR facility for each route (least time en route but with adequate safety and navigational references for the facility);
- Facilities for various tasks;
- Coordination with agencies that have suitable SAR facilities;
- Recovery methods acceptable to the person in charge of the SAR facility;
- Number and immediate needs of survivors;
- Need for and method of delivery of supplies and other supporting equipment;
- Post-recovery transportation;
- Suitable places of safety;
- Rescue action plan development; and
- Awareness of all participating agencies of the rescue action plan.

Survivability

Survival time of persons in distress is the foremost consideration in rescue planning. The SMC/IC should consider injuries or other medical conditions that might require special consideration, such as the need for quick recovery or specialized rescue equipment.

Factors to consider include:

- Number of survivors;
- If the condition of the survivors is unknown, assume urgent medical attention will be required (this will help determine the need for stretchers, oxygen, blood plasma, intravenous fluids, or other medical supplies);
- Medical action taken by the survivors or resources on scene; and
- Environmental conditions on scene.

Certain geographical areas with unique terrain, weather, or accessibility challenges may make SAR operations difficult.

(07/11/11) National Park ranger rescuing a man who was injured at Crater Lake, Grants Pass, Oregon. (Photo: NPS)

Cold Weather

Polar or other cold environments have harsh weather, sparse population, and a lack of natural food and shelter that makes extended survival challenging. Extreme cold, snow, ice, and lack of bases for rescue operations further complicate survivor recovery. Rescue planning should begin early during the search.

Aerial evacuation is normally the preferred means of rescue. Where rescue is by land-based SAR facility, logistical support will usually be via aerial delivery. Continuous air coverage should be maintained for any land SAR facility dispatched until the rescue operation is completed.

Immediately upon locating the distress site in a polar environment, the SAR facility should deliver supplies and survival equipment even if it appears no survivors are present. Survivors may have built snow caves or other shelters and may not be visible from the air. Cold weather SAR aircraft should carry air-droppable polar survival kits or substitutes. The SMC should also consider the:

- Use of pararescue teams trained in polar survival as a primary means of polar rescue; and
- Continuous, regular support of survivors and the safety of rescue teams, since harsh conditions in polar areas can cause death in minutes without proper equipment and in hours even with good survival equipment.

The most effective rescue methods depend on the location, weather, and physiological condition of the survivors. A base camp may need to be established and aerial recovery from it should normally be used. Related considerations include:

- Helicopter aircrew qualifications, including training in emergency medical care and polar survival;
- Icebreakers as helicopter advance bases; and
- Surface conditions, ice thickness, and terrain features for fixed-wing aircraft landing;

If land SAR facilities are used, survivors should not leave the incident site unless accompanied by a rescue party member. Surface transportation should be provided for the SAR responders.

In cold weather environments, victims of near drowning in cold water (70 degrees F or less) often appear lifeless, cold, blue, non-breathing and show no detectable heartbeat. If immersion is less than one hour, prompt CPR should begin and the victim rapidly transferred to a suitable medical facility.

Swamp

SAR operations in swamp conditions are usually performed by helicopter, but airboats and hovercraft may be used in tidal grass swamps. All types of swamps have been penetrated by land SAR facilities, but the time required and difficulties encountered indicate that all other possible methods of reaching the distress scene and evacuating survivors should be considered first. Other SAR considerations in swamp-type environments include:

- While the bottom in a cypress swamp is relatively firm, it is pocketed with many holes not visible from the surface;
- Ground party visibility is limited in tropical cypress, palmetto, and mangrove swamps; cover aircraft may be required to vector the SAR facility to the distress scene;
- Mangrove trees and root systems present considerable barriers to walk-in penetration;
- Tidal runs in tidal swamps, averaging 3 feet in depth, will impede progress; and
- Both wetland and tidal grass swamps

have silt-laden mud that can be quite deep.

Rescue Methods and SAR Facilities

Selecting the method to rescue persons in distress usually depends on the environment, available SAR facilities, number of survivors, and their condition.

(04/05/10) Air National Guardsmen from the 129th Rescue Wing completed a four-day rescue mission for an injured sailor approximately 650 miles off the coast of Baja, California, working with container ship CAP PALMERSTON. (Photo: CAP PALMERSTON crew)

The recovery method may be left to the OSC or SAR facility. However, the SMC usually develops a rescue plan and coordinate its implementation.

The final step in the planning sequence relates to the safe transport and delivery of survivors to a place of safety. The SMC/IC should select a place of safety, such as a hospital, airport, or other safe haven, and a means of transport.

Safety Considerations

Safety considerations are critical during rescue operations. No SAR facility should be directed to conduct a maneuver hazardous to the craft, crew or team unless a thorough evaluation indicates that the risk is acceptable. While the OSC and SMC should have the experience, training, and knowledge of the capabilities of the SAR facility to make the evaluation, the person in charge of the SAR facility has ultimate authority and responsibility for determining whether an operation can be executed safely.

Additional SAR planning considerations can be found in the *Coast Guard Addendum*, *Land SAR Addendum,* and *CISAR Addendum.*

Section 2-5: Emergency Medical Services (EMS)

Overview

The capability of sustaining life after rescue is as important as searching for and rescuing survivors.

The *IAMSAR Manual (Volume 2)* provides general medical information, and some details on MEDICO (medical advice) and MEDEVAC (medical evacuation) operations. *Volume 3* provides a wide range of advice on medical assistance from the viewpoint of a SAR facility or craft in distress, including assistance by helicopters, care of survivors, and training for SAR personnel.

The four major EMS capabilities provided as SAR services are:

- Personnel trained in emergency care;
- Lifesaving and life-sustaining services;
- Survivor evacuation and transport; and
- Medical facilities available to receive injured survivors.

Emergency Medical Service (EMS) Personnel

EMS personnel are trained to provide emergency medical care at the distress scene. These personnel may be trained to provide life support and life-sustaining services during survivor extraction from wreckage or collapsed structures, evacuation, and transport to a receiving medical facility. EMS personnel may include SAR crewmen and pararescue personnel qualified to administer basic lifesaving first aid, as well as specially trained EMS personnel such as doctors, nurses, corpsmen, paramedics, or Emergency Medical Technicians (EMTs).

Emergency Care

Emergency care may include:

- Extraction or removal from wreckage or collapsed structures;
- Triage (sorting and assignment of priorities for attendance, care, treatment, and transportation of multiple

survivors);

- First aid and emergency care to stabilize survivor condition;
- Survivor debriefings;
- Transport of survivors to an interim or final place of safety;
- Life support during transport; and
- Briefing of receiving authorities at the delivery point.

Rescue Considerations

SAR facilities should consider the following in the conduct of rescue operations:

- Ensure the rescue of persons trapped in a hazardous environment without unduly compromising the survival of other survivors or themselves;
- Survivor processing should begin as soon as possible after the SAR operation is complete;
- The number of survivors, type of SAR facility, and medical resources available determine the nature of processing and any further SAR efforts;
- Conduct triage and render medical care;

(09/13/13) Rescue of man trapped in car during Boulder, Colorado flooding. (Photo: WGN)

- Medical evacuation involving transport by aircraft should be coordinated closely with a recognized medical authority familiar with the risks associated with these types of SAR operations;
- Provide shelter and care for survivors until they are ready to be transported;
- Provide or arrange for transportation to a place of safety; and
- Aircraft crash sites present particular problems for SAR facilities, as discussed in the *IAMSAR Manual (Volume 2)*:
    - o Aircraft wreckage and the surrounding area should not be disturbed except to assist in the recovery of survivors. As such, controlling access to the crash site should be established as soon as possible.

Medical Evacuation (MEDEVAC)[6]

Survivors should be recovered from a distress scene and transported to a place of safety, or transported to receiving medical facilities by the most expeditious means.

The *IAMSAR Manual (Volume 2)* lists factors to consider when planning a medevac. In addition, the following parameters should also be considered:

- When relying on medical advice from a doctor inexperienced in the conduct of medevac operations, effectively explaining the hazardous conditions on scene associated with the particular case should be provided so an informed decision can be reached on whether a medevac is warranted;
- The risks associated with transporting a patient in hazardous conditions must be

[6] A MEDEVAC is the evacuation of a person for medical reasons. IMO/ICAO, *IAMSAR Manual, Volume 2* (IMO/ICAO: London/Montreal, 2010): xviii.

weighed against the risk of not conducting the medevac; and

- The risk to SAR facilities and responders must be balanced against the patient's medical status, especially if the medevac is delayed or not performed.

MEDEVAC at Sea

The *IAMSAR Manual (Volume 3)* provides specific guidance on the conduct of medevac at sea by helicopters. The primary controlling factors are distance, weather, and threat to the patient and SAR responders. The SMC may ask the vessel to divert toward a certain position or port. Once the vessel diverts and provides an ETA to the SMC, the SAR facility response can be coordinated and executed. After the SAR facility has departed, the vessel should be advised of its ETA.

The vessel should provide to the SAR facility as accurate a position as possible, time of position, course, speed, weather and sea conditions, wind direction, and velocity. Medical information should include whether the patient is ambulatory.

If the vessel with the patient is out of medevac range by official SAR facilities, assistance may often be accomplished by another vessel, possibly a merchant or passenger ship in the vicinity, with medical personnel that can assist the patient.

Fixed-wing aircraft may also be dispatched to serve as escort, navigational support, and/or communications relay for the SAR facility.

(11/13/10) Coast Guard Air Station San Diego helicopter conducted the medevac of an ill person from the passenger ship OOSTERDAM. (Photo: U.S. Coast Guard)

Collapsed Structure Medical Response

Experience has shown that medical response to collapsed structures encountered in disaster situations requires specialized training and education beyond that normally acquired in the traditional emergency medicine/pre-hospital setting.

The FEMA US&R Task Forces have the capability and specialized training to provide advanced medical care to injured or trapped survivors in collapsed structures.

(01/21/10) In the response to Haiti's devastating earthquake, FEMA US&R New York Task Force 1 pulled a five-year-old boy from a building. (Photo: Dean Meminger, NY1)

Delivery of Survivors to a Medical Facility

When survivors are being delivered to a medical facility, the SAR facility should provide the number of patients, age and information on first aid and emergency treatment provided. Information to be passed to medical personnel should include:

- Type of injury or condition;
- Treatment given and medications, including time and amounts; and
- Times when tourniquets, splints, or compress bandages were applied.

The survivor processing tag, medical logs, and any other medical records should be delivered to the treatment facility.

Section 2-6: Mass Rescue Operations (MROs)

Mass Rescue Operations (MROs)

MROs are internationally defined as search and rescue services characterized by the need for immediate response to large numbers of persons in distress, such that the capabilities normally available to search and rescue authorities are inadequate (*IAMSAR Manual, Volume I*).

Introduction

MROs are low probability – high consequence events that pose significant challenges for SAR authorities. Effective response to such major incidents typically requires immediate, well-planned, and closely coordinated large-scale actions and use of resources from multiple organizations.

Flooding, earthquakes, terrorism, casualties in the offshore oil industry and accidents involving releases of hazardous materials are examples which, because of their magnitude, may require the application of the same resources required for mass maritime or aeronautical rescue operations (e.g., large passenger ship, rail, or aircraft, etc.). Such incidents might involve hundreds or even thousands of persons in distress in well populated areas, or remote and hostile environments.

For example, a passenger ship sinking hundreds of miles offshore, could require the rescue of thousands of passengers and crew in poor weather and sea conditions, with many of the survivors having little ability to help themselves.

(01/14/12) Grounding and partial sinking of passenger ship COSTA CONCORDIA, Isola del Giglio, Tuscany, Italy 13 January 2012, with the loss of 32 passengers. (Photo: Roberto Vongher)

When is a SAR case a MRO?

SAR authorities have acknowledged it would be counter-productive to assign a "number of persons in distress" requirement to the definition of a MRO.

How many persons in distress would be enough to classify a SAR case as a MRO? If there was *one less* person in distress than the required number, would an incident *not* be classified a MRO? In many instances, the type of event (e.g., catastrophic incident, passenger ship or ferry disaster, passenger aircraft or train crash, etc.), time of day, location, weather and environmental conditions, etc., may be better determiners of whether a SAR case is a MRO, not necessarily the number of persons in distress.

MROs vs. Catastrophic Incidents

In the United States, a MRO may not necessarily be classified as a catastrophic incident, which, by definition, includes the destruction of infrastructure. However, a MRO may very well be a component of the overall response to a catastrophic incident in which ESF #9 is activated and Federal SAR resources are utilized to support the requesting State, Tribe, Territory/Insular Area, and/or FEMA Region SAR requirements. Further information on the conduct of MROs in response to a catastrophic incident can be found in the *CISAR Addendum*.

Other than large-scale SAR operations conducted during the response to a catastrophic incident, most MROs occur on transportation systems that carry large numbers of passengers.

Even MROs that are not catastrophic incidents must be coordinated and conducted within a broader emergency response context that may involve hazards mitigation, damage control and salvage operations, pollution response, complex traffic management, large scale survivor logistics, medical and coroner functions, accident/incident investigation, and intense public and political attention. However, the priority in the conduct of a MRO must be lifesaving.

(01/15/09) U.S. Airways Flight 1549 departed LaGuardia Airport in New York City, struck a flock of geese, lost engine power and ditched in the Hudson River off midtown Manhattan. No loss of life. (Photo: Bebeto Matthews, Associated Press)

Early notification of a potential or developing MRO is critical due to the level of effort required to mount a large-scale rescue operation. It is always better to begin a MRO response and secure operations if the response is unnecessary, than to begin a MRO response later when lives are at greater risk.

"Worst-Case" Scenario

In preparing for and responding to a MRO, the uniqueness of this type of event must be appreciated. Two principles identified below provide a basis for putting in context why MRO response preparedness must be considered a priority.

Titanic Effect

In 1974, author Kenneth E. F. Watt wrote, *The Titanic Effect: Planning for the Unthinkable*, which describes possible future economic and energy consumption challenges. Relevant to the challenges associated with responding to a MRO, is the book's description of the "Titanic effect" principle:

History abounds with parallels of imminent disaster. Public warnings have been ignored when they were outside the range of past experience. Consequently, the appropriate countermeasures were not taken. The Titanic and other "unsinkable" ships that nevertheless went down; the cities built on flood plains; Pearl Harbor and other military "surprises"; hospitals and schools destroyed with great loss of life after repeated warnings of what fire or earthquake might do; these are some examples.

There appears to be a basic human tendency to ignore warnings about such possible enormous disasters as "unthinkable." We must understand this tendency and guard against it…. Yet if we examine history, an important generalization, which might be called the "Titanic effect," can be discerned:

THE MAGNITUDE OF DISASTERS DECREASES TO THE EXTENT THAT PEOPLE BELIEVE THAT THEY ARE POSSIBLE, AND PLAN TO PREVENT THEM, OR TO MINIMIZE THEIR EFFECTS.[7]

The Titanic Effect principle captures the foundational basis for disaster prevention and MRO planning and response. Despite regulatory, safety, and training improvements, the primary premise is that disasters will continue to occur and SAR authorities must be prepared to coordinate, as well as respond, to future MROs.

(04/15/1912) Last lifeboat launched from the *Titanic*, which sank after colliding with an iceberg on April 15, 1912. , with a loss of 1,502 passengers and crew. (Photo taken by a passenger on the *Carpathia*, the ship that received the *Titanic's* distress signal and came to rescue the survivors/Public Domain)

The United States will continue to improve safety and prevent disasters from occurring. Mitigating risk is the essence of the Titanic effect. Even though disasters may occur with less regularity, or with less extreme impact as the sinking of the *Titanic* or other large scale disaster, SAR authorities must continue to plan for the *response* to future MROs.

[7] Kenneth E. F. Watt, *The Titanic Effect: Planning for the Unthinkable* (New York: E. P. Dutton & Co., Inc., 1974): 6-7.

The author provides an important recommendation in preparing for MROs:

In general, it is worth taking action in advance to deal with disasters. The reason is that the costs of doing so are so typically inconsequential as measured against the losses that would ensue if no such action were taken.[8]

Black Swan

More than three decades after the publication of *The Titanic Effect*, in 2007, Nassim Taleb wrote, *The Black Swan: The Impact of the Highly Improbable*.[9] The author describes how history generally moves forward, not in a gradual incline, but in singular events that are outside the expected; unpredictable events with massive history-making impact. These unpredictable events are known as "Black Swans" – events that are unforeseen and point to the limits of human knowledge:

Before the discovery of Australia, people in the Old World were convinced that all swans were white, an unassailable belief as it seemed completely confirmed by empirical evidence. The sighting of the first black swan might have been an interesting surprise for a few ornithologists (and others extremely concerned with the coloring of birds), but that is not where the significance of the story lies. It illustrates a severe limitation to our learning from observations or experience and the fragility of our knowledge. One single observation can invalidate a general statement derived from millennia of confirmatory sightings of millions of white swans. All you need is a single… black bird.[10]

There are three criteria that define a Black Swan, which are relevant to MRO response preparedness and planning:

Criteria #1: Black Swans are outlier events

An *outlier* is a data point that significantly deviates from the rest of the data;[11] a rare event that "lies outside the realm of regular expectations."[12]

Disasters that result in a MRO can be statistically considered outlier events: low-probability, high-consequence incidents that infrequently occur. Even with the development of new laws, regulations, technical system improvements, safety procedures, inspections, etc., disasters will still continue to occur.

(10/30/12) Emergency personnel rescue residents from flood waters brought on by Hurricane Sandy in Little Ferry, New Jersey. (Photo: Adam Hunger, Reuters)

As a result, effectively planning the response to MROs, even though considered outlier events, is critical. The tragic consequences of unpreparedness in a MRO response can be exacerbated by the lack of planning.

[8] Ibid, 7.
[9] Nassim Nicholas Taleb, *The Black Swan: The Impact of the Highly Improbable*, 2nd Edition (New York: Random House Trade Paperbacks, 2010).
[10] Ibid, xxii.
[11] Frank. E. Grubbs, "Procedures for Detecting Outlying Observations in Samples," *Technometrics Vol. 11, No. 1* (February, 1969): 1.
[12] Nassim Nicholas Taleb, *The Black Swan: The Impact of the Highly Improbable,* 2nd Edition (New York: Random House Trade Paperbacks, 2010): xxii.

Criteria #2: Black Swans will have a major impact

Disasters that include a significant loss of life, historically, have been the impetus for implementing new laws, regulations, safety standards and practices and the development of new technologies and response procedures. However safety improvements and regulations will never completely guarantee that a MRO will not occur in the future, especially with the occurrence of natural disasters (e.g., hurricanes, earthquakes, tornadoes, flooding, etc.). Reviewing historical trends helps to isolate where new regulations and other requirements can target specific safety gaps, but will not predict if and when the next disaster will again occur.

Criteria #3: Black Swan events become explainable and predictable… after the fact

Analysis of disasters and the subsequent MRO response will provide useful information that will help planners and SAR authorities prepare for future disasters, as well as be the impetus for new safety regulations, development of new equipment, improved design and construction. All of these efforts will be beneficial.

However, even as attempts are made to understand how a disaster occurs and what can be done to prevent them in the future, they will still continue to occur due to *human error*. An important example of this trend is found in the shipping industry:

Over the last 40 years or so, the shipping industry has focused on improving ship structure and the reliability of ship systems in order to reduce casualties and increase efficiency and productivity. We've seen improvements in hull design, stability systems, propulsion systems, and navigational equipment. Today's ship systems are technologically advanced and highly reliable.

Yet the maritime casualty rate is still high. Why? Why is it, with all these improvements, we have not significantly reduced the risk of accidents? It is because ship structure and system reliability are a relatively small part of the safety equation. The maritime system is a people system, and human errors figure prominently in casualty situations. About 75-96% of maritime casualties are caused, at least in part, by some form of human error.[13]

Even though Black Swans may be explainable after the fact, and lead to needed improvements to continue preventing these disasters in the future, they will still occur due to the challenge of human error. This is because transportation systems, in particular, are "people operated and maintained." As long as people continue to be an integral component of complex transportation systems, errors will occur that can lead to future disasters requiring a MRO response.

Summary

- The *Titanic effect* provides an important principle in MRO planning: Anticipate that a disaster with a MRO will occur again in the future. SAR authorities must plan for the event to minimize the effect; and
- The Black Swan criterion provides SAR authorities with a framework for understanding the MRO challenge.

[13] Anita M. Rothblum, "Human Error and Marine Safety;" available on the internet at http://www.bowles-langley.com/wp-content/files_mf/humanerrorandmarinesafety26.pdf; accessed on January 10, 2013.

MRO Planning and Preparedness

Moral and legal obligations, as well as public and political expectations, mandate the preparation and response to a MRO safely and effectively in order to save as many lives as possible. The ability to effectively respond to a MRO requires the development of a comprehensive planning, preparedness, and training program. A simple way to describe MRO response preparedness is:

Partnerships + Planning + Practice = Preparedness

Partnerships

Effective coordination and cooperation between international, Federal, STTIA, and local SAR authorities, as well as the support of other MRO response stakeholders (e.g., industry, volunteers, NGOs, etc.), is essential. Especially in the conduct of MRO operations, the use of all available resources is critical to saving lives.

An important element in developing partnerships for MRO response preparedness is mutual assistance/mutual aid agreements and mutual aid programs.

Most SAR authorities are not equipped *on their own* to handle the rescue or evacuation of large numbers of people. Consideration should be given by SAR authorities to develop mutual assistance systems, particularly in areas where the risk for a MRO may exist.

In a mutual aid system, SAR authorities can call upon the use of not only other SAR response agencies but also private industry resources that would be vital to a successful response. It is important to identify which organizations in a given area have the SAR facilities available to rescue and transport to a place of safety large numbers of persons in distress.

A commitment from stakeholder organizations to a mutual assistance agreement ensures SAR facilities are available for MRO planning, the conduct of MRO exercises, and in the response to an actual MRO.

Planning

MRO response plans must be incorporated into, and compatible with overall response plans for major incidents. Plans must typically allow for command, control, and communications structures that can accommodate simultaneous air, sea, and land operations.

The consequences of poor preparedness for the conduct of an MRO can be significant. As a result, preparedness to mount an extraordinarily large and rapid MRO response is critical to preventing large-scale loss of life. Such preparedness often depends on:

- Understanding potential MRO scenarios in a given geographic location;
- SAR agency and potential MRO response stakeholder support for MRO preparedness efforts; and
- Cooperative planning and preparedness efforts between SAR authorities and other MRO response stakeholders.

The challenge will be the effort required to prepare for this worst-case type of disaster, especially since MROs are rare events. The required levels of cooperation, coordination, planning, resources, funding, and exercises required for preparedness are challenging and do not happen without the requisite commitment of SAR authorities, regulatory authorities, transportation companies, military, commercial assistance, volunteers, and industry stakeholders.

An excellent planning resource for MROs, developed mainly for aeronautical and maritime incidents but is applicable for any type of MRO, is the IMO Circular, *Guidance for Mass Rescue Operations (COMSAR/Circ.31)*. This comprehensive Circular (Appendix E) is used worldwide and is of value for U.S. SAR authorities for MRO planning. COMSAR/Circ.31:

- The unique aspects of MROs;
- Provides general MRO response guidance;
- Provides comprehensive guidance on the conduct of MRO exercises; and
- Discusses industry's role in responding to a MRO.

Additional MRO guidance includes the *IAMSAR Manual (Volume 2)*, *Coast Guard Addendum*, and *CISAR Addendum*.

Another important consideration in MRO planning involves identifying and analyzing the risks within a given geographic area. A "MRO Threat Analysis" should evaluate all potential hazards, including, but not limited to:

- Passenger vessel and aircraft traffic;
- Geographic constraints (the availability of SAR resources will decrease and response times increase the farther off shore or the more remote an area the MRO occurs);
- Availability of SAR facilities for response and support operations; and
- Other considerations as appropriate.

Practice (MRO Exercises)

Since opportunities to conduct actual incidents involving mass rescues are rare, conducting MRO exercises is particularly important. An effective exercise program will allow diverse SAR agencies (Federal, international, military, state, local, volunteers, etc.), industry partners, and other vested stakeholders the opportunity to train together in order to provide an effective, coordinated MRO response.

Mass evacuation and rescue operations are difficult and costly, leading to a tendency to use simulation excessively during exercises rather than physically exercising on scene efforts. MRO exercise objectives need not be addressed in a single large exercise, but may be satisfied in part by routine incorporation into multiple drills, some intended mainly to test other systems. In particular it is important to exercise MRO notification and response procedures to achieve better preparedness.

(04/02/13) A lifeboat with actors aboard makes its way to shore as the Coast Guard Cutter DIAMONDBACK stands watch during exercise Black Swan, Freeport, Grand Bahamas. Black Swan was a joint offshore emergency exercise coordinated by the Bahamian government, Coast Guard, cruise line industry, and emergency response teams to test and evaluate safety procedures at sea. (Photo: Chris Todd, Coast Guard Auxiliary)

Identifying and practicing different, likely scenarios using available SAR facilities will help prepare SAR responders for future MRO possibilities. Contingency exercises of other MRO scenarios such as ones that could be unique to a particular SAR authority should also be considered for preparedness, readiness, and response planning.

MRO exercise participants should, at a minimum, include the responsible SAR authorities and pertinent Federal, STTIA, local, volunteer organizations, commercial assistance providers, and other vested industry groups and their emergency operations functions. SAR authorities should coordinate MRO exercises and contingency plans with stakeholders and share in their preparations to minimize the chances that MROs will be needed, and to ensure success if they are.

SAR exercise planners should consider lessons learned from previous exercises and experiences as an integral part of the exercise process. Objectives should meet the type of exercise to be conducted. Discussion-based exercises (e.g., seminars, workshops, table top exercises, and games) are normally used as a starting point in the building-block approach to the cycle, mix, and range of exercises. These types of exercises typically highlight existing plans and focus on coordination, notification procedures, rescue operations, and other provisions as per established mutual assistance programs agreements. In addition, drills and Functional Exercises (FEs) may be conducted as preliminary actions for an Operations-Based Full Scale Exercise (FSE).

Section 2-7: Airspace Management during SAR Operations

Introduction

Note: The Coast Guard Addendum, Land SAR Addendum and *CISAR Addendum provide additional information concerning the management of aircraft during SAR operations.*

The SMC has three primary aircraft management concerns;

- Gaining SAR aircraft access to controlled airspace over the scene of SAR operations;
- Effectively assign limited SAR aircraft to search areas; and
- Ensure safety of flight.

Other SMC/IC SAR aircraft considerations include:

- Be familiar with Air Traffic Control (ATC) procedures;
- Coordinate air operations with Air Traffic Control (ATC) facilities during a mission;
    - Aircraft are prohibited from flying in instrument meteorological conditions (IMC) in controlled airspace unless flying on an IFR clearance provided by ATC;
    - It is usually not possible to obtain an IFR clearance in uncontrolled airspace, so aircraft may operate only if visual separation from other aircraft and obstacles can be maintained; and
    - Government-owned aircraft flying over open ocean may operate in IMC without an IFR clearance if certain criteria are met (The parent agency or the pilot-in-command should be consulted regarding these operations).
- The SMC/IC may request ATCs establish a Temporary Flight Restriction (TFR) during SAR operations to prevent non-SAR aircraft from interfering with search operations (e.g., General Aviation (GA) aircraft, helicopters, Unmanned Aircraft Systems (UAS), etc.), which can pose in-flight safety hazards and noise interference.

SAR Operations in Special Use Airspace

In special use airspace, DoD controls many of these areas (e.g., MOAs, low level training routes, restricted areas over land, and warning areas over the ocean). If a SAR operation requires the use of aircraft in special use airspace, prior coordination with the military command exercising control over the special use airspace is required. The names and telephone numbers for the controlling agencies are available in military Flight Information Publications (FLIPs), specifically DoD's Area Planning/Military Training Routes publication.

The SMC/IC can reserve a SAR operations warning area in either domestic or international airspace (or both) and are usually in uncontrolled airspace. Unlike a TFR, restraint on aircraft entering the area is voluntary. ARTCC will not routinely issue a NOTAM for this type of reservation. However, the SMC may want to consider requesting a NOTAM for non-SAR aircraft to remain outside the area.

After the SMC/IC has developed the search area, five miles should be added to the outer boundaries of the coordinates passed to the ARTCC. The SAR operations warning area will include airspace within the expanded boundaries from the surface normally up to 2,000 feet over land or 6,000 feet over water. For airspace beyond the U.S. territorial sea, the ceiling should not exceed the base of the Oceanic Control Area (OCA) found in the applicable Regional Air Navigation Plan (RANP).

While the SAR operations warning area is in effect, ATC typically will not route IFR traffic to within 3-6 miles of the boundaries laterally, or at least 500 feet (above FL 290-1000 feet) above/below the upper/lower limit of the area to be protected.

Altitude Reservation (ALTRV) for SAR Operations

SAR Altitude Reservation is usually in controlled airspace, and provides for separation from ATC of controlled aircraft. There is no assurance of separation from aircraft not under ATC control. ATC does not issue a NOTAM for this reservation. When requesting SAR ALTRV, the SMC/IC should provide ATC with the following:

- Name and organization of the person making the request;
- Brief incident description;
- Estimated time of area reservation;
- Method of contacting SMC/IC;
- Description of area by geographic features or coordinates;
- Nature of operations and altitudes for aircraft SRUs;
- SAR aircraft staging bases, and whether non-SAR aircraft should be asked to avoid these bases; and
- Whether aircraft carrying news media or persons on official SAR business should operate at altitudes used by SAR aircraft, including special instructions such as radio call signs, frequencies of SAR aircraft, requirement to contact the OSC, specific areas to be avoided, and direction of traffic flow. The SMC/IC notifies ATC when reservations are no longer required.

During large-scale operations, or operations remote from adequate communications facilities, the SMC may require an ACO to establish a high-altitude orbit over the search area for better communications with SAR facilities and shore stations. The SMC/IC selects a position over the search area that allows the ACO to establish early radio contact with SAR aircraft approaching from staging bases.

SAR aircraft should use the word "rescue" in their call signs when requesting priority handling or when in a restricted area.

Altitude and orbit distance is requested from the ACO for the search and to record in the flight plan.

Temporary Flight Restrictions (TFRs)

Temporary Flight Restrictions (TFRs) are tools used by the FAA to restrict aircraft operations within designated areas. Historically, TFRs have been used by air traffic management as a means of separating "non-participating" aircraft from those engaged in certain activities, such as firefighting, rescue, and law enforcement operations.

In the conduct of SAR operations, a TFR is utilized to:

- Protect the safety of aircraft in support of SAR;
- Provide safety and security of ground SAR personnel; and
- Ensure an environment necessary for successful SAR operations.

Since U.S. domestic airspace is provided for access to all aviation customers, the use of TFRs is determined by need, not convenience.

As an example, it may be convenient to exclude aerial news reporting over a SAR event, but it may not be necessary to exclude those flights for safe operation. In this example, the news aircraft should not be excluded through use of temporary flight restrictions.

TFR Factors

When determining the use of TFR, seven factors are necessary for consideration:

Shape: Most commonly, a circle is used as the shape of a temporary flight restriction because it is easy to define, easy to use and quick to implement. The circle is defined by a fixed point as the center. In SAR, this point is commonly the center of effort. That point must be defined by a fix/radial/distance on a VHF Omni-directional Radio navigation aid (VOR) and/or latitude/longitude (lat/long). A street address or landmark must be converted to fix/radial/distance or latitude/longitude prior for TFR publication. FAA air traffic facilities can assist in that conversion. The radius of the circle is determined by nautical miles. However, a TFR can be any shape including square, rectangles and polygons. However, the more complex the shape, the more difficult and complex the language in the defining NOTAM will be. As in a circle, each point of the temporary flight restriction must be defined by fix/radial/distance and/or lat/long. If a TFR will over-lie an area where free airspace access is necessary, (airport, heliport, etc) the NOTAM can include a "cut-out" to provide that access. FAA air traffic facilities can assist in determining the necessity and size of any "cut-out".

Size: The TFR should be no larger than necessary to ensure the safety of personnel and flight operations while enabling successful search and rescue activity. If airborne operations are not used, a TFR of one to three nautical miles radius is often sufficient. If airborne operations are required, generally, the number and type of supporting aircraft determine the size. Rotary wing aircraft require much smaller airspace to safely perform search and rescue. As such, a one to three nautical miles temporary flight restriction is typical. However, fixed wing aircraft require more airspace to safely maneuver. Therefore, a three nautical miles radius or six nautical miles square is typically required for simple search and rescue efforts. The SMC/IC should rely upon the flight planners for the

The SMC/IC should advise the OSC of authorized non-SAR craft in the area.

geographical size requirements of the temporary flight restriction.

Altitude: Since aerial support of SAR operations is typically conducted close to ground level, the defining altitudes of the TFR are typically 1,000 to 3,000 feet above ground level. Generally, higher altitudes impact aviation more than lower altitudes. Therefore, requested temporary flight restriction altitudes should be the minimum necessary to safely and successfully support the search and rescue mission. However, some aerial platforms with advanced imagery or other technology may require higher altitudes.

The SMC/IC should rely upon flight planners and aircrews to determine required altitudes for SAR support.

Access: Access to TFR airspace is defined by two elements:

- Type of TFR; and
- SMC/IC authorization.

14 CFR 91.137 is the TFR that SMCs/ICs will request for airspace restriction for the conduct of SAR operations (Figure 2-7-1 below).

Title 14 - Aeronautics and Space

14 CFR 91.137 – Temporary flight restrictions in the vicinity of disaster/hazard areas.

(a) The Administrator will issue a Notice to Airmen (NOTAM) designating an area within which temporary flight restrictions apply and specifying the hazard or condition requiring their imposition, whenever he determines it is necessary in order to—

 (1) Protect persons and property on the surface or in the air from a hazard associated with an incident on the surface;

 (2) Provide a safe environment for the operation of disaster relief aircraft; or

 (3) Prevent an unsafe congestion of sightseeing and other aircraft above an incident or event which may generate a high degree of public interest. The Notice to Airmen will specify the hazard or condition that requires the imposition of temporary flight restrictions.

(b) When a NOTAM has been issued under paragraph (a)(1) of this section, no person may operate an aircraft within the designated area unless that aircraft is participating in the hazard relief activities and is being operated under the direction of the official in charge of on scene emergency response activities.

(c) When a NOTAM has been issued under paragraph (a)(2) of this section, no person may operate an aircraft within the designated area unless at least one of the following conditions are met:

 (1) The aircraft is participating in hazard relief activities and is being operated under the direction of the official in charge of on scene emergency response activities.

 (2) The aircraft is carrying law enforcement officials.

 (3) The aircraft is operating under the ATC approved IFR flight plan.

(4) The operation is conducted directly to or from an airport within the area, or is necessitated by the impracticability of VFR flight above or around the area due to weather, or terrain; notification is given to the Flight Service Station (FSS) or ATC facility specified in the NOTAM to receive advisories concerning disaster relief aircraft operations; and the operation does not hamper or endanger relief activities and is not conducted for the purpose of observing the disaster.

(5) The aircraft is carrying properly accredited news representatives, and, prior to entering the area, a flight plan is filed with the appropriate FAA or ATC facility specified in the Notice to Airmen and the operation is conducted above the altitude used by the disaster relief aircraft, unless otherwise authorized by the official in charge of on scene emergency response activities.

(d) When a NOTAM has been issued under paragraph (a)(3) of this section, no person may operate an aircraft within the designated area unless at least one of the following conditions is met:

(1) The operation is conducted directly to or from an airport within the area, or is necessitated by the impracticability of VFR flight above or around the area due to weather or terrain, and the operation is not conducted for the purpose of observing the incident or event. Code of Federal Regulations / Title 14 – Aeronautics and Space / Vol. 2 / 2011-01-01722

(2) The aircraft is operating under an ATC approved IFR flight plan.

(3) The aircraft is carrying incident or event personnel, or law enforcement officials.

(4) The aircraft is carrying properly accredited news representatives and, prior to entering that area, a flight plan is filed with the appropriate FSS or ATC facility specified in the NOTAM.

(e) Flight plans filed and notifications made with an FSS or ATC facility under this section shall include the following information:

(1) Aircraft identification, type and color.

(2) Radio communications frequencies to be used.

(3) Proposed times of entry of, and exit from, the designated area.

(4) Name of news media or organization and purpose of flight.

(5) Any other information requested by ATC.

Figure 2-7-1: 14 CFR 91.137 – TFR for SAR

- 14 CFR 91.137a(1) limits TFR access to those aircraft in direct support of SAR efforts;
- 14 CFR 91.137a(2) provides the same access with the addition of accredited press aircraft and other military, police and rescue aircraft; and

- 14 CFR 91.137a(3) allows aircraft landing and departing from airports within the temporary flight restricted airspace to proceed directly to and from that airport.

The SMC/IC determines which aircraft directly supports a SAR operation and must provide authorization for specific aircraft to operate within the TFR.

There is a difference between *airspace access* and *airspace control*. *Airspace control* is strictly within Federal Aviation Administration statutory authority and is only delegated in writing through a Letter of Agreement. Through a TFR, the FAA grants to the SMC/IC named in the NOTAM the authority to approve or disapprove *access* to the defined airspace. Under no circumstances does a TFR grant the SMC/IC the authority to control airspace and/or provide air traffic services.

Duration: A TFR NOTAM must contain the date and time the TFR starts and ends. Typically, a TFR in support of SAR operations is effective upon publication and remains effective until further notice (when specifically cancelled). However, the TFR's duration should be limited to only time and duration necessary. Examples include "from sunrise to sunset" or "effective immediately until 07172200 UTC".

Contact Information: Each TFR NOTAM must have the contact name and phone number for the SMC/IC or organization coordinating aircraft for the SAR operation. This allows air traffic control facilities and aircraft operators to determine which aircraft are specifically authorized to operate within the TFR. Additionally, the SMC/IC information provides FAA the ability to determine changing airspace requirements in a dynamic environment.

FAA Coordination Facility: A FAA air traffic facility is designated in the TFR NOTAM as the Coordination Facility. The Coordination Facility serves as the coordination and communication focal between the SAR incident response and the aviation community.

Typically the FAA Coordination Facility is the ARTCC or TRACON which controls the airspace that contains the TFR. When the TFR is close to an airport with an air traffic control tower, the air traffic control tower may be designated as the FAA Coordination Facility.

The SMC/IC should rely on the FAA to determine the FAA Coordination Facility.

Figure 2-7-2 is an example TFR.

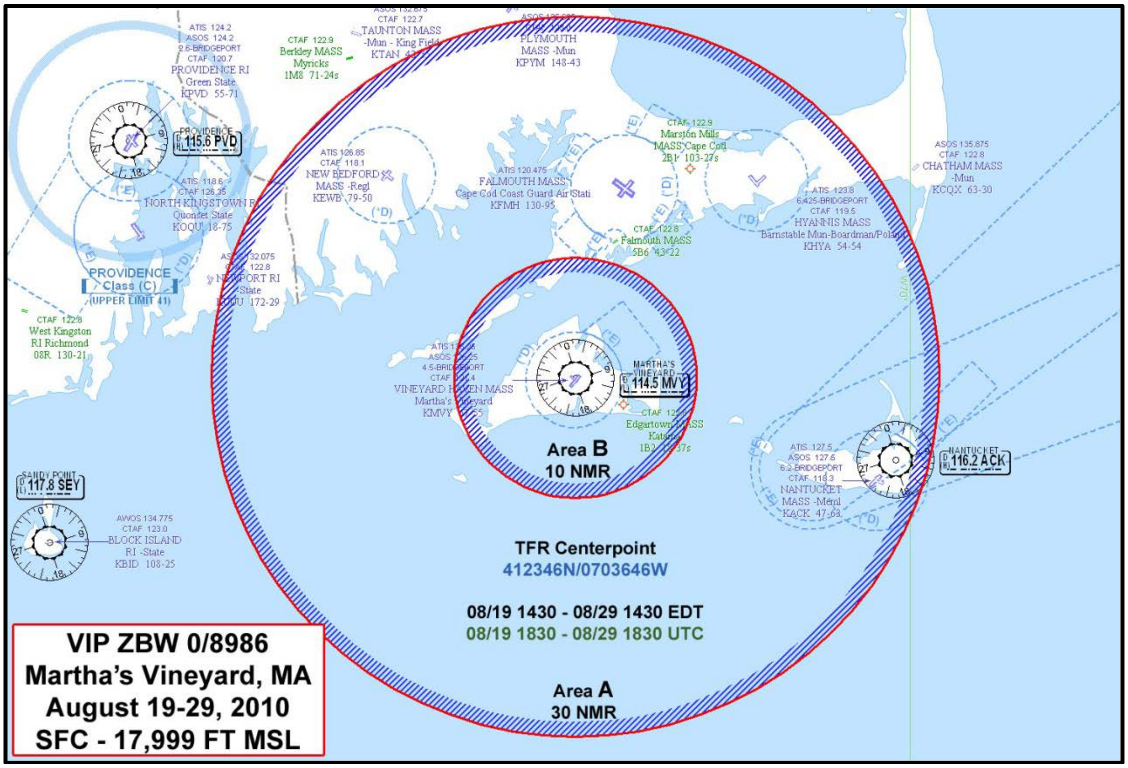

Figure 2-7-2: Example TFR

Aviation Safety Considerations

The safe conduct of aircraft performing SAR operations is a major concern to the SMC/IC. If no airspace reservations are provided, SAR aircraft are responsible for complying with all FAA and ICAO requirements. During large-scale searches, the SMC/IC normally obtains a SAR airspace reservation from ATC. When ATC facilities are unable to provide airspace reservation for search aircraft, the SMC/IC and OSC will normally provide safety and alerting services. All aircraft within the area will maintain their own VFR separation. When instrument meteorological conditions (IMC) exist in the SAR airspace reservation, aircraft should not be assigned for visual searches.

In the absence of adequate ATC facilities, aircraft control in the SAR area will often be advisory rather than directive. Unless the OSC has a qualified and experienced air controller or ACO to handle air traffic, each aircraft pilot-in-command should make technical air safety decisions.

The OSC or ACO should monitor the progress of arriving or departing aircraft, and assign altitudes to ensure separation of aircraft and clearance of obstructions. Assigned altitudes may not provide separation between aircraft unless all aircraft have the same altimeter setting.

Altimeter settings may be obtained from ground stations or vessels, and are based on prevailing atmospheric pressure. A common setting should be assigned to all aircraft on scene unless the search area is large. "Flight level" is used over ocean areas where sea level barometric pressure is not available. Flight levels provide vertical separation of aircraft because a common altimeter setting of 29.92 is used. They should never be used to assign altitudes for low-level searches.

When the SMC/IC and OSC or ACO directs search aircraft to specific search altitudes, they must ensure that aircraft do not interfere with each other. The SMC/IC uses search altitudes, commence search point (CSP), and direction of creep to provide aircraft separation. In addition, the OSC, ACO or pilot provides vertical separation during descent and ascent.

When several search areas are involved and a large total area is being searched, all search aircraft should be directed to file for either their CSP or their search area center point before descent to the search area. If altitudes below are clear, the aircraft should descend to search altitudes and keep the OSC or ACO advised.

If poor visibility in the search area makes flight safety a concern, the OSC or ACO should suspend searching and direct arriving aircraft to return to base.

The SMC/IC obtains, briefs, and dispatches relief SAR facilities, OSCs, and ACOs. As relief SAR facilities arrive on scene, each should be given an initial briefing by the OSC or ACO and monitored until in its assigned search area. The SAR facility being relieved, or finishing the assigned search, reports search results to the OSC or ACO and depart after OSC or ACO clearance.

Arrangements for on scene relief of SAR facilities reliefs must be made by the SMC with the providing agencies. If the aircraft or vessel assigned as OSC or ACO experiences a malfunction that prevents it from effectively carrying out OSC or ACO duties, one of the SAR facilities already on scene is usually selected as an immediate relief.

When multiple search areas are involved, departing aircraft may be authorized to climb out of the search area airspace within the lateral boundaries of the assigned search area, obtaining clearance from ATC for the return flight.

Section 2-8: Other SAR Considerations

Rescue Sites

Any type of site can pose hazards, especially fuel, and to a lesser extent, chemical and radiation hazards. Rescue personnel should exercise caution when approaching or boarding an unfamiliar vessel, or when approaching a vehicle or aircraft crash site. In addition to obvious dangers of fire and explosion, there may be danger of exposure to chemicals or radiation. For example, many fishing vessels use liquid ammonia to refrigerate their catch. If a fishing vessel crew is sick or unconscious, there may be an ammonia leak in the refrigeration system.

Aircraft Crash Sites

SAR responders, when conducting a SAR operation involving military aircraft should understand that many military aircraft are fitted with ejection seats and other hazardous material (e.g., explosive devices, chemicals, etc.).

When a pilot has to be removed from an aircraft so fitted, extreme care should be taken to avoid triggering the seat mechanism. The activating handles are normally indicated by red or yellow-and-black coloring.

The aircraft wreckage and its surroundings should not be disturbed except to assist in the recovery of survivors. Not only does the wreckage pose dangers, but the position of flight controls, the location of debris and other factors are important to the accident investigation.

It is important for the team leader to ensure the aircraft is not accidentally set on fire. If it becomes necessary to cut into the aircraft to remove survivors, non-sparking tools should be used and fire extinguishers should be kept ready. Composite material construction of some aircraft and the possible presence of hazardous materials pose additional safety hazards to SAR facilities and responders.

To help investigators, photographs should be taken of the crash site and of the wreckage.

A description should be passed on to the SMC/IC as soon as possible.

Measures to preserve as much medical evidence as possible include:

- Photography of bodies before moving them;
- Shielding of bodies from the elements by the best means available;
- Notation of the position of immobilized survivors; and
- Maintenance of a medical log for each survivor.

Except for compelling reasons, human remains should not be moved without authorization from the SMC/IC.

Hazardous Materials

Proper hazardous materials (HAZMAT) handling by on-scene personnel is an important element to the rescue of victims. SAR responders and medical personnel must be knowledgeable enough or forewarned of on-scene conditions for their own safety. Appropriate actions could include hazardous materials identification, on-scene safety strategies, and barricade zoning for the protection of the public.

HAZMAT protective equipment and decontamination procedures should comply with previously established guidelines. Incidents that involve hazardous materials will include medical conditions that require decontamination on site or upon arrival to a medical facility with decontamination areas. Due to the unknown exposure to agents, contact in the hot zone should be limited to the personnel equipped with personal protection gear. Poisons, gases, vapors and corrosives are a few of the elements that could be present.

Medical facilities and poison control centers can be consulted for guidelines for treating contaminated victims.

Stress

Exposure to traumatic events and duties, particularly if they involve dead, mutilated, or dismembered bodies, is extremely stressful. SAR responders may need to cope with such situations during or after a SAR operation. Adverse psychological effects of working in such an environment increase with prolonged exposure, and may be cumulative for personnel involved in multiple events over time.

Both survivors and SAR responders can experience post traumatic stress after an accident. Grief, despair, or the ordeal of survival may cause irrational behavior such as neglect of personal safety, or suicide attempts.

(03/15/11) OFDA USA 2 (FEMA US&R California Task Force 2) firefighter and live human scent working dog search debris for tsunami survivors in Ofunato, Japan. (Photo: Technical Sgt Daniel St. Pierre, U.S. Air Force)

Rescued survivors should not be left alone, especially if injured or showing signs of physical or mental exhaustion. Uninjured survivors may possibly be on the verge of mental collapse due to what was just experience, or witnessed. This condition could result in a state of uncontrollable shock.

Specialized counselors are often available upon request to help SAR responders, survivors, and relatives of survivors. In particular, counselors should be considered for supporting SAR responders following a mass casualty incident, crash of a SAR facility, or if SAR responders perished during a rescue attempt. RCCs/SAR authorities should be familiar with such resources and have contact information readily available.

Further information on traumatic stress can be found in the *CISAR Addendum.*

Survivor Debriefs

The *IAMSAR Manual (Volume 2)* provides information on the debriefing of survivors after a rescue operation has concluded. Debriefs should seek to obtain information concerning:

- The possible location of other survivors. The survivor should first be asked if there are any other survivors, and any leads as to their whereabouts. Any amplifying information (e.g., aircraft bailout altitude and position) may be important in determining the probable location of any other survivors for determining subsequent search efforts;
- Any history of recurring disease, such as heart trouble, diabetes, or epilepsy, that should be brought to the attention of the SMC/IC and future attending medical personnel; and
- Experiences during the survival, search, and rescue phases.

Debriefing survivors may provide information important for evaluating and improving future SAR processes and procedures, as well as help prevent future accidents from occurring. Depending on the case, this step may be delayed until survivors are adequately cared for and rested.

Underwater SAR Operations

IAMSAR Manual (Volume 2) discusses rescue of persons from inside damaged, capsized or ditched craft. Common casualties include entrapment in capsized, damaged, or sunken vessels and submersibles, crashed aircraft, and swimming and diving mishaps. Often, the Coast Guard or local resources will respond to these types of SAR operations.

However, in more complex or major cases, the resources and expertise of the U.S. Navy are used. In such cases, the Navy normally assumes SMC. For rescue of civilian submersibles, the SMC may request use of Navy submarine rescue capability through the Navy Command Center Duty Captain at the Pentagon (on 24-hour duty).

Diving Accidents

Victims of professional and recreational diving accidents often have medical injuries that few SAR personnel on scene may understand or are prepared to handle. SAR personnel are not required to be experts in diagnosing and/or treating dive injuries. However, SAR personnel in places with known diving activity should be able to recognize the general symptoms so that their potential severity is recognized, medical advice can be obtained, and basic steps can be taken to minimize worsening the medical condition.

Symptoms of diving-related illnesses are quite varied. Any unusual occurrences, including pain, confusion, dizziness, numbness, or shortness of breath within 24 hours of diving should also be considered a possible diving accident.

General categories of dive-related injuries include:

- Decompression sickness (“the bends”);
- Oxygen toxicity;
- Air embolism; and
- Nitrogen narcosis (“rapture of the deep”).

General Procedures

For all reported or potential diving accidents, SAR personnel should:

- Obtain the dive history: time, depth, activity, problems encountered, stops during ascent, time at the surface, time to onset of symptoms, pre-dive problems and activities, and the symptoms or signs currently being experienced;
- Obtain emergency medical advice as necessary, and if recompression is needed locate the closest available decompression chamber (Locations of decompression chambers are available from Divers Alert Network (DAN), Duke University Medical Center, North Carolina.);
- Be prepared to transport both diver and the diving partner (diving buddy) who may develop the same symptoms; and
- Be aware of limitations of air transport.

Air transportation of a diving accident victim is safest in a pressurized aircraft that can maintain sea level cabin altitude. Non-pressurized aircraft should maintain an altitude safe for flying and no higher than 200 feet above the location from which the victim was received. Cabin altitudes should also not exceed 200 feet above this location except in life-threatening situations where no other form of transportation is available. If oxygen is available, it should be administered by mask at the highest concentration available.

Section 2-9: Recovery of Property

SAR involves assisting persons in distress. However, other types of activities can be considered within the scope of SAR, such as assisting animals, particularly service animals upon which a survivor may depend, and saving property.[14]

The recovery of property is a secondary SAR function that should not interfere with the conduct of lifesaving operations. However, the recovery of property can be the *means* of rescuing persons in distress (e.g., towing a disabled boat). Agency and organization specific policies and procedures for the recovery of property during a SAR response, or subsequent to the SAR response, should be developed.

The recovery of property:

- Is often a natural extension of the rescue operation;
- May be the means of safely conducting the rescue operation;
- Does assist in justifying the cost of SAR facilities in relation to the value of the property recovered; and
- Takes advantage of the capabilities of SAR facilities, which may be the only resources available to recover property.

Considerations for the recovery of property may include:

- Cost and risks to the SAR responders in saving the property;
- Estimated value of the property;
- Whether abandoning the property may introduce other problems, such as pollution or hazards to navigation;
- Whether proper facilities, equipment, and skill are available to recover the property;
- The availability of resources that may be required to conduct higher priority missions or duties at the time; and
- An assessment of the situation by the SAR responders on scene who are usually in the best position to determine the risks involved in recovering property.

[14] See the *CISAR Addendum* for further guidance on assisting animals.

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Section 2-10: Charging Survivors for SAR Services

Traditional Practice

National SAR Committee (NSARC) Policy

Exceptions

Traditional Practice

Traditional practice worldwide is to *not* charge survivors for their rescue. With efforts to reduce costs, it is increasingly difficult to keep the nature of SAR operations purely humanitarian. Current and potential policies and legal provisions, and what constitutes the "right thing to do," are all factors.

National SAR Committee (NSARC) Policy

NSARC policy on not charging survivors for SAR services is documented in the NSP (Appendix A):

National SAR Plan

Charging for SAR Services

Each Participant should fund its own activities in relation to this Plan unless otherwise provided for by law or arranged by the Participants in advance, and not allow cost reimbursement to delay response to any person in distress.

Unless required by law, SAR services provided to persons in distress should be without subsequent cost-recovery from the persons assisted.

Consistent with international practice, generally, when a nation requests help from another nation to assist persons in distress, if such help is provided, it should be accomplished voluntarily; the United States should neither request nor pay reimbursement costs for such assistance.

Federal SAR authorities should not charge survivors for SAR assistance, and strongly discourage such a move. However, NSARC member agencies can charge for:

- Fuel they provide to a vessel so it can reach the nearest port, and the
- Recovery of expenses for hoaxes when they identify and successfully prosecute the offender(s).

Figure 3-10-1 provides reasons for not charging survivors for SAR:

1. SAR is typically a high tempo operation that requires sophisticated communications and command infrastructure, and costly fixed wing aircraft, helicopters, boats, personnel, etc. To directly charge survivors for rescues involving use of these resources could impose an enormous financial burden on survivors. Typical SAR operations can cost thousands of dollars per aircraft-hour, and run into the hundreds of thousands of dollars for extensive searches.

2. SAR authorities cannot choose who to rescue based on ability or willingness to pay, even if this could be quickly determined before the survivor(s) are rescued.

   If SAR authorities charged survivor(s) for their rescue, there is the possibility of having financial considerations affect search planning and execution decisions, as well as open SAR authorities to future legal liability. In addition, it would be extremely difficult to develop an objective test for deciding when persons in distress are financially capable of bearing the cost of their rescue.

3. Financial considerations may keep persons in distress from reporting their condition and seeking assistance in the early stages of the distress. The earlier a SAR authority is notified of a distress, the greater the opportunity to conduct a rescue and save someone's life. If financial considerations became a factor in a person's decision to notify SAR authorities of a distress, then SAR authorities may get fewer calls, or calls in the later stages of the distress, causing greater risk to those in distress, as well as to the SAR units conducting the rescue.

   This factor alone outweighs any consideration of how much money a SAR authority may be able to recoup from a survivor for a particular SAR case.

4. Delayed alerting of a distress can result in added SAR response costs that could be greater than the potential funds received by charging the survivors for SAR services.

Figure 2-10-1: Reasons to not Charge Survivors for SAR Services

As mandated in both the Maritime SAR and Chicago Conventions and as fully supported by the NSARC, assistance shall be provided to any person in distress, regardless of the nationality or status of each person, or the circumstances in which that person is found. U.S. citizens are not given priority or exclusive assistance by virtue of citizenship. In cases involving illegal immigration or other law enforcement operations, lifesaving efforts take priority and precedence over enforcement actions.

United States and other SAR authorities are Parties to international agreements that preclude charging each other for assisting in the conduct of SAR operations. U.S. SAR authorities neither charge nor pay foreign governments for reimbursement of expenses for SAR assistance. The practice of charging for SAR services would detract from treatment of SAR in purely humanitarian terms, and financial factors could adversely affect both cooperation and safety of persons in distress.

Internationally, providers of SAR services customarily fund the services, even if the assistance is provided at the request of another authority (e.g., an RCC of another nation). Most nations prefer that this aspect of international law be preserved to avoid an environment that might dictate resolution of funding prior to providing SAR assistance.

Exceptions

There are two exceptions to not charging survivors for SAR operations:

- When services are provided by an organization under a contractual arrangement with the requesting organization, in which case this service provider is acting on behalf, and as a primary resource, of the responsible SAR authority; and
- Federal Agencies conducting SAR operations at the request of a State, Tribe, Territory/Insular Area, and/or FEMA Region, can, under ESF #9, be reimbursed for CISAR operations.

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Section 2-11: Recovery of Human Remains

Searching for and recovering human remains is not normally considered a SAR mission. However, humanitarian interests and practical concerns may involve SAR personnel to some degree in such efforts. Normal SAR activities may lead to the discovery of persons who died before they could be rescued, and lives are sometimes lost after rescue.

Proper handling of such situations may provide practical benefits for persons affected by the loss of loved ones, improve public relations, and reduce SAR organization liability.

SAR authorities should make prior arrangements with other authorities, often law enforcement or public health officials, concerned with removal and disposal of human remains, so that plans for proper coordination can be developed and implemented quickly. If human remains are recovered, they should be preserved until the proper authorities assume responsibility for them. Availability of body bags can be particularly useful where some time has passed since death occurred, or where bodily damage or deterioration has taken place.

Policies regarding human remains, including handling by civilian and military authorities, should be established and familiar to SAR personnel.

Removal of human remains across international borders may be affected by the laws of both nations involved, and may need to be coordinated via diplomatic channels.

Careful preservation of human remains has important humanitarian, legal, and accident investigation implications. Medical examinations of bodies may lead to important conclusions by accident investigators. Medical examiners may need to issue a certificate of death.

Handling of human remains can be unpleasant and even traumatic. SAR personnel need to be informed on proper procedures to use and, subsequent to their involvement, and providing counseling, as appropriate, to help meet emotional needs.

The *CISAR Addendum* provides additional information on handing human and animal remains.

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Section 2-12: Places of Safety and Lily Pads

Place of Safety

Place of Safety in Maritime SAR Operations

Place of Safety in CISAR Operations

Lily Pad

Place of Safety

Place of Safety

The *IAMSAR Manual* describes a place of safety as:

- A location where rescue operations are considered to terminate;
- A place where the survivors' safety of life is no longer threatened;
- Where a person's basic human needs (i.e., food, shelter and medical needs) can be met; and is
- A place from which transportation arrangements can be made for the survivors' next or final destination.

A place of safety may be on land or other suitable facility until the rescued survivors are transported to their next destination.

Delivery to a place of safety should take into account the particular circumstances of the case. These circumstances may include factors such as:

- The situation on board the assisting SAR facility;
- On scene conditions;
- The survivor's medical condition; and the
- Availability of further transportation.

Each case is unique, and selection of a place of safety may need to account for a variety of factors, both on scene and at the proposed location of the place of safety.

Selection of a place of safety is usually based on the distance and direction from the SAR facility and its suitability for receiving survivors.

SAR authorities, whether national, State or local, should cooperate with each other regarding providing suitable places of safety for survivors after considering relevant factors and risks.

A location should not be considered a place of safety based solely on the fact that the survivors are no longer in immediate danger once delivered there. The location may not have appropriate facilities and equipment to sustain additional persons without the ability to properly care for survivors. Even if the location is capable of safely accommodating survivors and may serve as a temporary place of safety, it should be relieved of this responsibility as soon as alternative arrangements can be made.

Place of Safety in Maritime SAR Operations

A place of safety may be on land, or it may be aboard a rescue unit or other suitable vessel or SAR facility at sea that can serve as a place of safety until the survivors are disembarked to their next destination.

(02/19/12) Passenger ship SEABOURN ODYSSEY rescued three fishermen adrift in the Pacific for three weeks. (Photo: Seabourn blog)

The fact that a place of safety need not be on land is particularly important for the United States. Once a person in distress is rescued, the United States then attempts to determine the person's status and, if the survivor is not a U.S. citizen, may return the person to his or her country of origin.

In addition, an assisting ship should not be considered a place of safety based solely on the fact that the survivors are no longer in immediate danger. An assisting ship may not have appropriate facilities and equipment to sustain additional persons on board without endangering its own safety or to properly care for the survivors. Even if the ship is capable of safely accommodating the survivors and may serve as a temporary place of safety, it should be relieved of this responsibility as soon as alternative arrangements can be made by the RCC.

Maritime SAR Convention
Chapter 3
Co-operation between States

3.1.9 Parties shall co-ordinate and co-operate to ensure that masters of ships providing assistance by embarking persons in distress at sea are released from their obligations with minimum further deviation from the ship's intended voyage, provided that releasing the master of the ship from these obligations does not further endanger the safety of life at sea. The Party responsible for the search and rescue region in which such assistance is rendered shall exercise primary responsibility for ensuring such co-ordination and co-operation occurs, so that survivors assisted are disembarked from the assisting ship and delivered to a place of safety, taking into account the particular circumstances of the case and guidelines developed by the Organization. In these cases, the relevant Parties shall arrange for such disembarkation to be effected as soon as reasonably practicable.

Often the assisting ship or another ship may be available to transport the survivors to a place of safety. However, if performing this function would be a hardship for the ship, RCCs should attempt to arrange use of other reasonable alternatives for this purpose.

In the case of asylum-seekers and refugees rescued at sea, the ship must avoid disembarkation in territories where the survivors allege a well-founded fear of persecution.

Place of Safety in CISAR Operations

During CISAR operations, there may be multiple places of safety for many survivors. In these complex operations, the transportation and support of survivors must be coordinated through the SMC/IC.

Survivors may include school children, elderly, hospital patients, prisoners, and persons with special needs. Place of safety advance planning should account for such scenarios with special rescue teams and facilities identified that may be needed for the recovery and transportation of the survivors.

Lily Pad

Lily Pad

A *lily pad* is an interim stopping point during rescue operations where:

- Allows rescue personnel to reduce transportation time and remain focused on SAR operations
- Survivors can be accounted for;
- Have some initial basic needs cared for; and
- From which survivors can be transported to a place of safety.

Additionally, a lily pad can provide limited logistics and support for rescue personnel and SAR facilities.

For large numbers of persons in distress, it may be necessary to establish a temporary or intermediate safe delivery point for handling of survivors.

The lily pad allows for initial coordination, initial triage, and processing of a large number of survivors that were quickly evacuated from an immediate, hostile environment. Secondary facilities such as local police and ambulance services can then transfer survivors to medical care centers and places of safety.

Lily pads are also used to replenish SAR facilities and crews.

(09/05/05) U.S. Navy SAR swimmer, Aviation Warfare Systems Operator 1st Class Tim Hawkins, retrieves and evacuates a survivor of Hurricane Katrina from a rooftop in New Orleans, Louisiana, into an SH-60B Seahawk helicopter. (Photo: Photographer's Mate 3rd Class Jay C. Pugh, U.S. Navy)

In flooding scenarios or major aircraft or marine disasters a short distance offshore, survivors might be transported to a suitable nearby landing area where a temporary emergency care center could be established. The survivors should be processed, provided with emergency care, and transported to a permanently established emergency care center or other place of safety.

By using a temporary delivery point, a large number of survivors can be evacuated quickly from an immediate hostile environment, and secondary SAR facilities, such as local police and ambulance services, can then transfer survivors to medical care centers.

In CISAR operations, the use of lily pads can help SAR responders remain focused more on rescue operations and less on transportation.

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Section 2-13: Conclusion of SAR Operations

Most SAR operations typically conclude when a person is no longer in distress, or is rescued and SAR responders and facilities are returned to normal duties.

There are two ways to conclude a SAR operation:

- A SAR mission is considered closed when the search object(s) is located, assistance is completed, and no other SAR issues arise. No other SAR related action is necessary or contemplated.
- In some SAR cases extended searches may have been conducted and the search object(s) has not been located. At some point, the SMC/IC will be required to make the difficult decision to suspend active search operations pending receipt of additional information. That is, the SMC/IC has determined that any additional search effort without any new information will not result in locating the search object.

In making this decision to suspend SAR operations, each SAR incident must be considered on its own merits, and care should be taken not to end the search prematurely. While the decision to suspend a search involves humanitarian considerations, there must be a limit to the time and effort that can be devoted to a SAR operation.

If new information is received indicating the search object may not have been in the areas searched, or pertinent details of the search object were other than those previously reported, then the search should be resumed.

A SAR mission is not complete until all agencies and facilities are de-alerted. Failure to de-alert an agency, when services are no longer required, may impose unnecessary expense or inconvenience. SMCs should continually monitor the mission to de-alert facilities and agencies when their assistance is no longer required.

The SMC/IC should inform appropriate accident investigation authorities when the case involves a casualty to aircraft or marine craft. The National Transportation Safety Board (NTSB) normally investigates aircraft and major marine accidents. The SMC/IC should ensure that marine casualty debris and lifesaving equipment are recovered and protected for examination by accident investigators.

After the mission is concluded, it may be necessary to inform other agencies to take follow-up action. The Coast Guard may need to check marine aids to navigation after grounding; the FAA may need to check aeronautical aids after aircraft accidents; and the Army Corps of Engineers may need to remove stranded or wrecked ships in navigable waters. Other agencies may also be involved.

Note: Further information on the conclusion of SAR operations can be found in the IAMSAR Manual and Coast Guard Addendum; further information on concluding CISAR operations can be found in the CISAR Addendum.

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Part 3: Search and Rescue Satellite Aided Tracking (SARSAT)

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Section 3-1: Overview

Introduction

System Concept

Introduction

Cospas-Sarsat is an international space-based distress alerting system designed to provide distress alert and location information from distress beacons operating on 406 MHz, to SAR authorities worldwide. The position of the distress beacon and other related information is forwarded by the responsible Cospas-Sarsat Mission Control Center (MCC) to the appropriate national SAR authorities. The purpose of the Cospas-Sarsat system is to support SAR organizations with timely, accurate, and reliable distress alert information, whether at sea, in the air, or on land, globally.

System Concept

The basic concept of the system involves the use of distress beacons (Emergency Position Indicating Radio Beacon – EPIRB, Emergency Locator Transmitters – ELT; and Personal Locator Beacons – PLB), satellites, and ground equipment to relay distress location and identification information (referred to as distress alerts) to SAR authorities. [1]

SAR instruments are flown on low-earth polar orbiting (LEO), medium-earth orbiting (MEO) and geostationary earth orbiting (GEO) satellites provided by the United States, Russian Federation, India and the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT). Canada and France provide the SAR instruments (the SAR Repeater and the SAR Processor) for the U.S. LEO and MEO satellites.

These instruments are capable of detecting signals coming from the Earth's surface transmitted by emergency beacons. Figure 3-1-1 provides an overview of the Cospas-Sarsat system.

The distress beacon, operating on the 406 MHz frequency, transmits a digital code that contains information about the type of beacon and possibly the location of the beacon (derived from GPS or other navigational system).

Each distress beacon in the world has a unique identifier that allows additional information ("registration data") to be linked to the beacon and which assists SAR authorities in conducting the SAR operation. After receipt of distress beacon signals by the satellite, it relays the signals to earth stations referred to as Local User Terminals (LUTs).

The LUT, after computing the location of the distress beacon, transmits an alert message to its respective Mission Control Center (MCC) via a data communication

[1] Cospas-Sarsat system also supports an IMO anti-Piracy effort with a class of beacons called Ship Security Alerting System (SSAS). These beacons are processed in the same way as EPIRBs, ELTs and PLBs, but are distributed to different authorities.

network. The MCC performs matching and merging of alert messages with other received messages, geographically sorts the data, and transmits a distress message to an appropriate SAR authority.

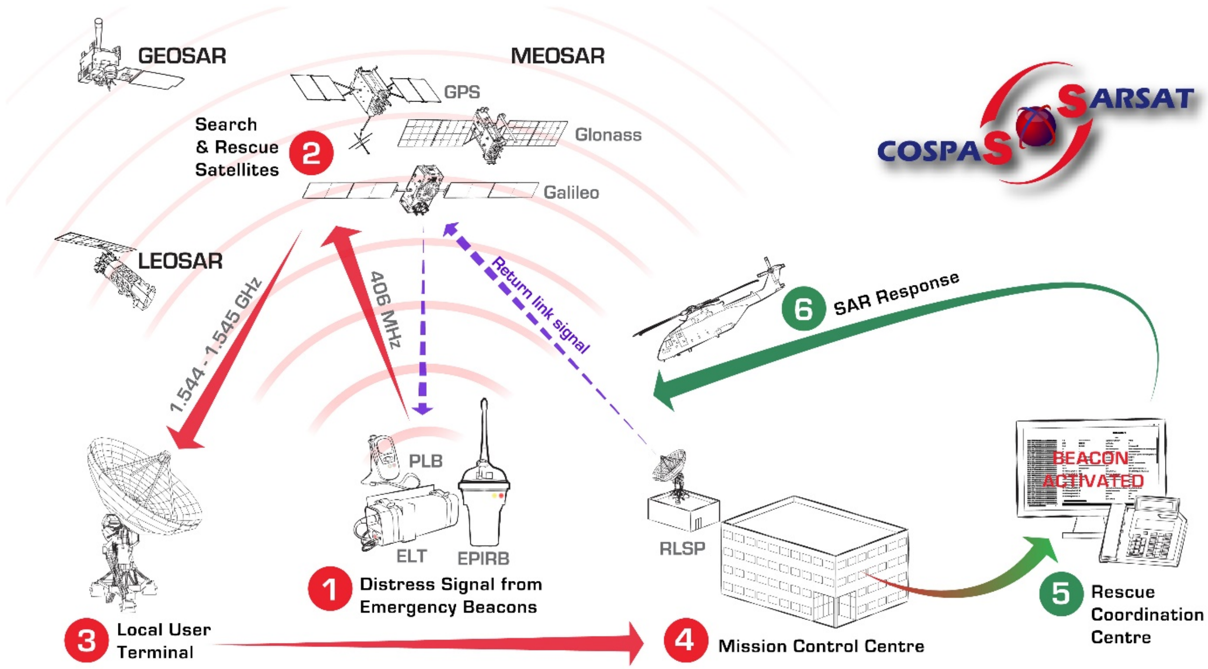


Figure 3-1-1: Cospas-Sarsat System Overview

Section 3-2: International Cospas-Sarsat Programme

Introduction

The detection and location of an aircraft crash or maritime distress is of paramount importance to SAR teams and to the potential survivors. Studies show that while the initial survivors of an aircraft crash have less than a 10% chance of survival if rescue is delayed beyond two days, the survival rate is over 60% if the rescue can be accomplished within eight hours. Similar urgency applies in maritime distress situations, particularly where injuries have occurred.

Furthermore, accurate location of the distress can significantly reduce both SAR costs and the exposure of rescue forces to hazardous conditions, and clearly improve efficiency.

In view of this, Canada, France, the Russian Federation and the United States established the Cospas-Sarsat satellite system to reduce the time required to detect Cospas-Sarsat satellite system to reduce the time required to detect and locate SAR events world-wide.

Space-Based Distress System Evolution[2]

The beginning of United States development of SARSAT dates back to March 11, 1967, when a Cessna 195 aircraft crashed with a pilot and two passengers in the Trinity Mountains, California. After an extensive, multi-day search was conducted for the

[2] The following information was obtained from: Daniel Levesque, "Cospas-Sarsat 1979-2009: A 30-year Success Story," *Cospas-Sarsat Information Bulletin*, Issue 22 (February, 2010). Used with permission from the International Cospas-Sarsat Programme Secretariat.

missing aircraft, the location of neither the wreck, nor the pilot and two female passengers were ever located. However, several months later, the remains of the two passengers were discovered. It appeared that the 16 year old female, Carla Corbus, had survived for at least 54 days after the crash. She kept a diary and recorded how she overheard searching and transiting aircraft every day until she perished due to starvation.[3]

This high-profile incident became the impetus for mandating carriage of 121.5 MHz ELTs. The passage of Public Law 90-596, Section 31, on December 29, 1970, amended the Federal Aviation Act of 1958 to require the installation of an ELT on most General Aviation (GA) aircraft. The focus of this law was to ensure alerting of an overflying aircraft when an ELT is activated. The FAA implemented the new statute by adopting several amendments to the Federal Aviation Regulations (FAR).

While satellite technology was still in its infancy, the frequency selected for ELT transmissions was 121.5 MHz, already in use as the international aircraft voice distress frequency. This system worked, but had limitations:

- The frequency was cluttered;
- Unable to verify the signal's origin; and
- Most importantly, another aircraft had to be within range to receive the signal.

In addition, early ELTs were insufficiently robust and on many occasions were poorly installed in aircraft, causing false alerts and becoming a burden for SAR responders when notified of an ELT activation.

On October 16, 1972, a Cessna 310C aircraft, owned and operated by Pan Alaska Airways, Inc., with a pilot, two United States Congressmen and a Congressional aid disappeared on a flight from Anchorage to Juneau, Alaska. For 39 days, an extensive air, sea, and land search was conducted; nothing was ever found that could be identified with either the aircraft or its occupants.

The failed search again reaffirmed in Congress the value of mandating carriage of ELTs on aircraft.

International Space-Based Distress Alerting Development

In 1973, the United States formed the Interagency Committee on Search and Rescue (ICSAR).[4]

At ICSAR's very first meeting in 1974, a primary concern was to address problems experienced with 121.5 MHz ELTs used to send distress alerts when aircraft crash. With NASA's previous work in developing and demonstrating radio beacon location from space, ICSAR recommended that NASA conduct a demonstration of satellite detection and location of distress beacons.

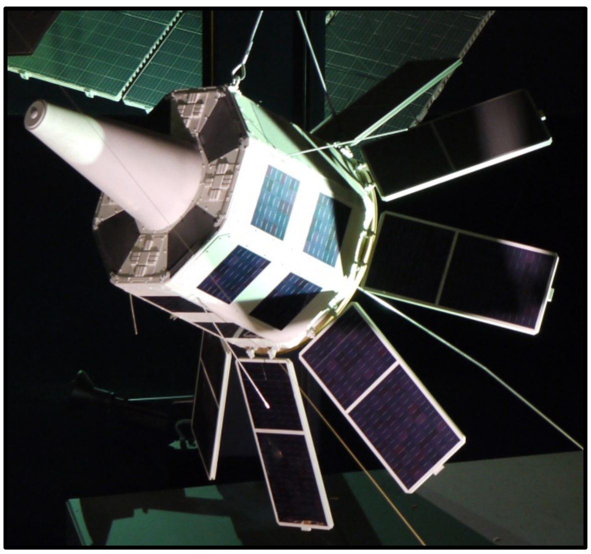
By the mid-seventies, more than 250,000 ELTs were carried in commercial and GA aircraft. Additionally, 121.5 MHz distress beacons were being carried on recreational boats.

Canada and the United States began to investigate the use of satellites in low-altitude Earth orbit to detect 121.5 MHz

[3] "Death in Trinity Mountains," *Time*, Issue 15, Volume 90 (October 13, 1967).

[4] "ICSAR" remained the committee's title from 1974 until a 1999 revision to the inter-agency cooperation agreement changed the committee's name to the "National Search and Rescue Committee (NSARC)." ICSAR's original membership included DoD, DOT, DOC, FCC and NASA.

distress beacon transmissions and locate the source of the signal using the Doppler location technique. The concept was previously demonstrated in 1971 with the French Eole[5] satellite system, tracking meteorological balloons drifting through the atmosphere. In 1975, Canada conducted a Proof of Concept (POC) using modified distress beacons and an amateur radio satellite (OSCAR-6). Challenges continued to mount in using Doppler to locate the position of 121.5 MHz distress beacons that were not designed for this capability. However, Canada was able to overcome these problems and pioneered the Doppler processing technique for 121.5 MHz distress beacons.



Eole Meteorological Satellite; 1971. (Photo: Museum of Air and Space, Paris, France)

The French national space center (CNES) was also working with NOAA and NASA on development of Argos, an environmental data collection polar orbiting satellite system and the successor to the Eole. Argos, still in operation today, was capable of locating moving objects from large ships to animals, anywhere in the world using low power transmitters at 401 MHz. The transition to a 406 MHz distress alerting system was a logical next step which would offer, in the long term, far better performance than could be expected from the 121.5 MHz system.

At the same time, the Soviet Union's Morflot (Ministry of Merchant Marine) and Morsviazsputnik (Russian agency for maritime navigation and mobile satellite communications at sea and on land) were also considering the development of a satellite system using 406 MHz frequency for low-power Emergency Position-Indicating Radio Beacons (EPIRBs). The Soviet Union's "COSPAS" program was under development to detect and locate ships in distress worldwide.[6]

Argos Weather Satellite (Photo: Rockwell Collins)

In 1979, the United States, France and Canada's "SARSAT" initiative and the Soviet Union's COSPAS were joined through a four nation Memorandum of Understanding. In 1980, the Cospas-Sarsat project was officially established with the objective being to ensure that both systems would be fully "interoperable" with all distress beacon transmissions, whether 121.5 or 406 MHz, and that the distress alert would be relayed by all available satellites to ground stations worldwide.

The first satellite (COSPAS-1) was launched on June 30, 1982. On September 10, 1982, a few days after the satellite SAR repeater was activated and made available in orbit, a

[5] Also known as the Cooperative Applications Satellite (CAS)

[6] "Cospas" is a Russian acronym for "Space System for Search of Vessels in Distress".

121.5 MHz distress alert was detected by an experimental ground station in Ottawa, Canada. The distress signal led to the first successful rescue of three survivors of a light airplane crash in British Columbia, Canada. The first actual rescue using a 406 MHz distress beacon occurred in December, 1984, when a driver in an automobile rally injured himself in Somalia.[7]

COSPAS (Nadezhda) Satellite

After a thorough demonstration and evaluation was conducted between 1982 and 1984, in 1984 a second MOU was signed by Canada, France, the United States and the Soviet Union. The Cospas-Sarsat system was declared operational in July, 1985. Other countries became involved in using the system or by providing ground stations (Australia, Brazil, Chile, Denmark, India, Italy, Japan, the Netherlands, Spain, Sweden, and Switzerland).

International Cospas-Sarsat Programme Agreement (ICSPA)

The system began to incorporate more operational and regulatory requirements in addition to technical development of the system, as well as implementation of a global data distribution system. As a result of these emerging requirements, the nations agreed there was a need for a permanent, administrative, international secretariat. On July 1, 1988, the International Cospas-Sarsat Programme Agreement (ICSPA) was concluded between the governments of Canada, France, the United States and the Soviet Union. The ICSPA ensured the continuation of the Cospas-Sarsat system and its availability to all nations on a non-discriminatory basis, free of charge to all users in distress. In the 1992, the Russian Federation formally assumed responsibility for the obligations of the former Soviet Union under the ICSPA.

INTERNATIONAL SATELLITE SYSTEM
COSPAS SARSAT
SEARCH AND RESCUE

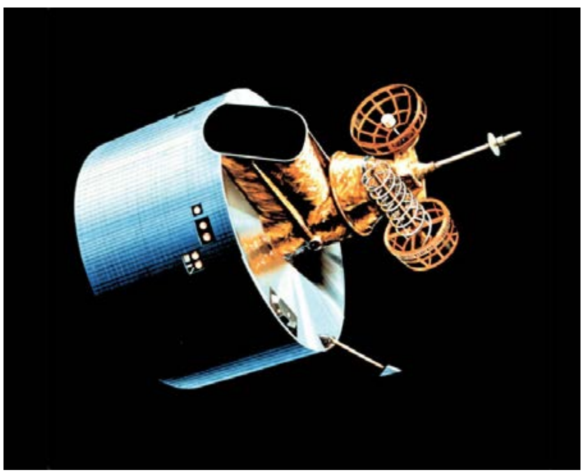
With the signing of the ICSPA and international acceptance of Cospas-Sarsat as an invaluable, global, space-based distress alerting system, in 1993 IMO mandated the carriage of 406 MHz EPIRBs on all ships subject to the Safety of Life at Sea (SOLAS) Convention. In addition, during this period

[7] The first rescue at sea using a 406 MHz distress beacon to alert SAR authorities did not occur until March, 1987.

saw the development of EPIRBs with integrated GPS receivers.

Implementation of GEOSAR

While the polar orbiting, LEOSAR satellites with Doppler location technology proved invaluable with thousands of lives saved, the emerging requirement internationally was for Cospas-Sarsat to implement a near real time distress alerting and location capability. This type of capability was not feasible with the low-power 121.5 MHz analogue system, but was sought for the 406 MHz distress beacons. Back in 1984, the United States, in conjunction with France and Canada, conducted an experiment on NOAA’s Geostationary Operational Earth Satellite (GOES-7) that successfully demonstrated and confirmed the feasibility of detecting Cospas-Sarsat signals in near real time.



GOES-7 Satellite (Photo: NOAA)

In 1995, three geostationary satellites were placed in orbit equipped with 406 MHz repeaters. The satellites were used in an extensive demonstration and evaluation conducted from 1996 to 1997 with Canada, Chile, France, India, Spain, the U.K. and the United States. The evaluation demonstrated the significant time advantage provided by the GEOSAR system. Subsequent testing demonstrated that the GEOSAR distress beacon frequency data could be combined with LEOSAR data processing to enhance the Doppler location capability of the LEOSAR system. As a result of this extensive evaluation, in October, 1998, the GEOSAR system was formally declared to be an integral component of the Cospas-Sarsat system.

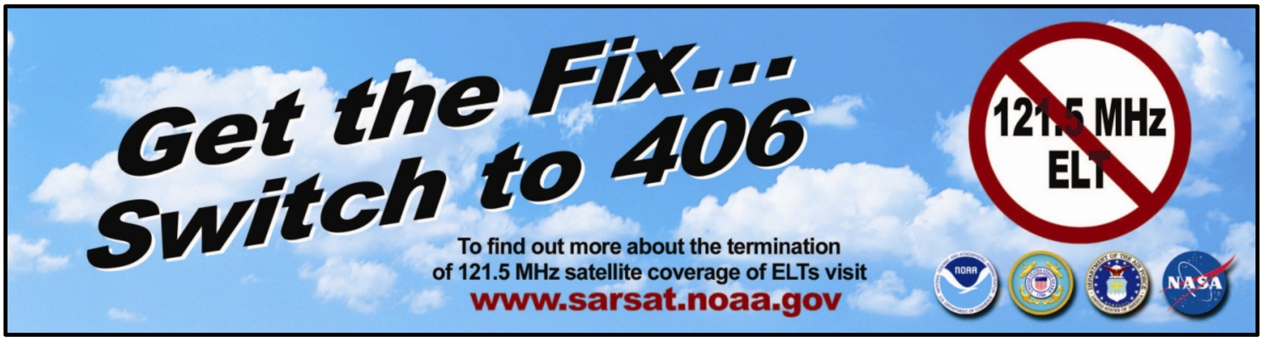
Cospas-Sarsat Secretariat

Under the ICSPA, in 1987, the Cospas-Sarsat Secretariat was located in London, U.K., under a contractual arrangement with the International Maritime Satellite Organization (Inmarsat). In 1999, when Inmarsat was privatized, the Cospas-Sarsat Secretariat transferred to Inmarsat’s successor, the International Mobile Satellite Organization. Over the next several years, it was realized by the Parties to the ICSPA that in order to continue to manage, operate, as well as continue to improve the worldwide space-based distress alerting, the Cospas-Sarsat Secretariat needed to become an independent, international organization. In 2005, the Cospas-Sarsat Parties agreed to accept Canada’s invitation to become an independent organization in Montreal, with the legal status of body corporate with all privileges of an international organization. As a result, in July, 2005, the Cospas-Sarsat Secretariat moved from London to Montreal, where it resides today.

Termination of Satellite Processing of 121.5/243.0 MHz Signals

In October, 2000 the International Cospas-Sarsat Programme, announced at its 25th Council Session the plan to terminate satellite processing of distress signals from 121.5 and 243.0 MHz distress beacons on February 1, 2009. All mariners, aviators, and individuals using distress beacons on those frequencies were required to switch to the newer, more reliable, digital 406 MHz frequency to ensure detection by the Cospas-Sarsat satellite system in a distress situation.

The decision to cease satellite processing of 121.5/243.0 MHz signals was due to problems in this frequency band which inundate SAR authorities with poor accuracy and numerous false alerts, adversely impacting the effectiveness of lifesaving services. By comparison, the 406 MHz distress beacon provides SAR authorities with more reliable, timely and accurate distress information.



Termination of Satellite Processing of 121.5 MHz Signals Advertisement.

In preparation for this transition, in the United States, the operation of Class A, B, and S EPIRBs became prohibited as of December 31, 2006.

The International Cospas-Sarsat Programme's transition to satellite detection of only 406 MHz distress beacons officially occurred on February 1, 2009, after a 10-year global transition period.

Future of Space-Based Distress Alerting

The Cospas-Sarsat system, designed in the 1970s and launched in the 1980s is credited with assisting SAR authorities in the notification of distress and subsequent rescue of tens of thousands of lives. The system, however, continues to have limitations, including significant wait times (possibly delays of greater than 2 hours for distress beacon transmissions near the equator), limited accuracy, and remains susceptibility to radio interference.

U.S. Distress Alerting Satellite System (DASS)[8]

For several years, the National Search and Rescue Committee (NSARC) sponsored investigations via its NASA technical arm for a follow-on satellite-aided SAR system that would address these limitations. A 1997 Canadian government study[9] of possible satellite system alternatives, including commercial sources, determined that the ideal system would use Mid-Earth Orbiting (MEO) satellites. A MEO system would provide superior global detection and location data with fewer ground stations than the existing Cospas-Sarsat system. The U.S. Global Positioning System (GPS) constellation was identified as an ideal MEO platform.

NASA, in cooperation with the U.S. Air Force Space Command and the Department of Energy's (DOE) Sandia National Laboratories developed a new space-based SAR system called the Distress Alerting

[8] NASA SAR Mission Lab, *DASS Proof of Concept Final Report* (January 8, 2009).

[9] CAL Corporation, *FOSS Report – Final Study* (Ottawa: CAL Corporation, 1997).

Satellite System (DASS). In February, 2003, a MOA between NASA, NOAA, Air Force, Coast Guard, and DOE was concluded that:

- Addressed the development and demonstration of DASS;
- Development of a DASS Proof-of-Concept (POC) space segment;
- Prototyped ground equipment to perform post-launch checkout, testing, and performance of a demonstration and evaluation program; and
- Committed to planning the implementation of an operational DASS.

From 2006 to 2008, NASA conducted a DASS POC to develop the technology and confirm the expected benefits of the system. A DASS POC ground station was built and remains operational at the NASA Goddard Space Flight Center, Greenbelt, Maryland, to demonstrate the effectiveness of the DASS concept, support additional performance analysis and improvement, and assist in the definition of future DASS technical and operational performance characteristics. The DASS POC demonstrated:

- Reliable detection and accurate location of distress beacons within five minutes of activation;
- Accurate location information produced after only a single burst of a newly activated distress beacon; and
- Improved performance over the existing Cospas-Sarsat space segment.

NASA's projections indicated that significant improvement in the detection and location of distress beacon signals could be achieved with the implementation of a full MEO constellation of satellites equipped with SAR repeaters.

With the DASS POC complete, the United States' pursuit of the next generation SARSAT space segment became known as "SAR/GPS."

Medium Earth Orbit Search and Rescue (MEOSAR)

While the United States was conducting the DASS POC and continued development of SAR/GPS, internationally, in 2000, the United States, European Commission (EC), and Russian Federation began consultations regarding the feasibility of installing 406 MHz SAR instruments on their navigation satellite systems and incorporating a 406 MHz MEOSAR capability into the Cospas-Sarsat System.

While in the United States, the development of MEOSAR became known as SAR/GPS, in the EC the system was named "SAR/Galileo," and in the Russian Federation as "SAR/GLONASS."

GPS Block III Satellite ("SAR/GPS") (Photo: GPS.gov)

Galileo Satellite (“SAR/Galileo”) (Photo: ESA)

GLONASS-K Satellite (“SAR/ GLONASS”)

Initial investigations identified many possible SAR alerting benefits that might be realized from a MEOSAR system, including:

- Near instantaneous global coverage with accurate independent location capability;
- Robust beacon to satellite communication links, high levels of satellite redundancy and availability;
- Resilience against beacon to satellite obstructions; and the
- Possible provision for additional (enhanced) SAR services, such as a ground to distress beacon return link.

In light of this potential, the Cospas-Sarsat Council decided to prepare for the introduction of a MEOSAR capability into the Cospas-Sarsat System and to encourage coordination among the space segment providers for System compatibility and interoperability with the proposed MEO satellite systems. Details of the coordination are captured in Cospas-Sarsat Document R.012: The MEOSAR Implementation Plan.

The three MEOSAR satellite constellations will use transparent repeater instruments to relay 406 MHz distress beacon signals, without onboard processing, data storage, or demodulation/remodulation. MEOSAR satellite providers will make their satellite downlinks available internationally for processing by MEOLUTs operated by MEOSAR ground segment participants.

The SAR/Galileo constellation will offer a return link service which may provide the potential for two-way communications services in the future.

Figure 3-2-1 provides an overview of the current MEOSAR System.

SAR/GPS Constellation

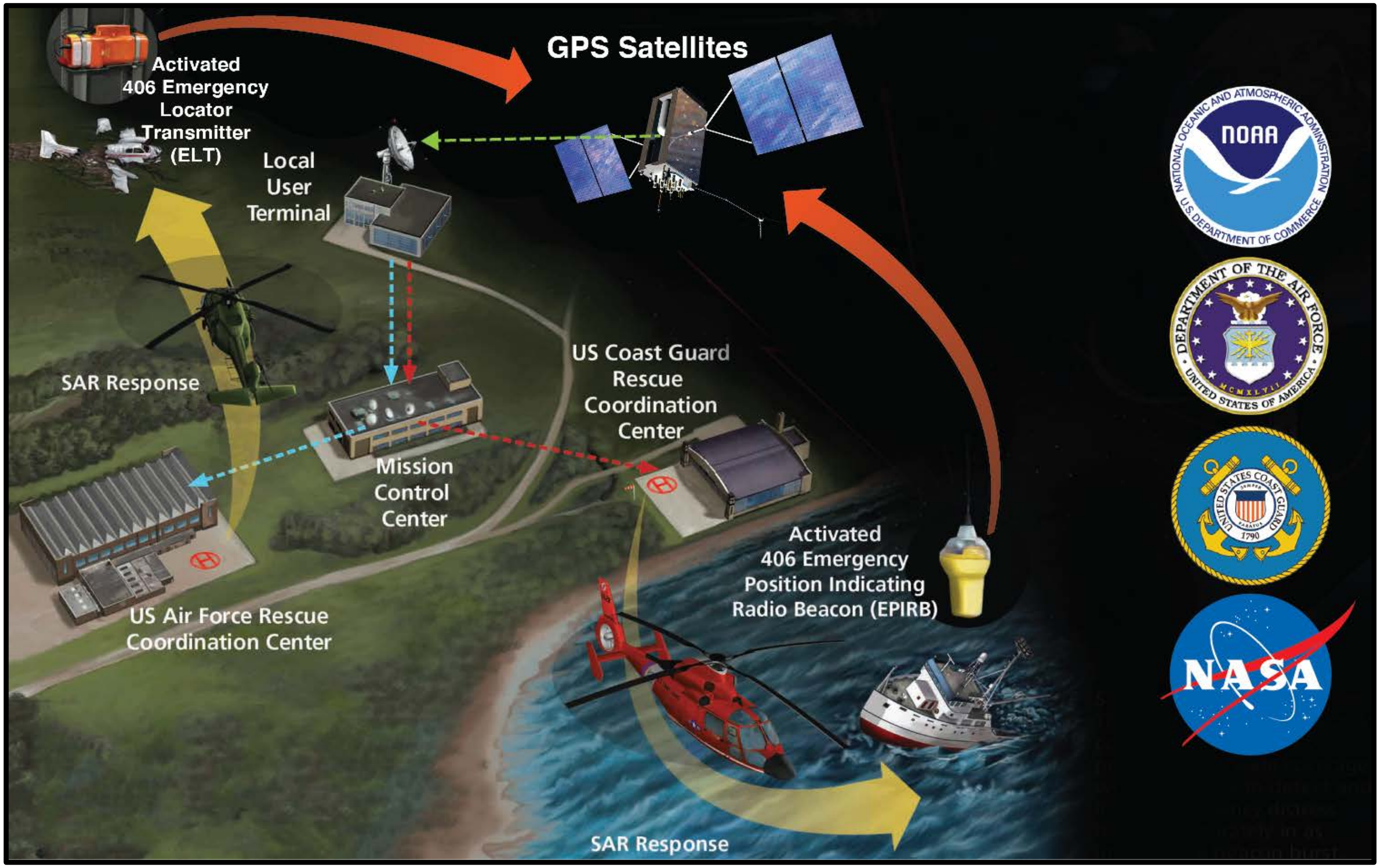


Figure 3-2-1: MEOSAR System

MEOSAR and Second-Generation Distress Beacons

In 2016, the Cospas-Sarsat Council approved C/S T.018, Issue 1, "Specification for Second-Generation Cospas-Sarsat 406-MHz Distress Beacons" and have since further refined and approved the document. With the approval of this document, second-generation beacons (SGBs) are nearing the point where they may begin to be used by the operational community.

The technology employed by SGBs differs from legacy first-generation beacons (FGB) in that FGBs employ a narrowband signal to encode the digital message, whereas SGBs will employ a digital "spread spectrum" signal, which transmits over the 406.0 to 406.1 MHz frequency range. This allows improved independent-location accuracy to be achieved in the MEOSAR environment, reduces susceptibility to interference from other radio transmitters, reduces power demands on a beacon battery, and simplifies channel management in the 406.0 to 406.1 MHz frequency range.

In addition to signal structure, the timing of transmission bursts from SGBs will differ from FGBs. MEOSAR allows location calculations from each individual burst, measured through several satellites simultaneously. This means that the transmission bursts can be timed more "intelligently." This differs from FGBs, as it was necessary for FGBs to have a series of evenly spaced bursts over several minutes to allow the legacy LEOSAR system to measure the Doppler shift among the bursts to estimate a beacon's location. With MEOSAR and SGBs, it is possible to have more frequent transmissions immediately after beacon activation, and an increased interval between transmission bursts as more time passes after activation.

Section 3-3: U.S. SARSAT Program

Introduction

U.S. SARSAT Program

- *Program Steering Group (PSG)*
- *Joint Working Group (JWG)*

Funding

Space Segment

- *Low Earth Orbiting (LEO) Satellites*
- *Medium Earth Orbiting (MEO) Satellites*
- *Geostationary Operational Environmental Satellite (GOES)*

Local User Terminals (LUTs)

U.S. Mission Coordination Center (USMCC)

Introduction

The U.S. SARSAT program is a Federal interagency program that provides space-based capability to detect, locate, and relay distress signals from emergency beacons carried by aviators, mariners, and land-based users to SAR authorities. The alerts include information about the user, as well as position information when available.

The Federal Government needs the SARSAT capability to:

- Support the general public;
- Support civilian SAR efforts of the USAF and USCG;
- Support maritime security requirements;
- Support military SAR operations; and
- Meet international obligations under the Maritime SAR, Chicago and SOLAS Conventions.

U.S. SARSAT Program

The SARSAT Program is managed by NASA, NOAA, USAF, and USCG, with NOAA maintaining the lead for the Program.

NOAA SARSAT management responsibilities include:

- Collection and distribution of distress alert data using LUTs and the USMCC;
- Coordinate with national and international organizations on frequency management, satellite, emergency beacon and SAR issues;
- Maintenance of a national beacon Registration Data Base (RGDB) for 406 MHz emergency beacons; and
- Be the lead U.S. agency for SARSAT and for U.S. involvement in the International Cospas-Sarsat Programme.

Two key coordinating bodies have been created to support the continued growth and improvement of the U.S. SARSAT system.

Program Steering Group (PSG)

The Program Steering Group (PSG) is responsible for the overall management of the U.S. SARSAT Program and is comprised of representatives from NOAA's SARSAT program, USAF Air Combatant Command, USCG Office of Search and Rescue, and NASA's Search and Rescue Mission Office.

While the PSG decides on the policy, management, and funding of the program, NOAA as lead agency implements the decisions of the PSG. This interagency management structure allows the PSG to steer the program while allowing NOAA the flexibility to achieve the desired results.

Joint Working Group (JWG)

The U.S. SARSAT Joint Working Group (JWG) supports the PSG and is comprised of representatives and contractors from each of the member agencies, as well as the FAA and the FCC.

The JWG is responsible for:

- Operational coordination including operational plans development;
- Development of requirements and specifications;
- Outreach activities; and
- Development of international positions for the International Cospas-Sarsat Programme annual Joint Committee (JC) meeting.

Funding

U.S. SARSAT Program funding is shared equally among the USAF, USCG and NOAA and is used to sustain the system (e.g., ground segment operations and maintenance; program management; technical and operational services; data communications; and United States contribution to the International Cospas-Sarsat Programme). Funding for agency staff salaries, travel, training, and routine unit expenses are not shared.

Space Segment

The current U.S. SARSAT system operates three types of satellites and LUTs to relay distress signals.

Low Earth Orbit (LEO) Satellites

SAR instruments are carried on board the NOAA Polar Orbiting Environmental Satellite (POES) and GOES series of satellites.

POES Satellite (Photo: NOAA)

The POES satellites orbit the Earth at an altitude of approximately 850 kilometers and orbit the Earth once every 102 minutes. The relative motion between the LEO satellites and a distress beacon on the surface of the Earth allows ground processing to use the Doppler Effect to determine the distress beacon's location.

Medium Earth Orbiting (MEO) Satellites

Search and rescue receivers are placed on the GPS satellites operated by the United States. These satellites are medium-altitude Earth orbit, at an altitude between 19,000 and 24,000 km.

GPS Block III Satellite (Photo: GPS.Gov)

Geostationary Operational Environmental (GOES) Satellites

The GOES satellites orbit the Earth in a geosynchronous orbit.[10] This allows the satellite to "hover" continuously over one position on the surface at the equator. The geosynchronous plane is about 36,000 kilometers above the Earth, high enough to allow the satellites to view approximately 1/3 of the Earth.

GOES Satellite (Photo: NOAA)

Because the GOES satellites stay above a fixed spot on the surface, they provide a constant vigil for distress beacons activated within their footprint.

Local User Terminals (LUTs)

NOAA manages and operates Low Earth Orbit LUTs (LEOLUTs), Mid Earth Orbiting LUTs (MEOLUTs) and Geostationary Earth Orbit LUTs (GEOLUTs) to track, receive and process alerts.

LEOLUTs track, receive and process alerts from the POES, European Meteorological Operational (METOP) satellites, and the Russian Nadezhda satellites. In the United States, dual LEOLUTs are located at:

- Andersen Air Force Base (AFB), Guam
- USCG Communications Station, Hawaii
- NOAA Command and Data Acquisition station, Alaska

[10] Orbit the equatorial plane of the Earth at a speed matching the Earth's rotation.

- USCG Communications Station, Florida

Dual LEOLUTs at each site allow NOAA to resolve satellite tracking conflicts and provides redundancy in case of failure.

MEOLUTs track, receive and process alerts from the SAR payloads on US GPS satellites, European Union Galileo satellites and Russian Federation GLONASS satellites. In the United States, six channel MEOLUTs are located at:

- USCG Communications Station, Hawaii
- USCG Communications Station, Florida

GEOLUTs track, receive and process alerts from the SAR payloads on the GOES East and GOES West satellites. In the United States, two GEOLUTs are located in Suitland, Maryland. Both GEOLUTs perform error detection and correction on 406 MHz distress beacon messages and automatically generate alert messages to the USMCC.

The U.S. SARSAT Program also maintains one LEOLUT one GEOLUT and one LEO/MEO LUT in Maryland as backup equipment and test beds.

U.S. Mission Coordination Center (USMCC)

The USMCC receives alert data from national LUTs and foreign MCCs. It matches beacon signals to identify those coming from the same source and merges them to improve position accuracy.

The USMCC appends registration information to 406 MHz beacon distress alerts registered in the United States then geographically sorts the data to determine the appropriate recipient (RCC, foreign SPOC or other MCC).

NOAA U.S. Mission Coordination Center (Photo: NOAA)

The USMCC filters redundant data and performs system support and monitoring functions. System support functions include:

- Relaying SAR instrument telemetry from the Environmental Processing Satellite Center (ESPC) to the Canadian MCC (CMCC) and the French MCC (FMCC); and
- Relaying SAR instrument commands from the CMCC and FMCC to the Satellite Operations Control Center (SOCC).

The USMCC contains the important National 406 MHz Registration Database (RGDB). The RGDB provides the capability to store and manage 406 MHz beacon owner information that will be provided to SAR services when a beacon activation occurs. Registration can be created or updated online at:

www.beaconregistration.noaa.gov

The Registration form can also be mailed to:

SARSAT Beacon Registration
NSOF, E/SPO53
1315 East West Hwy
Silver Spring, MD 20910

The registration form can also be faxed to NOAA at (301) 817-4565.

The USMCC maintains the Incident History Database (IHDB) which allows RCCs and

SPOCs to provide critical feedback to the USMCC on beacon activations. The information in the IHDB is used to determine the number of rescues assisted and accuracy of the beacon registration database.

The U.S. LEOLUTs and the USMCC have the capability to detect and locate interference in the 406 MHz band. This information is automatically forward to the Federal Communications Commission (FCC) for further investigation, as appropriate.

Also supporting the operations of the LUTs is the receipt of timing information from Global Positioning System (GPS) satellites or from the National Institute of Standards and Technology.

Figure 3-3-1 provides an overview of the U.S. SARSAT system.

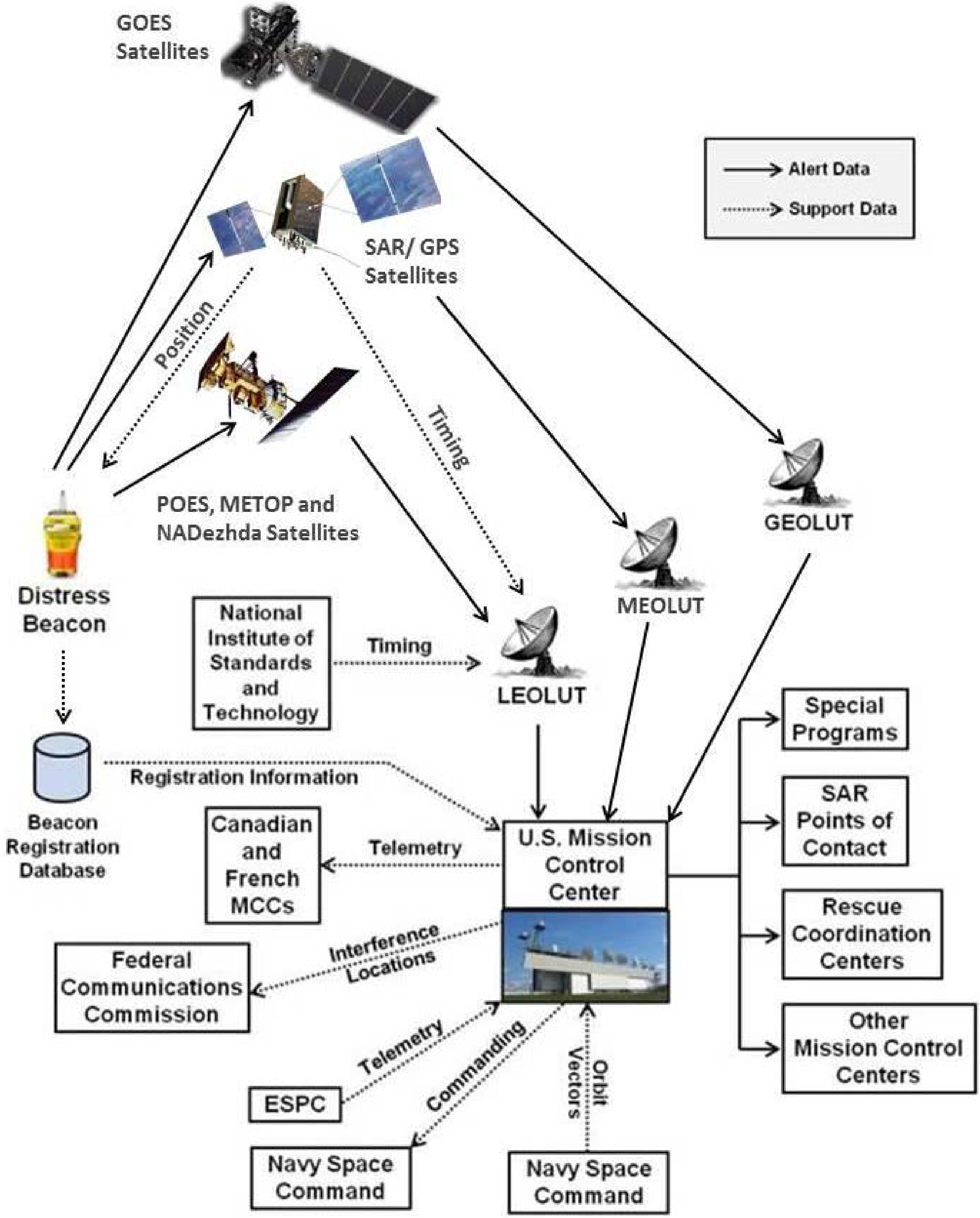


Figure 3-3-1: U.S. SARSAT System

Section 3-4: Distress Beacons

Overview

The Cospas-Sarsat System provides alerting services for the following types of beacons[11]:

- EPIRBs for maritime use;
- ELTs for aviation use; and
- PLBs for personal and multi-environment use.

These distress beacons are designed to transmit emergency signals to alert the SAR system of a distress and can be located by Doppler processing, with positions encoded within some beacons using Global Navigational Satellite System (GNSS) technology, and by direction finding (DF) equipment.

EPIRBs are waterproof, corrosion resistant and able to float upright on their own. ELTs are built to survive the force of an aircraft crash and be fire resistant. PLBs are designed to be manually activated and operate on land; some models are marketed for multi-environments.

Most EPIRBs, ELTs and PLBs send an alert on 406 MHz and have a 121.5 MHz homing signal. There may be some ELTs that alert on 121.5 MHz, but unlike 406 MHz signals, 121.5 MHz alerts are not relayed to SAR authorities by satellite; 121.5 MHz ELT alerts may still be detected and relayed via non-satellite entities such as other aircraft or air traffic control facilities.

A 406 MHz signal consists of a 0.44-second burst of data transmitted every 50 seconds to polar orbiting, medium earth orbiting and geostationary orbiting satellites. This data contains a unique identifier number that links the individual distress beacon to a registration database that contains a country

[11] The Cospas-Sarsat system also supports an IMO anti-Piracy effort with a class of beacons called Ship Security Alerting System (SSAS). These beacons are processed in the same way as EPIRBs, ELTs and PLBs, but are distributed to different authorities.

code and information on the vessel, aircraft, or person and emergency points of contact.

It is important that once a distress beacon is activated in a distress situation that it is left on until a rescue is accomplished or until the batteries are exhausted. There have been many cases where someone turned a distress beacon on and off to prolong the life of the battery; this could interfere with detecting the signal and locating the person(s) in distress. In a distress situation, distress beacons must remain activated.

Second-Generation Distress Beacons

Currently, First-Generation ELT, EPIRB, and PLB distress beacon alerts are located by Doppler processing using LEOSAR satellites with positions encoded within some beacons using GNSS technology. With the deployment and operation of SGBs in the near future, ELT, EPIRB, and PLB beacons designed to meet C/S T.018 (SGB) specifications will be located by the MEOSAR system, which allows location calculations from each individual burst, measured through several satellites simultaneously.

Unlike FGBs that transmit at nominally 50-second intervals, SGBs, when activated, will initially transmit multiple bursts for the first few minutes, and then transition to a nominal interval. The “intelligently” timed transmission bursts improve the chances of the distress message being received successfully, avoiding loss of the signal to submersion/destruction of the beacon. Intelligent scheduling of transmissions also prolongs battery life for periodic position updates and homing signals for nearby search teams.

Emergency Position Indicating Radio Beacon (EPIRB)

Category I 406 MHz EPIRBs automatically activate and float free of a sinking vessel. These EPIRBs can also be manually activated. Ships subject to the SOLAS Convention and other classes of vessels (U.S. fishing vessels) are required to carry Category I EPIRBs. These EPIRBs transmit for at least 48 hours and have the 121.5 MHz homing capability.

EPIRBs

Category II 406 MHz EPIRBs are similar to the Category I devices except that they can only be manually activated and do float, but are not designed to float free of a vessel automatically. Most voluntary users acquire Category II EPIRBs.

Some EPIRBs may also transmit a position within the distress alert. This position may be a one-time input from the ship’s navigation system or may be periodically updated from a GPS processor internal to the EPIRB. The one-time position input may not represent the most accurate position of the EPIRB since it may not be known when that position was last inserted.

EPIRBs usually have strobe or equivalent flashing lights that also assist with locating the beacons.

Emergency Locator Transmitter (ELT)

406 MHz beacons designed for use in an aircraft are known as an Emergency Locator Transmitter (ELT). ELTs can be manually activated by the pilot or automatically activated by a G-switch. ELTs transmit for at least 24 hours and most have the 121.5 MHz homing capability.

ELTs

Some 406 MHz ELTs may also transmit a position within the distress alert. This position may be a one-time input from the aircrafts navigation system or may be periodically updated from a GPS processor internal to the ELT. The one-time position input may not represent the most accurate position of the ELT since it may not be known when that position was last inserted into the message.

Antiquated 121.5 MHZ ELTs are also available. The 121.5 MHz ELTs were intended to alert other aircraft flying overhead of a crash. Satellites are not listening for the 121.5 MHz ELT signal. Obviously, a major limitation is that another aircraft must be within range and listening to 121.5 MHz to receive the signal.

In the U.S., there are approximately 170,000 of the older generation 121.5 MHz ELTs in service. Unfortunately, these have proven to be highly ineffective. They have a 97% false alarm rate, activate properly in only 12% of crashes, and provide no identification data.

406 MHz ELTs dramatically reduce the false alert impact on SAR resources, have a higher accident survivability success rate, and decrease the time required to reach accident victims by an average of 6 hours.

Presently, most aircraft operators are mandated to carry an ELT and have the option to choose between either a 121.5 MHz or a 406 MHz ELT.

Personal Locator Beacon (PLB)

PLBs are portable units that operate much the same as EPIRBs or ELTs. These distress beacons are designed to be carried by an individual person instead of on a boat or aircraft. Unlike ELTs and some EPIRBs, PLBs can only be activated manually and operate exclusively on 406 MHz. And like EPIRBs and ELTs, all PLBs also have a built-in, low-power homing beacon that transmits on 121.5 MHz. This allows rescue forces to home in on the distress beacon once the 406 MHz satellite system has provided the necessary position information. Some PLBs also allow GPS units to be integrated into the distress signal. This GPS-encoded position dramatically improves the location accuracy down to 100-meters (roughly the size of a football field).

In the United States, PLBs are authorized for nationwide use.

PLBs

Distress Beacon Carriage Requirements

The SOLAS Convention established the Global Maritime Distress and Safety System (GMDSS), which includes a mandate that ships of 300 tons and over carry an EPIRB; currently only float-free 406 MHz EPIRBs satisfy the requirement.

As of 2005, ICAO recommends that all aircraft on international flights carry a 406 MHz ELT for compatibility with the Cospas-Sarsat System.

Various national requirements also exist for the carriage of ELTs (e.g., aboard general aviation aircraft) and EPIRBs (e.g., aboard commercial fishing vessels). PLB carriage is voluntary unless required by agencies or organizations for their own personnel.

Distress Beacon Registration

Federal regulations require that all U.S. 406 MHz distress beacons be registered with the NOAA SARSAT Program Manager.[12]

The U.S. beacon Registration Database (RGDB) is maintained as a function of the USMCC. Initial registrations and subsequent updates can be made online at:

www.beaconregistration.noaa.gov

An important part of the registration information is the 24-hour emergency contact from which SAR authorities can obtain additional information if the person using the beacon is in distress or inadvertently activates the beacon.

Questions or comments pertaining to beacon registration may be addressed by phone to 301-817-4515 or toll-free at 1-888-212-SAVE (7283), or by email to beacon.registration@noaa.gov.

The RGDB only accepts registration applications that include the country codes of:

- Alaska (303);
- Hawaii (338);
- Puerto Rico (358);
- US Virgin Islands (379);
- Northern Marianas Islands (536);
- American Samoa (559); and
- Contiguous U.S. (366, 367, 368, & 369).

Beacons with other country codes cannot be registered in the RGDB.

U.S. RCCs automatically receive beacon registration data from the RGDB with beacon distress alerts from the USMCC. RCCs outside the USMCC service area must contact a U.S. RCC to obtain beacon registration data from the RGDB.

The International Cospas-Sarsat Programme maintains a beacon registration database

[12] EPIRBS: 47 CFR 80.1061(f); ELTs: 47 CFR 87.199 (f); and PLBs: 47 CFR 95.1402 (f). Beacon owners and companies renting beacons are subject to the registration requirements.

called the International Beacon Registration Database (IBRD), mainly intended for beacon owners to use when their respective Governments have not provided suitable national arrangements for registration. However, Governments with registration databases may also upload them into the IBRD to facilitate access to the data by international SAR authorities.

If the IBRD does not contain registration data for a particular beacon, it typically provides information on how to obtain registration data from the relevant national registration database. The International Cospas-Sarsat Programme website:

http://www.cospas-sarsat.org

The website provides a list of points of contacts for beacon information in various countries.

IBRD access is available at:

www.406registration.com

Distress Beacon Testing

Activating a 406 MHz distress beacon will generate a Cospas-Sarsat distress alert message that will be relayed to SAR authorities for immediate action. Therefore, 406 MHz beacons should not be activated except in real distress situations or unless special prior arrangements have been made with the Cospas-Sarsat cognizant MCC.

Activating a distress beacon for reasons other than to indicate a distress situation or without the prior authorization from a Cospas-Sarsat MCC is illegal in most countries, including the United States, and may result in substantial legal penalties.

406 MHz distress beacons are designed with a self-test capability for evaluating key performance characteristics. Initiating the beacon self-test will not generate a distress alert. However, it will use some of the beacon's limited battery power, and should only be used in accordance with the beacon manufacturer's guidance. Cospas-Sarsat maintains a list of contact information for beacon manufacturers (http://cospas-sarsat.int/en/contacts-pro/contacts-details-all), and questions about a beacon's self-test mode should be directed to its manufacturer.

Anyone inadvertently activating a distress beacon in its operational mode must contact the nearest Cospas-Sarsat MCC as soon as possible. Cospas-Sarsat maintains a list of contact information for MCCs (http://www.cospas-sarsat.int/en/contacts-pro/contacts-details-all).

In rare circumstances there may be a need to activate a 406 MHz distress beacon in its operational mode for test purposes. The resulting distress alert message would be routed to every MCC in the Cospas-Sarsat system. Consequently, a great deal of coordination is required to ensure that all MCCs throughout the world are aware of live beacon test transmissions from beacons in their operational mode and that they have programmed their equipment to respond accordingly.

In the United States, requests to conduct a live beacon test should be directed to the USMCC, typically by an appropriate Federal authority. With hundreds of thousands of 406 MHz beacons in service worldwide, coupled with the effort and resources required to coordinate a live beacon test, authorization to activate a beacon for testing will only be granted in exceptional circumstances.

In accordance with Cospas-Sarsat system requirements, tests of 3 beacons or less must be approved at least 24 hours in advance, while tests involving four to six beacons must be approved at least 30 days in advance. Testing of more than 6 beacons is never authorized.

EPIRB Tests and Inspections

Information has been developed by the NOAA SARSAT Office and the U.S. Coast Guard Office of Search and Rescue to provide EPIRB owners and maintainers a generic list of recommended procedures for conducting monthly EPIRB inspections. These inspection procedures are intended to provide general guidance and do not supersede the recommended procedures provided by the International Maritime Organization or by the EPIRB manufacturer. All owners and maintainers should follow the inspection and self-testing procedures of their EPIRB manufacturer accordingly.

The procedures mentioned above are available at www.sarsat.noaa.gov or by calling (888) 212- 7283.

These procedures cover topics such as: avoiding false alerts; physical inspections; precautions for testing Category I EPIRBs; battery replacements; checking registration data; using self-test switches; and mandatory logs of inspections and tests for EPIRBs used to comply with SOLAS.

Section 3-5: Cospas-Sarsat Data Distribution

Overview

This Section discusses how data (alerts from distress beacons) is relayed by the Cospas-Sarsat ground system to SAR authorities worldwide.

Signals relayed via Cospas-Sarsat satellites from 406 MHz distress beacons to receivers on the ground (LUTs) are typically processed and forwarded by the LUTs to an associated MCC. The MCC then geographically sorts the alerts and relays them directly or indirectly (via other MCCs) to the proper RCC or SPOC.

USMCC

The main function of the USMCC is to receive alert data from its associated LUT(s) and other MCCs, and distribute this information to the appropriate MCC or SAR authority 24 hours a day, seven days a week. The USMCC:

- Establishes procedures for the distribution of Cospas-Sarsat alert data, System information, and other data within its service area;
- Responds to requests for information from other MCCs, SPOCs or RCCs; and
- Accounts for all messages received or transferred through its system.

The USMCC, located at the NOAA Satellite Operations Facility (NSOF) in Suitland, Maryland, maintains suitable and reliable communication links with its associated LUTs, U.S. RCCs, international SPOCs within its service area, and other MCCs in the Cospas-Sarsat system. Cospas-Sarsat standard formats are used to exchange messages with MCCs and SPOCs. Nationally defined formats are used to exchange messages with LUTs and RCCs.

The USMCC monitors the performance of Cospas-Sarsat satellites, U.S. LUTs USMCC and other MCCs and monitors communications with U.S. LUTs, U.S. RCCs, other MCCs and SPOCs. This monitoring helps to ensure that timely, accurate and reliable distress data is provided to SAR services worldwide in an effective and efficient manner.

In the event of a failure, the USMCC operates a backup facility at Wallops Island, Virginia. In addition, the USMCC has arranged for the Canadian MCC (CMCC) and the Australian MCC (AUMCC) to provide backup of the USMCC national and international responsibilities, respectively.

Nodal MCC

In addition to its standard MCC functions, the USMCC serves as a nodal MCC within the Cospas-Sarsat system. The world is divided into six Cospas-Sarsat Data Distribution Regions (DDRs), with one nodal MCC per DDR. As a nodal MCC, messages among certain other Cospas-Sarsat MCCs is routed via the USMCC. This substantially increases the data processing and communications demands on the USMCC.

The nodal MCC validates all messages received from other MCCs with respect to data format and content. If the nodal MCC detects an invalid message from an MCC, it filters the message from distribution and notifies the MCC that generated the message.

As a nodal MCC, USMCC communications with other MCCs must be available over 99.5% of the time over a period of one year. Nationally, the USMCC is required to implement backup procedures if it is not available for more than 60 minutes.

Data Processing

The USMCC receives and processes data from its LUTs and from other MCCs, and geographically sorts distress beacon locations, as well as send and receive system information (satellite ephemeris and satellite instrument calibration data). System information is validated to ensure the accuracy of the alert data provided by the Cospas-Sarsat system to the SAR community.

The USMCC matches new alerts to previously received data to resolve distress beacon position ambiguity and improve the alert position data, and filters redundant data. The USMCC enhances alerts by providing 406 MHz beacon registration data and missed detection notification.

More specific information on USMCC alert distribution is provided below and in the USMCC National RCC and SPOC Alert and Support Messages document (available at www.sarsat.noaa.gov, under "System Documentation").

Alert Distribution

Alert data is distributed to the SAR system mainly based on the location of the signal. In addition, the USMCC distributes 406 MHz unlocated alerts and NOCRs (Notification of Country of Beacon Registry – NOCR) based on the country of registration encoded in the 406 MHz distress beacon.

Position conflict messages are sent for 406 MHz beacons if the new position differs from the previous positions by more than 20 km. Encoded position update messages are sent if the 406 MHz encoded position changes by more than 3 km and less than 20 km.

Typically, an initial 406 MHz unresolved alert is sent prior to position confirmation; however, positions may be confirmed on the first alert by encoded position. Once a position is confirmed, alerts are distributed based on the resolved position. If the 406 MHz beacon message is invalid, then the associated alert is sent based solely on its difference of arrival (DOA) or Doppler location.

Unlocated Alerts

All 406 MHz distress beacons are required to transmit an appropriate country code. As such, if a U.S. coded beacon is in the RGDB, the USMCC distributes the unlocated alert to the U.S. RCC associated with the distress beacon's homeport or owner's mailing address. If a U.S. coded distress beacon is not in the RGDB, then the unlocated alert is distributed based on beacon type; EPIRB alerts are sent to RCC Alameda, ELT and PLB alerts are sent to the AFRCC.

Unlocated alerts from unregistered U.S. distress beacons are not distributed unless the RCC might be able use the decoded beacon information to access a database other than the RGDB, such as the ITU database for EPIRBs or a tail number database for ELTs.

If a distress beacon is coded for a non-U.S. country within a U.S. SRR that has a SPOC, the USMCC distributes the unlocated alert to the SPOC. For example, an unlocated alert for a Columbian distress beacon is sent to the Columbian SPOC.

If a beacon is coded for a non-U.S. country within a U.S. SRR that does not have a SPOC, the USMCC distributes the unlocated alert to the RCC responsible for that country. For example, an unlocated alert for a Cuban distress beacon is sent to RCC Miami.

NOCR Distribution

Distribution of Notification of Country of Registry (NOCR) messages was started because of the concern that the SAR response was not adequate in some areas of the world. The USMCC sends a NOCR to the appropriate RCC when a U.S. coded distress beacon is detected in a location outside of the U.S. SRR. In these instances, the alert is forwarded to the appropriate non-US RCC based on location.

Coast Guard and Air Force policy requires that RCCs receiving an NOCR attempt to contact the responsible RCC to ensure that a SAR response is made to assist U.S. citizens in distress.

A NOCR is sent by any MCC that detects a beacon located within its service area with a code for a country outside its service area.

The USMCC sends an NOCR to a U.S. RCC only if it has not already sent a located alert to the RCC. As with unlocated alerts, NOCRs are sent to U.S. RCCs based on available registration data, and based on beacon type if registration data is not available.

Problems can sometimes arise for RCCs when U.S. coded distress beacons are carried aboard foreign flag vessels, or when U.S. owners reside outside the U.S

Distress Beacon Monitoring

The USMCC collects data on distress beacon activations by beacon identification, manufacturer and RCC in the Incident History Database (IHDB). Accurate feedback from RCCs to the IHDB on the causes of distress beacon activations is required to reduce false alerts, whether due to beacon problems or user problems. The USMCC works with manufacturers and other organizations to help resolve beacon problems, and participates in an annual workshop with beacon manufacturers where this data is discussed.

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Appendices

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Appendix A: National Search and Rescue Plan of the United States (2016)

Policy

1. It is the policy of the signatory Federal departments and agencies to provide a *National Search and Rescue Plan of the United States* (referred to as the "Plan") for coordinating search and rescue (SAR) services to meet domestic needs and international commitments. Implementing guidance for this Plan is provided in the *International Aeronautical and Maritime Search and Rescue (IAMSAR) Manual*, the *National Search and Rescue Supplement (NSS) to the International Aeronautical and Maritime Search and Rescue Manual*, and other relevant directives of the Participants in this Plan.

Purpose

2. This Plan continues, by interagency agreement, the effective use of all available resources in all types of SAR operations to enable the United States to satisfy its humanitarian, national, and international commitments and obligations.

3. The *National Search and Rescue Plan of the United States (2007)* is superseded by this Plan.

Terms and Definitions

4. The following terms and definitions are used in this Plan.[1]

   a. Catastrophic Incident: Any natural or manmade incident, including terrorism, that results in extraordinary levels of mass casualties, damage, or disruption severely affecting the population, infrastructure, environment, economy, national morale, or government functions.

   b. Incident Command System (ICS): a management system designed to enable effective and efficient domestic incident management by integrating a combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure. ICS is a subcomponent of the National Incident Management System.

   c. Mass Rescue Operation (MRO): SAR services characterized by the need for immediate response to large numbers of persons in distress, such that the capabilities normally available to SAR authorities are inadequate.

   d. National Incident Management System (NIMS): A systematic, proactive approach to guide departments and agencies at all levels of government, nongovernmental organizations, and the private sector to work together seamlessly and manage incidents

[1] Additional terms and definitions are available in the IAMSAR Manual and the NSS.

involving all threats and hazards – regardless of cause, size, location, or complexity – in order to reduce loss of life, property damage, and harm to the environment.

e. National Response Framework (NRF): A guide establishing a comprehensive, national, all-hazards approach to domestic incident response. It intends to capture specific authorities and best practices for managing incidents ranging from the serious but purely local, to large-scale terrorist attacks or catastrophic natural disasters.

f. National Search and Rescue Committee (NSARC): Federal committee comprising the Departments of Homeland Security, Defense, Transportation, Interior, Commerce, and State, the Federal Communications Commission, and the National Aeronautics and Space Administration. Established to oversee the NSP and act as a coordinating forum for national SAR matters.

g. Rescue: An operation to retrieve persons in distress, provide for their initial medical or other needs, and deliver them to a place of safety.

h. Rescue Coordination Center (RCC): A unit, recognized by the International Civil Aviation Organization (ICAO), International Maritime Organization (IMO), or other cognizant international body, responsible for promoting efficient organization of SAR services and for coordinating the conduct of SAR operations within a SAR Region (SRR).

i. Rescue Sub-Center (RSC): A unit subordinate to an RCC established to complement the latter according to particular provisions of the responsible authorities.

j. Search: An operation using available personnel and facilities to locate persons in distress.

k. Search and Rescue Coordinator (SC): As defined in the IAMSAR Manual, one or more persons or agencies within an Administration with overall responsibility for establishing and providing SAR services, and ensuring that planning for those services is properly coordinated.

l. Search and Rescue Facility: Any mobile resource, including designated search and rescue units, used to conduct search and rescue operations.

m. Search and Rescue Region (SRR): An area of defined dimensions, associated with a rescue coordination center, within which search and rescue services are provided.

n. Search and Rescue Service: The performance of distress monitoring, communication, coordination and SAR functions, including provision of medical advice, initial medical assistance, or medical evacuation, through the use of public and private resources, including cooperating aircraft, vessels and other craft and installations.

o. U.S. Search and Rescue Satellite-Aided Tracking (SARSAT): The interagency cooperation among the Department of Commerce's National

Oceanic and Atmospheric Administration (NOAA), Department of Defense's U.S. Air Force (USAF), Department of Homeland Security's U.S. Coast Guard (USCG), and National Aeronautics and Space Administration (NASA) to support the International Cospas-Sarsat Programme and to provide the capability to receive and process distress alerts from distress radio beacons via satellite accurately, to determine these alerts' locations, and to relay this information to U.S. and foreign SAR authorities expeditiously, in order to facilitate the timely rescue of persons in the U.S. SAR regions and around the world.

p. <u>Urban Search and Rescue (US&R)</u>: The location, rescue (extrication), and initial medical stabilization of survivors trapped in confined spaces.

Objectives

5. Knowing the importance of cooperation in providing expeditious and effective SAR services, the Participants seek to:

    a. Provide a U.S. Plan for coordinating SAR services to meet domestic needs and international commitments and to document related national policies;

    b. Support lifesaving provisions of IMO's *International Convention on Maritime Search and Rescue* (SAR Convention), ICAO's *Convention on International Civil Aviation* (Chicago Convention), certain international agreements to which the United States is a party, and similar international instruments;

    c. Provide an overall Plan for coordination of SAR operations, effective use of available SAR resources, mutual assistance, and efforts to improve such cooperation and services;

    d. Integrate available SAR resources into a cooperative network for greater protection of life and property and to ensure greater efficiency and economy; and

    e. Enable the United States to satisfy its humanitarian, national, and international commitments and obligations.

6. This Plan is further intended to:

    a. Provide national guidance for the development of SAR-related systems;

    b. Describe its Participants and their roles in a pro-lifesaving context;

    c. Recognize lead Federal agencies for the types of operations covered by this Plan, and describe SAR responsibilities within the U.S. and international SAR systems;

    d. Account for saving property, but on a secondary basis to the conduct of SAR operations;

    e. Account for all operations up to and including providing initial assistance (food, clothing, medical, etc.) to SAR survivors and delivering them to a place of safety; and

    f. Have, as a primary concept, cooperation for overall and continual development, coordination, and improvement of SAR services.

Scope

7. It is intended that this Plan not conflict in any way with the SAR responsibilities agreed to by contracting States of the SAR and Chicago Conventions, or other international instruments to which the United States is, or may become, a party or participant.

8. No provisions of this Plan or any supporting plan are to be construed in such a way as to contravene responsibilities and legal authorities of the United States or of any Participant as defined by statutes, executive orders, or international instruments, or of established responsibilities of other departments, agencies, and organizations that regularly assist persons in distress.

9. This Plan is solely intended to provide guidance to the Participants. State, Tribal, Territorial/Insular Area (STTIA) authorities should normally retain SAR responsibilities within their jurisdictions for incidents primarily local or intrastate in character. In such cases, appropriate agreements are generally made between Federal SC(s) and the relevant authority.

National SAR Committee

10. The NSARC is responsible for the provisions of this Plan, consistent with applicable laws and Executive orders, and coordinates and provides guidance for its implementation.

Participants

11. The Participants to this Plan are the NSARC member departments and agencies:

a. The Department of Homeland Security (DHS) carries out responsibilities to protect against and respond to hazards and distress situations affecting the nation and its people;

   (1) The USCG develops, establishes, maintains, and operates SAR resources for the promotion of safety on, under, and over waters subject to U.S. jurisdiction as well as waters beyond the territorial sea of any country. The USCG has specialized expertise, facilities, and equipment for responding to maritime distress and other situations; and

   (2) The Federal Emergency Management Agency (FEMA) coordinates the Federal response under the guidelines of the NRF and oversees the National US&R Response System.

b. The Department of Transportation (DOT) carries out broad responsibilities in transportation safety;

   (1) The Federal Aviation Administration (FAA) establishes and enforces flight safety regulations and operates the air traffic control, navigation, and flight service facilities that are available to assist in SAR operations; and

   (2) The Maritime Administration (MARAD) maintains a fleet of ready reserve vessels for government use in contingencies and supports and promotes commercial maritime safety

with regard to vessels, equipment, and mariners. MARAD advocates efficient maritime intermodal commerce through enhanced security.

c. Department of Defense (DoD) components have unique capabilities, specialized expertise, and facilities and other resources that are used to conduct personnel recovery missions and support a wide spectrum of military and civil support operations. It is DoD policy that these resources may be used for SAR needs to the fullest extent practicable on a non-interference basis with primary military duties according to applicable national directives, plans, guidelines, and agreements. Within DoD, Commander, U.S. Northern Command (CDRUSNORTHCOM) is designated as a Federal SAR Coordinator and provides, coordinates, and uses resources for the efficient organization and conduct of SAR services, including SAR operations within DoD's assigned SRRs;

d. The Department of Commerce (DOC) participates in and supports SAR operations through NOAA. NOAA provides satellite services for detecting and locating persons in distress. NOAA is the lead Federal Agency for the U.S. SARSAT Program and associated international Programs, including the International Cospas-Sarsat Programme. NOAA also provides nautical and aeronautical charting; information on tides and tidal currents; marine environmental forecasts; and warnings for the high seas as well as coastal waters and inland waterways, as well as environmental data used for search planning for SAR operations;

e. The Department of the Interior (DOI)/National Park Service (NPS) provides SAR services on lands and waters administered by NPS, may assist STTIA and local authorities with emergency response operations outside NPS jurisdiction, and supports response operations during catastrophic incidents;

f. The Department of State (DOS) is responsible for the foreign affairs and international relations of the United States. DOS provides oversight, as well as direct and indirect support, for U.S. departments, agencies, and delegations that work on SAR in the international arena, including where another country's interests are involved;

g. The Federal Communications Commission (FCC) promulgates rules and regulations for interstate and foreign commerce by wire and radio for promoting safety of life and property, and supports SAR geo-location through its long-range direction finding network; and

h. NASA supports SAR objectives through research and development or application of technology for search, rescue, survival, and recovery systems and equipment, such as location tracking systems, transmitters, receivers, and antennas capable of locating aircraft, ships, spacecraft, or persons in distress. Additionally, NASA has aircraft, spacecraft, and worldwide tracking, data acquisition, and communications networks that can assist in SAR operations.

12. A Federal department or agency that is not a Participant may become a Participant in accordance with the procedures set forth in the *U.S. National Search and Rescue Committee Interagency Agreement*.

SAR Services Supported by this Plan

13. This Plan includes the following types of SAR services:

    a. Maritime (involving the search for and rescue of persons in distress from a water environment);

    b. Aeronautical (involving the search for aircraft overdue, missing, or in distress and SAR assistance in the vicinity of airports);

    c. Land (including SAR operations associated with environments such as remote areas, swift water, caves, and mountains, etc.);

    d. Collapsed structure/US&R (including military support to US&R);

    e. Utilization of specialized personnel, resources, and equipment to identify affected areas, ascertain conditions on scene, and search for persons in distress;

    f. Provision of initial assistance at or near the scene of a distress situation (e.g., initial medical assistance or advice, medical evacuation, provision of needed shelter, food, or clothing to survivors, emotional support, and humanitarian services);

    g. Delivery of survivors to a place of safety (where the survivor's safety of life is no longer threatened, basic human needs (e.g., food, shelter, and medical needs) can be met, and transportation arrangements can be made for the survivor's next or final destination);

    h. Saving of property when accomplished in conjunction with the conduct of SAR operations;

    i. MROs;

    j. Catastrophic Incident SAR (CISAR) in support of the NRF's Emergency Support Function (ESF) #9, Search and Rescue (including follow-on life-sustaining support to survivors in the disaster area);

    k. Recovery of human remains when accomplished in conjunction with the conduct of SAR operations (with minimal risk to SAR responders); and

    l. Search for and rescue of personnel of a spacecraft.[2]

14. This Plan does *not* cover:

    a. Air ambulance services that did not result from the conduct of a SAR operation;

    b. Military personnel recovery operations, such as combat SAR or

[2] For example, as a party to the *Agreement on the Rescue of Astronauts, the Return of Astronauts and Return of Objects Launched into Outer Space* (Rescue and Return Agreement), the United States is obliged to immediately take all possible steps to rescue and render all necessary assistance to personnel of a spacecraft who, owing to accident, distress, emergency, or unintended landing, land within U.S. jurisdiction or on the high seas.

other types of recovery by military operations to remove military or civilian personnel from harm's way;

c. Salvage operations;

d. Assistance in cases of civil disturbance, insurrection, or other emergencies that endanger life or property or disrupt the usual process of government; and

e. Operations and coordination in addition to those covered by this Plan that might be carried out concurrently with SAR operations on scene, such as could occur during the response to a catastrophic incident.

Federal SAR Coordinators

15. The Federal SCs, designated below, have overall responsibility for establishing RCCs as necessary, and for providing or arranging for SAR services within the U.S. SRRs:

    a. CDRUSNORTHCOM: Recognized Federal SC for the U.S. aeronautical SRR corresponding to the continental United States and Alaska; and

    b. USCG: Recognized Federal SC for all other U.S. aeronautical and maritime SRRs. This includes the State of Hawaii as well as waters over which the United States has jurisdiction, such as navigable waters of the United States.

Other SAR Responsibilities

16. National Park Service: NPS provides emergency services on lands and waters administered by NPS, assists visitors within NPS units, and aids authorities in neighboring jurisdictions. SAR operations, including emergency medical aid, are conducted in a wide variety of environments such as remote, rural, and roadless areas; lakes, rivers, and oceans; and deserts, mountains, and caves; and often require extended response times and the use of specialized equipment. NPS works closely with STTIA and local authorities and volunteer SAR organizations and is proficient in the use of the incident command system.

17. Federal Emergency Management Agency: FEMA oversees the National US&R Response System.

18. Critical SAR support: Implementation of the U.S. national SAR system and support of the global SAR plan includes other critical support functions conducted by DOS, NASA, NOAA, FCC, and other entities. Although this Plan primarily concerns matters directly related to SAR operations, the importance of international engagement in support of U.S. citizens abroad; negotiation and implementation of bilateral and regional SAR instruments with other countries; U.S. involvement in IMO, ICAO, and other international and regional fora; research and development in support of space-based distress alerting and to improve SAR capabilities and procedures; providing weather data for search planning; U.S. SARSAT system management and operation; and regulatory support cannot be overstated. Close cooperation and mutual support among all the Participants in this Plan are vital to conducting effective SAR operations and to the U.S. imperative to save lives on land and sea.

19. Other Assistance: The Participants in this Plan are encouraged to support each

other, as well as other Federal, STTIA, and local SAR authorities, for the conduct of SAR operations in accordance with applicable legal authority.

20. Catastrophic Incidents: Participants are encouraged to use their SAR capabilities to support ESF #9 SAR operations. ESF #9 details the overall coordination for the Federal provisioning of lifesaving assistance to STTIA and local SAR authorities when there is an actual or anticipated request for Federal SAR assistance.[3]

    a. During incidents or potential incidents requiring a unified SAR response, Federal SAR responsibilities reside with the ESF #9 primary agencies that provide timely and specialized SAR capabilities;

    b. Primary and support agencies are listed in the ESF #9 Annex.

    c. FEMA is the ESF #9 Coordinating Agency responsible for both day-to-day and response ESF #9 coordination activities;

    d. With the activation of ESF #9 Federal SAR support, Federal SCs need to ensure that SAR facilities not involved in the response are available to conduct other SAR operations that may occur concurrently.

21. STTIA and local SAR authority responsibilities: Outside the above listed Federal SC and SAR support responsibilities, STTIA and local SAR authorities are responsible for land-based SAR and should designate a person or agency to be "SAR Coordinator" within their respective jurisdictions. STTIA and local SAR authorities will always be integral stakeholders of the U.S. national SAR system and are critical in providing effective SAR services.

International Representation

22. DOS has designated certain Federal departments and agencies responsible for SAR under this Plan to represent the United States, with appropriate interagency coordination, in the following international fora:[4]

    a. USCG leads and coordinates national participation in IMO's international and regional SAR and safety-related initiatives;

    b. FAA leads and coordinates national participation in ICAO's international and regional SAR and safety-related initiatives;

    c. NOAA leads and coordinates national participation in the International Cospas-Sarsat Programme; and

    d. Based upon invitations from ICAO and IMO, respectively, the USAF

[3] The NRF and ESF #9 are the coordination structures for a Federal SAR response, including to a catastrophic incident. This Plan covers all types of aeronautical, maritime, and land-based SAR operations, whether conducted independently or also within the NRF. If SAR operations are carried out within the NRF, this Plan becomes an NRF supporting plan by integrating matters relating to coordination and conduct of disaster response operations. When ESF #9 is activated, other SAR operations in the affected area will continue to be covered by this Plan; the only difference is that the SAR services will be coordinated with the Incident Command organization on scene.

[4] This Plan merely reflects previous such designations and is not itself the mechanism for those designations.

intends to provide an aeronautical SAR expert and the USCG intends to provide a maritime SAR expert to serve as members of the ICAO-IMO Joint Working Group on SAR.

SAR Support outside the U.S. SAR Regions

23. Federal SCs, as well as other U.S. authorities, may support SAR operations anywhere in the world, consistent with their expertise, capabilities, and legal authority. This is in the interest of all U.S. citizens who travel or live abroad and advances U.S. humanitarian goals and international cooperation. As well, it is consistent with the principles of:

    a. Assisting persons in distress without regard to nationality or status of such a person or the circumstances in which that person is found; and

    b. Using all available resources for the coordination and conduct of SAR operations.

24. Consistent with international law, U.S. SAR facilities, in a position to render timely and effective assistance, may enter into or over the territorial sea or archipelagic waters of another country for the purpose of rendering assistance to persons in distress when:

    a. There is reasonable certainty (based on the best available information regardless of source) that a person is in distress from the perils of the sea;

    b. The position of the person or persons is reasonably well known; and

    c. The SAR facility is in position to render timely and effective assistance.

25. Participants, consistent with their capabilities and legal authority, should support another country's SAR operations in its territorial sea in accordance with international law and in waters that are beyond recognized U.S. aeronautical and maritime SRRs and beyond the territorial sea of any country. As appropriate, and within their capabilities, DoD combatant commanders should provide such support within their respective geographic areas of responsibility.

26. In carrying out SAR support with other nations (e.g., training, exercises, and liaison activities), each Participant should coordinate its activities with other Participants having SAR expertise with respect to the support concerned.

27. To the extent the Participants have the legal authority to do so, they may maintain liaison and cooperate with authorities of other nations that have comparable responsibilities for providing SAR services. Such cooperation should be carried out in coordination with the U.S. Federal SCs and with other SAR authorities that might be affected, as appropriate. When such coordination deals substantially with matters relating to the conduct of SAR operations, it should normally include USCG Headquarters, Office of Search and Rescue, in order to ensure consistency with international SAR instruments, the IAMSAR Manual, and other international guidance relevant to implementing such instruments. Where such cooperation may involve significant foreign affairs interests, timely coordination with DOS is important.

28. Participants should not normally accept an SC or RCC role for SAR operations for SRRs for which another country is

responsible. However, the Participants may provide and support SAR operations in such areas when:

a. Assistance is requested (normally this should be in accordance with RCC-to-RCC procedures prescribed in the IAMSAR Manual);

b. U.S. citizens are involved; or

c. U.S. SAR facilities become aware of a distress situation to which no other suitable facilities are responding, or where other available SAR services appear to be inadequate.

29. For distress situations in waters beyond the territorial sea of any country or in international airspace where no SRR exists for which an RCC is responsible, or where it appears that the responsible RCC is not responding in a suitable manner, U.S. RCCs or SAR facilities may assist as appropriate.

30. International SAR instruments are intended to facilitate the provision of suitable SAR services globally to assist persons in distress. In support of these instruments, situations may arise in which U.S. SAR resources are requested to supplement SAR capabilities outside the U.S. SRRs, as well as to support other countries' development of their SAR capabilities by providing training or other support. Participants are encouraged to take advantage of such situations as appropriate.

31. When assisting foreign SAR authorities, or other departments, agencies, and organizations that support these SAR authorities, Participants should ensure that:

a. They have appropriate legal authority and expertise to do so;

b. Assistance is consistent with any applicable international instruments;

c. Applicable procedures set forth in the IAMSAR Manual, the NSS, and other relevant directives are followed;

d. Such efforts are carried out in consultation with other Participants as appropriate; and

e. The SAR authorities assisted are responsible for the SAR functions in that country.

32. Policies on rendering SAR assistance in foreign territories or territorial seas must balance concerns for saving lives, sovereignty, and national security. Provisions for entry into territory or territorial seas, as necessary, should be consistent with international law and applicable international SAR instruments.

33. When any Participant to this Plan is addressing SAR-related inquiries or proposals from foreign SAR authorities, or when hosting or attending international SAR meetings, care should be taken that other interested U.S. departments, agencies, and organizations are consulted and involved as appropriate.

International SAR Instruments

34. Bilateral or multilateral SAR agreements and arrangements between the United States and foreign countries, or between U.S. departments, agencies, or organizations and foreign SAR authorities, may be of practical value by:

a. Assisting in the fulfillment of U.S. domestic and international obligations and commitments;

b. Promoting the effective use of all available resources in the conduct of SAR operations;

c. Ensuring effective integration of U.S. SAR services within the international SAR system;

d. Building mutual commitment to cooperate and support the conduct of SAR operations;

e. Resolving conflicting SAR procedures and sensitive matters in advance of time-critical distress situations; and

f. Identifying types of cooperative matters and efforts that may enhance or support the conduct of SAR operations (e.g., access to medical or fueling facilities, training and exercises, meetings, information exchanges, use of communications capabilities, and joint research and development projects).

35. Negotiation and conclusion of SAR instruments is to be consistent with international and domestic SAR principles, policies, and law, and with U.S. law and practice and DOS guidance concerning the negotiation and conclusion of international agreements and arrangements, including as reflected in the relevant Circular 175 grant of authority for legally binding international agreements. Negotiation and conclusion of SAR instruments should consider:

a. Which U.S. Government authorities, departments, agencies, or organizations concerned should be involved with the instrument;

b. Which types of SAR services (e.g., aeronautical and/or maritime) and/or SAR support functions should be included within the scope of the instrument;

c. Establishment of lines of delimitation separating aeronautical and maritime SRRs;

d. Whether other preexisting instruments should be superseded, modified, or otherwise accounted for in preparation of a new SAR instrument; and

e. Relevant guidance provided in the SAR and Chicago Conventions, the IAMSAR Manual, the NSS, and other pertinent directives.

36. Participants that develop any SAR instrument should ensure that such efforts are coordinated with other interested Participants prior to initiating negotiations.

U.S. SAR Regions

37. SRRs are established to ensure provision of adequate land-based communications infrastructure, efficient distress alert routing, and proper operational coordination to effectively support SAR operations.

38. SRRs should be contiguous and, as far as practicable, not overlap.

39. Establishment of SRRs is intended to effect an understanding concerning where the U.S. and foreign SAR authorities have accepted responsibility for coordinating or providing SAR

services. The existence of SRR limits should not be viewed as a basis to restrict, delay, or limit in any way prompt and effective action to relieve persons in distress.

40. U.S. aeronautical and maritime SRRs are established in accordance with the SAR and Chicago Conventions. Specific information concerning the U.S. SRRs can be found in the NSS.

41. As provided in the SAR and Chicago Conventions, the U.S. aeronautical and maritime SRRs should be harmonized to the extent practicable with countries having contiguous SRRs with the United States.

42. As affirmed in the SAR and Chicago Conventions, the delimitation of SRRs is not related to and shall not prejudice the delimitation of any boundary between the United States and any other country.

43. As defined in the SAR and Chicago Conventions, one RCC is associated with each internationally recognized SRR. Comprehensive IMO and ICAO standards and guidance pertinent to these RCCs have been developed and may be found in relevant international conventions, instruments, the IAMSAR Manual, and other publications that should be held and used by U.S. RCCs.

44. SCs, as designated in this Plan, are responsible for arranging SAR services and establishing RCCs for their respective SRRs. The U.S. national SAR system becomes integrated into the international SAR system by establishing recognized SRRs and RCCs that comply with international standards. SCs arrange and provide for all SAR services covered by this Plan within their respective SRR.

45. An SRR may be subdivided as long as the delimitation of the sub-regions coincides with the SRR limits. Where this is not practicable, changes to the SRR limits should be coordinated with any affected country, and for aeronautical or maritime SRRs, the changes need to be recognized by ICAO or IMO, respectively, in accordance with requirements of those Organizations.

Mutual Assistance

46. The Participants are encouraged to cooperate as follows:

    a. Provide mutual department or agency support by providing SAR facilities and support services as appropriate for SAR operations;

    b. Make and respond to requests for operational assistance between U.S. and international RCCs, RSCs, and Incident Command organizations as capabilities allow;

    c. Develop procedures, communications, and databases appropriate for coordination of SAR facilities responding to persons in distress and for coordination between the RCCs, RSCs, and/or Incident Command organizations;

    d. Normally follow applicable IMO, ICAO, and other relevant international guidance regarding operational procedures and communications; and

    e. In areas where more than one SAR authority may respond to persons in distress, agreed procedures should be in place that balance concerns for the conduct of SAR operations and jurisdiction.

47. Participants may enter into other collaborative efforts with each other, including:

    a. Mutual visits, information exchanges, and cooperative projects in support of the conduct of SAR operations;

    b. The conduct of joint training and exercises;

    c. Cooperation in development of procedures, techniques, equipment, and SAR facilities;

    d. Establishment of groups subordinate to NSARC as a means for more in-depth focus on matters of common concern; and

    e. Carrying out cooperative efforts similar to those indicated above on an international level, in coordination with DOS as it considers appropriate.

Charging for SAR Services

48. Each Participant should fund its own activities in relation to this Plan unless otherwise provided for by law or arranged by the Participants in advance, and not allow cost reimbursement to delay response to any person in distress.[5]

49. Unless required by law, SAR services provided to persons in distress should be without subsequent cost-recovery from the persons assisted.

50. Consistent with international practice, generally, when a nation requests help from another nation to assist persons in distress, if such help is provided, it should be accomplished voluntarily; the United States should neither request nor pay reimbursement costs for such assistance.

General Terms

51. No provision of this Plan or any supporting plan is to be construed as an obstruction to prompt and effective action by any department, agency, or individual to assist persons in distress.

52. Cooperative arrangements between the Participants with other Federal departments and agencies, STTIA and local SAR authorities, volunteer organizations, and industry stakeholders should provide for the fullest practicable mutual cooperation in the conduct of SAR operations, consistent with the willingness and ability of such departments and agencies to support, and for such coordination by the responsible RCC, RSC, and/or Incident Command organization as may be necessary and practicable.

53. The Participants do not compel STTIA and local SAR authorities or volunteer organizations to conform to this Plan. Mutual cooperation and coordination of SAR operations should be pursued through prior cooperative arrangements, liaison, and consultation (e.g., STTIA agreements with Air Force and Alaska RCCs (AFRCC/AKRCC)).

54. Participants coordinating SAR operations should, consistent with applicable domestic and international law and policy, organize their SAR facilities through suitable arrangements

[5] In some cases, SAR operations may be reimbursed under provisions of the Stafford Act when ESF #9 is activated. Such funding provisions are beyond the scope of this Plan and should not adversely affect the commencement or conduct of needed SAR operations.

into a basic network to assist persons in distress.

55. Participants intend to keep political, economic, jurisdictional, or other such factors secondary when coordinating and conducting SAR operations.

56. Consistency and harmonization should be fostered wherever practicable through plans, procedures, equipment, agreements, training, terminology, etc., for the conduct of SAR operations, taking into account terms and definitions adopted internationally as much as possible.

57. Terminology and definitions used in the U.S. SAR system should be consistent with the terminology and definitions in the SAR and Chicago Conventions and the IAMSAR Manual.

58. If a distress situation appears to exist or may exist, it should be assumed that a distress situation does actually exist until known differently.

59. Generally, cost-effective safety, regulatory, or diplomatic measures that tend to minimize the need for U.S. services will be supported.

60. Close cooperation should be established between services and organizations that may support improvements in SAR operations in areas such as operations, planning, training, exercises, communications, and research and development.

61. Recognizing the critical importance of reduced response time in successful SAR operations, a continual focus should be maintained on developing and implementing means to reduce the time required for:

    a. Receiving distress alerts and information associated with distress situations;

    b. Planning and coordinating SAR operations;

    c. SAR facility transits and searches;

    d. Rescues; and

    e. Providing immediate assistance (e.g., medical assistance), as appropriate.

62. Federal SCs and other SAR authorities should be generally familiar with the SAR Convention, Chicago Convention (in particular Annex 12 – Search and Rescue), the IAMSAR Manual, the NSS, and other primary directives or applicable information.

63. Customary international law, international instruments relevant to SAR, the IAMSAR Manual, and domestic law and policy serve as the framework for coordination of SAR operations, and especially SAR operations involving multiple countries, organizations, and jurisdictions.

64. SAR operational responsibilities are generally associated with the internationally recognized U.S. aeronautical and maritime SRRs. Consistent with this Plan, Federal SCs are assigned primary responsibility for coordinating SAR operations within each SRR with other departments, agencies, and organizations providing support, as appropriate. However, in some specific sub-areas, other Federal SAR authorities may be responsible (e.g., U.S. national park units and military bases).

65. Local cooperative arrangements within the United States should be made in

advance between SAR authorities and air traffic and airport authorities for close coordination in handling aircraft emergencies.

66. Distress situations involving airborne aircraft should normally be coordinated by the SAR authority responsible for the SRR concerned once the distressed aircraft is down; cooperation between the SAR authority and air traffic service authority should continue while the aircraft remains airborne.

67. Land SAR services may include aeronautical SAR operations. Participants' involvement in such operations may be governed by arrangements between the Federal SC, STTIA, and local SAR authorities. Participants should support such operations, as appropriate.

Coordination of SAR Operations

68. Each department or agency responsible for SAR operations under this Plan intends to:

    a. Keep information readily available on the status and availability of SAR facilities or other resources that may be required for SAR operations; and

    b. Keep each other fully and promptly informed of SAR operations of mutual interest or that may involve the use of SAR facilities of another Participant;

69. Federal SCs delegate to their RCCs the authority to:

    a. Request SAR assistance via other U.S. and foreign RCCs/RSCs;

    b. Promptly respond to requests for SAR assistance from other U.S. and foreign RCCs/RSCs; and

    c. Coordinate entry into the United States of foreign SAR facilities. Such coordination and entry:

        (1) Should involve appropriate U.S. authorities (e.g., customs, immigration, and health) as well as the proper authorities of the nation or SAR facility involved with the entry; and

        (2) May include appropriate overflight or landing of SAR aircraft and similar accommodation of surface (land or water) SAR facilities for the purpose of fueling, medical, delivery of survivors to a place of safety, and other appropriate and available operational support as circumstances dictate.

70. The use of any SAR facilities committed to support a SAR operation should normally be coordinated and, as appropriate, directed by the responsible RCC/RSC/Incident Command organization consistent with this Plan's provisions.

71. On-scene coordination may be delegated to any appropriate SAR facility participating in a particular incident under the cognizance of the SAR Mission Coordinator (SMC) or Incident Commander.

72. Federal SCs should arrange for the receipt of distress alerts originating from within their respective SRRs and ensure that every RCC/RSC can communicate with persons in distress, SAR facilities, and other RCCs/RSCs/Incident

Command organizations.

National Incident Management System

73. Under NIMS, ICS is adopted for use within the United States to command, control, and coordinate an emergency response. When SAR operations are conducted in situations where ICS has been implemented, one or more representatives of the SMC should be assigned to work with the Operations Section of the Incident Command organization. Coordination procedures of this Plan should continue to be used under NIMS.

Military Roles and Military/ Civilian Relationships

74. Arrangements between Federal military and civil departments and agencies should provide for the fullest practicable cooperation, consistent with statutory responsibilities, authorities, and assigned SAR functions.

75. Cooperative arrangements involving DoD commands should provide for the fullest practicable use of their facilities for SAR on a non-interference basis with primary military duties, consistent with statutory responsibilities, authorities, and assigned department and agency functions.

76. Participants with operational responsibilities should develop plans and procedures for effective use of all available SAR facilities and for contingencies to continue SAR operations if military forces are withdrawn because of another emergency or a change in military missions.

Resources

77. Participants intend to use all available resources in the conduct of SAR operations. STTIA and local SAR authorities, volunteer organizations, and industry stakeholders have facilities that contribute to the effectiveness of the U.S. national SAR system that should be considered in the planning and conduct of SAR operations.

78. To help identify, locate, and quantify primary SAR facilities, Participants may designate facilities that meet international standards for equipment and personnel training as "SAR units" (SRUs). Such SAR facilities do not need to be dedicated exclusively to the conduct of SAR operations and should not preclude the use of other available resources.

79. Recognizing the critical role of communications in receiving distress information and coordinating a response that can involve multiple organizations and jurisdictions, the Participants should work to develop suitable SAR provisions for:

    a. Interoperability;

    b. Means of sending and receiving distress alert information;

    c. Means of identification;

    d. Effective provisions for equipment registration and continual access to registration data by SAR authorities;

    e. Rapid, automatic, and direct routing of emergency communications;

    f. System reliability; and

g. Preemptive or priority processing of distress communications.

Technical and Support Services

80. The Participants intend to:

   a. Apply the most effective systems to save the most lives at the least operational risk and cost; and

   b. Foster innovation in technical, administrative, and information systems to improve the ability of the Participants to carry out their SAR responsibilities.

81. Each Participant's managerial, operational, and support personnel intend to maximize SAR operational effectiveness.

82. Priority goals of the Participants with operational roles include:

   a. Making distress alerts and associated data available to operational personnel as quickly, comprehensively, and reliably as possible;

   b. The provisioning of communications systems that are reliable, simple, problem-free, interoperable, and as functionally effective as possible;

   c. Enabling operational personnel to be as effective in the planning and conduct of SAR operations as possible; and

   d. Ensuring SAR personnel are provided quality training, equipment, procedures, facilities, information, and other tools necessary to conduct SAR operations in a consistent, highly professional, and effective manner.

83. Participants should:

   a. Encourage development and proficiency in SAR techniques and procedures by other departments and agencies participating in SAR, and assist these other departments and agencies as appropriate;

   b. Encourage continued development of STTIA and local SAR authorities and facilities as appropriate; and

   c. Enter into cooperative arrangements with STTIA and local SAR authorities, SAR volunteers, private organizations, nongovernmental organizations, and industry stakeholders to provide for the fullest practicable cooperation in the coordination and conduct of SAR operations consistent with their capabilities and resources.

Amendment or Termination

Amendment or termination of this Plan is to be in accordance with the procedures set forth in the *United States National Search and Rescue Committee Interagency Agreement*.

Secretary of Homeland Security

Date: 9/11/15

Secretary of Commerce

Date: FEB 1 9 2016

Secretary of Defense

Date: DEC 0 8 2015

Secretary,
Department of the Interior

Date: 12/16/15

Secretary of State

Date: MAR 2 9 2016

Administrator,
National Aeronautics and Space Administration

Date: 11/14/16

Secretary of Transportation

Date: 11-4-15

Chairman,
Federal Communications Commission

Date: 9/23/15

Appendix B: U.S. SAR Regions

Guam Aeronautical SRS

Guam Maritime SRS

Langley and Elmendorf Aeronautical SRRs

Introduction

IMO's SAR Convention and ICAO's Chicago Convention characterize an SRR as an area of defined dimensions associated with an RCC, within which SAR services are provided. Within the SRR, the maritime and/or aeronautical RCC is responsible for promoting efficient organization of SAR services and for coordinating the conduct of SAR operations. This Appendix B provides the coordinates for the U.S. aeronautical and maritime SRRs for which the United States is responsible; Annex B-1 to this Appendix provides the coordinates for delimiting the U.S. SRRs with other countries with contiguous SRRs; Annex B-2 to this Appendix provides charts for each U.S. SRR.

Under the SAR Convention, IMO provides the framework for nations to implement the maritime global SAR plan. For the United States, the Coast Guard, as the SC for the aeronautical and maritime SRRs in the Atlantic and Pacific Oceans (Figures B-2-1 and B-2-2), continues to pursue formally delimiting the U.S. maritime SRRs with nations having contiguous SRRs.

Under the Chicago Convention (Annex 12), ICAO provides the framework for the implementation of the international aeronautical SAR system. Globally, the aeronautical SRRs are relatively complete worldwide and are adjusted only occasionally.

U.S. aeronautical and maritime SRR coordinates are published in several documents in addition to the NSS:

- SAR agreements signed with other countries;
- ICAO's *Regional Air Navigation Plans* (aeronautical SRRs); and
- IMO's Global SAR Plan.

In many instances the coordinates between the U.S. aeronautical and maritime SRRs are not in alignment. RCCs must be cognizant of these differences and effectively coordinate SAR operations with international SAR partners in areas where the aeronautical and maritime SRRs are not the same.

(Note: Coordinates in "[ ]" are the maritime SRR coordinates submitted to IMO in the following format: degrees and decimal degrees to two decimal places.)

Atlantic Ocean

The U.S. Atlantic Ocean aeronautical and maritime SRRs are subdivided into the following SRRs and SRS:

- Boston aeronautical and maritime SRRs;
- Norfolk aeronautical and maritime SRRs;
- Miami aeronautical and maritime SRRs;
- New Orleans aeronautical and maritime SRRs;

- Cleveland aeronautical and maritime SRR; and
- San Juan aeronautical and maritime SRSs.

Atlantic Ocean Aeronautical SRR

SAR Coordinator: Commander, Atlantic Area

The U.S. Atlantic Ocean aeronautical SRR (Figure B-2-3) includes the following ocean area:

1) 44°-30′N, 67°W; (United States-Canada national boundary)
2) 41°-52′N, 67°W;
3) 43°-36’N, 60°W;
4) 45°N, 53°W;
5) 45°N, 40°W;
6) 22°-18′N, 40°W;
7) 18°N, 45°W;
8) 18°N, 62°W;
9) 17°-22′N, 63°W;
10) 15°-20′N, 63°W;
11) 15°N, 63°-15′W;
12) 15°N, 65°W;
13) 15°-41′N, 67°-04′W;
14) 16°N, 68°W;
15) 19°N, 68°W;
16) 20°-25′N, 70°-29′W;
17) 20°-25′N, 73°W;
18) 20°N, 73°-20′W;
19) 22°N, 75°-10′W;
20) 24°N, 78°W;
21) 24°N, 86°W;
22) 24°-30′N, 88°W;
23) 24°-30′N, 93°W;
24) 26°N, 95°-55′W;
25) 26°N, 97°W; and
26) 25°-57′-14″N, 97°-08′-46″W. (United States-Mexico national boundary)

Atlantic Ocean Maritime SRR

SAR Coordinator: Commander, Atlantic Area

The U.S. Atlantic Ocean maritime SRR (Figure B-2-4) includes the following ocean area:

1) 44°-30′N, 67°W; (United States-Canada national boundary)

   [44.50°N, 67.00°W]
2) 41°-52′N, 67°W;

   [41.87°N, 67.00°W]
3) 43°-36′N, 60°W;

   [43.60°N, 60.00°W]
4) 45°N, 53°W;

   [45.00°N, 53.00°W]
5) 45°N, 40°W;

   [45.00°N, 40.00°W]
6) 18°N, 40°W;

   [18.00°N, 40.00°W]

(Note: Bermuda (32°-20′N, 64°-45′W) has a 200 mile radius aeronautical and maritime SRR surrounding the island. The Bermuda SRR is completely within the Norfolk SRR. Bermuda maintains a Joint RCC.)

7) 18°N, 48°W;

   [18.00°N, 48.00°W]

8) 19°N, 48°W;
[19.00°N, 48.00°W]

9) 19°N, 63°-30’W;
[19.00°N, 60.50°W]

10) 17°N, 63°-30′W;
[17.00°N, 63.50°W]

11) 16°N, 62°-20′W;
[16.00°N, 62.33°W]

12) 16°N, 65°-30′W;
[16.00°N, 65.50°W]

13) 15°-41′N, 67°-04′W;
[15.68°N, 67.07°W]

14) 16°N, 68°W;
[16.00°N, 68.00°W]

15) 19°N, 68°W;
[19.00°N, 68.00°W]

16) 20°-25′N, 70°W;
[20.42°N, 70.00°W]

17) 20°-25′N, 71°-40′W;
[20.42°N, 71.67°W]

18) 20°-25’N, 73°W;
[20.42°N, 73.00°W]

19) 21°-30′N, 75°W;
[21.50°N, 75.00°W]

20) 21°-42′N, 75°-46′W; (Cay Santo Domingo)
[21.70°N, 75.77°W]

21) 22°-22′-46″N, 77°-35′-10.7″W; (Cay Lobos)
[22.38°N, 77.59°W]

22) 22°-45′N, 78°-06′W; (Guinchos Cay)
[22.75°N, 78.10°W]

23) 23°-40′N, 80°-30′W;
[23.67°N, 80.50°W]

24) 24°N, 80°-30′W;
[24.00°N, 80.50°W]

25) 24°N, 86°-35′W; thence westerly along the
[24.00°N, 86.58°W]

(Note: The Bahamas SAR Understanding (Sir Grey memo, 1964) does not delimit the United States-Bahamas maritime SRR. At the Final Meeting on Caribbean Maritime Search and Rescue (30 April to 04 May 1984), the Bahamas provisionally delimited a maritime SRR with limits partly coinciding with the limits of the Miami maritime SRR. The coordinates of Bahamas provisional maritime SRR are as follows: 20°-25′N, 73°W; 21°-30′N, 75°W; Cay Santo Domingo (21˚-42′N, 75˚-46′W); Cay Lobos (22˚-22′-46″N, 75˚-35′-10.7″W) ; Quinchos Cay (22˚-45′N, 78˚-06′W); 23°-40′N, 80°-30′W; 24°N, 80°-30′W; 25°-40′N, 79°-25′W; 28°-20′N, 79°-25′W; 27°N, 76°W; 21°-45′N, 70°W; 20°-25′N, 70°W; thence back to 20°-25′N, 73°W. Until the United States can conclude a SAR agreement with the Bahamas, Miami maritime SRR will continue to include the Bahamas provisional maritime SRR.)

26) Mexico Exclusive Economic Zone (EEZ); to

27) 25°-57′-14″N, 97°-08′-46″W; (United States-Mexico national boundary; approximate)
[25.95°N, 97.15°W]

(Note: The Agreement between the Government of the United States of America and the Government of the United Mexican States on Maritime Search and Rescue, 1989, references an exchange of notes on the Maritime Boundary, 1976. The 1976 exchange of notes does not delimit the United States-Mexico maritime SAR Regions

in the Gulf of Mexico. Until the United States can delimit the maritime SAR regions with Mexico, the provisional delimitation shall continue to be Mexico's Exclusive Economic Zone (EEZ))

Boston Aeronautical and Maritime SRRs

SAR Coordinator: Commander, 1st Coast Guard District

The Boston aeronautical and maritime SRRs (Figure B-2-5) include the following ocean area:

1) 44°-30′N, 67°W;
   (United States-Canada national boundary)

   [44.50°N, 67.00°W]

2) 41°-52′N, 67°W;

   [41.87°N, 60.00°W]

3) 43°-36′N, 60°W;

   [43.60°N, 60.00°W]

4) 45°N, 53°W;

   [45.00°N, 53.00°W]

5) 45°N, 40°W;

   [45.00°N, 40.00°W]

6) 37°N, 40°W;

   [37.00°N, 40.00°W]

7) 37°N, 67°-13′W; and

   [37.00°N, 67.22°W]

8) 40°-18′N, 73°-58.8′W.

   [40.30°N, 73.98°W]

Norfolk Aeronautical SRR

SAR Coordinator: Commander, 5th Coast Guard District

The Norfolk aeronautical SRR (Figure B-2-6) includes the following ocean area:

1) 40°-18′N, 73°-58.8′W;
2) 37°N, 67°-13′W;
3) 37°N, 40°W;
4) 22°-18′N, 40°W;
5) 19°-22′N, 43°-25′W;
6) 29°N, 69°-19′W; and
7) 33°-51.1′N, 78°-32.5′W.

Norfolk Maritime SRR

SAR Coordinator: Commander, 5th Coast Guard District

The Norfolk maritime SRR (Figure B-2-7) includes the following ocean area:

1) 40°-18′N, 73°-58.8′W;

   [40.30°N, 73.98°W]

2) 37°N, 67°-13′W;

   [37.00°N, 67.22°W]

3) 37°N, 40°W;

   [37.00°N, 40.00°W]

4) 18°N, 40°W;

   [18.00°N, 40.00°W]

5) 29°N, 69°-19′W; and

   [29.00°N, 69.32°W]

6) 33°-51.1′N, 78°-32.5′W.

   [33.85°N, 78.54°W]

(Note: Bermuda (32°-20′N, 64°-45′W) has a 200 mile radius aeronautical and maritime SRR surrounding the island. The Bermuda

SRR is completely within the Norfolk SRR. Bermuda maintains a Joint RCC.)

Miami Aeronautical SRR

SAR Coordinator: Commander, 7th Coast Guard District

The Miami aeronautical SRR (Figure B-2-8) includes the following ocean area:

1) 33°-51.1′N, 78°-32.5′W,
2) 29°N, 69°-19′W;
3) 21°-45′N, 70°W;
4) 20°-08′N, 70°W;
5) 20°-25′N, 70°-29’W;
6) 20°-25′N, 73°W;
7) 20°N, 73°-20′W;
8) 22°N, 75°-10′W;
9) 24°N, 78°W;
10) 24°N, 86°W; and
11) 30°N, 83°-50′W.

Miami Maritime SRR

SAR Coordinator: Commander, 7th Coast Guard District

The Miami maritime SRR (Figure B-2-9) includes the following ocean area:

1) 33°-51.1′N, 78°-32.5′W;

   [33.85°N, 78.54°W]
2) 29°N, 69°-19′W;

   [29.00°N, 69.32°W]
3) 21°-45′N, 70°W;

   [21.75°N, 70.00°W]
4) 20°-25′N, 70°W;

   [20.42°N, 70.00°W]
5) 20°-25′N, 71°-40′W;

   [20.42°N, 71.67°W]
6) 20°-25′N, 73°W;

   [20.42°N, 73.00°W]
7) 21°-30′N, 75°W;

   [21.50°N, 75.00°W]
8) 21°-42′N, 75°-46′W;
   (Cay Santo Domingo)

   [21.70°N, 75.77°W]
9) 22°-22′-46″N, 75°-35′-10.7″W;
   (Cay Lobos)

   [22.38°N, 77.59°W]
10) 22°-45′N, 78°-06′W;
   (Guinchos Cay)

   [22.75°N, 78.10°W]
11) 23°-40′N, 80°-30′W;

   [23.67°N, 80.50°W]
12) 24°N, 80°-30′W;

   [24.00°N, 80.50°W]
13) 24°N, 86°-35′W; and

   [24.00°N, 86.58°W]
14) 30°N, 83°-50′W.

   [30.00°N, 83.83°W]

(Note: The Bahamas SAR Understanding (Sir Grey memo, 1964) does not delimit the United States-Bahamas maritime SRR. At the Final Meeting on Caribbean Maritime Search and Rescue (30 April to 04 May 1984), the Bahamas provisionally delimited a maritime SRR with limits partly coinciding with the limits of the Miami maritime SRR. The coordinates of Bahamas provisional maritime SRR are as follows: 20°-25′N, 73°W; 21°-30′N, 75°W; Cay Santo Domingo (21˚-42′N, 75˚-46′W); Cay Lobos (22˚-22′-46″N, 75˚-35′-10.7″W) ; Quinchos Cay (22˚-45′N, 78˚-06′W); 23°-40′N, 80°-30′W; 24°N, 80°-30′W; 25°-40′N, 79°-25′W; 28°-20′N, 79°-25′W; 27°N, 76°W; 21°-45′N, 70°W;

20°-25′N, 70°W; thence back to 20°-25′N, 73°W. Until the United States can conclude a SAR agreement with the Bahamas, Miami maritime SRR will continue to include the Bahamas provisional maritime SRR.)

New Orleans Aeronautical SRR

SAR Coordinator: Commander, 8th Coast Guard District

The New Orleans aeronautical SRR (Figure B-2-10) includes the following ocean area:

1) 30°N, 83°-50′W.
2) 24°N, 86°W;
3) 24°-30′N, 88°W;
4) 24°-30′N, 93°W;
5) 26°N, 95°-55′W;
6) 26°N, 97°W; and
7) 25°-57′-14″N, 97°-08′-46″W. (United States-Mexico national boundary)

New Orleans Maritime SRR

SAR Coordinator: Commander, 8th Coast Guard District

The New Orleans maritime SRR (Figure B-2-11) includes the following ocean area:

1) 30°N, 83°-50′W;

   [30.00°N, 83.83°W]
2) 24°N, 86°-35′W;

   [24.00°N, 86.58°W]
3) Mexico Exclusive Economic Zone (EEZ); to
4) 25°-57′-14″N, 97°-08′-46″W; (United States-Mexico national boundary; approximate)

   [25.95°N, 97.15°W]

(Note: The Agreement between the Government of the United States of America and the Government of the United Mexican States on Maritime Search and Rescue, 1989, references an exchange of notes on the Maritime Boundary, 1976. The 1976 exchange of notes does not delimit the United States-Mexico maritime SAR Regions in the Gulf of Mexico. Until the U.S. can delimit the maritime SAR regions with Mexico, the provisional delimitation shall continue to be Mexico's Exclusive Economic Zone (EEZ))

Cleveland Aeronautical and Maritime SRRs

SAR Coordinator: Commander, 9th Coast Guard District

The delimitation of the Cleveland aeronautical and maritime SRRs is along the United States and Canada national boundary (Figure B-2-12):

1) 49°-00.04′N, 97°-13.74′W;
2) Easterly along the United States-Canada national boundary; and
3) 44°-59′-57″N, 74°-39′-40″W.

San Juan Aeronautical SRS

Commanding Officer, Sector San Juan

The San Juan aeronautical SRR (Figure B-2-13) includes the following ocean area:

1) 29°N, 69°-19′W;
2) 19°-22′N, 43°-25′W;
3) 18°N, 45°W;
4) 18°N, 62°W;
5) 17°-22′N, 63°W;
6) 15°-20′N, 63°W;

7) 15°N, 63°-15′W;

8) 15°N, 65°W;

9) 15°-41′N, 67°-04′W;

10) 16°N, 68°W;

11) 19°N, 68°W;

12) 20°-25′N, 70°-29′W;

13) 21°-45′N, 70°W; return to

14) 29°N, 69°-19′W.

San Juan Maritime SRS

Commanding Officer, Sector San Juan

The San Juan maritime SRS (Figure B-2-14) includes the following ocean area:

1) 29°N, 69°-19′W;
   [29.00°N, 69.32°W]

2) 18°N, 40°W;
   [18.00°N, 40.00°W]

3) 18°N, 48°W;
   [18.00°N, 48.00°W]

4) 19°N, 48°W;
   [19.00°N, 48.00°W]

5) 19°N, 63°-30′W;
   [19.00°N, 63.50°W]

6) 17°N, 63°-30′W;
   [17.00°N, 63.50°W]

7) 16°N, 62°-20′W;
   [16.00°N, 62.33°W]

8) 16°N, 65°-30′W;
   [16.00°N, 65.50°W]

9) 15°-41′N, 67°-04′W;
   [15.68°N, 67.07°W]

10) 16°N, 68°W;
   [16.00°N, 68.00°W]

11) 19°N, 68°W;
   [19.00°N, 68.00°W]

12) 20°-25′N, 70°W;
   [20.42°N, 70.00°W]

13) 21°-45′N, 70°W; return to
   [21.75°N, 70.00°W]

14) 29°N, 69°-19′W.
   [29.00°N, 69.32°W]

Pacific Ocean

The U.S. Pacific Ocean aeronautical and maritime SRRs are subdivided into the following SRRs and SRS:

- Alameda aeronautical and maritime SRRs;
- Seattle aeronautical and maritime SRRs;
- Honolulu aeronautical and maritime SRRs;
- Juneau aeronautical and maritime SRRs; and
- Marianas Section aeronautical and maritime SRSs.

Pacific Ocean Aeronautical SRR

SAR Coordinator: Commander, Pacific Area

The U.S. Pacific Ocean aeronautical SRR (Figure B-2-15) includes the State of Hawaii and the following ocean area:

1) 49°-00′-07″N, 122°-49′-05″W; (United States-Canada western transcontinental national boundary)

2) 48°-30′N, 124°-45′W;

3) 48°-30′N, 125°W;

4) 48°-20′N, 128°W;

5) 48°-20′N, 145°W;

6) 54°-40′N, 140°W;

7) 54°-40′N, 136°W;

8) 54°N, 136°W;

9) 54°-13′N, 134°-57′W;

10) 54°-39′-27″N, 132°-41′W;

11) 54°-42′-30″N, 130°-36′-30″W;

12) 69°-39′-47″N, 141°W;
(United States-Canada national boundary)

13) 90°N;
(North Pole)

14) 65°N, 168°-58′-24″W;

15) 64°-03′N, 172°-12′W;

16) 60°N, 180°E/W;

17) 54°-49′N, 170°-12′E;

18) 54°N, 169°E;

19) 50°-05′N, 159°E;

(Note: The United States is a party to the Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic, 2011, which harmonized U.S. aeronautical and maritime SRRs in the North Pacific. The resulting SAR agreement caused an overlap between the United States and Japan maritime SRRs. The overlapped area of SAR responsibility has the following coordinates: 52°-30′N, 165°E; 50°-05′N, 159°E; and 43°N, 165°E. This overlap will remain until the United States and Japan renegotiate the maritime SRR delimitation.)

20) 43°N, 165°E;

21) 27°N, 165°E;

22) 27°N, 155°E;

23) 21°N, 155°E;

24) 21°N, 130°E;

25) 7°N, 130°E;

26) 3°-30′N, 133°E;

27) 3°-30′N, 141°E;

28) 0°N/S, 141°E;

29) 0°N/S, 160°E;

30) 3°-30′N, 160°E;

31) 3°-30′N, 180°E/W;

32) 5°S, 180°E/W;

33) 5°S, 155°W;

34) 3°-30′N, 145°W;

35) 3°-30N, 120°W;

36) 30°N, 120°W;

37) 30°N-45′N, 120°-50′W; and

38) 32°-33′N, 117°-05′W.

Pacific Ocean Maritime SRR

SAR Coordinator: Commander, Pacific Area

The U.S. Pacific Ocean maritime SRR (Figure B-2-16) includes the following ocean area:

1) 49°-00′-07″N, 122°-49′-05″W;
(United States-Canada national boundary)

[49.12°N, 122.73°W]

2) 48°-30′N, 124°-45′W;

[48.50°N, 124.75°W]

3) 48°-30′N, 125°W;

[48.50°N, 125.00°W]

4) 48°-20′N, 128°W;

[48.33°N, 128.00°W]

5) 48°-20′N, 145°W;

[48.33°N, 145.00°W]

6) 54°-40′N, 140°W;

[54.67°N, 140.00°W]

7) 54°-40′N, 136°W;

[54.67°N, 140.00°W]

8) 54°N, 136°W;

[54.00°N, 136.00°W]

9) 54°-13′N, 134°57′W;

[54.22°N, 139.95°W]

10) 54°-39′-27″N, 132°-41′W;

[54.66°N, 132.68°W]

11) 54°-42′-30″N, 130°-36′-30″W.

[54.71°N, 130.61°W]

12) 69°-39′-47″N, 141°W;
(United States-Canada national boundary)

[69.66°N, 141°W]

13) 90°N
(North Pole)

[90°N]

14) 65°N, 168°-58′-24″W;

[65.00°N, 168.97°W]

15) 64°-03′N, 172°-12′W;

[64.05°N, 172.02°W]

16) 60°N, 180°E/W;

[60.00°N, 180.00°E/W]

17) 54°-49′N, 170°-12′E;

[54.82°N, 170.20°E]

18) 54°N, 169°E;

[54.00°N, 169.00°E]

19) 50°-05′N, 159°E;

[50.08°N, 159.00°E]

(Note: The United States is a party to the Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic, 2011, which harmonized U.S. aeronautical and maritime SRRs in the North Pacific. The resulting SAR agreement caused an overlap between the United States and Japan maritime SRRs. The overlapped area of SAR responsibility has the following coordinates: 52°-30′N, 165°E; 50°-05′N, 159°E; and 43°N, 165°E. This overlap will remain until the U.S. and Japan renegotiate the maritime SRR delimitation.)

20) 43°N, 165°E;

[43.00°N, 165.00°E]

21) 17°N, 165°E;

[17.00°N, 165.00°E]

22) 17°N, 130°E;

[17.00°N, 130.00°E]

23) 6°N, 130°E;

[6.00°N, 130.00°E]

24) 6°N, 132°E;

[6.00°N, 132.00°E]

25) 3°-30′N, 132°E;

[3.50°N, 132.00°E]

26) 3°-30′N, 141°E;

[3.50°N, 141°E]

27) 0°N/S, 141°E;

[0.00°N/S, 141.00°E]

28) 0°N/S, 160°E;

[0.00°N/S, 160.00°E]

29) 3°-30′N, 160°E;

[3.50°N, 160.00°E]

30) 3°-30′N, 180°E/W;

[3.50°N, 180.00°E/W]

31) 5°S, 180°E/W;

[5.00°S, 180.00°E/W]

32) 5°S, 120°W;

[5.00°S, 120.00°W]

33) 3°-23′-33.96″S, 120°W;

[3.39°S, 120.00°W]

34) 3°-23′-33.96″S, 95°-23′W;

[3.39°S, 95.38°W]

35) 1°-28′-54″N, 95°-23′W;

[1.48°S, 95.38°W]

36) 1°-28′-54″N, 90°W;

[1.48°S, 90.00°W]

(Note: The Memorandum of Understanding for Cooperation between the Ecuador Direccion General de la Marina Mercante y del Litoral and the United States Coast Guard Concerning Search and Rescue, 2005, delimits the United States-Ecuador maritime SRRs along the following coordinates: 3°-23′-33.96″S, 95°-23′W; 1°-28′-54″N, 95°-23′W; and 1°-28′-54″N, 78°-46′W.

The Memorandum of Understanding for Cooperation between the Ministry of Public Security of Costa Rica and the United States Coast Guard concerning Aeronautical and Maritime Search and Rescue, 2008, expanded the Costa Rica maritime SRR south to 1°-28′-54″N, 90°W. The United States and Ecuador will need to revise the current MOU to reflect this change in coordinates with Costa Rica assuming maritime SRR responsibilities south to the Ecuador maritime SRR northern limit.)

37) 9°-27′N, 90°W;

[9.45°N, 90.00°W]

38) 9°-44′N, 89°-14′W;

[9.73°N, 89.23°W]

39) 9°-56′N, 89°-27′W;

[9.93°N, 89.45°W]

40) 10°-33′-50″N, 91°-28′W;

[10.56°N, 91.47°W]

41) 11°-58′-06”N, 94°-26′W; thence northwesterly along the

[11.97°N, 94.43°W]

42) Mexico Exclusive Economic Zone (EEZ);

(Note: The Agreement between the Government of the United States of America and the Government of the United Mexican States on Maritime Search and Rescue, 1989, references an exchange of notes on the Maritime Boundary, 1976. The 1976 exchange of notes does not delimit the United States-Mexico maritime SAR Regions in the Pacific Ocean. Until the United States can delimit the maritime SAR regions with Mexico, the provisional delimitation shall continue to be Mexico's Exclusive Economic Zone (EEZ))

43) 32°-35′-22.11″N, 117°-27′-49.42″W;

[32.59°N, 94.43°W]

44) 32°-30′N, 117-05’W; and

[32.05°N, 117.08°W]

45) 32°-33′N, 117°-05′W.
(United States-Mexico national boundary)

[32.55°N, 117.08°W]

Alameda Aeronautical SRR

SAR Coordinator: Commander, 11th Coast Guard District

The Alameda aeronautical SRR (Figure B-2-17) includes the following ocean area:

1) 42°N, 124°-13′W; west to (California-Oregon State line)

2) 40°N, 150°W;

3) 7°-09′N, 120°W;

4) 30°N, 120°W;

5) 30°-45′N, 120°-50′W; and

6) 32°-33′N, 117°-05′W.
(United States-Mexico national boundary)

Alameda Maritime SRR

SAR Coordinator: Commander, 11th Coast Guard District

The Alameda maritime SRR (Figure B-2-18) includes the following ocean area:

1) 42°N, 124°-13′W;
(California-Oregon State line)

[42°N, 124.22°W]

2) 40°N, 150°W;

[40.00°N, 150.00°W]

3) 3°-23′-33.96″S, 111°-20′W;

[3.39°N, 111.33°W]

4) 3°-23′-33.96″S, 95°-23′W;

[3.39°N, 95.38°W]

5) 1°-28′-54″N, 95°-23′W;

[1.48°S, 95.38°W]

6) 1°-28′-54″N, 90°W;

[1.48°S, 90.00°W]

(Note: The Memorandum of Understanding for Cooperation between the Ecuador Direccion General de la Marina Mercante y del Litoral and the United States Coast Guard Concerning Search and Rescue, 2005, delimits the United States-Ecuador maritime SRRs along the following coordinates: 3°-23′-33.96″S, 95°-23′W; 1°-28′-54″N, 95°-23′W; and 1°-28′-54″N, 78°-46′W.

The Memorandum of Understanding for Cooperation between the Ministry of Public Security of Costa Rica and the United States Coast Guard concerning Aeronautical and Maritime Search and Rescue, 2008, expanded the Costa Rica maritime SRR south to 1°-28′-54″N, 90°W. The United States and Ecuador will need to revise the current MOU to reflect this change in coordinates with Costa Rica assuming maritime SRR responsibilities south to the Ecuador maritime SRR northern limit.)

7) 9°-27′N, 90°W;

[9.45°N, 90.00°W]

8) 9°-44′N, 89°-14′W;

[9.73°N, 89.23°W]

9) 9°-56′N, 89°-27′W;

[9.93°N, 89.45°W]

10) 10°-33′-50″N, 91°-28′W;

[10.56°N, 91.47°W]

11) 11°-58′-06″N, 94°-26′W; thence northwesterly along the

[11.97°N, 94.43°W]

12) Mexico Exclusive Economic Zone (EEZ);

(Note: The Agreement between the Government of the United States of America and the Government of the United Mexican States on Maritime Search and Rescue, 1989, references an exchange of notes on the Maritime Boundary, 1976. The 1976 exchange of notes does not delimit the United States-Mexico maritime SAR Regions in the Pacific Ocean. Until the U.S. can delimit the maritime SAR regions with Mexico, the provisional delimitation shall continue to be Mexico's Exclusive Economic Zone (EEZ)

13) 32°-35′-22.11″N, 117°-27′-49.42″W;

[32.59°N, 117.464°W]

14) 32°-30′N, 117-05′W; and

[32.05°N, 117.08°W]

15) 32°-33′N, 117°-05′W.
(United States-Mexico national boundary)

[32.55°N, 117.08°W]

Seattle Aeronautical and Maritime SRRs

SAR Coordinator: Commander, 13th Coast Guard District

The Seattle aeronautical and maritime SRRs (Figure B-2-19) include the following ocean area:

1) 49°-00′-07″N, 122°-49′-05″W; (United States-Canada western transcontinental national boundary)

   [49.12°N, 122.73°W]

2) 48°-30′N, 124°-45′W;

   [48.50°N, 124.75°W]

3) 48°-30′N, 125°W;

   [48.50°N, 125.00°W]

4) 48°-20′N, 128°W;

   [48.33°N, 128.00°W]

5) 48°-20′N, 145°W;

   [48.33°N, 145.00°W]

6) 40°N, 150°W; and

   [40.00°N, 150.00°W]

7) 42°N, 124°-13′W. (California-Oregon State line)

   [42.00°N, 124.22°W]

Honolulu Aeronautical SRR

SAR Coordinator: Commander, 14th Coast Guard District

The Honolulu aeronautical SRR (Figure B-2-20) includes the State of Hawaii and the following ocean area:

1) 40°N, 150°W;
2) 40°N, 165°E;
3) 27°N, 165°E;
4) 27°N, 155°E;
5) 21°N, 155°E;
6) 21°N, 130°E;
7) 7°N, 130°E;
8) 3°-30′N, 133°E;
9) 3°-30′N, 141°E;
10) 0°N/S, 141°E;
11) 0°N/S, 160°E;
12) 3°-30′N, 160°E;
13) 3°-30′N, 180°E/W;
14) 5°S, 180°E/W;
15) 5°S, 155°W;
16) 3°-30′N, 145°W;
17) 3°-30′N, 120°W;
18) 7°-09′N, 120°W; and
19) Return to 40°N, 150°E.

Honolulu Maritime SRR

SAR Coordinator: Commander, 14th Coast Guard District

The Honolulu maritime SRR (Figure B-2-21) includes the following ocean area:

1) 40°N, 150°W;

   [40.00°N, 150.00°W]

2) 40°N, 165°E;

   [40.00°N, 165.00°E]

3) 17°N, 165°E;

   [17.00°N, 165.00°E]

4) 17°N, 130°E;

   [17.00°N, 130.00°E]

5) 6°N, 130°E;

   [6.00°N, 130.00°E]

6) 6°N, 132°E;

   [6.00°N, 132.00°E]

7) 3°-30′N, 132°E;
[3.50°N, 132.00°E]

8) 3°-30′N, 141°E;
[3.50°N, 141.00°E]

9) 0°N/S, 141°E;
[0.00°N/S, 141.00°E]

10) 0°N/S, 160°E;
[0.00°N/S, 160.00°E]

11) 3°-30′N, 160°E;
[3.50°N, 160.00°E]

12) 3°-30′N, 180°E/W;
[3.50°N, 180.00°E/W]

13) 5°S, 180°E/W;
[5.00°S, 180.00°E/W]

14) 5°S, 120°W;
[5.00°S, 120.00°W]

15) 3°-23′-33.96”S, 120°W;
[3.39°S, 120.00°W]

16) 3°-23′-33.96”S, 111°-20′W; return to
[3.39°S, 111.33°W]

17) 40°N, 150°W.
[40.00°N, 150.00°W]

Juneau Aeronautical and Maritime SRRs

SAR Coordinator: Commander, 17th Coast Guard District

The Juneau aeronautical and maritime SRRs (Figure B-2-22) include the following ocean area:

1) 69°-39′-47″N, 141°W;
(United States-Canada national boundary)
[69.66°N, 141°W]

2) 90°N;
(North Pole)
[90°N]

3) 65°N, 168°-58′-24″W;
[65.00°N, 168.97°W]

4) 64°-03′N, 172°-12′W;
[64.05°N, 172.20°W]

5) 60°N, 180°E/W;
[60.00°N, 180.00°E/W]

6) 54°-49′N, 170°-12′E;
[54.82°N, 170.20°E]

7) 54°N, 169°E;
[54.00°N, 169.00°E]

8) 50°-05′N, 159°E;
[50.08°N, 159.00°E]

(Note: The United States is a party to the Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic, 2011, which harmonized U.S. aeronautical and maritime SRRs in the North Pacific. The resulting SAR agreement caused an overlap between the United States and Japan maritime SRRs. The overlapped area of SAR responsibility has the following coordinates: 52°-30′N, 165°E; 50°-05′N, 159°E; and 43°N, 165°E. This overlap will remain until the U.S. and Japan renegotiate the maritime SRR delimitation.)

9) 43°N, 165°E;
[43.00°N, 165.00°E]

10) 40°N, 165°E;
[40.00°N, 165.00°E]

11) 40°N, 150°W;
[40.00°N, 150.00°W]

12) 48°-20′N, 145°W;
[48.33°N, 145.00°W]

13) 54°-40′N, 140°W;

[54.67°N, 140.00°W]

14) 54°-40′N, 136°W;

[54.67°N, 136.00°W]

15) 54°N, 136°W;

[54.00°N, 136.00°W]

16) 54°-13′N, 134°-57′W;

[54.22°N, 134.95°W]

17) 54°-39′-27″N, 132°-41′W; and

[54.66°N, 132.68°W]

18) 54°-42′-30″N, 130°-36′-30″W.

[54.71°N, 130.61°N]

Guam Aeronautical SRS

Commanding Officer, Coast Guard Sector Guam

The Guam maritime SRS (Figure B-2-23) includes the following ocean area:

1) 17°N, 130°E;
2) 17°N, 160°E;
3) 9°-30′N, 160°E;
4) 7°N, 165°E;
5) 3°-30′N, 165°E;
6) 3°-30′N, 160°E;
7) 0°N/S, 160°E;
8) 0°N/S, 141°E;
9) 3°-30′N, 141°E;
10) 3°-30′N, 133°E;
11) 7°N, 130°E; return to
12) 17°N, 130°E.

Guam Maritime SRS

Commanding Officer, Coast Guard Sector Guam

The Guam maritime SRS (Figure B-2-24) includes the following ocean area:

1) 17°N, 130°E;

[17.00°N, 130.00°E]

2) 17°N, 160°E;

[17.00°N, 160.00°E]

3) 9°-30′N, 160°E;

[9.50°N, 160.00°E]

4) 7°N, 165°E;

[7.00°N, 165.00°E]

5) 3°-30′N, 165°E;

[3.50°N, 165.00°E]

6) 3°-30′N, 160°E;

[3.50°N, 160.00°E]

7) 0°N/S, 160°E;

[0.00°N/S, 160.00°E]

8) 0°N/S, 141°E;

[0.00°N/S, 141.00°E]

9) 3°-30′N, 141°E;

[3.50°N, 141.00°E]

10) 3°-30′N, 132°E;

[3.50°N, 132.00°E]

11) 6°N, 132°E;

[6.00°N, 132.00°E]

12) 6°N, 130°E; return to

[6.00°N, 132.00°E]

13) 17°N, 130°E.

[17.00°N, 130.00°E]

Langley and Elmendorf Aeronautical SRRs

SAR Coordinator: Commander, U.S. Northern Command

The Langley aeronautical SRR (Figure B-2-25) is internationally recognized by ICAO as the area encompassing the continental United States.

The Elmendorf aeronautical SRR (Figure B-2-26) is internationally recognized by ICAO as the mainland portion of the State of Alaska west of the United States-Canada national boundary from the Arctic Ocean to the Gulf of Alaska, west of 141°W.

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Annex B-1 to Appendix B: U.S. Aeronautical and Maritime SAR Regions Delimited by States with Contiguous SAR Regions

Overview

Atlantic Ocean Aeronautical SRR Delimitation

- *Canada*
- *Portugal*
- *Trinidad and Tobago*
- *Venezuela*
- *Curacao*
- *Dominican Republic*
- *Haiti*
- *Cuba*
- *Mexico*

Atlantic Ocean Maritime SRR Delimitation

- *Canada*
- *Portugal*
- *Martinique (France)*
- *Venezuela*
- *Curacao*
- *Dominican Republic*
- *Haiti*
- *Bahamas*
- *Cuba*
- *Mexico*

Pacific Ocean Aeronautical SRR Delimitation

- *Canada*
- *Russian Federation*
- *Japan*
- *Philippines*
- *Indonesia*
- *Papua New Guinea*
- *Nauru*
- *Fiji*
- *New Zealand*
- *French Polynesia*
- *Uncontrolled Airspace*
- *Mexico*

Pacific Ocean Maritime SRR Delimitation

- *Canada*
- *Russian Federation*
- *Japan*
- *Philippines*
- *Papua New Guinea*
- *Nauru*
- *Fiji*
- *New Zealand*
- *French Polynesia*
- *Peru*
- *Ecuador*

Costa Rica

Nicaragua

El Salvador

Guatemala

Mexico

This Annex B-1 to Appendix B provides a listing of the coordinates of the U.S. aeronautical and maritime SRRs/SRSs in the Atlantic and Pacific Oceans based on the delimitation by countries with contiguous SRRs.

Atlantic Ocean Aeronautical SRR Delimitation

The U.S. Atlantic Ocean aeronautical SRRs are delimited by the following countries with contiguous aeronautical SRRs.

Canada

1) 44°-30′N, 67°W; (U.S.-Canada National Boundary)
2) 41°-52′N, 67°W;
3) 43°-36′N, 60°W;
4) 45°N, 53°W; and
5) 45°N, 40°W.

Portugal

1) 45°N, 40°W; and
2) 22°-18′N, 40°W.

Trinidad and Tobago

1) 22°-18′N, 40°W;
2) 18°N, 45°W;
3) 18°N, 62°W;
4) 17°-22′N, 63°W;
5) 15°-20′N, 63°W;
6) 15°N, 63°-15′W; and
7) 15°N, 65°W.

Venezuela

1) 15°N, 65°W; and
2) 15°-41′N, 67°-04′W.

Curacao

1) 15°-41′N, 67°-04′W; and
2) 16°N, 68°W.

Dominican Republic

1) 16°N, 68°W;
2) 19°N, 68°W;
3) 20°-25′N, 70°-29′W; and
4) 20°-25′N, 71°-40′W.

(Note: Coordinate 4) does not delimit the U.S. aeronautical SRR, but delimits the Dominican Republic/Haiti aeronautical SRRs along the U.S. aeronautical SRR.)

Haiti

1) 20°-25′N, 71°-40′W;

2) 20°-25′N, 73°W; and

3) 20°N, 73°-20′W.

Cuba

1) 20°N, 73°-20′W;

2) 22°N, 75°-10′W;

3) 24°N, 78°W; and

4) 24°N, 86°W.

Mexico

1) 24°N, 86°W;

2) 24°-30′N, 88°W;

3) 24°-30′N, 93°W;

4) 26°N, 95°-55′W;

5) 26°N, 97°W; and

6) 25°-57′-14″N, 97°-08′-46″W. (U.S.-Mexico national boundary)

Atlantic Ocean Maritime SRR Delimitation

The U.S. Atlantic Ocean maritime SRRs are delimited by the following countries with contiguous aeronautical SRRs.

Canada

1) 44°-30′N, 67°W; (U.S.-Canada National Boundary)

2) 41°-52′N, 67°W;

3) 43°-36′N, 60°W;

4) 45°N, 53°W; and

5) 45°N, 40°W.

Portugal

1) 45°N, 40°W; and

2) 18°N, 40°W.

Martinique (France)

1) 18°N, 40°W;

2) 18°N, 48°W;

3) 19°N, 48°W;

4) 19°N, 63°-30′W;

5) 17°N, 63°-30′W; and

6) 16°N, 62°-20′W.

Venezuela

1) 16°N, 62°-20′W;

2) 16°N, 65°-30′W; and

3) 15°-41′N, 67°-04′W.

Curacao

1) 15°-41′N, 67°-04′W; and

2) 16°N, 68°W.

Dominican Republic

1) 16°N, 68°W;

2) 19°N, 68°W;

3) 20°-25′N, 70°W; and

4) 20°-25′N, 71°-40′W.

Haiti

1) 20°-25′N, 71°-40′W; and

2) 20°-25′N, 73°W;

Bahamas

1) 20°-25′N, 73°W;

2) 21°-30′N, 75°W;

3) 21°-42′N, 75°-46′W; (Cay Santo Domingo)

4) 22°-22′-46″N, 77°-35′-10.7″W;

(Cay Lobos)

5) 22°-45′N, 78°-06′W;
(Guinchos Cay)

6) 23°-40′N, 80°-30′W; and

7) 24°N, 80°-30′W.

(Note: The Bahamas SAR Understanding (Sir Grey memo, 1964) does not delimit the U.S.-Bahamas maritime SRR. At the Final Meeting on Caribbean Maritime Search and Rescue (30 April to 04 May 1984), the Bahamas provisionally delimited a maritime SRR with limits partly coinciding with the limits of the Miami maritime SRR. The coordinates of Bahamas provisional maritime SRR are as follows: 20°-25′N, 73°W; 21°-30′N, 75°W; Cay Santo Domingo (21˚-42′N, 75˚-46′W); Cay Lobos (22˚-22′-46″N, 75˚-35′-10.7″W) ; Quinchos Cay (22˚-45′N, 78˚-06′W); 23°-40′N, 80°-30′W; 24°N, 80°-30′W; 25°-40′N, 79°-25′W; 28°-20′N, 79°-25′W; 27°N, 76°W; 21°-45′N, 70°W; 20°-25′N, 70°W; thence back to 20°-25′N, 73°W. Until the U.S. can conclude a SAR agreement with the Bahamas, Miami maritime SRR will continue to include the Bahamas provisional maritime SRR.)

Cuba

1) 24°N, 80°-30′W; and

2) 24°N, 86°-35′W.

Mexico

1) 24°N, 86°-35′W;

2) 24°-56′N, 86°-56′W;

3) 25°-38′N, 87°-20′W;

4) 25°-43′N, 89°-12′W;

5) 25°-59′N, 93°-26′W;

6) 25°-59′N, 97°-12″W;
(U.S.-Mexico national boundary in the Gulf of Mexico)

(Note: The Agreement between the Government of the United States of America and the Government of the United Mexican States on Maritime Search and Rescue, 1989, references an exchange of notes on the Maritime Boundary, 1976. The 1976 exchange of notes does not delimit the U.S.-Mexico Maritime SAR Regions in the Pacific Ocean and Gulf of Mexico. The above coordinates used to delimit the U.S.-Mexico Maritime SAR Regions were obtained from and provisionally agreed to by the U.S. and Mexico at the Caribbean Maritime SAR Conference, 1989.)

Pacific Ocean Aeronautical SRR Delimitation

The U.S. Pacific Ocean aeronautical SRRs are delimited by the following countries with contiguous aeronautical SRRs.

Canada

1) 49°-00′-07″N, 122°-49′-05″W;
(U.S.-Canada western transcontinental national boundary)

2) 48°-30′N, 124°-45′W;

3) 48°-30′N, 125°W;

4) 48°-20′N, 128°W;

5) 48°-20′N, 145°W;

6) 54°-40′N, 140°W;

7) 54°-40′N, 136°W;

8) 54°N, 136°W;

9) 54°-13′N, 134°-57′W;

10) 54°-39′-27″N, 132°-41′W;

11) 54°-42′-30″N, 130°-36′-30″W; and

12) 69°-39′-47″N, 141°W; and
(U.S.-Canada national boundary)

13) 90°N.
(North Pole)

Philippines and Indonesia aeronautical SRRs along the U.S. aeronautical SRR.)

Russian Federation

1) 90°N.
   (North Pole)
2) 65°N, 168°-58′-24″W;
3) 64°-03′N, 172°-12′W;
4) 60°N, 180°E/W;
5) 54°-49′N, 170°-12′E;
6) 54°N, 169°E; and
7) 50°-05’N, 159°E.

Japan

1) 50°-05′N, 159°E;
2) 43°N, 165°E;
3) 27°N, 165°E;
4) 27°N, 155°E;
5) 21°N, 155°E; and
6) 21°N, 130°E.

(Note: The U.S. is a party to the Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic, 2011, which harmonized U.S. aeronautical and maritime SRRs in the North Pacific. The resulting SAR agreement caused an overlap between the U.S. and Japan maritime SRRs. The overlapped area of SAR responsibility has the following coordinates: 52°-30′N, 165°E; 50°-05′N, 159°E; and 43°N, 165°E. This overlap will remain until the U.S. and Japan renegotiate delimitation of the U.S.-Japan maritime SRRs.)

Philippines

1) 21°N, 130°E;
2) 7°N, 130°E; and
3) 4°-01′-24″N, 132°-32′-58″E.

(Note: Coordinate 3 does not delimit the U.S. aeronautical SRR, but delimits the

Indonesia

1) 4°-01′-24″N, 132°-32′-58″E;
2) 3°-30’N, 133°E
3) 3°-30′N, 141°E; and
4) 0°N/S, 141°E.

Papua New Guinea

1) 0°N/S, 141°E; and
2) 0°N/S, 160°E.

Nauru

1) 0°N/S, 160°E
2) 3°-30′N, 160°E; and
3) 3°-30′N, 170°E.

(Note: Coordinate 3 does not delimit the U.S. aeronautical SRR, but delimits the Nauru and Fiji aeronautical SRRs along the U.S. aeronautical SRR.)

Fiji

1) 3°-30′N, 170°E;
2) 3°-30′N, 180°E/W; and
3) 5°S, 180°E/W.

New Zealand

1) 5°S, 180°E/W; and
2) 5°S, 157°E/W.

(Note: Coordinate 2 does not delimit the U.S. aeronautical SRR, but delimits the New Zealand and French Polynesia aeronautical SRRs along the U.S. aeronautical SRR.)

French Polynesia

1) 5°S, 157°W;
2) 5°S, 155°W; and
3) 3°-30′N, 145°W; and
4) 3°-30′N, 120°W.

Uncontrolled Airspace

1) 3°-30′N, 120°W; and
2) 5°N, 120°W.

(Note: Coordinate 2 does not delineate the U.S. aeronautical SRR, but delimits an area of uncontrolled airspace and the Mexico aeronautical SRR along the U.S. aeronautical SRR.)

Mexico

1) 5°N, 120°W;
2) 30°N, 120°W;
3) 30°N-45′N, 120°-50′W; and
4) 32°-33′N, 117°-05′W.
   (U.S.-Mexico national boundary)

Pacific Ocean Maritime SRR Delimitation

The U.S. Pacific Ocean aeronautical SRRs are delimited by the following countries with contiguous aeronautical SRRs.

Canada

1) 49°-00′-07″N, 122°-49′-05″W;
   (U.S.-Canada western transcontinental national boundary)
2) 48°-30′N, 124°-45′W;
3) 48°-30′N, 125°W;
4) 48°-20′N, 128°W;
5) 48°-20′N, 145°W;
6) 54°-40′N, 140°W;
7) 54°-40′N, 136°W;
8) 54°N, 136°W;
9) 54°-13′N, 134°57′W;
10) 54°-39′-27″N, 132°-41′W;
11) 54°-42′-30″N, 130°-36′-30”W;
12) 69°-39′-47″N, 141°W; and
    (U.S.-Canada national boundary)
13) 90°N.
    (North Pole)

Russian Federation

1) 90°N;
   (North Pole)
2) 65°N, 168°-58’-24′W;
3) 64°-03′N, 172°-12′W;
4) 60°N, 180°E/W;
5) 54°-49′N, 170°-12′E;
6) 54°N, 169°E; and
7) 50°-05′N, 159°E;

Japan

1) 50°-05′N, 159°E;
2) 43°N, 165°E;
3) 17°N, 165°E; and
4) 17°N, 130°E.

(Note: The U.S. is a party to the Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic, 2011, which harmonized U.S. aeronautical and maritime SRRs in the North Pacific. The resulting SAR agreement caused an overlap between the U.S. and Japan maritime SRRs. The overlapped area of SAR responsibility has the following coordinates: 52°-30′N, 165°E; 50°-05′N, 159°E; and 43°N, 165°E. This overlap will remain until the U.S. and

Japan renegotiate delimitation of the U.S.-Japan maritime SRRs.)

Philippines

1) 17°N, 130°E; and
2) 6°N, 130°E.

Indonesia

1) 6°N, 130°E;
2) 6°N, 132°E;
3) 3°-30′N, 132°E;
4) 3°-30′N, 141°E; and
5) 0°N/S, 141°E.

Papua New Guinea

1) 0°N/S, 141°E; and
2) 0°N/S, 160°E.

Nauru

1) 0°N/S, 160°E;
2) 3°-30′N, 160°E; and
3) 3°-30′N, 170°E.

(Note: Coordinate 3 is not required to delineate the U.S. maritime SRR, but delimits Fiji and Nauru's maritime SRRs along the U.S. maritime SRR.)

Fiji

1) 3°-30′N, 170°E;
2) 3°-30′N, 180°E/W;
3) 5°S, 180°E/W; and
4) 5°S, 171°W.

(Note: Coordinate 4 is not required to delineate the U.S. maritime SRR, but delimits Fiji and New Zealand maritime SRRs along the U.S. maritime SRR.)

New Zealand

1) 5°S, 171°W; and
2) 5°S, 157°W.

(Note: Neither coordinate is required to delineate the U.S. maritime SRR. Second coordinate delimits the New Zealand and French Polynesia maritime SRRs along the U.S. maritime SRR.)

French Polynesia

1) 5°S, 157°W; and
2) 5°S, 120°W.

Peru

1) 5°S, 120°W;
2) 3°-23′-33.96″S, 120°W; and
3) 3°-23′-33.96″S, 95°-23’W.

Ecuador

1) 3°-23′-33.96″S, 95°-23′W.
2) 1°-28′-54″N, 95°-23′W; and
3) 1°-28′-54″N, 90°W.

(Note: The Memorandum of Understanding for Cooperation between the Ecuador Direccion General de la Marina Mercante y del Litoral and the United States Coast Guard Concerning Search and Rescue, 2005, delimits the U.S.-Ecuador maritime SRRs along the following coordinates: 3°-23′-33.96″S, 95°-23′W; 1°-28′-54″N, 95°-23′W; and 1°-28′-54″N, 78°-46′W.

The Memorandum of Understanding for Cooperation between the Ministry of Public Security of Costa Rica and the United States Coast Guard concerning Aeronautical and Maritime Search and Rescue, 2008, expanded the Costa Rica maritime SRR *south to 1°-28′-54″N, 90°W. The U.S. and Ecuador will need to revise the current MOU to reflect this change in coordinates with Costa Rica assuming maritime SRR responsibilities south to the Ecuador maritime SRR northern limit.)*

Costa Rica

1) 1°-28′-54”N, 90°W.
2) 9°-27′N, 90°W; and
3) 9°-44′N, 89°-14′W.

Nicaragua

1) 9°-44′N, 89°-14′W; and
2) 9°-56′N, 89°-27′W.

El Salvador

1) 9°-56′N, 89°-27′W; and
2) 10°-33′-50″N, 91°-28′W.

Guatemala

1) 10°-33′-50″N, 91°-28′W; and
2) 11°-58′-06″N, 94°-26′W.

Mexico

1) 11°-58′-06″N, 94°-26’W; then northwesterly along the
2) Mexico Exclusive Economic Zone (EEZ); to

(Note: The delimitation of the U.S.-Mexico aeronautical and maritime SRRs is provisional. Generally, Mexico claims their Exclusive Economic Zone (EEZ) as their maritime SAR region. The Agreement between the Government of the United States of America and the Government of the United Mexican States on Maritime Search and Rescue, 1989, does not delimit the U.S.-Mexico aeronautical and maritime SRRs.)

3) 32°-35′-22.11″N, 117°-27′-49.42″W;
4) 32°-30′N, 117-05′W; and
5) 32°-33′N, 117°-05′W.
   (U.S.-Mexico national boundary)

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Annex B-2 to Appendix B: U.S. SAR Region Charts

This Annex B-2 to Appendix B provides charts that depict the aeronautical and maritime SRRs that the U.S. is responsible.

- Figure B-2-1: U.S. Aeronautical SAR Regions;
- Figure B-2-2: U.S. Maritime SAR Regions;
- Figure B-2-3: U.S. Atlantic Ocean Aeronautical SAR Regions;
- Figure B-2-4: U.S. Atlantic Ocean Maritime SAR Regions;
- Figure B-2-5: Boston Aeronautical and Maritime SAR Regions;
- Figure B-2-6: Norfolk Aeronautical SAR Region;
- Figure B-2-7: Norfolk Maritime SAR Region;
- Figure B-2-8: Miami Aeronautical SAR Region;
- Figure B-2-9: Miami Maritime SAR Region;
- Figure B-2-10: New Orleans Aeronautical SAR Region;
- Figure B-2-11: New Orleans Maritime SAR Region;
- Figure B-2-12: Cleveland Aeronautical and Maritime SAR Region (delimitation with Canada);
- Figure B-2-13: San Juan Aeronautical SAR Sub-Region;
- Figure B-2-14: San Juan Maritime SAR Sub-Region;
- Figure B-2-15: U.S. Pacific Ocean Aeronautical SAR Regions;
- Figure B-2-16: U.S. Pacific Ocean Maritime SAR Regions;
- Figure B-2-17: Alameda Aeronautical SAR Region;
- Figure B-2-18: Alameda Maritime SAR Region;
- Figure B-2-19: Seattle Aeronautical and Maritime SAR Region;
- Figure B-2-20: Honolulu Aeronautical SAR Region;
- Figure B-2-21: Honolulu Maritime SAR Region;
- Figure B-2-22: Juneau Aeronautical and Maritime SAR Region;
- Figure B-2-23: Guam Aeronautical SAR Sub-Region;
- Figure B-2-24: Guam Maritime SAR Sub-Region;
- Figure B-2-25: Langley Aeronautical SAR Region; and
- Figure B-2-26: Elmendorf Aeronautical SAR Region.

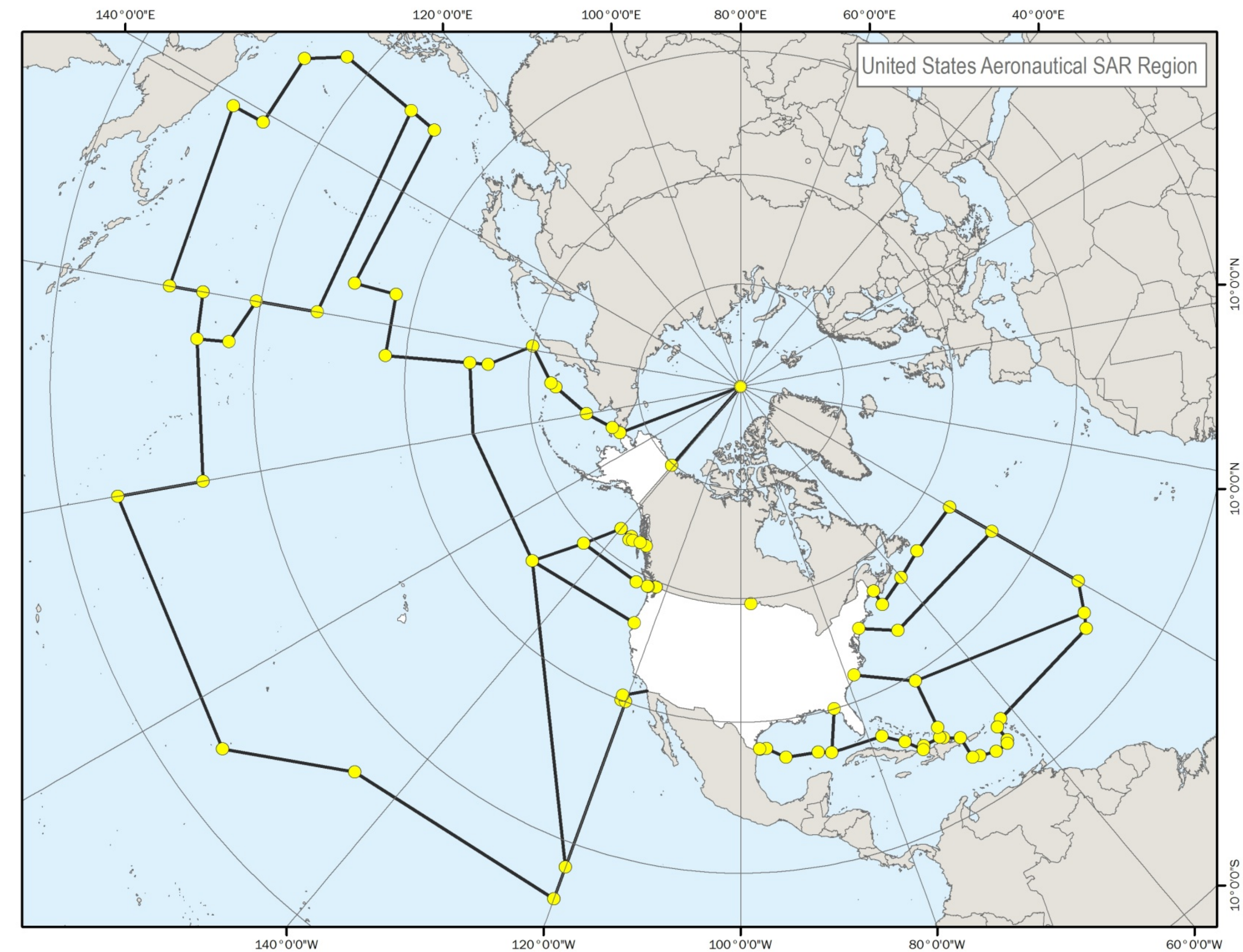


Figure B-2-1: U.S. Aeronautical SAR Regions

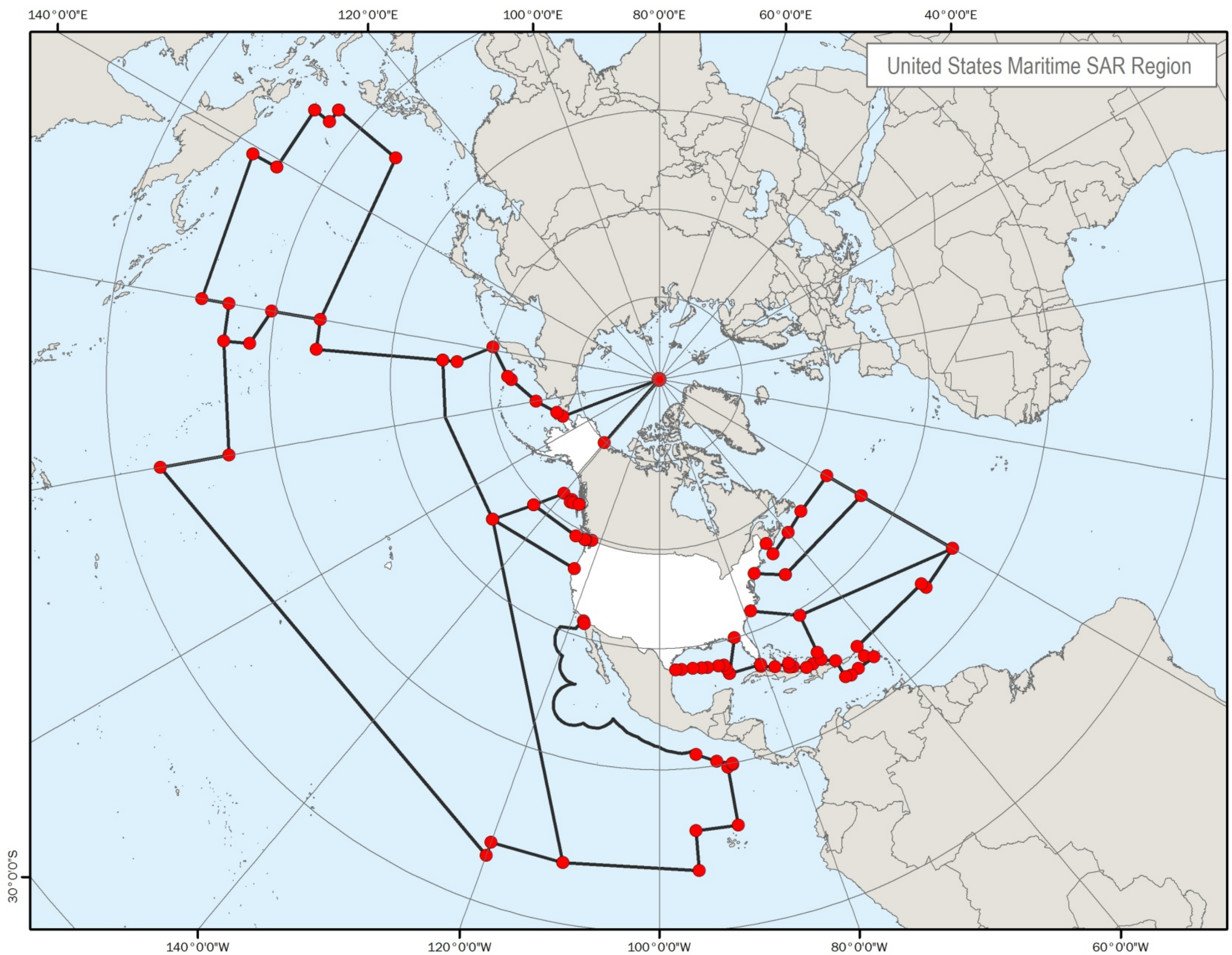


Figure B-2-2: U.S. Maritime SAR Regions

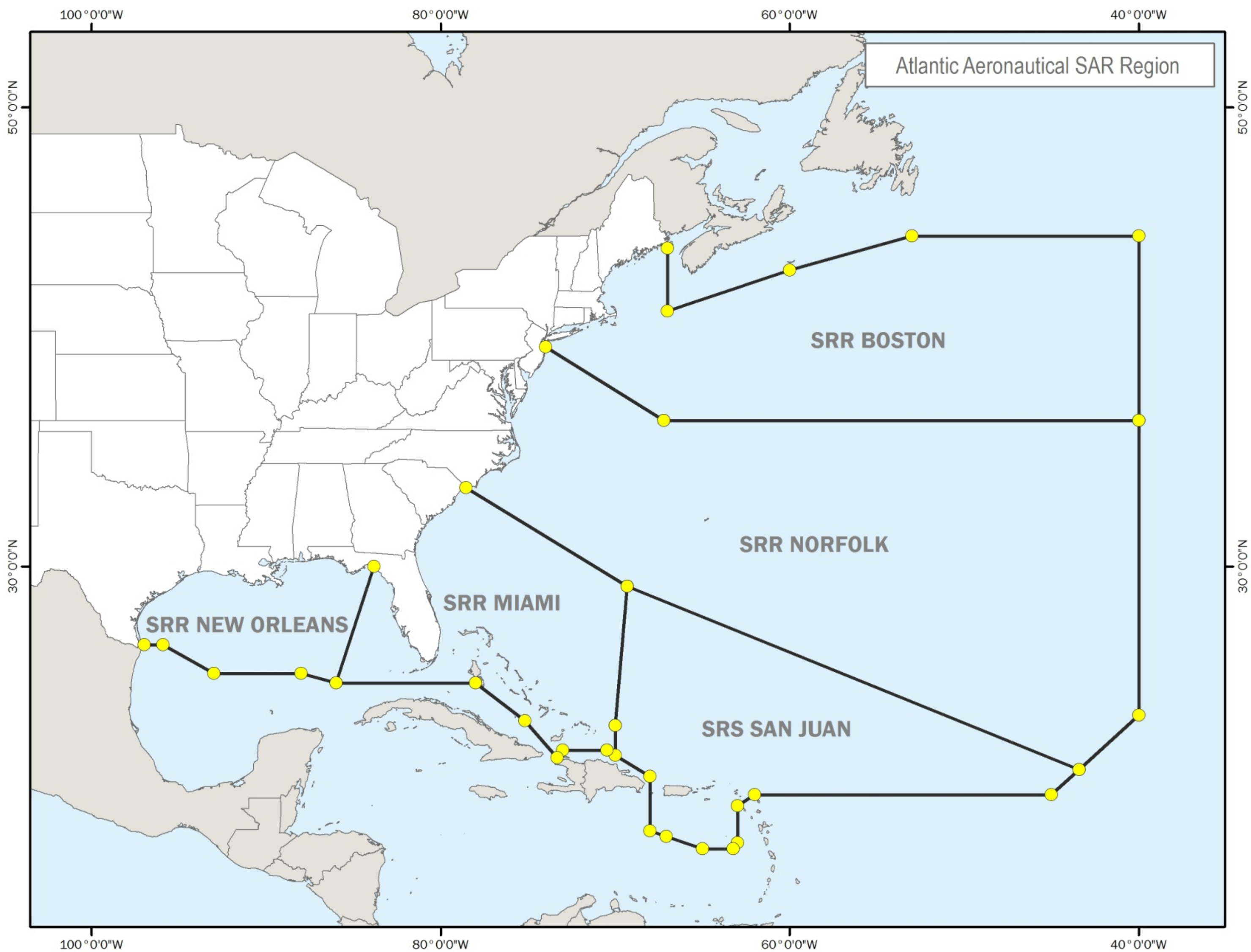


Figure B-2-3: Atlantic Ocean Aeronautical SAR Regions

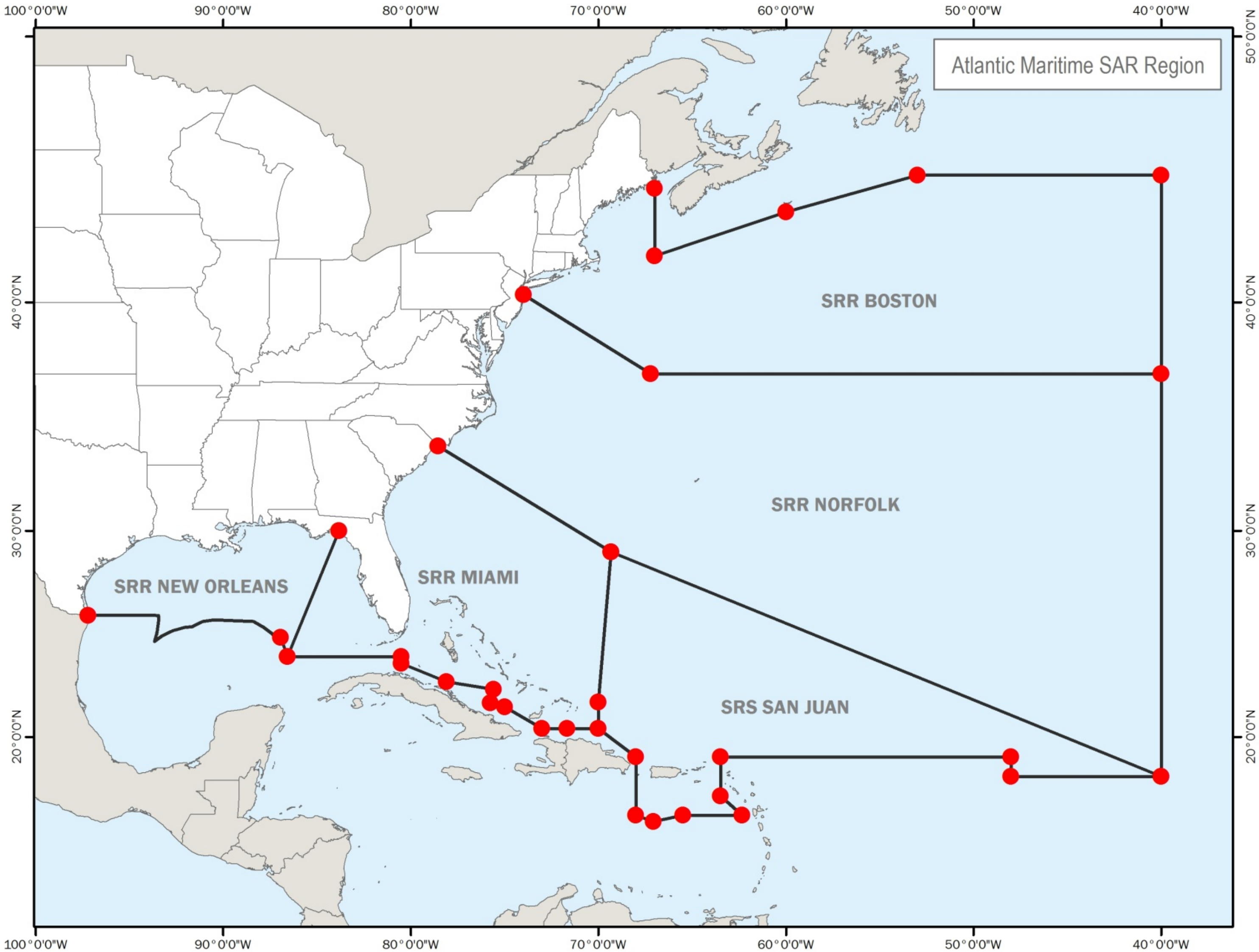
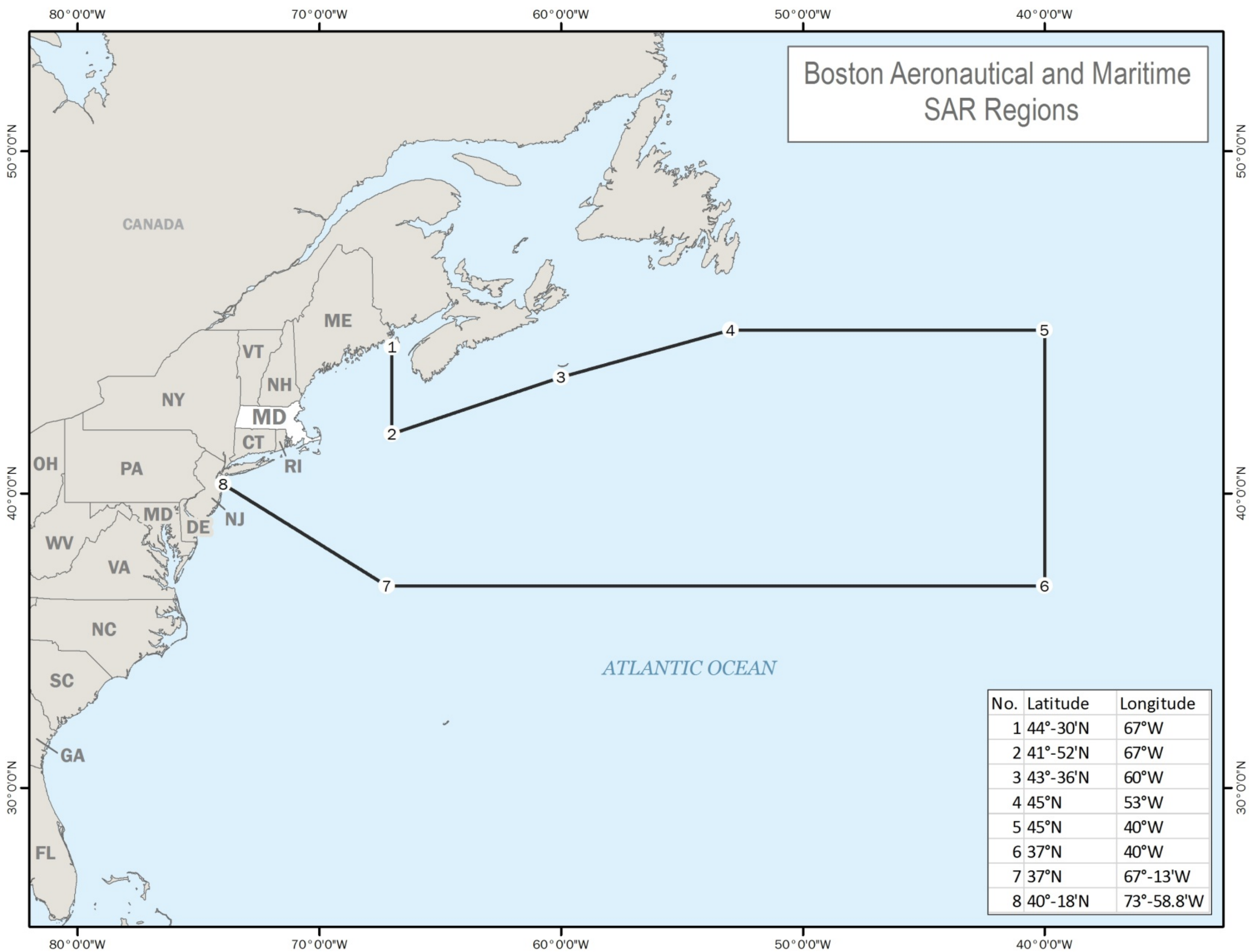


Figure B-2-4: Atlantic Ocean Maritime SAR Regions



No.	Latitude	Longitude
1	44°-30'N	67°W
2	41°-52'N	67°W
3	43°-36'N	60°W
4	45°N	53°W
5	45°N	40°W
6	37°N	40°W
7	37°N	67°-13'W
8	40°-18'N	73°-58.8'W

Figure B-2-5: Boston Aeronautical and Maritime SAR Region

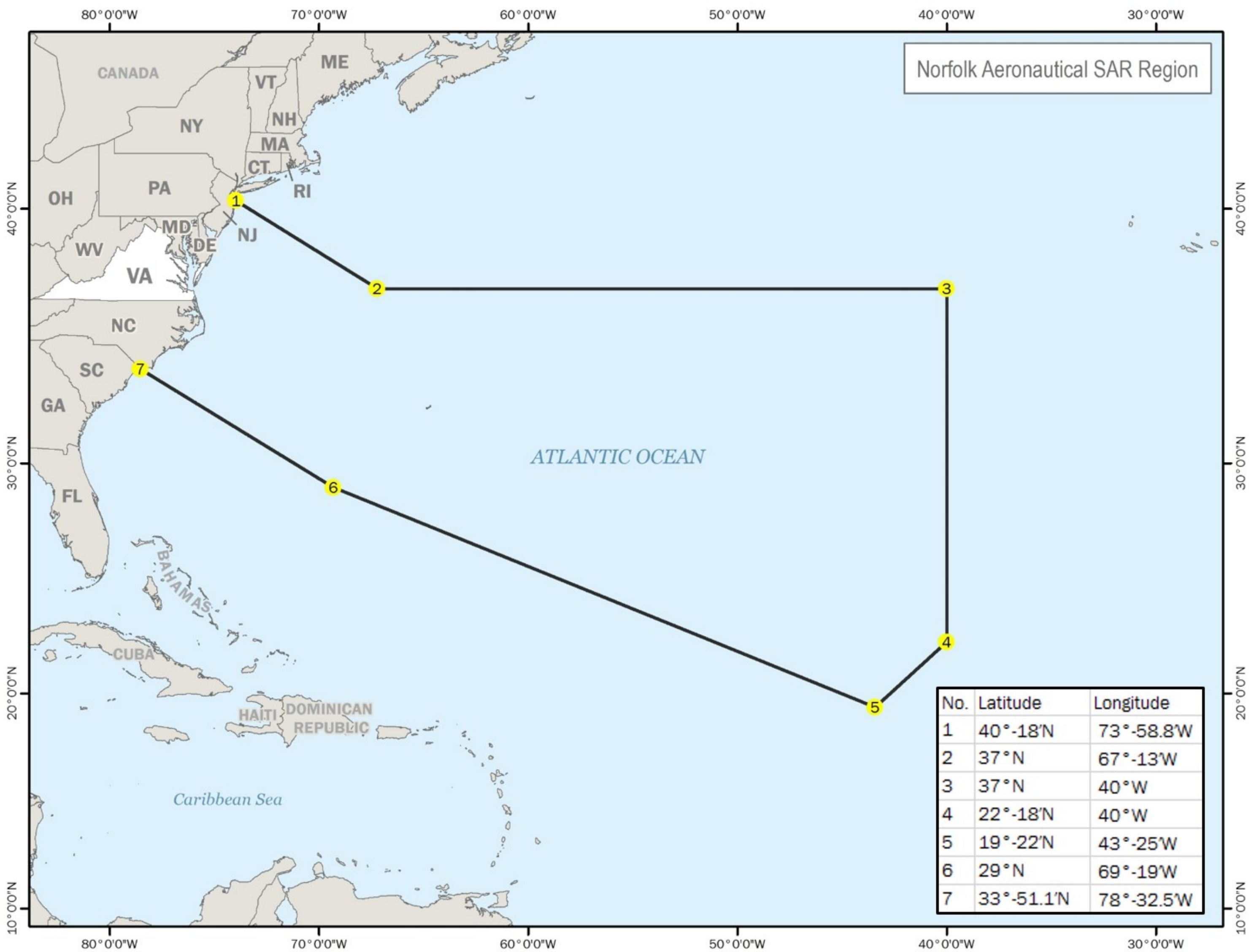


Figure B-2-6: Norfolk Aeronautical SAR Region

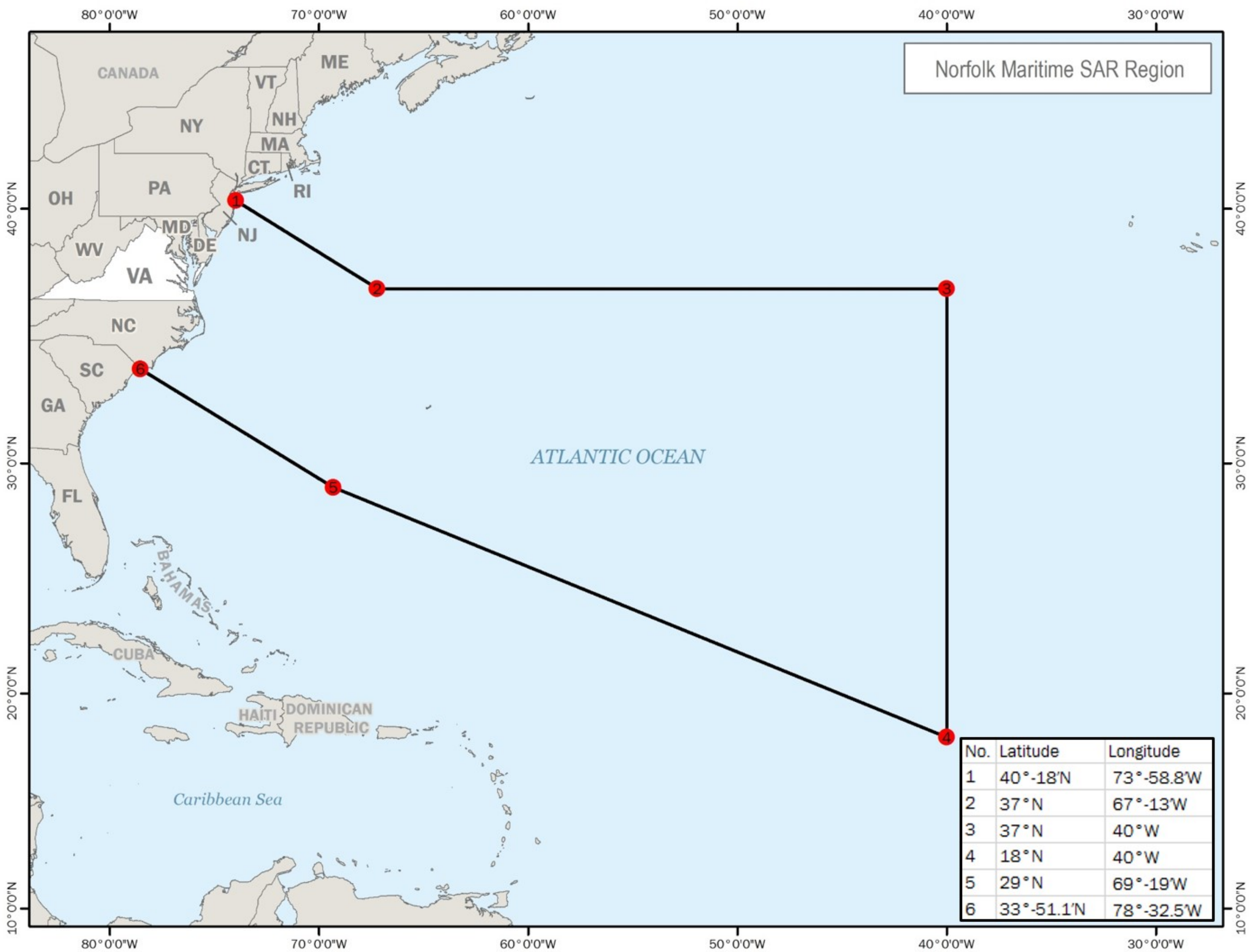
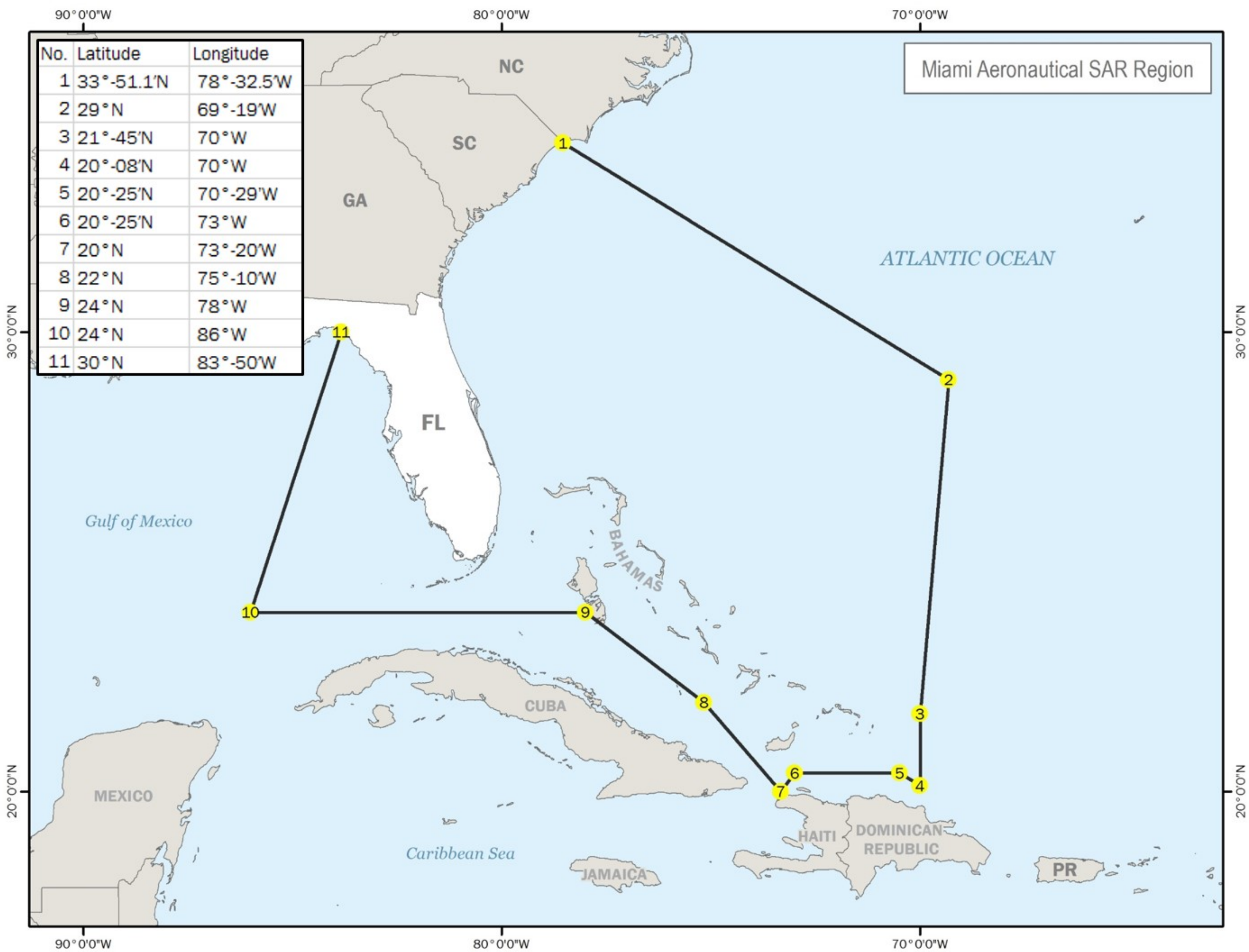
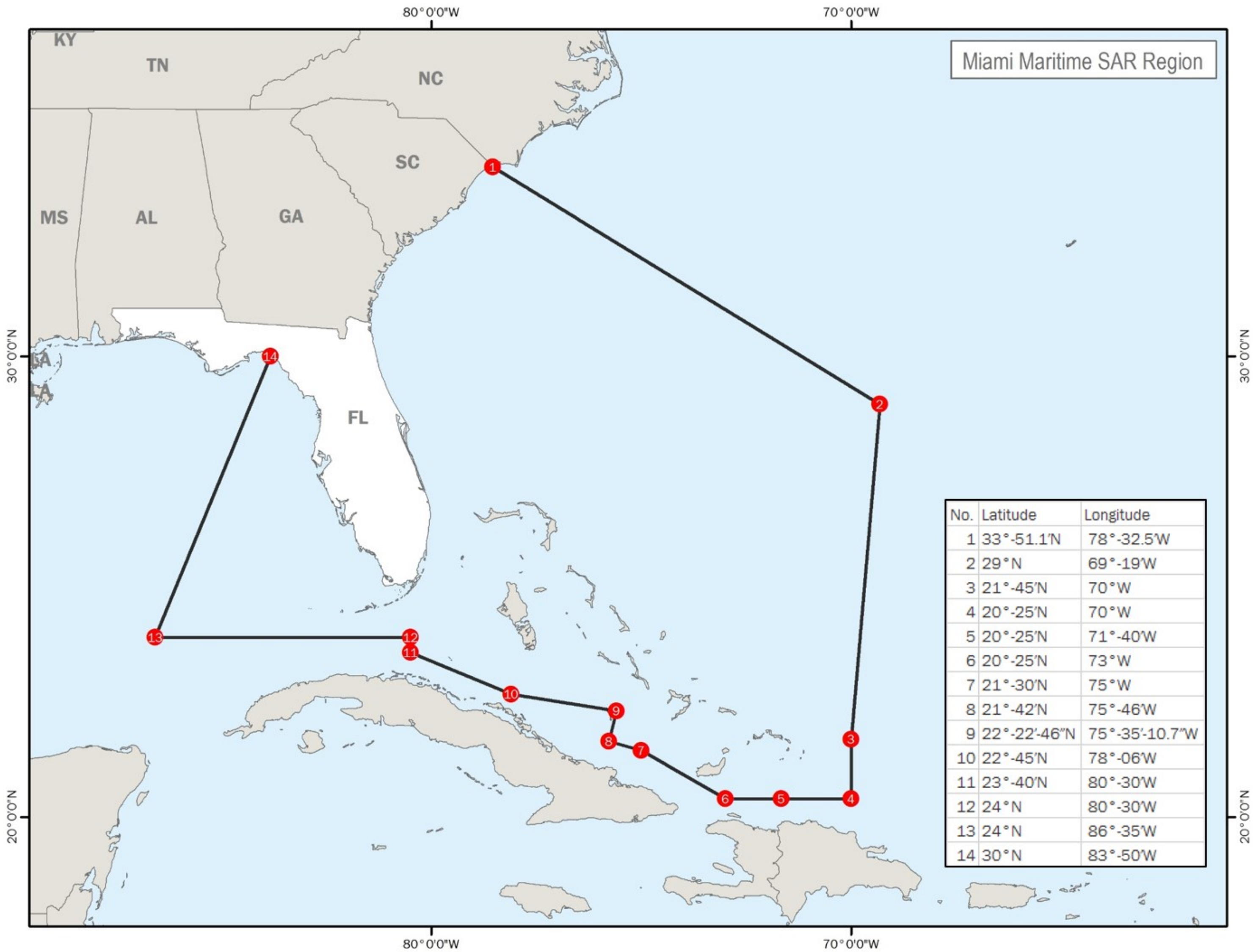


Figure B-2-7: Norfolk Maritime SAR Region



No.	Latitude	Longitude
1	33°-51.1′N	78°-32.5′W
2	29°N	69°-19′W
3	21°-45′N	70°W
4	20°-08′N	70°W
5	20°-25′N	70°-29′W
6	20°-25′N	73°W
7	20°N	73°-20′W
8	22°N	75°-10′W
9	24°N	78°W
10	24°N	86°W
11	30°N	83°-50′W

Figure B-2-8: Miami Aeronautical SAR Region



No.	Latitude	Longitude
1	33°-51.1′N	78°-32.5′W
2	29°N	69°-19′W
3	21°-45′N	70°W
4	20°-25′N	70°W
5	20°-25′N	71°-40′W
6	20°-25′N	73°W
7	21°-30′N	75°W
8	21°-42′N	75°-46′W
9	22°-22′-46″N	75°-35′-10.7″W
10	22°-45′N	78°-06′W
11	23°-40′N	80°-30′W
12	24°N	80°-30′W
13	24°N	86°-35′W
14	30°N	83°-50′W

Figure B-2-9 Miami Maritime SAR Region

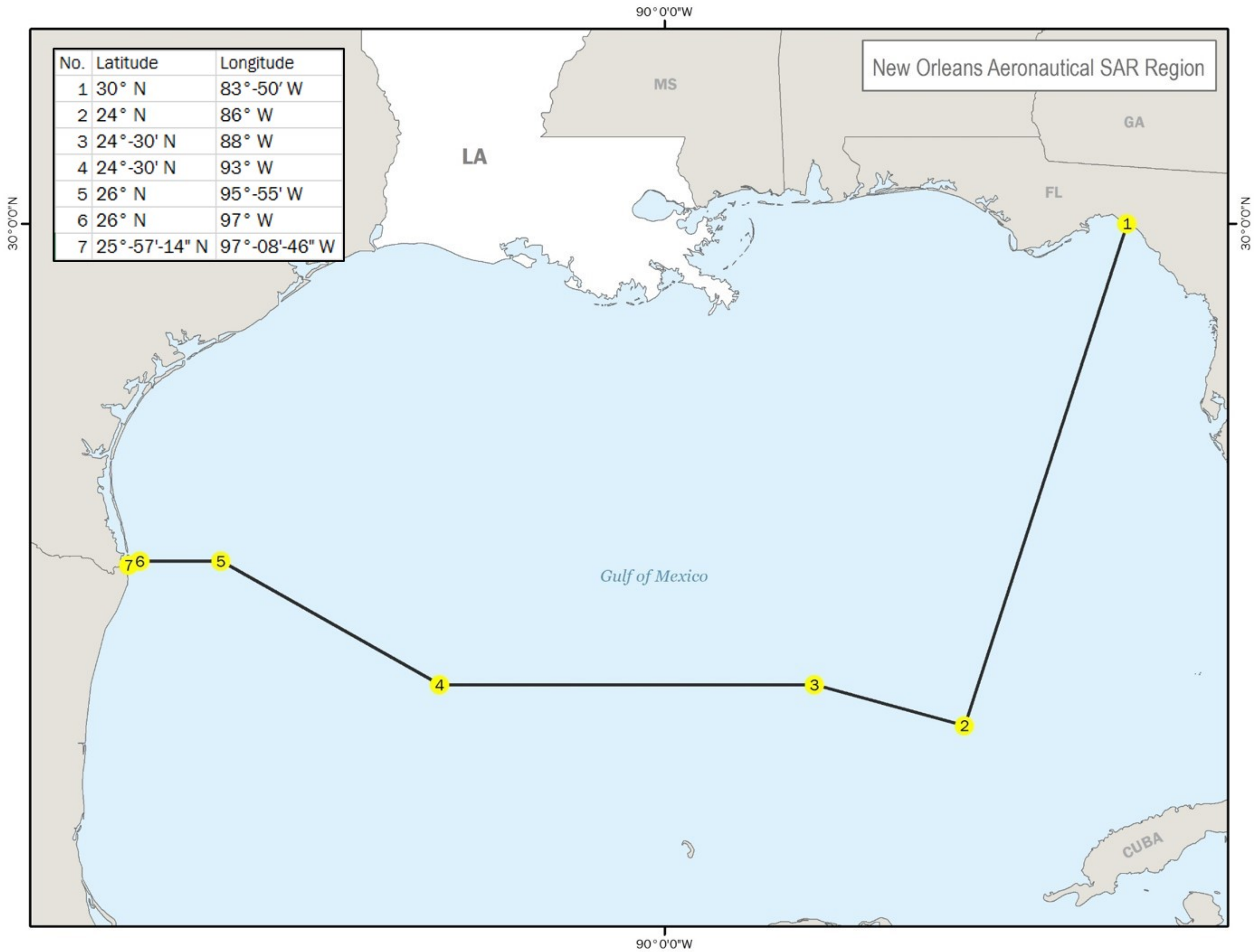


Figure B-2-10: New Orleans Aeronautical SAR Region

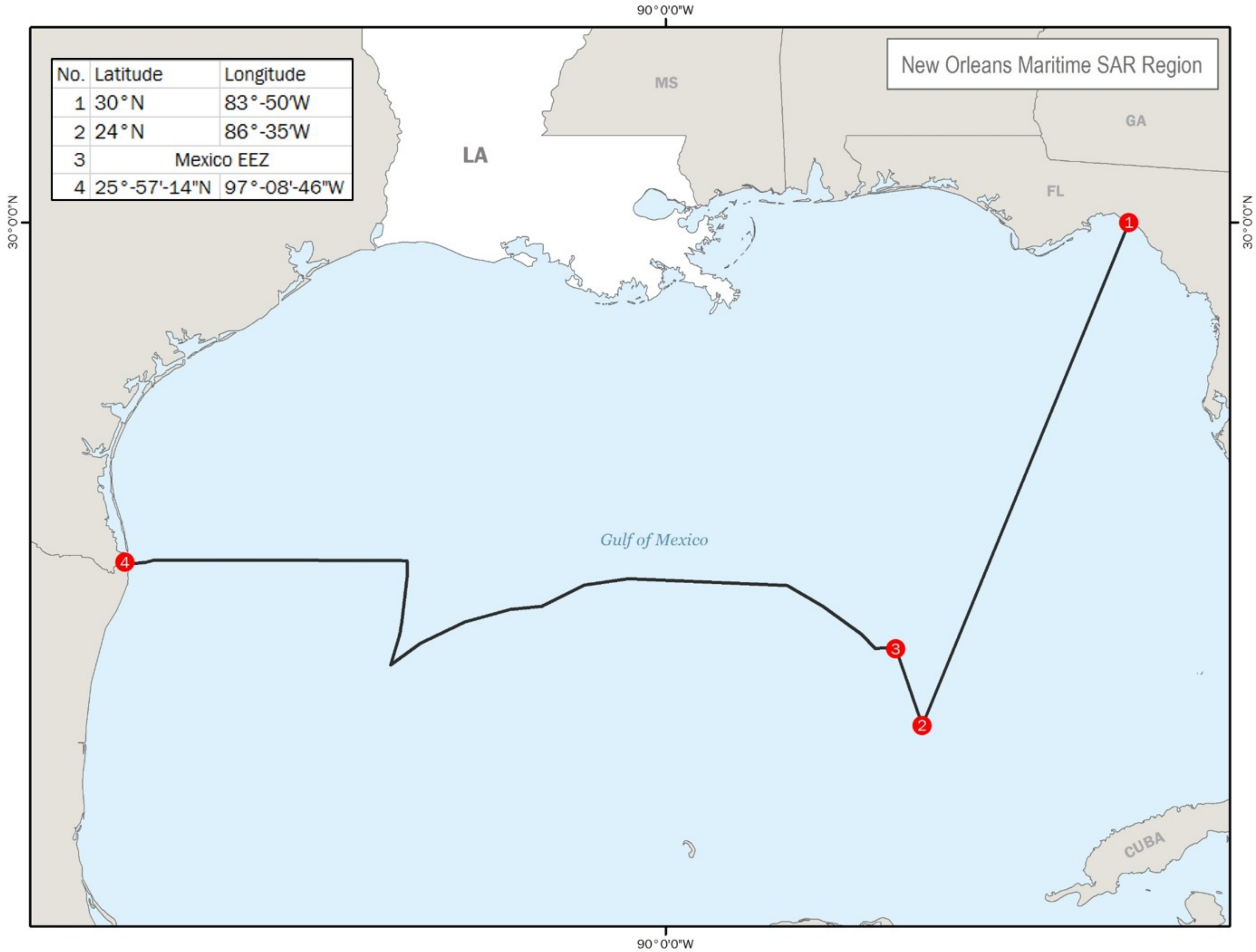
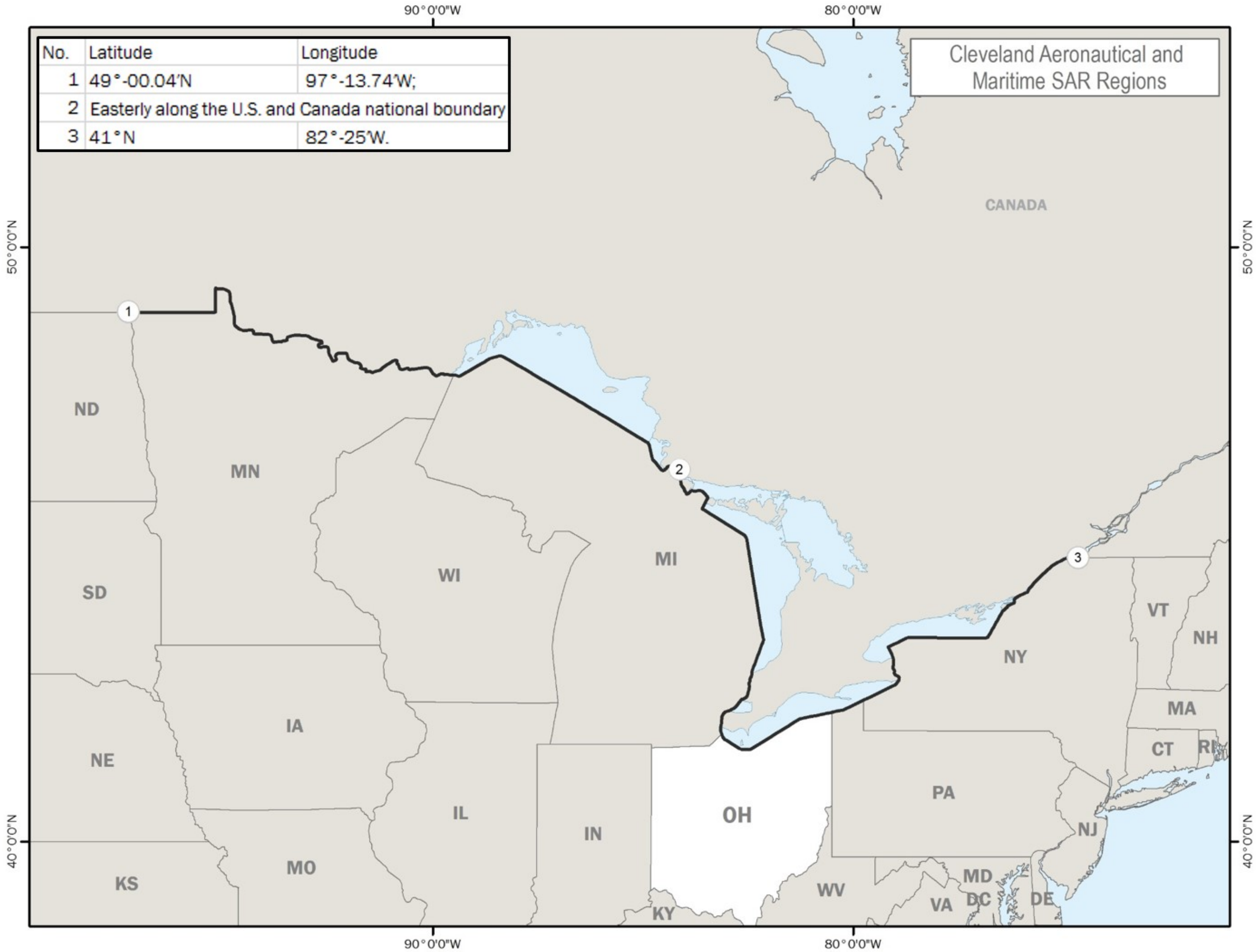


Figure B-2-11: New Orleans Maritime SAR Region



No.	Latitude	Longitude
1	49°-00.04'N	97°-13.74'W;
2	Easterly along the U.S. and Canada national boundary	
3	41°N	82°-25'W.

Figure B-2-12: Cleveland Aeronautical and Maritime SAR Region (delimitation with Canada)

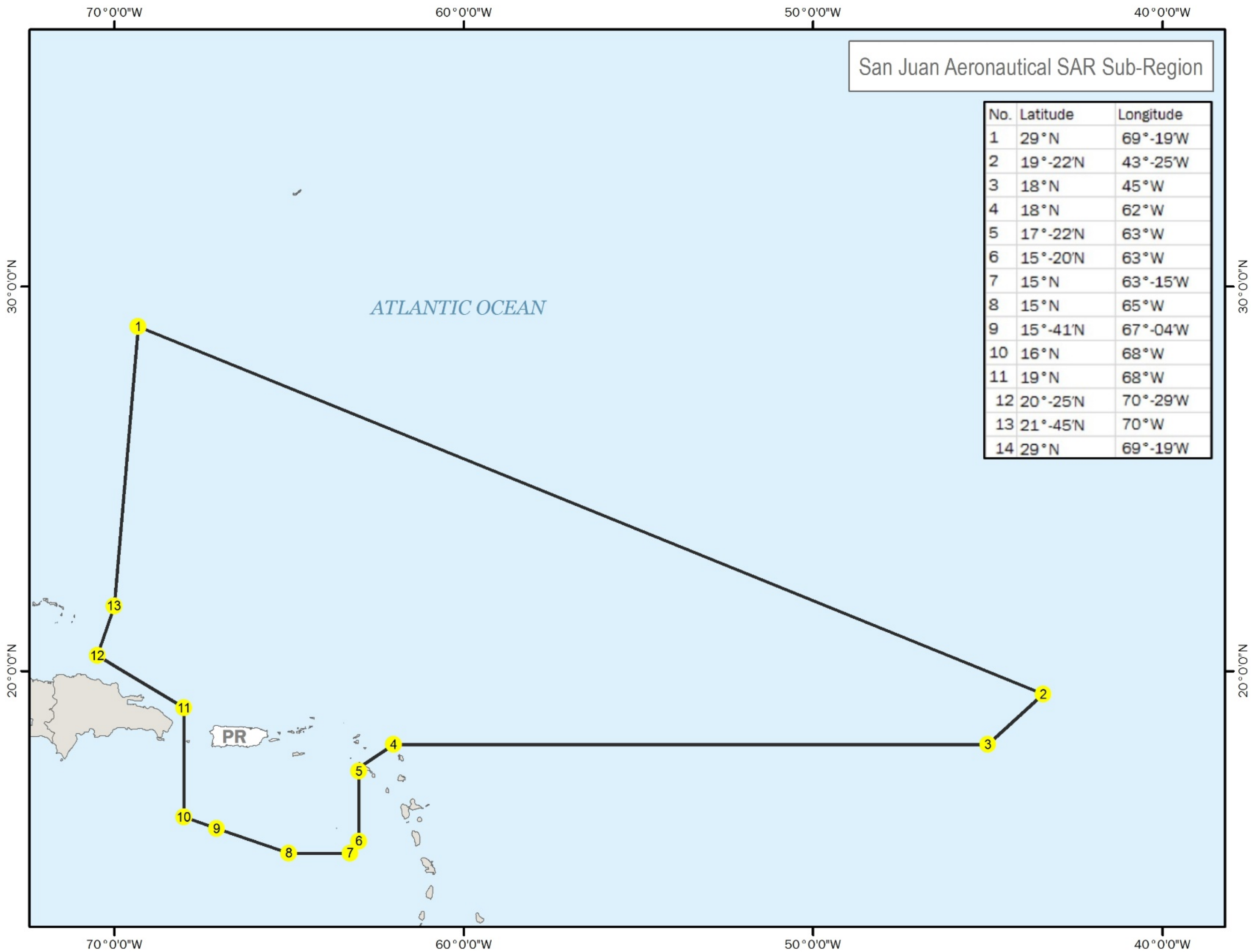
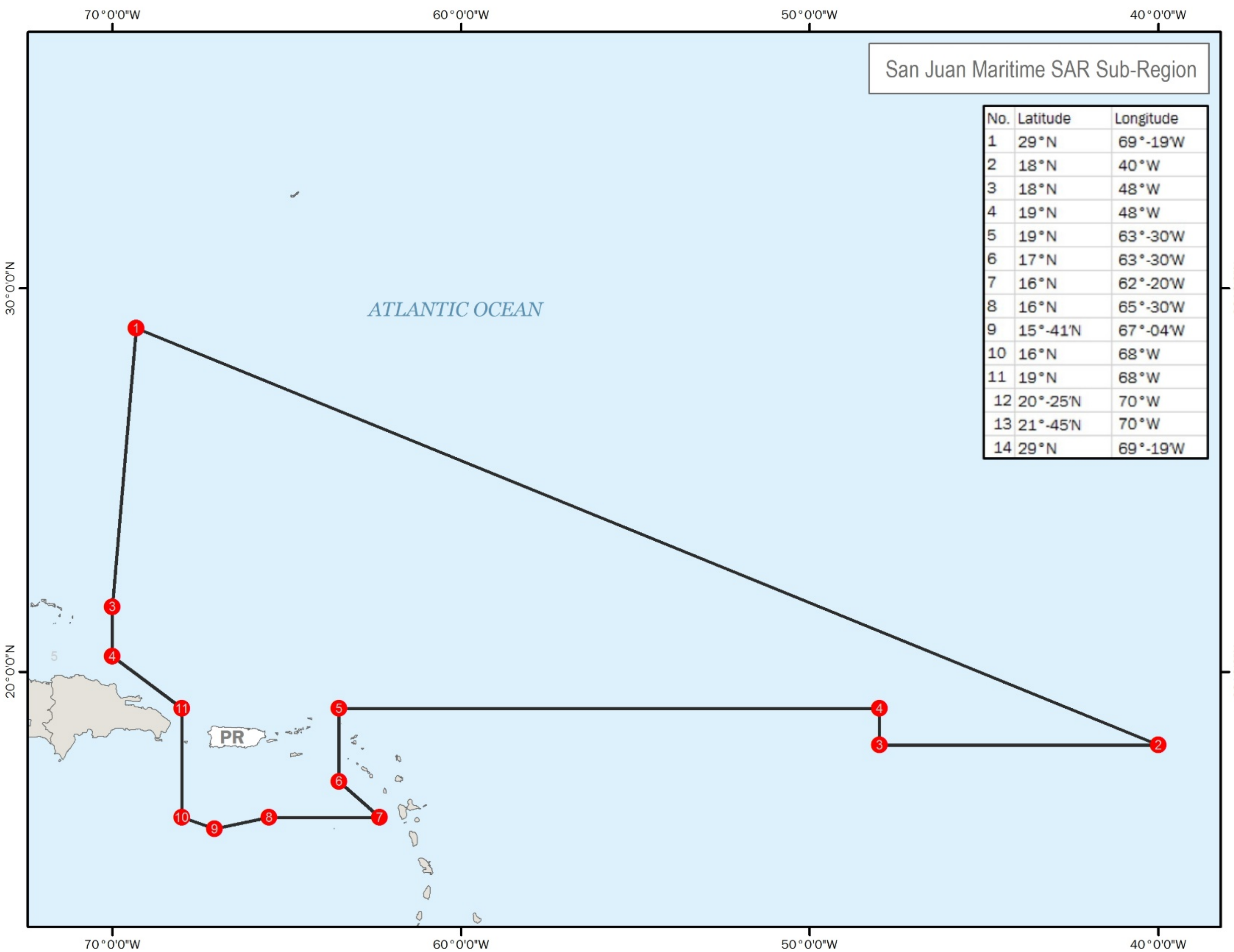


Figure B-2-13: San Jan Aeronautical SAR Sub-Region



No.	Latitude	Longitude
1	29°N	69°-19'W
2	18°N	40°W
3	18°N	48°W
4	19°N	48°W
5	19°N	63°-30'W
6	17°N	63°-30'W
7	16°N	62°-20'W
8	16°N	65°-30'W
9	15°-41'N	67°-04'W
10	16°N	68°W
11	19°N	68°W
12	20°-25'N	70°W
13	21°-45'N	70°W
14	29°N	69°-19'W

Figure B-2-14: San Juan Maritime SAR Sub-Region

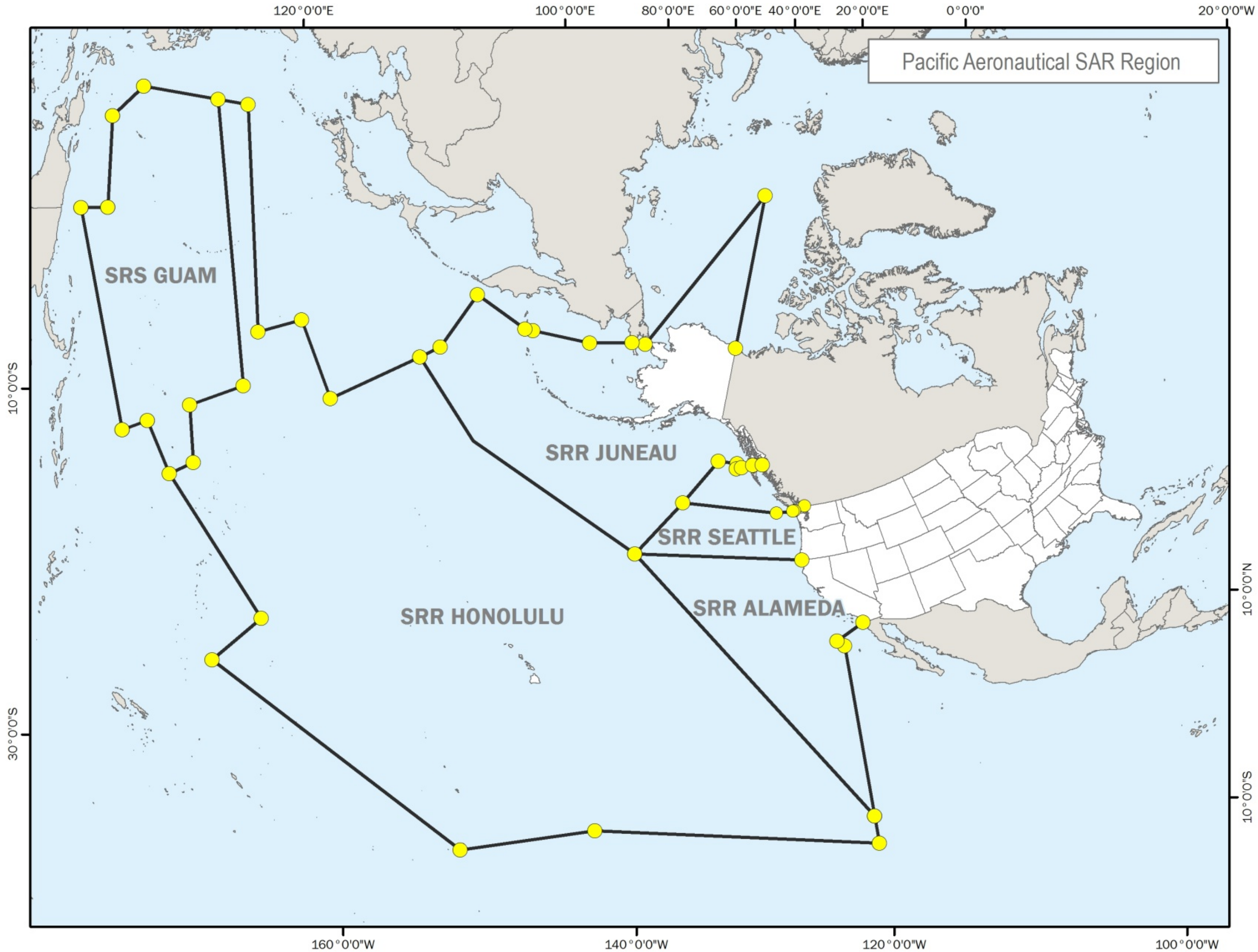


Figure B-2-15: Pacific Ocean Aeronautical SAR Regions

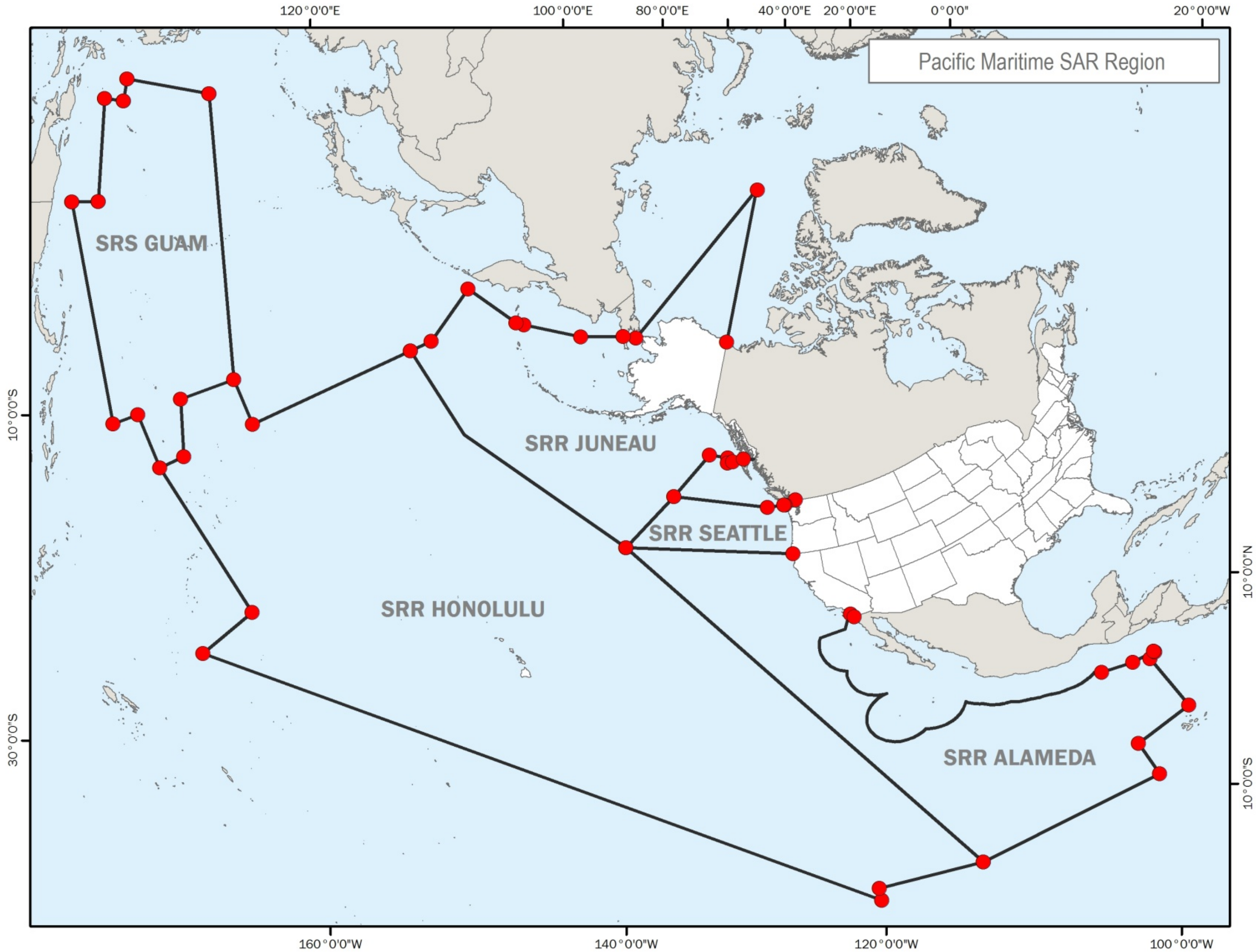


Figure B-2-16: Pacific Ocean Maritime SAR Regions

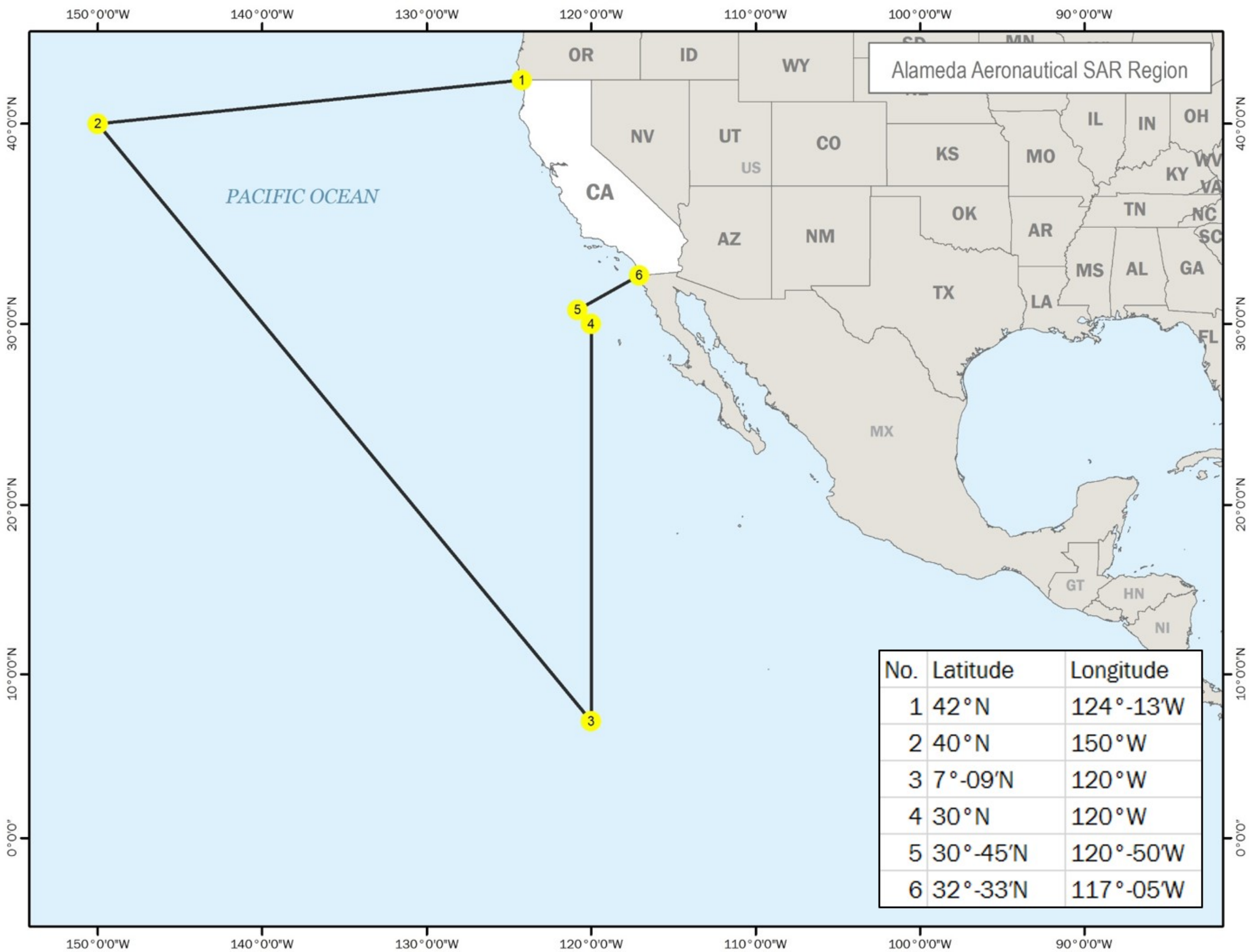
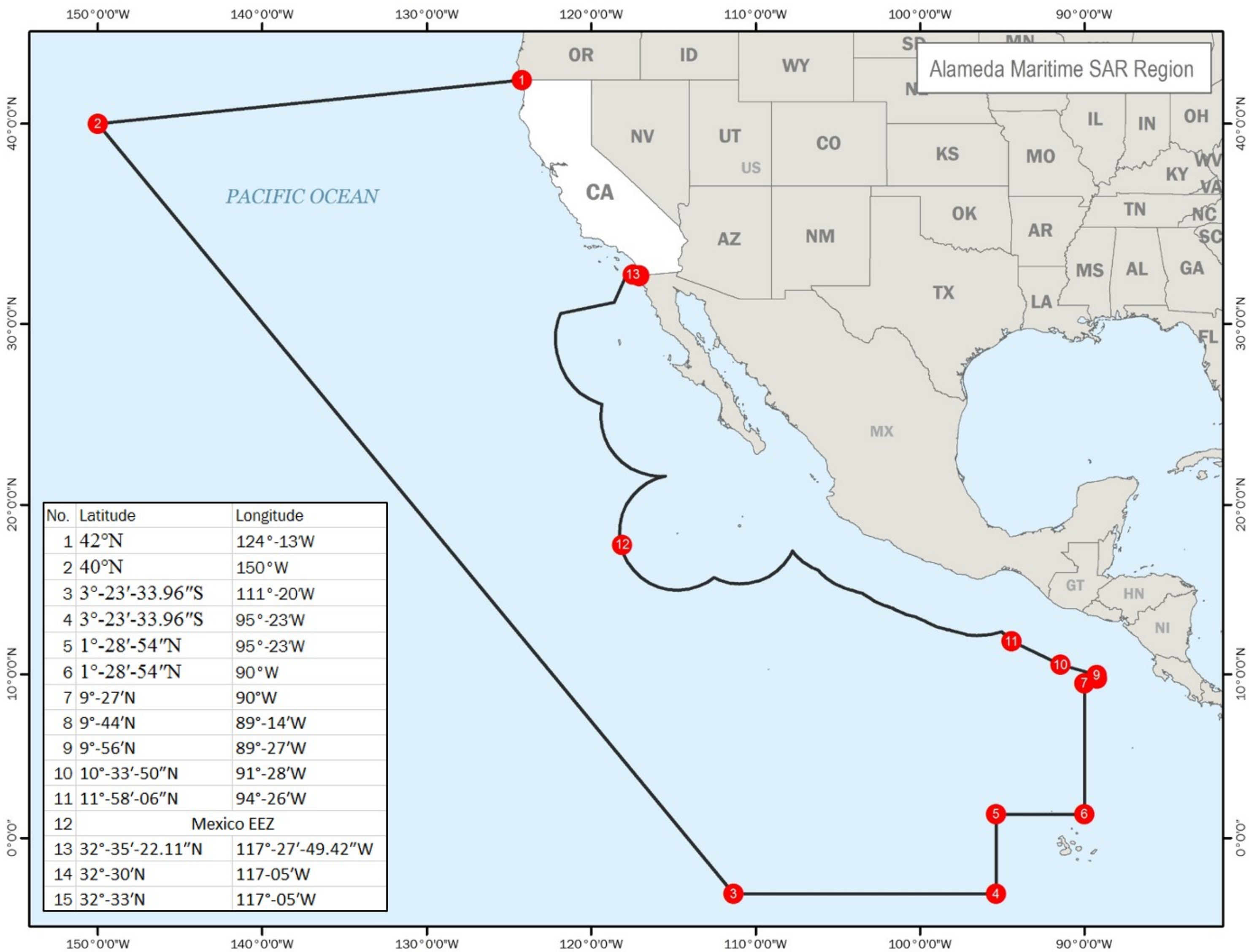


Figure B-2-17: Alameda Aeronautical SAR Region



No.	Latitude	Longitude
1	42°N	124°-13'W
2	40°N	150°W
3	3°-23′-33.96″S	111°-20'W
4	3°-23′-33.96″S	95°-23'W
5	1°-28′-54″N	95°-23'W
6	1°-28′-54″N	90°W
7	9°-27′N	90°W
8	9°-44′N	89°-14′W
9	9°-56′N	89°-27′W
10	10°-33′-50″N	91°-28′W
11	11°-58′-06″N	94°-26′W
12	Mexico EEZ	
13	32°-35′-22.11″N	117°-27′-49.42″W
14	32°-30′N	117-05′W
15	32°-33′N	117°-05′W

Figure B-2-18: Alameda Maritime SAR Region

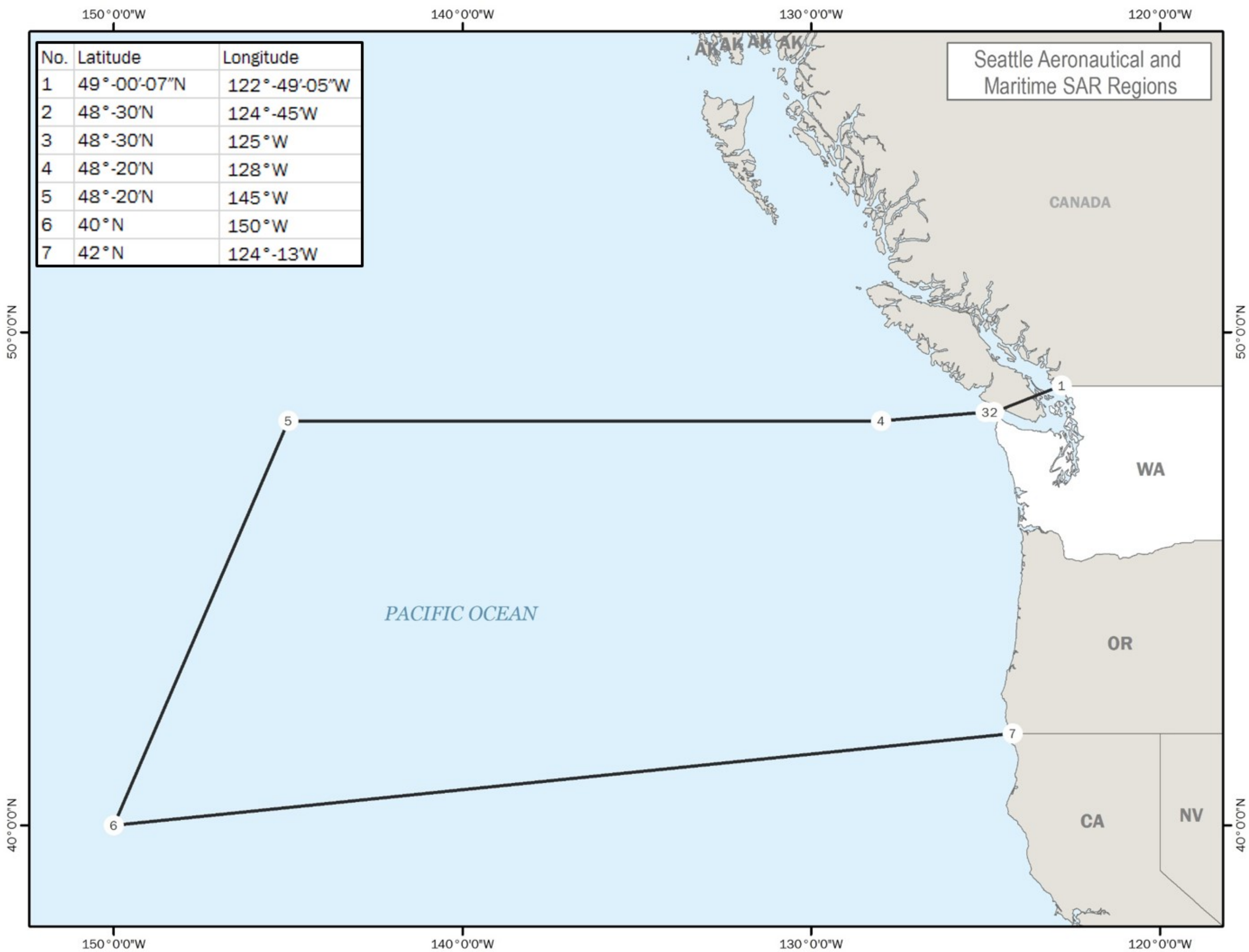


Figure B-2-19: Seattle Aeronautical and Maritime SAR Region

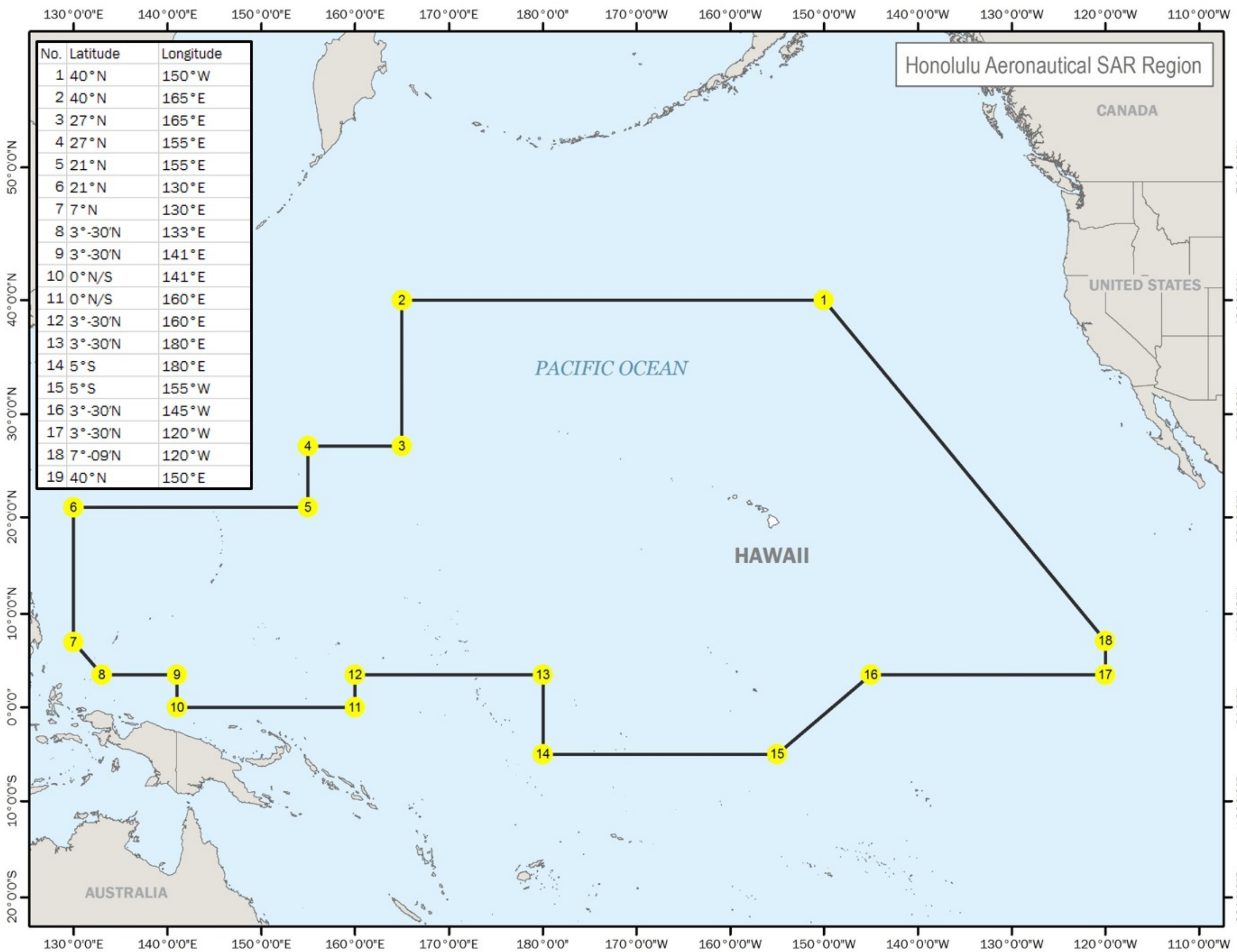
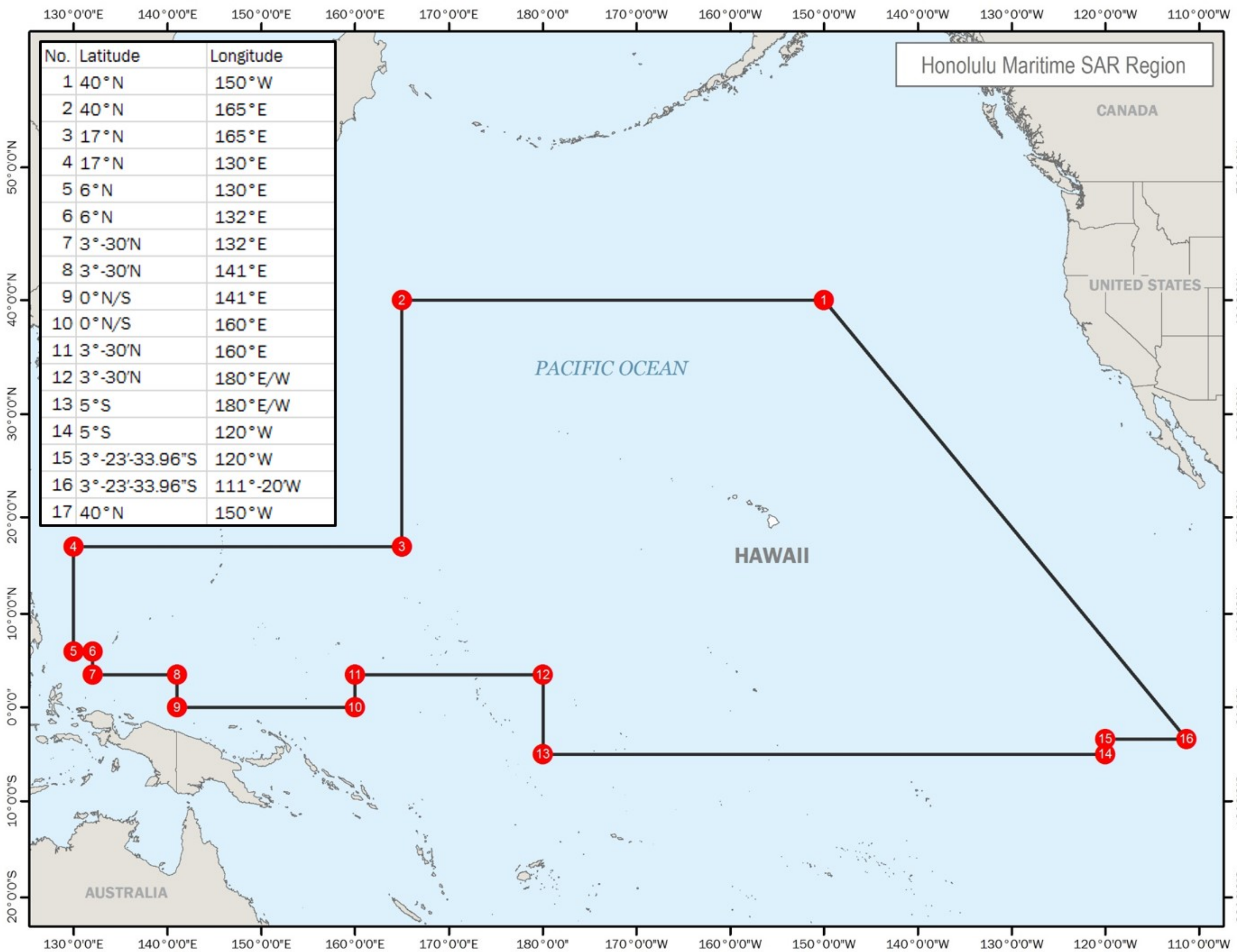
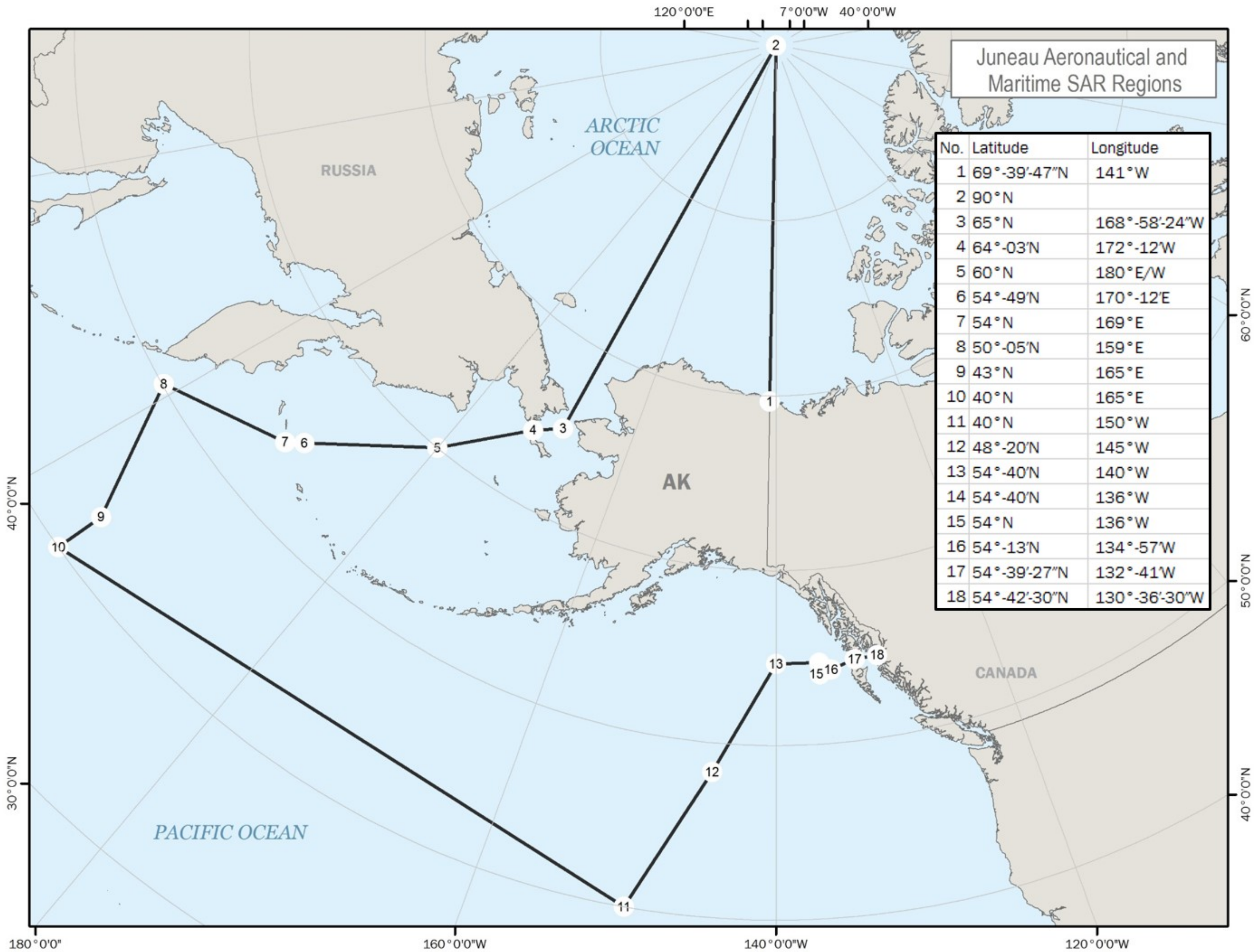


Figure B-2-20: Honolulu Aeronautical SAR Region



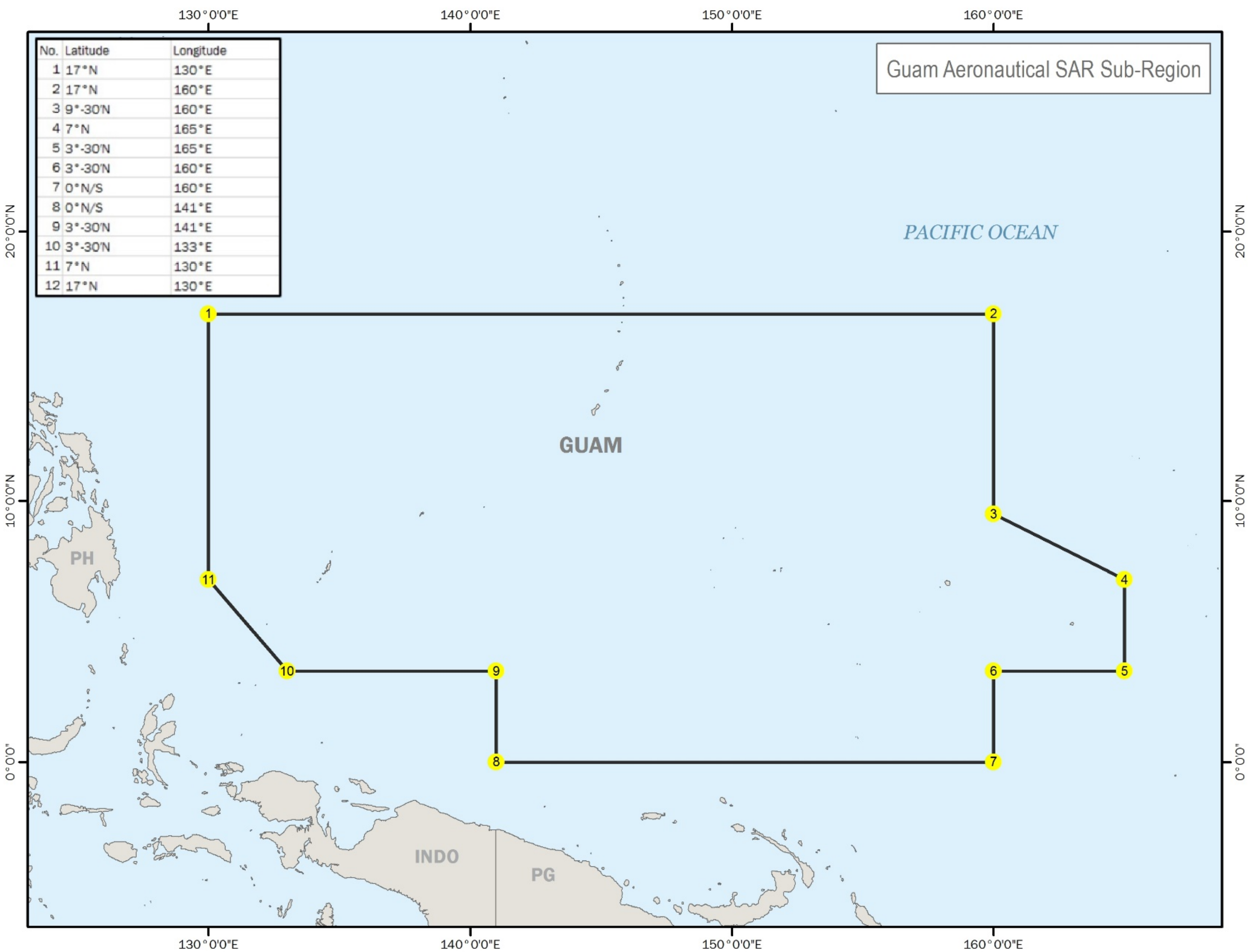
No.	Latitude	Longitude
1	40°N	150°W
2	40°N	165°E
3	17°N	165°E
4	17°N	130°E
5	6°N	130°E
6	6°N	132°E
7	3°-30'N	132°E
8	3°-30'N	141°E
9	0°N/S	141°E
10	0°N/S	160°E
11	3°-30'N	160°E
12	3°-30'N	180°E/W
13	5°S	180°E/W
14	5°S	120°W
15	3°-23'-33.96"S	120°W
16	3°-23'-33.96"S	111°-20'W
17	40°N	150°W

Figure B-2-21: Honolulu Maritime SAR Region



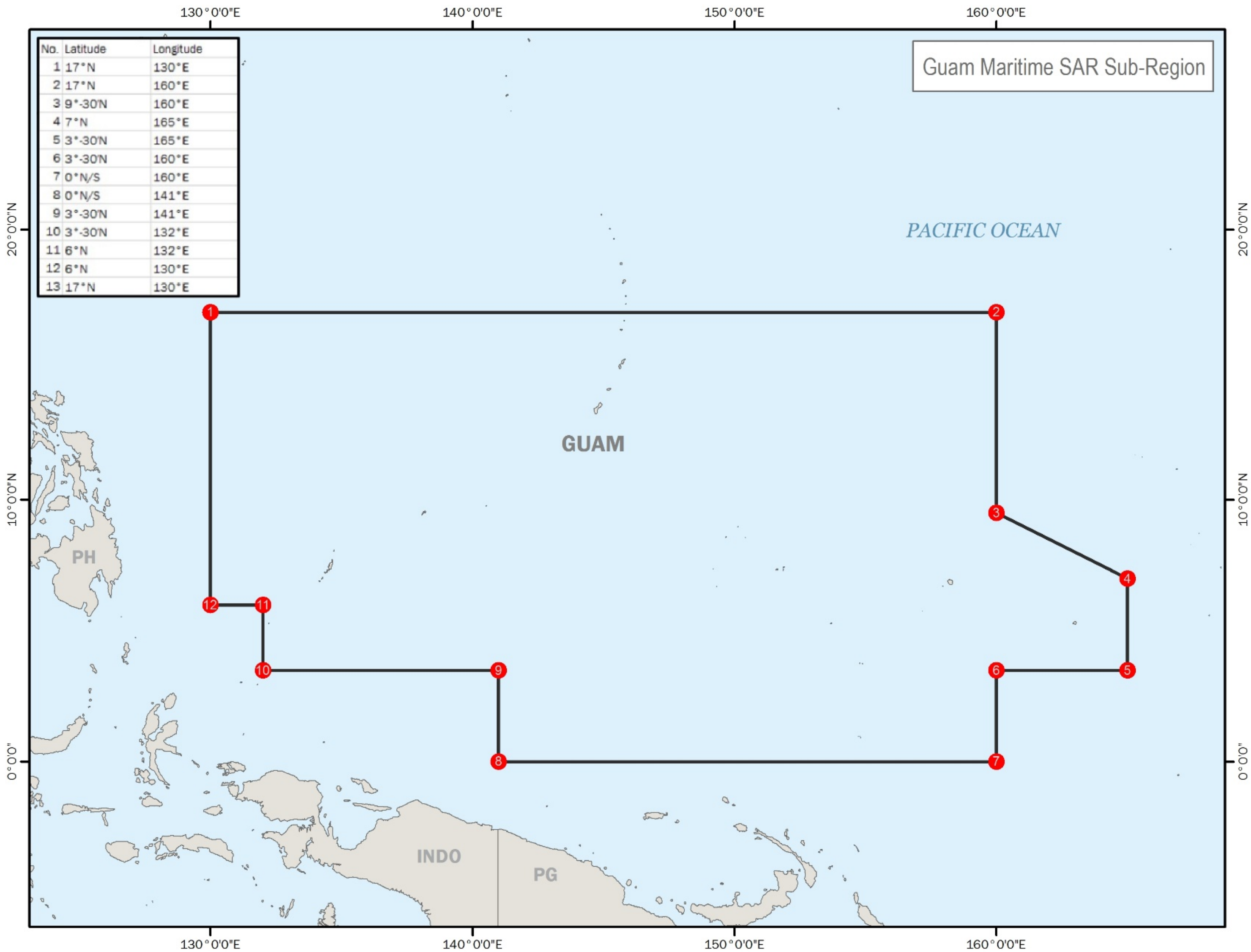
No.	Latitude	Longitude
1	69°-39'-47"N	141°W
2	90°N	
3	65°N	168°-58'-24"W
4	64°-03'N	172°-12'W
5	60°N	180°E/W
6	54°-49'N	170°-12'E
7	54°N	169°E
8	50°-05'N	159°E
9	43°N	165°E
10	40°N	165°E
11	40°N	150°W
12	48°-20'N	145°W
13	54°-40'N	140°W
14	54°-40'N	136°W
15	54°N	136°W
16	54°-13'N	134°-57'W
17	54°-39'-27"N	132°-41'W
18	54°-42'-30"N	130°-36'-30"W

Figure B-2-22: Juneau Aeronautical and Maritime SAR Region



No.	Latitude	Longitude
1	17°N	130°E
2	17°N	160°E
3	9°-30'N	160°E
4	7°N	165°E
5	3°-30'N	165°E
6	3°-30'N	160°E
7	0°N/S	160°E
8	0°N/S	141°E
9	3°-30'N	141°E
10	3°-30'N	133°E
11	7°N	130°E
12	17°N	130°E

Figure B-2-23: Guam Aeronautical SAR Sub-Region



No.	Latitude	Longitude
1	17°N	130°E
2	17°N	160°E
3	9°-30'N	160°E
4	7°N	165°E
5	3°-30'N	165°E
6	3°-30'N	160°E
7	0°N/S	160°E
8	0°N/S	141°E
9	3°-30'N	141°E
10	3°-30'N	132°E
11	6°N	132°E
12	6°N	130°E
13	17°N	130°E

Figure B-2-24: Guam Maritime SAR Sub-Region

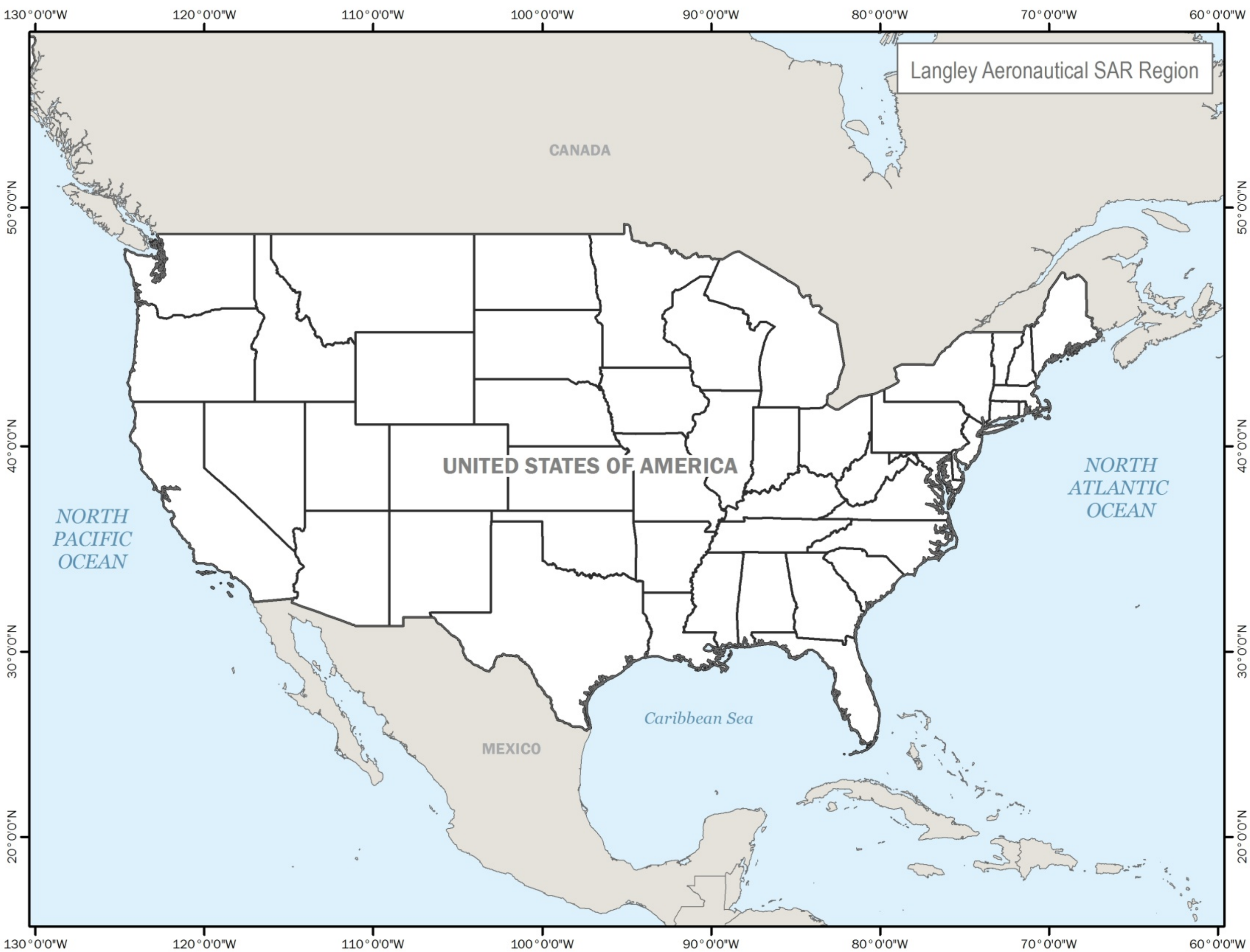


Figure B-2-25: Langley Aeronautical SAR Region

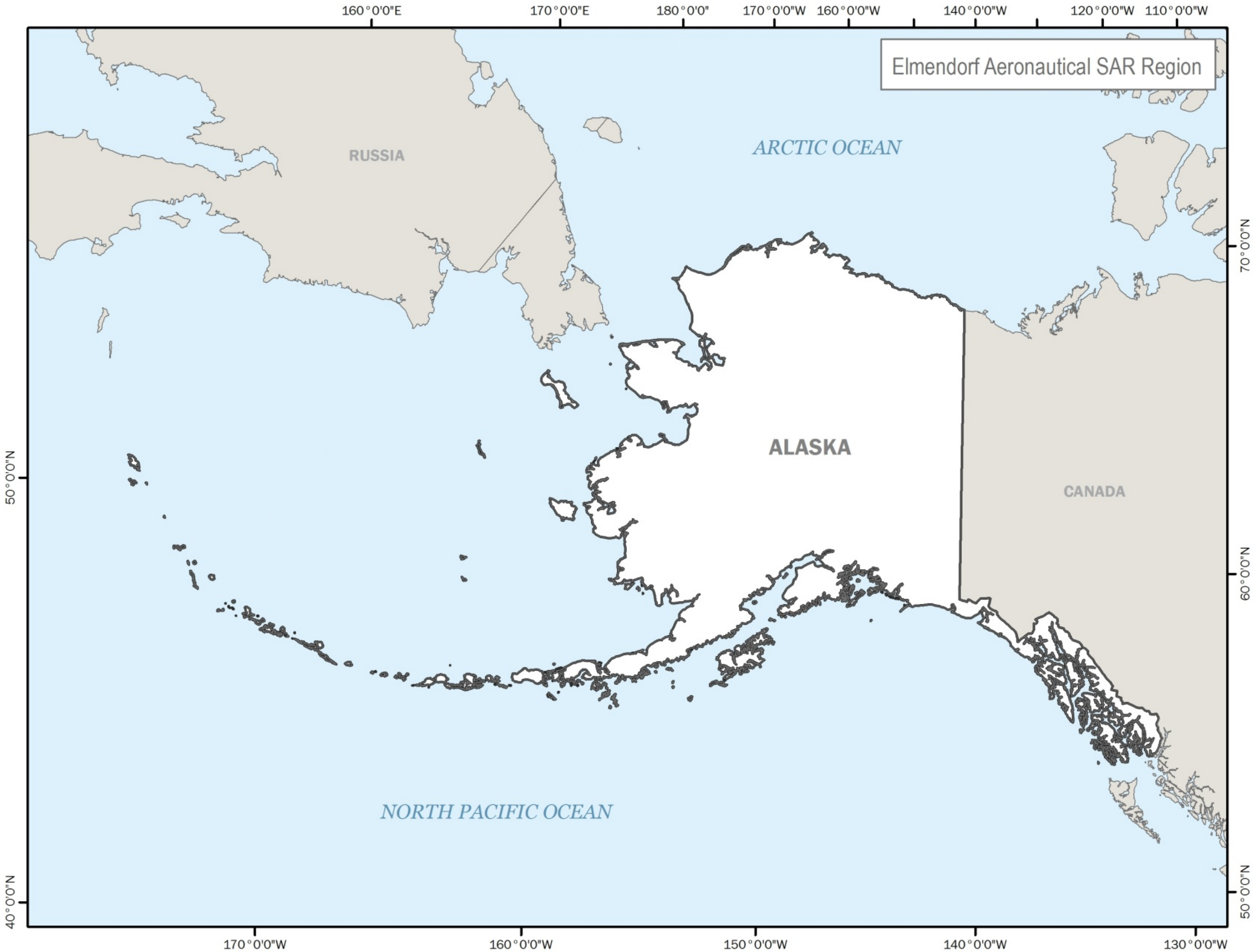


Figure B-2-26: Elmendorf Aeronautical SAR Region

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Appendix C: ESF #9

(Below is ESF #9 as of June, 2016.)

ESF Coordinator:

Department of Homeland Security/Federal Emergency Management Agency

Primary Agencies:

Department of Homeland Security/ Federal Emergency Management Agency
Department of Homeland Security/ U.S. Coast Guard
Department of the Interior/National Park Service
Department of Defense

Supporting Agencies:

Department of Agriculture
Department of Commerce
Department of Defense
Department of Health and Human Services
Department of Homeland Security
Department of the Interior
Department of Justice
Department of Labor
Department of Transportation
National Aeronautics and Space Administration
U.S. Agency for International Development

INTRODUCTION

Purpose

Emergency Support Function (ESF) #9 – Search and Rescue (SAR) deploys Federal SAR resources to provide lifesaving assistance to local, state, tribal, territorial, and insular area authorities, including local SAR Coordinators and Mission Coordinators, when there is an actual or anticipated request for Federal SAR assistance.

Scope

During incidents or potential incidents requiring a unified SAR response, Federal SAR responsibilities reside with ESF #9 primary agencies that provide timely and specialized SAR capabilities. Support agencies provide specific capabilities or resources that support ESF #9. Federal SAR response operational environments are classified as:

Structural Collapse (Urban) Search and Rescue (US&R): includes operations for natural and manmade disasters and catastrophic incidents, as well as other structural collapse operations that primarily require Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA) US&R task force operations.

Maritime/Coastal/Waterborne SAR: includes operations for natural and manmade disasters that primarily require air, cutter, boat, and response team operations.

Land SAR: includes operations that require aviation and ground forces to meet mission objectives, other than maritime/coastal/waterborne and structural collapse SAR operations as described above.

SAR services include distress monitoring, incident communications, locating distressed personnel, coordination, and execution of rescue operations including extrication and/or evacuation, along with providing medical assistance and civilian services through the use of public and private resources to assist persons and property in potential or actual distress. No provision of this annex is to be construed as an obstruction to prompt and effective action by any agency to assist persons in distress.

RELATIONSHIP TO THE WHOLE COMMUNITY

This section describes how ESF #9 relates to other elements of the whole community.

Local, State, Tribal, Territorial, and Insular Area Governments

Local, state, tribal, territorial, and insular area authorities are responsible for SAR within their respective jurisdictions and typically designate a SAR Coordinator to provide integration and coordination of all SAR services.

If an affected local, state, tribal, territorial, or insular area government publishes guidance or a plan for conducting unified SAR operations, that guidance or plan takes precedence.

State-to-state SAR assistance is requested by the affected state through the Emergency Management Assistance Compact (EMAC). Other local SAR resources are requested by the affected locality through other mutual aid and assistance agreements. Non-Federal SAR resources are, as appropriate, incorporated into any coordinated SAR operations.

Federal SAR responders assist and support local, state, tribal, territorial, and insular area SAR capabilities in incidents requiring a coordinated Federal response.

Federal Government

Specific Information on Federal Government actions are described in the following sections.

CORE CAPABILITIES AND ACTIONS

ESF Roles Aligned to Core Capabilities

The following table lists the Response core capability that ESF #9 most directly supports along with the related ESF #9 actions. Though not listed in the table, all ESFs, including ESF #9, support the core capabilities of Planning, Operational Coordination, and Public Information and Warning.

Core Capability	ESF #9 – Search and Rescue
Mass Search and Rescue Operations	• Activates when an incident is anticipated or occurs that may result in a request for a unified SAR response to an affected area. • Federal SAR responders assist and support local, state, tribal, territorial, and insular area SAR capabilities in incidents requiring a coordinated Federal response. No provision of this annex is to be construed as an obstruction to prompt and effective action by any agency to assist persons in distress. • Meets the specific needs of each incident, based upon the nature and magnitude of the event, the suddenness of onset, and the capability of local SAR resources. Response resources are drawn from ESF #9 primary and support agencies. • Conducts operations following the National Response Framework (NRF) and National Search and Rescue Plan (NSP), U.S. National SAR Supplement (NSS), Catastrophic Incident SAR (CISAR) Addendum, and other addenda that define SAR responsibilities and provide guidance to the Federal departments and agencies with civil SAR mandates. – **National Search and Rescue Plan (NSP):** The NSP is the policy guidance of the signatory Federal departments and agencies for coordinating SAR services to meet domestic needs and international commitments. – **National SAR Supplement (NSS):** This document provides implementation guidance on the International Aeronautical and Maritime Search and Rescue Manual and the NSP. – **Catastrophic Incident SAR (CISAR) Addendum to the NSS:** This document provides a description of the unified SAR response to catastrophic incidents, guides Federal authorities involved in the response, and informs local, state, tribal, territorial, and insular area authorities on what to expect of/from Federal SAR responders. • Operates under the Economy Act[1] when there is no Stafford Act declaration. • Assesses the specific SAR requirements and assigns one of the four primary agencies as the overall primary agency for SAR for that particular incident. Designation is dependent upon incident circumstances and the type of response required. • Conducts the following actions when assigned as the overall primary

[1] 31 U.S.C. 1535-1536 (2007): This act authorizes the Federal departments and agencies to provide goods or services, on a reimbursable basis, to other Federal departments and agencies.

	agency for a particular incident: – Coordinates planning and operations between primary and support agencies. – Coordinates resolution of conflicting operational demands for SAR response resources. – Provides representation to appropriate incident facilities (i.e., National Response Coordination Center [NRCC], Regional Response Coordination Center [RRCC], Joint Field Office [JFO], emergency operations centers [EOCs]). • All ESF #9 primary agencies provide support to the designated overall primary agency as required.

Agency Actions

<table>
<tr><th>Primary Agency</th><th>Actions</th></tr>
<tr><td>Department of Homeland Security (DHS)</td><td>Federal Emergency Management Agency (FEMA)

Serves as the overall primary agency to accomplish the ESF #9 mission during structural collapse SAR operations in incidents requiring a coordinated Federal response.
Conducts the following actions when DHS/FEMA is designated the overall primary agency:

Manages US&R task force and Incident Support Team (IST) deployments in the affected area.
Coordinates logistical support for US&R assets during field operations.
Coordinates the provisioning of additional support assets.
Provides representation, as required, at the NRCC, JFO, and local, state, tribal, territorial, and insular area EOCs.
Provides incident reports, assessments, and situation reports as required.
Coordinates with local, state, tribal, territorial, insular area, and Federal designated SAR authorities to integrate Federal SAR resources.

US&R includes operations for natural and manmade disasters and catastrophic incidents, as well as other structural collapse operations that primarily require DHS/FEMA US&R task force operations.
The National US&R Response System integrates DHS/FEMA US&R task forces, ISTs, and technical specialists.
The Federal US&R response integrates DHS/FEMA task forces in support of unified SAR operations conducted following the NSP.
DHS/FEMA develops national US&R policy, provides planning guidance and coordination assistance, standardizes task force procedures, evaluates task force operational readiness, funds special equipment and training within available appropriations, and reimburses, as appropriate, task force costs incurred as a result of ESF #9 deployment.
</td></tr>
</table>

Primary Agency	Actions

DHS (continued)	• The National US&R Response System is prepared to deploy and initiate operations immediately in support of ESF #9. The task forces are staffed primarily by emergency services personnel who are trained and experienced in collapsed structure SAR operations and possess specialized expertise and equipment.
	• Upon activation under the NRF, DHS/FEMA US&R task forces are considered Federal assets under the Homeland Security Act of 2002, the Robert T. Stafford Disaster Relief and Emergency Assistance Act, and other applicable authorities.
	• ISTs provide coordination and logistical support to US&R task forces during emergency operations. They also conduct needs assessments and provide technical advice and assistance to local, state, tribal, territorial, and insular area government emergency managers.
	• Reimburses the parent sponsoring agencies for US&R task forces for authorized US&R deployments. DHS/FEMA is authorized to reimburse such activities when there is a Stafford Act declaration or in anticipation of a declaration. For non-Stafford Act US&R deployments, the Federal department or agency requesting US&R assistance reimburses DHS/FEMA following provisions contained in the Financial Management Support Annex. DHS/FEMA uses the funding provided by the requesting Federal department or agency to reimburse the sponsoring agency for the task forces.
	• Conducts ESF #9 SAR operations for incidents where DHS/FEMA is the overall primary agency and follows the National US&R Response System manuals, NSP, NSS, and CISAR Addendum.
	• Works under the following authorities when performing US&R:
	  – **Homeland Security Act of 2002 (as amended); 6 U.S.C. 722:** This section codified US&R as a system within DHS/FEMA. “There is in the Agency a system known as the Urban Search and Rescue Response System.”
	  – **Stafford Act; 42 U.S.C. 5121-5207:** This act authorizes the President (assisted by DHS/FEMA) to declare major disasters and emergencies in the United States and provide assistance to local, state, tribal, territorial, and insular area governments. The President may use the services of local, state, tribal, territorial, and insular area governments for the purposes of the act, which includes addressing immediate threats to life and property (e.g., SAR operations).

Primary Agency	Actions
DHS (continued)	– **Post-Katrina Emergency Management Reform Act; P.L. 109-295 (2006):** This act expands the scope of ESF #9 from only US&R to include all types of SAR activities. Follow on congressional guidance establishes the organizational structure. It codified US&R as a system within DHS/FEMA in the Homeland Security Act of 2002 (as amended). It also mandated DHS/FEMA to develop a Federal response capability to rapidly and effectively deliver assistance essential to saving lives or protecting property or public health and safety and to carry out the mission of DHS/FEMA by conducting emergency operations to save lives and property.

Primary Agency	Actions
DHS (continued)	**U.S. Coast Guard (USCG)** • Serves as the overall primary agency to accomplish the ESF #9 mission during maritime/coastal/waterborne SAR operations in incidents requiring a coordinated Federal response. • Conducts SAR operations for incidents where DHS/USCG is the overall primary agency and follows the SAR response structure as outlined in the NSP, NSS, CISAR Addendum, USCG SAR Addendum, and other DHS/USCG directives. • Maritime/coastal/waterborne SAR includes operations for natural and manmade disasters that primarily require DHS/USCG air, cutter, boat, and response team operations. The Federal maritime/coastal/ waterborne SAR response integrates DHS/USCG resources in support of unified SAR operations conducted per the NSP. • Personnel are trained and experienced in maritime/coastal/ waterborne SAR operations and possess specialized expertise, facilities, and equipment for conducting an effective response to distress situations. • Develops, maintains, and operates rescue facilities for SAR in waters subject to U.S. jurisdiction and is designated the primary agency for maritime/coastal/waterborne SAR under ESF #9. • Uses staffing at Area, District, and local Sector Command Centers promotes interagency coordination with local, state, tribal, territorial, and insular area emergency managers during incidents requiring a unified SAR response in which maritime/coastal/waterborne SAR resources allocation are required. • Develops, establishes, maintains, and operates rescue facilities under and over the high seas and waters subject to the jurisdiction of the United States consistent with 14 U.S.C. 2. • Performs any and all acts necessary to rescue and aid persons and protect and save property in order to render aid to distressed persons, vessels, and aircraft on and under the high seas and on waters over which the United States has jurisdiction per 14 U.S.C. 88. • Performs any and all acts necessary to render aid to persons and protect and save property imperiled by flood and may also render aid to persons and protect and save property at any time and at any place at which Coast Guard facilities and personnel are available and can be effectively utilized per 14 U.S.C. 88.

Primary Agency	Actions
DHS (continued)	• Conducts the following actions when USCG is designated the overall primary agency for incidents: – Manages DHS/USCG SAR resources in the affected area. – Coordinates the provisioning of additional support assets. – Coordinates with local, state, tribal, territorial, insular area and Federal designated SAR authorities to integrate Federal SAR resources. – Provides representation, as required, at the NRCC, JFO, and local, state, tribal, territorial, and insular area EOCs. – Provides incident reports, assessments, and situation reports, as required.

Primary Agency	Actions
Department of Interior (DOI)	**National Park Service (NPS)** • Shares responsibility with the Department of Defense (DOD) as the overall primary agency for a particular incident to accomplish the ESF #9 mission during land SAR operations in incidents requiring a coordinated Federal response. • For incidents where DOI/NPS and/or DOD are the overall primary agency, ESF #9 SAR operations are conducted following the SAR response structure as outlined in the NSP, NSS, CISAR Addendum, and other relevant DOI/NPS and DOD SAR procedures, directives, and manuals. • DOI/NPS possesses SAR resources that are specially trained to operate in various roles, including ground search, small boat operations, swiftwater rescue, helo-aquatic rescue, and other technical rescue disciplines. DOI/NPS maintains preconfigured teams that include personnel and equipment from DOI/NPS, U.S. Fish and Wildlife Service, U.S. Geological Survey, Bureau of Indian Affairs, and other DOI components in planning for ESF #9. • Conducts the following actions when DOI/NPS is designated the overall primary agency for incidents: – Manages DOI/NPS land SAR resources in the affected area. – Coordinates the provisioning of additional support assets. – Coordinates with local, state, tribal, territorial, insular area, and Federal designated SAR authorities to integrate Federal SAR resources. – Coordinates logistical support for DOI/NPS resources during field operations. – Provides representation, as required, at the NRCC, JFO, and local, state, tribal, territorial, and insular area EOCs. – Provides incident reports, assessments, and situation reports as required. • Assumes authority to provide emergency rescue, firefighting, and cooperative assistance to public safety agencies for related purposes outside of the National Park System.

Primary Agency	Actions
Department of Defense (DOD)	• Shares responsibility with DOI/NPS as the overall primary agency for accomplishing the ESF #9 mission during land SAR operations in incidents requiring a coordinated Federal response. • Conducts the following actions through U.S. Northern Command (USNORTHCOM) and U.S. Pacific Command (USPACOM) when DOD is designated the overall primary agency for incidents: – Manages DOD SAR resources in the affected area. – Coordinates the provisioning of additional support assets. – Coordinates with local, state, tribal, territorial, insular area, and Federal designated SAR authorities to integrate Federal SAR resources. – Provides representation, as required, at the NRCC, JFO, and local, state, tribal, territorial, and insular area EOCs. – Provides incident reports, assessments, and situation reports as required. • Considers specific actions for operations involving DOD: – Coordinates facilities, resources, and special capabilities that conduct and support air, land, and maritime SAR operations according to applicable directives, plans, guidelines, and agreements, when requested by USNORTHCOM and USPACOM. – USNORTHCOM and USPACOM provide resources for the organization and coordination of civil SAR services and operations within their assigned SAR regions and, when requested, to assist local, state, tribal, territorial, insular area, and Federal authorities. – If DOD SAR capabilities deploy at the direction of the Air Force Rescue Coordination Center in support of the NSP, and subsequently if the Stafford Act is invoked, those capabilities are administered by the NRF and ESF #9. As soon as practical, a DHS/FEMA or other department/agency mission assignment is submitted to and approved by DOD for those capabilities' continued support.

Primary Agency	Actions
DOD (continued)	• Provides DOD policy guidance on the following items: – **DOD Support to Civil Search and Rescue (DODI 3003.01):** States that DOD shall support domestic civil authorities by providing civil SAR service to the fullest extent practicable on a noninterference basis with primary military duties. – **Defense Support of Civil Authorities (DODD 3025.18):** Provides guidance on the provision of DOD and designated National Guard capabilities when requested by civil authorities.

Support Agency	Actions
Department of Agriculture	**United States Forest Service** • Develops standby agreements to provide equipment and supplies from the National Interagency Fire Center (NIFC) Cache System at the time of deployment. • Develops contingency plans for use of NIFC contract aircraft during incidents. • If available, provides equipment and supplies from the NIFC Cache System and use of NIFC contract aircraft.
Department of Commerce	**National Oceanic and Atmospheric Administration** • Acquires and disseminates weather data, forecasts, and emergency information. • Provides weather information essential for efficient SAR. • Predicts pollutant movement and dispersion over time (marine and atmospheric). • Assesses areas of greatest hazard following a marine or atmospheric release. • Provides satellite services for detecting and locating persons in potential or actual distress in the wilderness, maritime, and aeronautical environments.

Support Agency	Actions
Department of Defense	**National Geospatial-Intelligence Agency (NGA)** • Coordinates and manages the timely tasking, acquisition, analysis, and delivery of satellite imagery or imagery-derived products as directed by the primary agency. • Provides expert analysis of imagery to determine damage levels and other elements of essential information, as needed. • Provides technical expertise/analysis from other imagery sources, if such expertise resides within DOD/NGA. • Provides mobile geospatial intelligence, including technical experts (imagery analysts and geospatial analysts) and robust communications to support SAR field teams or other DHS/FEMA field teams, as requested by the primary agency. • Provides imagery-derived and geospatial intelligence analysis in preparation for potential disasters or emergencies. • Coordinates the release and dissemination of DOD/NGA products and/or data following applicable security classifications, licensing, copyright agreements, and limited distribution restrictions. **U.S. Army Corps of Engineers (USACE)** • Deploys specially trained and equipped structural engineers to augment DHS/FEMA US&R Task Forces, ISTs, military technical rescue organizations, and general purpose troops during structural collapse incidents and other disaster response missions. • This rescue engineering capability provides technical support and advice to task force leaders and commanders to assess damage, mitigate hazards, enable safe entry, and assure mobility throughout a disaster site to enable rescue and lifesaving operations. • Develops doctrine, training programs, and national standards for structural collapse response operations, conducts initial training courses, advanced coursework, exercises and continuing education for all DHS/FEMA US&R Structures Specialists and other organizations requiring this capability. • Maintains specialized, pre-positioned, deployable equipment caches to support US&R/Disaster Response operations.

Support Agency	Actions
Department of Health and Human Services	Provides personnel for liaisons and support for medical field operations; medical equipment, supplies, and pharmaceuticals; and veterinary support.
Department of Homeland Security	**Customs and Border Protection** • Maintains Border Patrol Search, Trauma, and Rescue (BORSTAR) teams, which are highly specialized units capable of responding to emergency SAR situations anywhere in the United States. • Maintains air and marine assets to support SAR transportation operations. • Manages DHS/CBP SAR resources in the affected area. • Coordinates the provisioning of additional support assets. • Coordinates with local, state, tribal, territorial, insular area and Federal designated SAR authorities to integrate Federal SAR resources. • As required, provides representation at the NRCC, JFO, and local, state, tribal, territorial, and insular area EOCs. • Provides incident reports, assessments, and situation reports, as required.
Department of the Interior	**U.S. Geological Survey** • Provides personnel with appropriate technical disciplines and specialized technology to support geospatial analysis and mapping products in support of ESF #9 primary agencies.
Department of Justice	• As requested and approved pursuant to the ESF #13 mission, coordinates force protection. • Provides assistance with the development and maintenance of tort liability claims coverage for US&R task force and IST personnel engaged in mobilization, deployment, and field operations.

Support Agency	Actions
Department of Labor	**The Mine Safety and Health Administration** • Provides mine rescue teams, mobile command centers, seismic location systems, TV probe systems, gas sampling analysis, and robot explorers. **The Department of Labor Office of Workers' Compensation Programs** • Through its Federal Employees' Compensation Program, provides workers compensation guidance, claims resolution, and coverage for US&R task force and IST personnel while they are engaged in mobilization, deployment, and field operations. **The Occupational Safety and Health Administration** • Implements procedures contained in the Worker Safety and Health Support Annex to provide onsite technical assistance, including the evaluation of SAR team exposure to hazardous substances and the dangers of structural collapse.
Department of Transportation	**Federal Aviation Administration** • Is delegated sole authority to manage the National Airspace System (NAS), which includes operating a safe, secure, and efficient air traffic system; oversight and certification of aircraft and airmen; regulation of airspace; promotion of air commerce; and the support of America's national defense (49 U.S.C.). • Supports activities to protect and recover NAS operations.
National Aeronautics and Space Administration	• Provides personnel in appropriate technical disciplines (e.g., its Disaster Assistance and Rescue Team). • Provides temporary use of facilities for mobilization centers and staging areas for SAR assets.
U.S. Agency for International Development	• Manages the support of international SAR teams to a domestic U.S. disaster following a Stafford Act Declaration under the International Assistance System Concept of Operations (IAS CONOPS) and in support of the NRF's International Coordination Support Annex.

Support Agency	Actions
Department of State	• Designates the State Task Force (STF) as the sole entity within the Department of State responsible for coordinating formal offers of international assistance if DHS/FEMA does not activate the IAS CONOPS and proactive offers of assistance from foreign countries or international/multilateral organizations are received. – If the STF has not been established, a lead bureau or the Operations Center Crisis Management Support (CMS) office is designated. – Requests all offers be forwarded to the STF (or the lead bureau or CMS office, as appropriate) for dispensation.

Appendix D: Model State SAR Plan

Introduction

State SAR Plan:

Overview

1. *Purpose and Scope*
2. *State SAR Authority*
3. *Key References*

Situation

1. *General*
2. *Threat*
3. *Supporting Elements*
4. *Legal Considerations*

Operations

1. *Organization*
2. *SAR Objectives*
3. *Missions*
4. *Concept of Operations*
5. *Medical Support*
6. *Annexes*

Introduction

For reasons of dissimilar geography, topography, climate, weather phenomena, and the amount and the degree of exposure to the varying types of SAR, it is understandable that States, counties, municipalities, as well as Tribal and Territorial SAR authorities organize and conduct SAR operations within their individual AORs quite differently. Some may have a standalone plan while other states may have their respective SAR plan within or part of a larger overarching State agency's 'All- Hazards' or 'Response Coordination Plan' that captures mutually supporting missions as well as collaborative operations with other State agencies and organizations, Federal Agencies and as applicable, border nations.

A SAR plan illustrates policy and organization, as well as the roles and responsibilities of various State departments and agencies. It should be consistent with existing Federal plans and provide for the integration and coordination of all available resources to efficiently manage emergencies and disasters effectively.

The following is a model outline for a basic State SAR plan. It is patterned after similar national and international documents and includes common provisions and categories contained within several existing State plans. It may be used as a guide in the development or enhancement of State and local SAR plans; as a base document – adapted and expanded with implementing details as appropriate for the unique nature and inherent SAR requirements of a particular State.

State SAR Plan

Overview

1. Purpose and Scope

- Outline of operating guidelines for State for day-to-day SAR as well as for an incident that may require a unified State and Federal response;
- Types of SAR (modified by State as required);
- Authorities, roles, and responsibilities (general);
- Identified participating agencies and organizations; and
- External influences.

2. State SAR Authority

- Lead agency for civil SAR for the State;
- How and to who SAR authorities are delegated;
- Resource request authority and coordination; and
- Contact information.

3. Key References

- State level relevant references and/or event specific operations plans;
- County and municipal references and/or plans; and
- Applicable Federal/national plans.

Situation

1. General

- Specified intent;
- Overview of the area of responsibility or operations;
- State civil SAR operating standards, qualifications, terminology, procedures, and/or guidance;
- Training, equipment, procedures, facilities, information, and other qualifications or tools necessary to coordinate and safely conduct SAR operations; and
- SAR suspense authority.

2. Threat

- Vulnerability assessment;
- Potential problems (risk analysis); and
- Emergent issues/conditions.

3. Supporting Elements

- STTIA and local;
- EMAC;
- Federal;

- Non-Government Organizations;
- Coordination/authority to request;

4. Legal Considerations

Relevant Federal, State legislation, directives, agreements, etc., that apply to the conduct of SAR operations or to events that may include SAR. These may include, but are not limited to, U.S. law, State legal authorities, State regulations, executive orders, and mutual aid agreements.

Operations

1. Organization

- How the State SAR system is organized, coordinated, and supported within the State. If applicable, detail the differences that exist between conducting day-to-day SAR operations and managing an MRO or CISAR operations during a unified State and Federal SAR response;
- Management constraints or limitations; and
- Supporting relationships (among agencies and other SAR organizations/ participants).

2. SAR Objectives

List specific State SAR operational objectives.

3. Missions

Missions and potential mission assignments and resourcing for:

- Search operations;
- Air rescue;
- Water rescue;
- Land rescue;
- Transportation;
- External lift capability;
- Incident awareness and assessment (IAA);
- Air facility/lily pad management;
- Air traffic and airspace coordination and management;
- Information management; and
- Interoperable communications for SAR and airspace users.

4. Concept of Operations

(Note: Due to the differences among State government organizations, available SAR resources, and the various types and degree of exposure to potential distress/SAR situations, each State will have an inherently unique concept of operations that best provides SAR services within their respective jurisdictions.)

- SAR mission coordination (air, ground, water, lily pad, etc.);
- SAR mission dispatch and prosecution procedures;
- SAR communication;
- Air coordination plan;
- Geo-referencing;
- Structural marking;
- Special instructions;
- Information requirements;
- Operational and safety/risk management;
- Enabling capabilities;
- Animals and pets;
- Administration and reporting requirements;
- Demobilization criteria; and

- State policy concerning SAR case closure/suspension.

5. Medical Support

- Overview;
- Medical evacuation procedures;
- List of dedicated SAR assets;
- Determination of patient destination; and
- Hospitals, landing zones, and lily pads.

6. Annexes

- Communications;
- Air operations;
- Geo-referencing;
- Illustration and information concerning hospitals, possible landing zones, and pre-designated lily pads; and
- Key terms, definitions, and acronyms.

Appendix E: Guidance for Mass Rescue Operations (COMSAR/Circ.31)

Guidance for Mass Rescue Operations

1. The Sub-Committee on Radiocommunications and Search and Rescue (COMSAR), at its seventh session (13 to 17 January 2003), agreed Guidance for Mass Rescue Operations (MROs) prepared by the Joint ICAO/IMO Working Group on Harmonization of Aeronautical and Maritime Search and Rescue at its ninth session (Hong Kong, China, 30 September to 4 October 2002), to assist Member Governments in preparing for, and coordinating aspects of, major incidents involving rescue of large numbers of persons in distress from ships or downed aircraft; and in working with companies that operate large passenger ships and aircraft to ensure that they are prepared to effectively support such rescue efforts.

2. The annexed Guidance covers both maritime and aviation incidents since the provisions are equally applicable to both types of major incidents, because many rescue coordination centers (RCCs) handle both maritime and aeronautical rescue efforts.

3. Member Governments and international organizations are invited to bring the annexed Guidance to the attention of their national search and rescue (SAR) Authorities, RCCs, shipowners, shipping companies and shipmasters, and, based on the experience gained, provide their comments and recommendations to the

Organization for further consideration and appropriate action.

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Annex: Guidance for Mass Rescue Operations

Introduction

1. A mass rescue operation (MRO) is one that involves the need for immediate assistance to large numbers of persons in distress such that capabilities normally available to search and rescue (SAR) authorities are inadequate.

2. Fortunately, MROs are relatively rare compared to normal SAR operations, but major incidents leading to the need for MROs have not been infrequent on a world-wide basis, and can occur anywhere at any time. Since the nature of such operations may be poorly understood due to limited chances to gain experience with major incidents involving MROs, this Guidance begins with a general discussion of MROs and related matters.

3. Flooding, earthquakes, terrorism, casualties in the offshore oil industry, accidents involving releases of hazardous materials and major aircraft or ship incidents are examples which, because of their magnitude, may need to use the same resources as would be needed to carry out mass maritime or aeronautical rescue operations.

4. The sequence of priority in major multi-mission incidents must be lifesaving first, generally followed by environmental protection, and then protection of property.

5. Moral and legal obligations, as well as public and political expectations, drive the need to be prepared to carry out MROs safely and effectively should they become necessary. Since the need for MROs is relatively rare, it is difficult to gain practical experience to help deal with them. While the types of potential MRO scenarios, as well as the organizations, emergency response structures and circumstances vary from place to place, there are certain general principles, common actions and examples that can be followed based on lessons of history, which this Guidance is intended to convey.

6. MROs are relatively low-probability high-consequence events. Effective response to such major incidents typically require immediate, well-planned and closely coordinated large-scale actions and use of resources from multiple organizations. Intense and sustained high priority lifesaving efforts may need to be carried out at the same time and place as major efforts to save the environment and property. Huge amounts of selected information will need to be readily available at the right times and the right places not only to support the response efforts, but to meet the needs of the media, public and families of the persons in distress, which may number in the hundreds or thousands. Many means of communications will need to be available and interlinked amongst organizations at various levels to handle huge amounts of information reliably for the duration of the response. A surge in the numbers of competent staffing in all key organizations must be available immediately and be sustainable for up to weeks at a time. Equipment and logistics demands will jump to unprecedented levels. Successful MROs depend on the advance provision of flexible and all-level contingency plans. Intense integrated planning and operational efforts must also be carried out in real time throughout actual rescue efforts.

7. All who will be involved in the overall multi-agency, multi-jurisdiction, multi-mission and possibly international response to a major incidents will need to clearly understand who is in charge, how to work with who is in charge, the respective roles of

all involved, and how to interact with each other. SAR authorities may be responsible for all, or part, of the MRO responsibilities of the major incident response, and will be able to coordinate their efforts seamlessly with other incident responders under overall direction of another authority within or outside their agency. The broader response environment may involve hazards mitigation, damage control and salvage operations, pollution control, complex traffic management, large-scale logistics efforts, medical and coroner functions, accident-incident investigation, intense public and political attention, etc. MRO plans need to be part of and compatible with overall response plans for major incidents. Plans must typically allow for command, control and communications structures that can accommodate simultaneous air, sea and land operations.

8. Potential disastrous consequences of poor preparations for MROs in terms of loss of life and other adverse results are enormous. Major incidents may involve hundreds or thousands of persons in distress in remote and hostile environments. A large passenger ship collision, a downed aircraft, or a terrorist incident could, for example, call for the immediate rescue of large numbers of passengers and crew in poor environmental conditions, with many of the survivors having little ability to help themselves, and the dire results of failure are evident.

9. Preparedness to mount an extraordinarily large and rapid response is critical to preventing large-scale loss of lives. Such preparedness often depends on strong and visionary leadership and unusual levels of cooperation to achieve. There will often be strong resistance to paying the inherently high price in terms of time, effort and funding that preparedness for major incidents entails, particularly as they are rare events. The required levels of cooperation, coordination, planning, resources and exercises, required for preparedness are challenging and do not happen without the requisite commitment of SAR authorities, regulatory authorities, transportation companies, sources of military and commercial assistance and others.

10. SAR authorities should coordinate MRO plans with companies that operate ships and aircraft designed to carry large numbers of persons. Such companies should share in preparations to minimize the chances that MROs will be needed, and to ensure success if they are.

11. MRO planning, preparations and exercises are essential since opportunities to handle actual incidents involving mass rescues are rare. Therefore the exercising of MRO plans is particularly important. Appendix 1 provides guidance on planning and conducting such exercises.

12. The provisions of this document are intended to provide general guidance to authorities and organizations responsible for ensuring that MROs, should they be necessary, are successful.

General Guidance

13. For a situation involving large numbers or persons in distress, on scene responsibilities for the safety of passengers and crew will be shared by the OSC and the aircraft pilot in command or ship master, with the pilot or master assuming as much of this responsibility as possible before or after the aircraft or ship is abandoned.

14. Pilots and masters are responsible for maneuvering the aircraft or ship as feasible and appropriate. They also have overall responsibility for safety, medical care, communications, fire and damage control, maintaining order and providing general direction.

15. Unless a ship appears to be in imminent danger of sinking, it is usually advisable for passengers and crew to remain on board as long as it is safe to do so.

16. In the case of a downed aircraft, whether passengers would be safer on board should be assessed for each situation. Usually they should promptly evacuate the aircraft at sea. On land this decision must account for the conditions of the aircraft and the environment, expected time to rescue or aircraft repair, and whether required passenger care can be best provided inside the aircraft.

17. The OSC will normally be designated by an SMC. An OSC may be able to handle certain communications on scene and with appropriate remote authorities to help free the pilot or master to retain the integrity of his or her craft. However, these persons are themselves in need of assistance, and anything the OSC can do to help them should be considered, bearing in mind that the OSC's main duty is coordinating SAR facilities and rescue efforts under the SMC's general direction.

18. It is important to minimize unnecessary communications with the master of a ship or pilot in command of an aircraft in distress, and this should be taken into account in advance planning. Exchanges of information during joint planning by use of SAR Plans of Cooperation (see MSC/Circ.1000 or its superseding circulars) and other means will reduce the need to ask the pilot or master for this information one or more times during a crisis. Persons or organizations that want this information should be directed to a source ashore or on the ground that is prepared to handle what could be many requests.

19. High priority should be given to tracking and accounting for all persons on board and all lifeboats and rafts, and efforts to keep them together will help in this regard. Availability of accurate manifests and accounting is critical. The need to relocate survival craft and check for persons in them can waste valuable resources. One option is to sink survival craft once the persons in them have been rescued; however, the potential that other survivors may find and need the craft should be considered.

20. Navy ships are often better equipped than commercial vessels for retrieving people who have abandoned a ship or aircraft, and use of any such ships should be considered.

21. Helicopter capabilities should be employed if available, especially for retrieval of weak or immobile survivors. Lifeboat crews should be trained in helicopter hoist operations. Lowering a rescue person from the helicopter to assist survivors may be viable.

22. Ship companies should be encouraged to equip large passenger ships and possibly other types of vessels with helicopter landing areas, clearly marked hoist-winch areas, and onboard helicopters to facilitate more direct transfers of numerous persons.

23. If a ship with a large freeboard cannot safely retrieve survivors from the water or survival craft, it may be possible to first retrieve them onto small vessels, and then transfer them to progressively larger ones.

24. Depending on the circumstances, it may be safer to tow survival craft to shore without removing the occupants at sea. Lifeboats could be designed to support passengers for longer periods of time, and to be able to reach shore on their own from longer distances offshore.

25. To the extent practicable, MROs should be coordinated by an SMC in an RCC. However, depending on the magnitude, nature and complexity of a mass rescue incident, the rescue efforts may be better

coordinated by an appropriate operations center higher within the SAR agency or a government. Considerations in this decision might include, among others:

- Extensive rescue support by organizations other than those commonly used for SAR;
- Need for heavy international diplomatic support; and
- Serious problems in addition to potential loss of lives, such as environmental threats, terrorist actions, or national security issues.

26. The following factors should be considered in MRO planning:

- Use the Incident Command System (ICS) or other effective means of handling multiagency, multi-jurisdiction, multi-mission scenarios;
- Identify situations within the SRR that could potentially lead to the need for MROs, including scenarios that might involve cascading casualties or outages;
- Mobilization and coordination of necessary SAR facilities, including those not normally available for SAR services;
- Ability to activate plans immediately;
- Call up procedures for needed personnel;
- Need for supplemental communications capabilities, possibly including the need for interpreters;
- Dispatching of liaison officers;
- Activation of additional staff to augment, replace or sustain needed staffing levels;
- Recovery and transport of large numbers of survivors (and bodies, if necessary), accounting for survivors potentially having injuries and lack of training, age limitation, hypothermia, etc.;
- A means of reliably accounting for everyone involved, including responders, survivors, crew, etc.;
- Care, assistance and further transfer of survivors once delivered to a place of safety, and further transfer of bodies beyond their initial delivery point;
- Activation of plans for notifying, managing and assisting the media and families in large numbers;
- Control of access to the RCC and other sensitive facilities and locations;
- RCC backup and relocation plans, as appropriate; and
- Ready availability to all potential users of plans, checklists and flowcharts.

27. At some point the ability of an RCC to continue to effectively coordinate the MRO and still handle its other SAR responsibilities might be overwhelmed, and another RCC or a higher authority may need to assume responsibility for the MRO.

28. With these possibilities in mind, MRO plans may provide for various degrees of response, along with criteria for determining which amount of response will be implemented. For example, as local SAR resources are exhausted, or from the outset, SAR resources may need to be obtained from distant national or international sources.

29. Experiences in responding to major incidents have resulted in other practical advice such as the following:

- Plan and exercise how any agency receiving notification of an actual or potential mass rescue event can immediately alert and conference call other authorities that will potentially be involved, brief them, and enable immediate actions to be taken by all concerned (this will require identification of contacts in each agency that can be contacted on a 24-hour basis, and that have authority to immediately initiate actions and commit resources);

- Coordinate all rescue operations effectively from the very beginning;
- Begin quickly with a high level of effort, stand down as appropriate, rather than begin too late with too little effort;
- Use more capable resources like cruise ships for taking large numbers of survivors on board;
- Ensure that MRO emergency plans address communications interoperability or interlinking;
- Retrieve and protect debris as evidence for follow on investigation;
- Put security plans in place to limit access to the RCC;
- Arrange in advance to involve the Red Cross, chaplains, critical incident stress experts and other such support for human needs;
- Identify senior agency spokespersons to protect the time of workers directly involved in the response and designated a senior official to provide information to families;
- Clearly identify the point at which the SAR response (lifesaving) has ended, and the focus shifts to investigation and recovery;
- Be prepared to use an ICS when appropriate;
- Ensure that air traffic and air space can be and is controlled on scene;
- The SMC can often benefit from assigning additional liaison personnel on scene;
- Anticipate development and needs and act early;
- Ensure that the scopes of SAR plans and other emergency or disaster response plans are coordinated to reduce gaps, overlaps and confusion about who is in charge and what procedures will be followed at various times and places;
- Control access to the scene, including access by the media;
- Work out in advance how private resources can be appropriately used to supplement other SAR resources;
- Ensure that SAR plans provide for logistics support for large numbers of rescuers and survivors, including pre-arranged accommodations, if possible, and availability of food, medical care and transportation;
- Consider requesting assistance from airlines and shipping companies other than the one whose aircraft or ship is involved in the incident, and know the types of assistance that such organizations might provide;
- Bar coded bracelets can be an effective means of identifying children before, during and after the emergency;
- Attempt to reduce the burden on a pilot or master and crews;
- If safe and appropriate to do so, place a marine casualty officer on board to assist the master and SAR personnel; and
- Share capabilities, expertise and assets among government and industry to take maximum advantage of the strengths of each.

Communications

30. Communication plans must provide for a heavy volume of communication use, as a major incident will normally involve many

responding organizations that need to communicate effectively with each other from the beginning. As necessary, advance arrangements should be made to link means of interagency communications that are not inherently interoperable. Interagency communications must be based on terminology that all involved understand.

Major Incident Coordination

31. Regardless of the magnitude and priority of the lifesaving efforts involved in responding to a major incident, if any other functions are being carried out concurrently on scene by other than SAR personnel, the overall response involving SAR and the other functions, e.g., firefighting, should be well coordinated.

32. If certain basic concepts and terms are recognized and understood by all emergency responders, they will be much better prepared to coordinate joint efforts.

33. Standard SAR procedures should typically be followed for the SAR part of the response, but these procedures will be largely independent of other efforts. Companies or authorities handling other aspects of the response will follow command, control and communication procedures developed for their respective organizations and duties.

34. The SAR system can function in its normal manner or use modified SAR procedures established to account for special demands of mass rescues, but it should be appropriately linked and subjected to a scheme for management of the overall incident response.

35. For major incidents, crisis management for the overall response may also be needed. The Incident Command System (ICS) is one simple and effective means of meeting this need. The ICS works best with some advance familiarization and exercising. Since SAR and transportation authorities are likely to encounter use of the ICS within emergency response communities, Appendix 3 provides general information for familiarization with the ICS. The ICS is an example of an effective system used for emergency management, and is a tool that can be used where no equivalent means of overall incident management is in place.

Industry Planning and Response

36. SAR authorities should coordinate MRO plans with companies that operate aircraft and ships designed to carry large numbers of persons. Such companies should share in preparations to minimize the chances that MROs will be needed and to ensure success if they are. Appendix 2 provides guidance on industry roles and discusses how companies could arrange for use of company field teams and emergency response centers as possible means of carrying out their MRO responsibilities. For passenger ships, SAR Plans of Cooperation are part of MRO plans.

Public and Media Relations

37. What the media reports may matter more than what SAR services do for shaping of public opinion about MROs. Importantly, the role of the media may be critical in shaping the actions of the public and those directly involved in the distress situation in a way that contributes to safety, success and panic control. There should be no unwarranted delays in providing information to the media. Information should be readily available, clear, accurate, consistent and freely exchanged among emergency responders and others concerned, such as the public and families of persons on board.

38. Identify spokespersons and outline what they will say, staying factual. If SAR services do not provide a public spokesperson for a major incident, the media will. Spokespersons should be cautious about speculating on causes of accidents and

should inform the media that current operations are focused on saving lives.

39. Ensure that the media knows who is in charge of coordinating rescue operations.

40. A single spokesperson not directly involved in the incident can be valuable in relieving the IC and SMC of this duty.

41. Many entities are involved in a major incident, including ships, aircraft, companies and SAR services. Coordination is required to ensure that there is one message with many messengers. Interviews should be live if possible.

42. Prompt establishment of a joint information center away from the SMC will help to achieve this goal. The center can establish proper procedures for establishing what messages will be released to the public and how those messages will be released. Since the messages may be sensitive, it is critical that everyone communicates the same information. The center can be responsible for coordinating information made available via the internet and perhaps establishing and maintaining a public web site.

43. The media is a 24-hour global market, with news broadcast worldwide around the clock. The media will find a way to get to the scene for first hand information, pictures and video. By providing transportation to the scene and controlling media access, safety and what is reported can be improved and better controlled.

44. Media outlets may have more resources to mobilize on scene than do SAR authorities, and RCC operating plans should account for how to deal with such situations.

45. Information should be provided to the public on what SAR facilities are being used and, if possible, a web address or list of contact phone numbers should be provided for families, media and others to contact for more information.

46. Preparations should be made so that large numbers of callers can be accommodated without saturating the phone system or crashing the computer server.

47. Advance preparation of standby web pages by transportation companies and SAR authorities can help in responding to floods of requests for information. These pages can be quickly posted to provide general information the media can use. Web information should be timely and accurate. Once posted, these pages can be easily updated with the status of the incident and could also include:

- Contact information;
- Basic government or industry facts;
- Industry and SAR definitions;
- Photographs and statistics of aircraft, ships and SAR facilities;
- Answers to frequently asked questions;
- Links to other key sites;
- Information on passenger capacity, crew size, vessel plans and firefighting capabilities; and
- Library footage of a vessel inspection or of the crew performing lifesaving drills.

48. Besides the media, families and other organizations will also want this information.

Follow Up Actions

49. It is very important to develop and share lessons learned from actual MRO operations and exercises. However, concerns (often excessive) about legal liability may discourage highlighting matters that could have been done better.

50. Since lessons learned can help prevent recurring serious mistakes, agreement

should be reached among principal participants on how lessons learned can be depersonalized and made widely available. Lessons learned from MROs should be shared not just locally, but internationally.

51. Careful accounting for survivors after they have been delivered to a place of safety remains important. They need to be kept informed about plans for them and about the ongoing response operations. With large numbers of persons often staying in different places, keeping track of and working with them can be difficult.

52. Transportation companies are often best suited to handle and assist survivors during this time. Crewmembers may be placed at various locations to record passenger names and locations. Another possibility is for airlines or passenger ships to attach plastic cards to life vests to give passengers phone numbers for contacting the company. Some companies use bar coded bracelets to track children who are passengers.

53. Communicating with passengers is more difficult in remote areas, where phone service may be inadequate or lacking. If phones do exist, calling the airline or shipping company may be the best way to check in and find out information. In more populated areas, local agencies may have an emergency evacuation or other useful plan that can be implemented.

54. To protect passengers from harassment by interviewers and cameras, survivors might be placed in hotels or other places of refuge. However, triage and landing locations must be established and publicized to all rescue personnel and good Samaritans.

Appendix 1: Exercises for Mass Rescue Operations

Since opportunities to handle actual incidents involving mass rescues are rare and challenging, exercising MRO plans are particularly important. Mass evacuation and rescue operations are difficult and costly, leading to a tendency to use simulation excessively during exercises rather than physically exercising on scene efforts.

MRO exercise objectives need not be addressed in a single large exercise, but may be satisfied in part by routine incorporation into multiple drills, some intended mainly to test other systems. However, realistic drills are necessary and costly, and over 1,000 volunteer ship passengers or hundreds of volunteer aircraft passengers will likely be needed to conduct a realistic exercise. Separate rooms can be used to simulate command posts that would normally be in separate locations. MRO exercises should ideally achieve the following objectives:

- Account for:
  - Crew and passenger lists;
  - Rescued passengers and crew until they can return to their homes;
  - All persons associated with the rescue and aftermath operations;
  - Lifeboats, including empty boats or rafts; and
  - High freeboard issues for likely rescue facilities.
- Identify and task available resources:
  - Use of Amver;
  - Potential resources ashore and afloat;
  - Resources from local agencies (medical personnel, hospital facilities, fire department, general community, transportation resources); and
  - National and regional military and other resources.
- Evaluate notification processes, resource availability, timeliness of initial response, real-time elements, conference capabilities and overall coordination;

- Ensure all agency roles are sorted out, understood and properly followed;
- Test capabilities of potential OSCs and ability to transfer OSC duties;
- Evaluate span of control;
- Evacuate a ship or aircraft;
- Coordinate activities and achieve information exchanges:
    - Communications (RCC-RCC, government-industry, RCC-OSC, on scene, shore-ship, ground-air, ship-air, SAR facility-survival craft, etc.);
    - Information for all concerned (identify, merge, purge, retrieve and transfer to the right place in the right form at the right time);
    - New communication and information management technologies; and
    - Media and next-of-kin.
- Safely transfer and care for passengers (evacuation, in survival craft, rescue, medical, protection from environment, post-rescue transfers, etc.);
- Test all communication links that may be needed for notification, coordination and support;
- Conduct medical triage and provide first aid;
- Assess ship's safety management system effectiveness;
- Exercise coordination with local response agencies;
- Provide food, water, lifejackets and other protective clothing to survivors;
- Test mass rescue plans:
    - SAR services;
    - Company (including aircraft and ship plans);
    - Any relevant emergency response organizations, e.g., disaster response, military, firefighting and medical; and
    - Transportation and accommodations.
- Assess how effectively earlier lessons learned have been accounted for in updated plans and how well these lessons were disseminated;
- Exercise salvage and pollution abatement capabilities;
- Carry out emergency relocation of the disabled craft; and
- Exercise external affairs, such as international and public relations:
    - Necessary participants involved;
    - Joint information centers established quickly and properly staffed;
    - Press briefings handled effectively, e.g., consistent information from different sources;
    - Notification of the next of kin and family briefings;
    - Staff and equipment capacity to handle incoming requests for information; and
    - Rescued persons tracked, kept informed and needs monitored, and reunited with belongings.

The following steps are normally carried out during exercise planning:

- Agree on the exercise scenario, goals and extent;
- Assembly a multi-disciplinary planning team and agree on objectives for each aspect of the exercise;

- Develop the main events and associated timetables;
- Confirm availability of agencies to be involved, including any media representatives or volunteers;
- Confirm availability of transportation, buildings, equipment, aircraft, ships or other needed resources;
- Test all communications that will be used, including tests of radio and mobile phones at or near the locations where they will be used;
- Identify and brief all participants and people who will facilitate the exercise, and ensure that facilitators have good independent communications with person who will be controlling the exercise;
- Ensure that everyone involved knows what to do if an actual emergency should arise during the exercise;
- If observers are invited, arrange for their safety, and to keep them informed about the exercise progress;
- For longer exercises, arrange for food and toilet facilities;
- Use "exercise in progress" signs, advance notifications and other means to help ensure that persons not involved in the exercise do not become alarmed;
- Schedule times and places for debriefs;
- Agree and prepare conclusions and recommendations with the entity responsible for handling each recommendation along with the due date for any actions;
- Prepare a clear and concise report and distribute it as appropriate to the participating organizations; and
- Consider the outcome of this exercise in planning future exercises.

Appendix 2: Industry Planning and Response for Mass Rescue Operations

SAR authorities should coordinate MRO plans with companies that operate aircraft and ships designed to carry large numbers of persons. Such companies should share in preparations to minimize the chances that MROs will be needed, and to ensure success if they are. This Appendix provides guidance on industry roles, and discusses how companies could arrange for use of company field teams and emergency response centers as possible means of carrying out their MRO responsibilities.

Early notification of potential or developing MROs is critical, due to the level of effort required to mount a very large-scale response. It is much better to begin the response process and abort it should it become unnecessary, than to begin it later than necessary should the actual need exist. Pilots and masters should be advised and trained to notify SAR services at the earliest indication of a potential distress situation.

Company response organizations should be able to help SAR services by organizing support, equipment, advice and liaison any of their ships or aircraft.

Companies should be prepared to provide information to preclude the need for multiple sources attempting communications with the aircraft pilot in command or ship captain for information that is unavailable or available from another source. Receiving and handling requests for information aboard the distressed craft can interfere with the pilot's or master's ability to handle the emergency and handle critical on scene leadership needs.

Companies operating large aircraft or ships should be advised to be able to field a coordinated team that can handle emergency response functions around the clock should the need arise. Such a team might include staff as indicated in Figure E-1.

Team Leader	Maintains overview, directs operations and keeps management informed
Communicator	Maintains open (and possibly sole) line of communications to craft in distress
Coordinating Representative	Usually a pilot or master mariner, who coordinates with SAR and other emergency response authorities, organizes tugs, looks at itineraries, arranges to position ships or ground facilities that may be able to assist and organizes security and suitable delivery points for passengers crew when they are delivered to safety
Technical Representative	Maintains contact with regulatory authorities, classification societies, insurers and investigators and provides liaison and advice for firefighting, damage control, repairs and other specialized or technical matters
Environmental Representative	Involved with environmental impact and spill response
Medical Representative	Gives medical advice, tracks casualties and arranges medical and identification services for survivors
Passenger and Crew Representatives	Provides information and support to whoever is designated to care for next of kin and keep them informed, identifies transportation needs, and may need to deal with various countries, languages and cultures
Media Representative	Gathers information, coordinates public affairs matters with counterparts in other organizations, prepares press releases, briefs spokespersons and arranges availability of information by phone and web sites
Specialists	From within or outside the company who may facilitate some special aspect of the response or follow up

Figure E-1: Typical Company Field Team

The company may operate an Emergency Response Center (ERC) to maintain communications with the craft in distress, remotely monitor onboard sensors if feasible, and keep emergency information readily available. Such information might include passenger and crew data, aircraft or ship details, incident details, number of survival craft and status of the current situation.

Transportation companies should have readily available contacts with tour companies, shore excursion companies, airlines and cruise lines, hotels, etc., since such resources can be used to address many problems experienced with landing large numbers of survivors into a community.

Contingency plans for cooperation should be developed between SAR authorities and transportation companies, and these plans should be sufficiently exercised to ensure they would be effective should an actual mass rescue situation arise. Such plans should identify contacts, coordination procedures, responsibilities, and information sources that will be applicable for MROs. These plans should be kept up to date and readily available to all concerned.

Respective functions of the ERC and RCC should be covered in coordinated pre-established plans, and refined as appropriate for an actual incident. These centers must maintain close contact throughout the SAR event, coordinating and keeping each other appraised of significant plans and developments.

There are other steps the transportation industry could be urged to undertake to improve preparedness for MROs. The following are some examples:

- Carry SAR plans on board aircraft or ships;
- Provide water and thermal protection for evacuees appropriate for the operating area;
- Provide a means of rescue to bring people from the water to the deck of ships;
- Use preparation checklists provided by SAR authorities;
- Conduct an actual physical exercise in addition to simulations;
- Provide the capability to retrieve fully loaded lifeboats and rafts;
- Enhance lifeboat lifesaving capabilities;
- Provide ways to assist persons in lifeboats who are seasick, injured or weak;
- Provide on-board helicopter landing areas and helicopters;
- Prepare to assist survivors once they have been delivered to a place of safety;
- Have aircraft or ship status and specifications readily available, such as inspection records, design plans, communication capabilities, stability calculations, lifesaving appliances, classification society contacts, passenger and cargo manifests, etc., so that such information will not need to be obtained directly from a pilot or master; and
- Work with SAR authorities to develop and be able to rapidly deploy air droppable equipment or supplies for survivors, maintain strategically located caches for this purpose

Acceptance of certain responsibilities by industry demonstrates commitment to passenger safety and can free SAR services to handle critical arrangements relating to SAR resources, coordination and communications.

Appendix 3: Incident Command System Overview

For major incidents, crisis management for the overall response may also be needed. The Incident Command System (ICS), one widely used means of meeting this need, but works best with some advance familiarization and exercising within and among the transportation and emergency response communities. Since SAR and transportation authorities are likely to encounter use of the ICS within emergency response communities, this Appendix provides general information for familiarization with ICS. The following terms are relevant to the ICS:

- *Incident Commander (IC):* the primary person functioning as a part of the incident command system, usually at or near the scene, responsible for decisions, objectives, strategies and priorities relating to emergency response;
- *Incident Command Post (ICP):* location at which primary functions are carried out for the Incident Command System;
- *Incident Command System (ICS):* on scene emergency management concept that provides an integrated organizational structure adaptable to the complexity and demands of an major incident involving multiple missions, response organizations or jurisdictions; and
- *Unified Command (UC):* the incident commander role of the incident command system expanded to include a team of representatives that manages a major incident by establishing common objectives and strategies and directing their implementation The ICS is designed for use when multiple organizations and jurisdictions need to

be jointly involved in an emergency response activity and coordinate their efforts.

While organizations have their respective systems of command and control or coordination, these should be compatible with systems others use so organizations can function well jointly when necessary. Commonality and similarities among crisis management systems locally, regionally and internationally foster effective joint efforts.

The ICS does not take control, responsibility or authority away from SAR services; SAR services remain focused on lifesaving, while the ICS focuses on promoting an effective overall incident response.

The ICS training, advance coordination, and liaison will be rewarded by better performance and success when a crisis situation arises. As a tool for managing major incidents, the ICS:

- Accommodates all risks and hazards;
- Is simple, powerful, and flexible;
- Can easily expand or contract as the incident warrants;
- Relieves the SAR system of coordinating non-SAR missions;
- Enables SMC to use the ICS contacts to draw on additional resources; and
- Ensure better communication and cooperation between agencies

The ICS organization can grow or shrink as the situation dictates, and provides a logical process and progression to achieve results. Its organization should be allowed to grow with increased demand and shrink when operations decline, both of which require anticipation.

Advantages of the ICS can be lost when organizations develop their own unique and relatively complex versions of the ICS; it works best when it remains simple, flexible and standardized so everyone on scene from all organizations understands it.

In its basic form a person is designated as the IC to handle overall coordination, including setting objectives and priorities.

Support functions (sections supported by one or more persons) can be established *as needed* and on the scale needed to keep the IC informed and assist in certain areas. The four support sections in the ICS organization are as follows:

- *Operations Section* **–** helps manage resources to carry out the operations;
- *Planning Section* **–** helps develop action plans, collect and evaluate information, maintain resource status and arrange to scale up or scale down activities;
- *Logistics Section* **–** helps provide resources and services needed to support the incident response, including personnel, transportation, supplies, facilities and equipment; and
- *Finance-Administration Section* **–** assists with monitoring costs, providing accounting and procurements, keeping time records, doing cost analysis and other administrative matters.

Other additions to directly assist the IC might include:

- An *Information Officer* **–** assists the media and others seeking incident information, ensures the IC has appropriate information available, and helps to provide information to the public and families of persons in distress;
- A *Safety Officer* – monitors safety conditions and develops measures to ensure safety and reduce risks; and

- *Liaison Officers* **–** serve as primary contacts for on scene representatives of their respective organizations.

Figure E-2 illustrates the basic ICS organization.

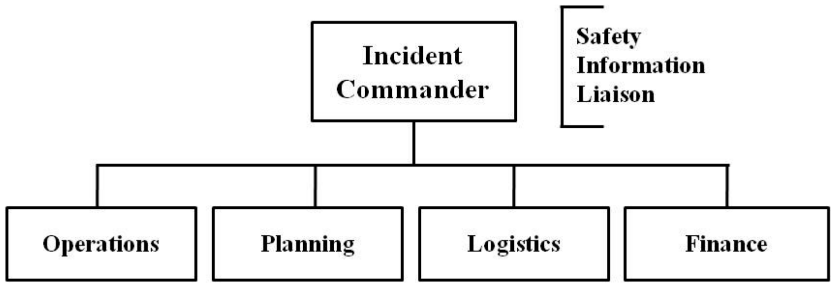

Figure E-2: Incident Command System Organization

The IC usually establishes an Incident Command Post (ICP) as a base for ICS activities.

For particularly demanding incidents, the ICS organization can be expanded. For example, for operations that are particularly large-scale, sustained or complex, the IC can be augmented by establishment of an actual or virtual (without everyone collocated) Unified Command (UC) populated by operational managers representing the primary response organizations involved. If the UC is made up of linked independent command posts, a government post and an industry post for example, ideally there should still be a person from each command post assigned to work at the other post(s) involved.

For a situation like a major passenger aircraft or ship disaster, a Joint Information Center (JIC) should be established, perhaps in association with the Information Officer position, to facilitate and coordinate the vast information that will need to be managed internally and shared with the public.

Whether the ICS should be used depends on the duration and complexity of the incident. If it is used, coordination of SAR functions with other functions is usually achieved by assigning a representative of the SAR agency or of the SMC to the Operations Section of the ICS organization. This allows SAR services to be plugged into the ICS and overall operations while still being able to function with relative independence in accordance with normal SAR procedures. The ICS has an overall incident focus, while SAR services must remain focused on lifesaving.

A determination should be made as early as possible on who will be responsible for overall coordination, and how the overall response will be organized and managed. Procedures that all involved understand and support should be applied to managing the overall response for mutual support, effort prioritization, and optimal use of available resources, and to enhance on scene safety and effectiveness.

Inter-agency contingency planning should identify who the IC should be for various scenarios. Typically, the IC will be assigned from the government organization with primary responsibility for the type of function most prominent for the particular incident. However, with appropriate access to experts and information from all agencies concerned, a key consideration in selecting the IC should be familiarity and experience with the IC function, i.e., the IC should be a person who can best handle the responsibility.

The IC should be someone good at managing on scene operations, and will usually be located at or near the scene. Everyone involved, regardless of rank or status, will normally be in a support role for the IC, similar to the way the SMC function is carried out.

The IC function can be transferred as the situation warrants, although such transfers should be minimized as is the case for transfers of SMC functions during a mission. It is important to designate an IC early, in contingency plans if possible, and make a transfer later as appropriate, as delay in designating an IC can be quite detrimental.

Except when functions other than SAR are relatively insignificant to the incident response, the IC should normally be someone other than the SMC. The priority mission will always be lifesaving, and the SMC should normally remain unencumbered by additional non-SAR duties.

Similarly, the IC's command post should normally be at a location other than in the RCC, because the RCC needs to remain focused on, and be vigilant and responsive to, its normal SAR responsibilities in addition to handling SAR aspects of the major incident.