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**Geospatial Standard Operating Guidance for Multi-Agency Coordination Centers**

***SUPPLEMENT FOR COASTAL OIL SPILLS***

****

**Version 1.0**

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Produced by the -
National Alliance for Public Safety GIS Foundation
Standards Working Group

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TABLE OF CONTENTS

[TABLE OF CONTENTS 3](#_Toc359239192)

[List of Figures 5](#_Toc359239193)

[CREDITS 6](#_Toc359239194)

[DOCUMENT BACKGROUND 7](#_Toc359239195)

[Tips on How to Use this Guidance Document 8](#_Toc359239196)

[INTRODUCTION 9](#_Toc359239197)

[How GIS Can Assist Emergency Managers and First Responders? 12](#_Toc359239198)

[What is GIS? 12](#_Toc359239199)

[What Types of Questions GIS Can Answer? 13](#_Toc359239200)

[What Resources are Needed?/Where Can I Get Them? 13](#_Toc359239201)

[NAPSG Quick Guide 14](#_Toc359239202)

[List of Acronyms, Terms and Definitions 14](#_Toc359239203)

[keys to the successful use of gis that emergency managers and first responders should know 15](#_Toc359239204)

[What Do GIS Professionals Need to Know About Emergency Management? 16](#_Toc359239205)

[Emergency Management Systems 16](#_Toc359239206)

[Emergency Operations Center 18](#_Toc359239207)

[Preparedness and Planning Documents 19](#_Toc359239208)

[Emergency Management Assistance Compact (EMAC) 22](#_Toc359239209)

[International Charter 22](#_Toc359239210)

[Crisis Information Management Systems 22](#_Toc359239211)

[GIS Products and Presentations 23](#_Toc359239212)

[keys to the successful use of gis that gis professionals should know 25](#_Toc359239213)

[Standard operating procedures for coastal oil spill response 27](#_Toc359239214)

[SOP Checklist 27](#_Toc359239215)

[GIS Resource & Staffing Requirements 27](#_Toc359239216)

[Resource Requirements 28](#_Toc359239217)

[Staffing Requirements 29](#_Toc359239218)

[Staffing and Team Transition 32](#_Toc359239219)

[GIS Responder Expectations 33](#_Toc359239220)

[ICP/DOC/MOC GIS Staffing 33](#_Toc359239221)

[Team Transition 33](#_Toc359239222)

[File Naming and Directory Structure 35](#_Toc359239223)

[GIS File Directory Structure 35](#_Toc359239224)

[GIS File Naming Convention 37](#_Toc359239225)

[Communication 38](#_Toc359239226)

[Mapping Protocols 39](#_Toc359239227)

[Common Operating Platform 40](#_Toc359239228)

[Consumable Services 40](#_Toc359239229)

[Obtaining Event Data 40](#_Toc359239230)

[Map Templates 41](#_Toc359239231)

[Map Elements 42](#_Toc359239232)

[Product Format Conventions 42](#_Toc359239233)

[Map Distribution Regulations 42](#_Toc359239234)

[Map Symbology Guidelines 43](#_Toc359239235)

[QA/QC 43](#_Toc359239236)

[Standard Map Product Definitions 43](#_Toc359239237)

[Optional Map Product Definitions 43](#_Toc359239238)

 [Data Protocols 44](#_Toc359239239)

[Data Format Conventions 45](#_Toc359239240)

[Data Backup Policy 46](#_Toc359239241)

[Briefing Cycles 46](#_Toc359239242)

[US National Grid 46](#_Toc359239243)

[Data Acquisition and Dissemination 47](#_Toc359239244)

[Data Management Plan 47](#_Toc359239245)

[Essential Elements of Information 48](#_Toc359239246)

[NOAA Trajectory Forecasts 51](#_Toc359239249)

[Compiled Imagery 52](#_Toc359239250)

[National & Federal Geospatial Products and Programs 52](#_Toc359239251)

[State/Local Geospatial Products and Programs 54](#_Toc359239252)

[Data Dissemination 54](#_Toc359239253)

[Data Dissemination Protocols 56](#_Toc359239254)

[Information Dissemination Protocols 56](#_Toc359239255)

[Data Connections 56](#_Toc359239256)

 [Enterprise Geodatabase 56](#_Toc359239257)

[GIS Emergency DVD 57](#_Toc359239258)

[Public Data Sharing/Exchange Policy 57](#_Toc359239259)

[Documentation and Metadata 59](#_Toc359239260)

[Dissemination of Metadata 59](#_Toc359239261)

[Recovery 59](#_Toc359239262)

[Training/Exercise 60](#_Toc359239263)

[National Preparedness for Response Exercise Program (PREP) 60](#_Toc359239264)

[Appendix 1: SOP Checklist 62](#_Toc359239265)

[Appendix 2: List of Acronyms, Terms and Definitions 67](#_Toc359239266)

[Appendix 3: State/Local Geospatial Products and Programs 71](#_Toc359239267)

[Appendix 4: List of Referenced Links 72](#_Toc359239268)

# List of Figures

[Figure 1-Example ICS Organizational Structure. Examples are for reference purposes only and are not intended to set a standard. 17](#_Toc359239181)

[Figure 2-FEMA Multi-Agency Coordination System Diagram, from NIMS. Examples are for reference purposes only and are not intended to set a standard. 18](#_Toc359239182)

[Figure 3-RCP and USCG Sector Boundaries for ACP’s 19](#_Toc359239183)

[Figure 4-Example GIS Supply List. Examples are for reference purposes only and are not intended to set a standard. 29](#_Toc359239184)

[Figure 5-Geospatial Roles and Responsibilities – Similar to the DHS GeoCONOPS, Section 2.1, Table 21. Examples are for reference purposes only and are not intended to set a standard. 32](#_Toc359239185)

[Figure 6-Example Directory Structure 36](#_Toc359239186)

[Figure 7-Example File Naming Conventions 37](#_Toc359239187)

[Figure 8-Example Data Format Conventions 45](#_Toc359239188)

[Figure 9-Example Data Backup Policy 46](#_Toc359239189)

[Figure 10-Example Minimum Essential Datasets 51](#_Toc359239190)

[Figure 11-Example GIS Press Package Policy 58](#_Toc359239191)

# CREDITS

Many dedicated leaders in the public safety and GIS communities supported the development of this Geospatial Standard Operating Guidance (SOG) for coastal oil spills response. Typically this will involve the United States Coast Guard, the Environmental Protection Agency, and Response Program coordination with the state and local emergency responders following the National Response System protocols.

Foremost, the National Alliance for Public Safety GIS Foundation and its partners in the project are grateful for the time and expertise that so many practitioners contributed in developing this.

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# DOCUMENT BACKGROUND

This Standard Operating Guidance (SOG) document was developed by a team of Geographic Information Systems (GIS) specialists and professionals, leaders in public safety operations & management, and incident support subject matter experts. This document strives to serve as a template to support national GIS standards for coastal oil spill emergency response using GIS and technical professionals, embedded within an Incident Command System (ICS) structure.

This document proposes a set of guidelines for coordinating geospatial emergency response efforts. These guidelines are intended to serve as a shared foundation, encouraging improved communication and collaboration amongst GIS and other emergency staff responding to a coastal oil spill. This is a living document that provides a starting point to produce guidelines for the organization and management of geospatial data, map creation and output within Multiagency Coordination Centers (MACC’s). It is anticipated that this document will be updated as more and more local agencies adopt GIS operating procedures for emergency management and provide best practices back to the NAPSG Foundation.

Intended as a template, agencies are encouraged to modify document content to accommodate local and regional specific details. Modifications may range from referencing local datasets and file locations to adjusting standard map products to better account for local hazards or values at risk. It is recommended that you work with your local emergency service coordinators to create a Standard Operating Procedure (SOP) or Standard Operating Guidance (SOG) that meets the unique needs of your agency and/or jurisdiction for coastal oil spills.

The Department of Homeland Security’s (DHS) Federal Interagency Geospatial Concept of Operations (GeoCONOPS) provides additional information on federal geospatial activities undertaken in support of emergency management. The DHS GeoCONOPS is intended to be a blueprint for coordinating geospatial activities in support of the National Response Framework. The DHS GeoCONOPS is structured to address key mission areas of life and property saving, damage assessment, recovery, and Federal Operation Centers. To obtain a copy of GeoCONOPS visit, <http://www.publicintelligence.net/dhs-geoconops-v4>

## Tips on How to Use this Guidance Document

Within this document, *background information* on each section is offered in blue text boxes at the beginning of each chapter*.* The background information is intended to guide the user on how to utilize the associated guidance. Text which is bold, italicized, and in carrots delineates where **<<*local jurisdictional input is needed>>***. Examples are given in motion quotes and are intended to provide the reader with tips on how to use and interpret the examples provided. Diagrams are also marked as examples to indicate where local inputs are required. These examples and diagrams are offered up only for reference purposes and are not intended to set a standard.

It is recommended that, once your agency has created a GIS operations document for coastal oil spills, it be exercised when emergency management agencies or first responders conduct exercises. This is a good opportunity to see if the document actually works and provides useful information. If possible GIS staff should provide injects to exercises that specifically test different elements within the document. Exercise after action reports should identify areas of the document and GIS response that worked and did not work. The document should be updated after each exercise to improve its effectiveness. This document includes examples of exercises to help get your organization started.

Involvement in Regional Response Teams (RRT’s) is also recommended. There are thirteen RRT’s in the United States, and are composed of representatives of the federal agencies that make up the National Response Team, and state representatives. They have four major responsibilities: 1) response, 2) planning, 3) training, and 4) coordination. To learn more visit: <http://www.nrt.org>

For more information on how to integrate geospatial technologies within your public safety organization, please visit <http://carat.napsgfoundation.org/> for best practices and a prototype version of the interactive Capability and Readiness Assessment Tool (CARAT). The CARAT is intended for public safety practitioners interested in learning about and/or building a GIS to support their agencies' work. It is designed to serve as an assessment tool to develop a roadmap for anyone interested in learning about, doing, or directing a GIS in support of public safety.

# INTRODUCTION

***Purpose*:** This Standard Operating Guidance document (SOG) was prepared to provide guidance and key components of a template SOG that will help to facilitate local agencies and jurisdiction with the creation, preparation, coordination, and dissemination of GIS services and products during coastal oil spill events. This is a living document that provides a starting point to produce guidelines for the organization and management of GIS data, map creation and output within the National Response System (NRS) specifically. The NRS is a multi-layered system of individuals and teams from local, state and federal agencies and industry that share expertise and resources during an oil spill to ensure effective and efficient clean-up and control. For more information visit: <http://www.epa.gov/oem/content/nrs/>

Additionally, proper internal and external communication channels for sharing these products are addressed.

When coastal oil spills occur, time is a critical factor. Evaluation and containment of the incident needs to happen quickly in order to minimize the spread of the oil, impacts to the coastal populations and the environment and allow cleanup to begin. When the Deepwater Horizon oil rig exploded in 2010, over 200 million gallons of oil leaked into the ocean over a five-month period. This document attempts to apply many of the lessons learned during a spill to plans for future incidents. It is intended to provide emergency managers, first responders and GIS professionals another tool that they can use during a coastal oil spill incident to provide for a smoother response to future incidents.

***Audience:*** The intended audience for this document includes all local, state and federal staff assigned GIS positions supporting a coastal oil spill emergency event as well as the emergency management professionals that they will integrate with and report to. It provides guidance for professionals without a background in responding to oil spill disasters. The responding staff will be performing GIS for the event in a coordination center, most likely an Incident Command System (ICS), therefore, this document focuses on the ICS. During an oil spill event, GIS staff are embedded directly into the ICS structure. GIS personnel directly support the Unified Command and the situation unit during an oil spill response. A liaison may work to expand data and information outward to a Multiagency Coordination Center (MACC), if needed, but for a spill the majority of data creation is within the ICS units. For more information visit: <http://www.fema.gov/incident-command-system>. Response to an oil spill should be addressed within the National Response System framework. For more information visit: <http://www.epa.gov/oem/content/nrs/nrp.htm>

The United States Coast Guard has created an Incident Management Handbook (IMH) with the purpose of assisting personnel in the use of the ICS during an emergency response operation. It provides guidance to be used before, during and after an incident. For more information visit: <http://www.uscg.mil/hq/nsfweb/docs/FinalIMH18AUG2006.pdf>

For additional information on federal geospatial activities in support of emergency management, please see the Federal Interagency Geospatial Concept of Operations (GeoCONOPS) coordinated by the Department of Homeland Security. For more information on the GeoCONOPS, see: <http://www.publicintelligence.net/dhs-geoconops-v4>

***Objectives:***

Seven objectives were set to adequately address GIS needs and practices in an emergency event:

1. Develop standard operating guideline templates for coastal oil spills, with a focus on State and Local Government needs.
2. Ensure the document and standards are consistent with the GeoCONOPS and the current NAPSG SOG.
3. Provide guidance for Local and State GIS professionals without an oil spill background to be able to quickly understand what is required of them and how they can more efficiently become productive members of the emergency management/first responder team.
4. Determine key GIS supplies and tools for MACC’s (Incident Command Post (ICP), Department Operations Center (DOC), or Medical Operations Center (MOC)).
5. Determine data and mapping protocols.
6. Determine and document protocols for data/map dissemination/sharing via web applications.
7. Determine data and map sharing practices with external contacts.

In order to meet these seven objectives, this document is broken down into the following chapters:

How GIS Can Assist Emergency Managers and First Responders – This section aids emergency responders who may be unfamiliar with the usefulness of GIS. This section aims to provide an overview of the capabilities for GIS within coastal oil spill response.

Keys to the Successful Use of GIS that Emergency Managers and First Responders Should Know – Provides general information about the use of GIS to emergency managers and first responders in order to help them utilize the technology and data to its full potential.

What Do GIS Professionals Need to Know About Emergency Management? – Outlines the various emergency management organizational structures and physical layout of the MACC’s to aid GIS Staff when responding to an Emergency Operations Center (EOC), DOC, or MOC.

Keys to the Successful Use of GIS that GIS Professionals Should Know – Provides general information to GIS professionals that can help them understand the best ways in which GIS, the technology and the data can be used during an event.

Standard Operating Procedure for Coastal Oil Spill Response – Discusses the main components involved in a coastal oil spill response, including a SOP checklist, GIS staffing and resource requirements, mapping and data protocols and metadata guidelines among other elements.

SOP Checklist – A general checklist, summing up the organization’s SOP, of what steps should be taken during an event. The document provided should be customized by the individual organizations to best suit their response to emergency events.

GIS Staffing and Resource Requirements – Outlines the hardware, software, data, map and general resources necessary for GIS staff to perform their jobs as well as the GIS knowledge, skills and abilities that are required to adequately function in the many GIS emergency support roles that exist.

Staffing and Team Transition – Outlines the procedure for requesting additional GIS support, tracking GIS requests and handling shift changes.

File Naming and Directory Structure – Provides standardized naming conventions for GIS files and directory structure to support data management and facilitate identification of GIS data during shift changes.

Communication – Provides information for communication with Federal contacts, State or Federal coordination calls and special interest groups.

Mapping Protocols – Details required map elements, data content and format conventions, distribution regulations, symbology guidelines and QA/QC procedures. This section also outlines agency specific cartographic standards for map products.

Data Protocols – Details data format conventions, backup policy, data sharing and the use of web applications to support GIS staff as well as data/map end users.

Data Acquisition and Dissemination – Provides information for briefing cycles and when incident data become available and accessible to GIS staff.

Documentation and Metadata – Outlines the documentation/metadata expectations and procedures.

Recovery – Discusses damage assessment and timelines for data and information availability.

Training/Exercise – Discusses the PREP program and the importance of pre-event training. Also gives examples of training exercises for organizations and agencies can use.

# How GIS Can Assist Emergency Managers and First Responders?

All phases of emergency management involve the collection, analysis, and dissemination of geospatial data/information in a logical manner. Geographic Information Systems (GIS) can provide a mechanism to centralize and visually display all of data relevant to an oil spill in a geographic context. It can allow hazards such as oil spill trajectories to be overlaid and viewed with other map data such as boom locations, sensitive species locations, critical facilities, census information, archaeology sites, etc. In addition, it can calculate potential areas of impact so that emergency managers can better understand the inherent risk and formulate a response or, even, foresee recovery needs. This information can then be displayed in maps, charts, graphs, reports or web sites to effectively disseminate data.

## What is GIS?

A GIS is an information system that understands location. Much more than a map, a true GIS is intelligent and interactive.

GIS products are built with layers of data. Each of these layers can be stored in an individual file and displayed with each other to give a sense of relational location. For example data can include:

* Oil spill source location
* Oil spill trajectory models
* Boom locations and types
* Weather information
* Environmentally sensitive areas
* Health hazards
* Economic impacts
* Roads/Infrastructure (including boat launches and mooring locations
* Land use/Land cover
* Environmental Sensitivity Index
* Place names and borders
* Managed areas
* Population Data (Census)

This data can be ‘layered’ together on a map to show which sensitive species habitats will be affected by the coastal oil spill, the current weather conditions that will influence the movement of the oil, the best locations to deploy the booms, as well as the location of those first responders who will be involved in the containment.

This is what gives GIS its distinctive analytic ability. Because information can be organized by a specific place on the earth, you can see relationships between otherwise disparate datasets. GIS provides you with the type of situational awareness that enhances incident-level decision making and helps save environmentally sensitive areas, property values, and critical facilities.

## What Types of Questions GIS Can Answer?

GIS can answer many questions. Of particular interest when responding in an EOC to a coastal oil spill event, one may be interested in the following:

* Where is the oil spill?
	+ GIS can be used to identify the location of any facilities in the area, the types of facilities and how much oil they contain.
* Where will or has the oil reached the shore?
* GIS can display helpful information such as the tide charts, wind direction and speed, oil type and water temperature.
* GIS can display the outputs of existing scientific models along with their input data (i.e., oil trajectories, tidal heights, wind direction and speed, water temperature).
* Where are potential staging areas located?
* Where are access points located?
* Who are the property owners?
* How can the coastline be protected?
	+ What is the Area Response Plan?
	+ What is the location and status of booming operations?
	+ Where are the response vessels located Automatic Identification System (AIS)?
	+ Where are Shoreline Cleanup and Assessment Teams (SCAT) deployed?
* What are the potential environmental impacts?
	+ What resources are at risk (i.e., wildlife, bird rookeries, endangered species habitat, natural resources at risk or impacted)?
	+ Locations of oiled wildlife?
	+ What are the protection priorities for sensitive resources?
* What will be the economic impacts?
	+ Once it has been determined where the oil will reach the shore, data such as population information, recreational facilities (beaches, boat launch sites, fishing areas), business locations and types, and critical facility locations can be mapped, and an analysis can be performed to see what will be affected and estimate impacts. Claims data can be geocoded to help verify businesses or citizens that are impacted by a spill. This is especially useful to public relations and financial groups to track claims through the recovery process.

## What Resources are Needed?/Where Can I Get Them?

In order to run a successful GIS response, certain resources are needed. The GIS Resources and Staffing section of this SOG aids in identifying the staffing and resources needed for a successful response. What is provided is in that section should be considered optimum. For most situations, GIS Team members will fill multiple roles.

 It is recommended that emergency managers and first responders reference their RRT for assistance when staffing for an incident. The RRTs are primarily planning, policy and coordinating bodies. They provide guidance and work to locate assistance requested during an incident. RRTs are often a good source of clearinghouse data, GIS tools and information. They are a coordination and communication asset, and are valuable planning and best practices resources.

If you don’t have adequate GIS resources, it is suggested that you contact your State GIS Coordinator. Your state’s coordinator would be able to guide you to available resources. A listing of State Coordinators is available at: <http://www.nsgic.org/state-representatives>. If there are not adequate GIS resources within your state, states have the option of obtaining additional resources from other states through the Emergency Management Assistance Cooperative. Contact your State EOC to determine if and how that is an appropriate resource to meet your needs.

## NAPSG Quick Guide

For more information please reference the NAPSG publication: A Quick Guide to Building a GIS for Your Public Safety Agency at the NAPSG website:

<http://www.napsgfoundation.org/attachments/article/81/Quick-Guide-GIS-Public-Safety-May-2011-PDF.pdf>

## List of Acronyms, Terms and Definitions

See Appendix 2 at the end of the document.

# keys to the successful use of gis that emergency managers and first responders should know

The most important keys to a successful GIS aided response are integration, training, communication, cooperation, and understanding. This section discusses the key elements emergency managers and first responders need to understand in order for GIS to be most effective during an event.

1. Have a GIS team selected and trained (minimum ICS 100/300) prior to an oil spill incident.
2. Provide appropriate bandwidth, Internet connectivity, servers, printers/plotters, supplies and IT staff support.
3. Meet with your GIS team prior to any oil spill incident to understand what GIS can provide to assist you emergency management needs and the timing required to obtain that product.
4. Integrate the use of GIS into standard operating procedures/emergency management workflow.
5. Provide regular communication with the GIS team on emergency management and first responder needs, expectations and product delivery timetables. Ensure that the GIS staff are in constant contact with the data management group.
6. Provide the GIS professionals a clearly defined organizational chart so that they can understand the structure of the organization and who to go to get things done.
7. Provide your GIS team with regular training on GIS software/tools as well as incident scenarios; integrate the use of GIS into emergency management drills/scenarios.
8. Provide a space/room in the EOC or ICP for the GIS team to work together/collaborate. This will help to streamline workflow and foster for better communication.
9. Designate a GIS liaison to work with the emergency managers and first responders to meet their needs and suggest support that can assist them in resolving their issues.
10. Understand that GIS can be used for more than planning.
11. Enable proper coordination with State and Federal Governments when appropriate.
12. GIS staff can benefit from NOAA training (such as Science of Oil Spills (SOS) and Shoreline Cleanup Assessment Technique (SCAT)). It is recommended they have a working understanding of NOAA/EPA modeling programs such as GNOME, Adios2 and Marplot.
13. GIS personnel may be exposed to certain pollutants while responding to a spill; consider having them trained in HAZWOPER.

# What Do GIS Professionals Need to Know About Emergency Management?

In order to respond to an oil spill incident as a GIS professional, it is important to understand the various emergency management and incident command systems that are in place.

Unlike other emergency management incidents, coastal oil spills are governed by the Oil Pollution Act (OPA-90). This act requires that all oil spills be reported to Federal, State, and local governments which then place that information into various databases. In addition, the OPA-90 provides specific requirements for government and industry contingency planning. The OPA-90 also influenced the most recent revisions of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The NCP is a three-tiered system (Federal, Area Committees, and local officials) that establishes the procedures for creating contingency plans and responding to coastal oil spills. Finally, the OPA-90 also establishes increased penalties for regulatory non-compliance, gives the response and enforcement authorities of the Federal government more influence, and allows the establishment of regulations governing prevention and response during an event.

It is important to understand how your specific ICS is set up and understand proper chain of command. There are several ways you can do that. Research how your agency’s ICS is set up. The organization’s organizational chart can be very useful. GIS responders may also want to refer to and become familiar with the DHS GeoCONOPS if Federal Government agencies are to become involved.

## Emergency Management Systems

Emergency management systems are policy documents with the purpose of guiding agencies on their internal organization when responding to coastal oil spill disasters.

Oil Pollution Act (OPA-90)
The **Oil Pollution Act (OPA-90)** was signed into law in August 1990, and established contingency plan requirements in the event of an oil spill incident for both the United States government and the oil industry. It also established provisions that would allow the federal government the ability, funding and resources to respond to oil spills. The National Oil Spill Liability Trust Fund was created as part of the OPA-90, which allows up to one billion dollars be available per incident. For more information on available funds visit: <http://www.uscg.mil/npfc/docs/PDFs/OSLTF_Funding_for_Oil_Spills.pdf> The OPA-90 also increased penalties for regulatory non-compliance. For more information about OPA-90 see: <http://www.epa.gov/osweroe1/content/lawsregs/opaover.htm>

NIMS
The **National Incident Management System (NIMS)** was released in March 2004 by the Department of Homeland Security (DHS). NIMS offers a standardized approach to incident management and response. It was developed to allow first responders from different jurisdictions and disciplines to better work together in an effort to respond to all hazards including natural disasters and emergencies. Benefits of NIMS include a unified approach to incident management, standard command and management structures, emphasis on preparedness, mutual aid and resource management. NIMS lays out the standardized structure of an ICS. For more information about NIMS see: [http://www.nrt.org/production/NRT/NRTWeb.nsf/AllAttachmentsByTitle/SA-52ICSUCTA/$File/ICSUCTA.pdf?OpenElement](http://www.nrt.org/production/NRT/NRTWeb.nsf/AllAttachmentsByTitle/SA-52ICSUCTA/%24File/ICSUCTA.pdf?OpenElement)

ICS
The **Incident Command System (ICS)** is a command structure set up in the field for first responders. Some of these command systems have GIS staff. ICS provides a flexible mechanism for coordinated and collaborative incident management for first responders in the field. The physical location where the ICS is set up is called the Incident Command Post (ICP). If you are requested to respond to or drop off information to the ICP, the following organizational structure is helpful for finding the right people. For more information about ICS see: <http://homeport.uscg.mil>



Figure 1-Example ICS Organizational Structure. Examples are for reference purposes only and are not intended to set a standard.

Federal Interagency Geospatial Concept of Operations (GeoCONOPS)
The **DHS GeoCONOPS** serves as a blueprint for coordinating federal Departments and Agencies and their respective activities in support of incidents per the National Response Framework. The DHS GeoCONOPS identifies federal geospatial activities based on key mission areas of life and property saving, damage assessment, recovery, and Federal Operation Centers. For more information about GeoCONOPS: <http://www.publicintelligence.net/dhs-geoconops-v4>

Multi-Agency Coordination System
According to FEMA, multiagency coordination is a process that allows all levels of government and all disciplines to work together more efficiently and effectively. Often, cooperating agencies develop a **Multiagency Coordination System (MACS)** to better define how they will work together and to work together more efficiently; however, multiagency coordination can take place without established protocols. MACS may be put in motion regardless of the location, personnel titles, or organizational structure. MACC’s such as EOC’s, and DOC’s, etc. are part of several system elements included within the MACS.  EOC’s and DOC’s are intended to facilitate MACS functions, and may provide support to Area Command, Incident Command, or Unified Command when resource needs exceed local capabilities.



Figure 2-FEMA Multi-Agency Coordination System Diagram, from NIMS. Examples are for reference purposes only and are not intended to set a standard.

United States Coast Guard Incident Management Handbook (IMH)
The purpose of the **United States Coast Guard Incident Management Handbook (IMH)** is to assist US Coast Guard personnel in using the NIMS Incident Command System (ICS) during multi-contingency response operations and planned events. The intention of the IMH is to be used as a reference job aid. It is not a policy document, but rather guidance for emergency responders.

## Emergency Operations Center

NIMS defines **Emergency Operations Centers (EOC’s)** as a component of a Multiagency Coordination System. EOC’s do not have to be organized around ICS. NIMS states that "EOC’s may be organized by major discipline (e.g., fire, law enforcement, or emergency medical services); by emergency support function (e.g., transportation, communications, public works and engineering, or resource support); by jurisdiction (e.g., city, county, or region); or, more likely, by some combination thereof. Incident Command Posts need reliable communication links to EOC’s to ensure effective and efficient incident management.” Personnel representing multiple jurisdictions and functional disciplines and a wide variety of resources may staff EOC’s.

An EOC is activated to support the on-scene response during an escalating incident by relieving the burden of external coordination and securing additional resources.

An EOC is the physical location where organizations and agencies come together during an emergency to coordinate response and recovery actions and resources. Often times during a coastal oil spill the EOC might be referred to as the area command post. Typically, either of these terms can be used during a coastal oil spill incident being conducted at the local level. An EOC is often an established, physical location that is set up as an operations center. During an event, smaller incident command posts (ICPs) are often established. ICPs can be set up anywhere-a high school gymnasium or a mobile command in a parking lot. Coastal oil spill incidents usually utilize an ICP, and major decisions about the event are made by the Unified Command (UC).



Figure 3-RCP and USCG Sector Boundaries for ACP’s

## Preparedness and Planning Documents

The purpose of these documents is to assist with the response to a coastal oil spill incident. They provide information about an area being effected by a spill, and are often used pre-event to create a response plan, or post-event to determine where to focus restoration or cleanup.

Area Contingency Plans (ACP)

**Area Contingency Plans (ACP’s)** were established by the Regional Response Teams (RRT’s). The RRT’s recognize that spills can occur at various geographic scopes, and, therefore, created five basic levels of planning: facility, local, area, regional and national. Area plans are typically activated when facilities are unable to handle the spill without assistance. The US Coast Guard is involved even when the responsible party is taking action. The United States Coast Guard acts in an over sight role ensuring the clean up is being conducted properly. The National Response System established 13 “Regions” nationwide under the authority of the Oil Pollution Act of 1990. Committees were also established to prepare contingency plans for each of the 13 regions. These committees are comprised of federal, state, and local government agencies. It is important to note that each state has an ACP which the GIS team should have read and incorporated into their templates and data requirements pre-event. For more information about ACP’s: <http://www.nrt.org/Production/NRT/RRTHome.nsf/AllPages/othr_rrt.htm?OpenDocument>

Environmental Sensitivity Indexes (ESI’s)

NOAA defines **Environmental Sensitivity Indexes (ESI’s)** as maps that compile information for coastal shoreline sensitivity, biological resources, and human resources. While ESI is the widely used acronym, these maps, atlases, and data are officially titled “Sensitivity of Coastal Habitats and Wildlife to Spilled Oil Atlases”. The information is used to create pre-event cleanup strategies to help emergency managers and first responders to prepare to take action during a coastal oil spill. It is important to note that each state has one or more ESI atlases and associated GIS data which the GIS team should have read, understood, and incorporated into their templates and data requirements pre-event. For more information about ESI’s see: <http://response.restoration.noaa.gov/esi>

NOAA has recently begun making every ESI atlas and GIS dataset in the United States freely downloadable via the internet at: <http://response.restoration.noaa.gov/maps-and-spatial-data/download-esi-maps-and-gis-data.html>

Shoreline sensitivity to spilled oil is classified based upon:

* Relative exposure to wave and tidal energy
* Biological productivity and sensitivity
* Substrate type (grain, size, mobility, and penetration)
* Shoreline slope
* Ease of cleanup
* Ease of restoration

This relative ranking scale is based upon overall sensitivity to spilled oils has a range from 1 to 10, with 10 being the most sensitive. In many atlases, there are additional subdivisions within this general scale such as A, B, C, etc. These subdivisions help to further refine shoreline types. A typical ESI map legend will generally look like the following:



Geographic Response Plans (GRP’s) Maps

**Geographic Response Plan (GRP’s) Maps** are defined as site-specific strategies for the initial response to a spill of oil or oil products on water, and whose goal is to ensure the response to a spill is fast and effective. They are used as guidelines for emergency managers and first responders in the event of a spill. Preparing GRP’s prior to an incident reduces the time needed to make decisions during a spill, by providing essential information about the site, the equipment needed, access details and other relevant information. For more information on GRP’s see: <http://www.epa.gov/osweroe1/docs/oil/fss/fss09/ellispaperareaplanningrev.pdf>

<https://homeport.uscg.mil/cgi-bin/st/portal/uscg_docs/MyCG/Editorial/20130226/2012%20Area%20Contingency%20Planning%20Process%20Job%20Aid.pdf?id=d87ac9fda20444d893e46237b43c255018a33941&user_id=2a47d4dbfd24ce2da39438e736cab2d6>

<https://homeport.uscg.mil/cgi-bin/st/portal/uscg_docs/MyCG/Editorial/20130219/Comms-Info-Mgt%20Job%20Aid-Jan-2013.pdf?id=27d4dc770d71b52d58a5c2071489c1ec0cda5499&user_id=3969bfbd90e5506314f810854469d06f>

A presentation addressing GRP’s can be found here: [http://www.nrt.org/production/NRT/RRTHome.nsf/resources/RRT4Aug2008Meeting/$File/RRTIV\_DigitalACP-Richard\_Knudsen.pdf](http://www.nrt.org/production/NRT/RRTHome.nsf/resources/RRT4Aug2008Meeting/%24File/RRTIV_DigitalACP-Richard_Knudsen.pdf)

Shoreline Cleanup and Assessment Technique (SCAT)

**Shoreline Cleanup and Assessment Technique (SCAT)** is a systematic method for surveying an affected shoreline after an oil spill, and was created in response to the Exxon Valdez oil spill in 1989. Standarized terminology is used to document shoreline conditions, and is used to support cleanup decisions. SCAT work can be highly GIS intensive and is generally best left to GIS professionals experienced in coastal oil spills. However, an understanding of the principles by which shoreline is “segmented” for SCAT is important for all GIS practicioners participating in a coastal oil spill respose effort. A few states “pre-segment” their shorelines, California and Florida being examples, and these shoreline data sets can be critical to assisting the response efforts as they serve as fairly high resolution uniquely identified spatial references for shorelines which have a number of uses beyond just SCAT. For additional information on SCAT see: <http://response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills/resources/shoreline-cleanup-and-assessment-technique-scat.html>

Natural Resource Damage Assessment (NRDA)

After an oil spill or hazardous substance release, response agencies like the U.S. Coast Guard (for a coastal event) or the U.S. Environmental Protection Agency (for an inland event) take the lead on cleaning up the substance and eliminating or reducing risks to human health and the environment. In a massive incident, they would work together reguardless of location. However, these efforts may not fully restore injured natural resources or address their lost uses by the public. Through the NRDA process, the National Oceanographic and Atmospheric Administration, the Department of the Interior, and state, tribal, and federal co-trustees conduct studies to identify the extent of resource injuries, the best methods for storing those resources, and the type and amount of restoration required.

The damage assessments are used to negotiate legal settlements or to take legal actions against the responsible parties. For more information about NRDA see: <http://www.doi.gov/restoration/about>

<http://www.darrp.noaa.gov/about/index.html>

## Emergency Management Assistance Compact (EMAC)

The **Emergency Management Assistance Compact (EMAC)** was established in 1996 and was the first national disaster relief compact since 1950 to be ratified by Congress. During a governor-declared state of emergency, EMAC offers assistance through the sending of personnel, equipment and commodities to aid disaster relief. All 50 States, the District of Columbia, Puerto Rico, Guam, and the U.S. Virgin Islands are EMAC members. EMAC allows effected states to join together and help one another during a disaster and provides a methodology for those states receiving assistance to pay those states providing assistance. For more information on EMAC see: <http://www.emacweb.org>. Requests for assistance from the EMAC should be discussed with State EOC.

## International Charter

The goal of the **International Charter** is to provide a unified system of space data acquisition, and deliver that data to people, communities or areas impacted by disasters, both man-made and natural. The services are provided to authorized users, which allows for a secure system. The International Charter is made up of over 20 agencies, which have committed various resources to support the International Charter for major events. For more information about the International Charter see: <http://www.disasterscharter.org> and your State GIS Coordinator see: <http://www.nsgic.org/state-representatives>.

## Crisis Information Management Systems

Crisis information management systems are systems and viewers designed to manage information flow during a coastal oil spill incident.

WebEOC
**WebEOC** is a web-based crisis information management system. It provides a secure, log on platform for emergency managers and first responders to share real-time critical information, and perform mapping and analysis during an incident.

COP
In the past, many emergency managers and first responders utilized a **Common Operating Picture (COP)** during an incident. A COP is a single viewer that contains relevant GIS data (such as boom locations, ESI data, over flight data, SCAT data, administrative boundaries, oil rig locations. etc.) and tools that several different command centers or groups can utilize during an incident. Your individual agency may have an established COP in use. It is important for GIS personnel to be aware of its existence and become familiar with its functionality pre-event.

Recently, GIS technology is moving towards the use of a **Common Operation Platform**. A Common Operating Platform is the underlying infrastructure that data, tools and various applications are built on. It is built on Esri’s Arc GIS Server or the equivalent server-based GIS system built to OGC (Open Geospatial Consortium) standards. It has the capability to manage content and operations, display situational awareness, engage the public, gather data and deliver content. The most powerful thing about a Common Operating Platform is the ability to push the content to many different target applications. The information stored in the COP can be used on a computer, through a tablet or Smartphone application, or a web-based viewer. This allows emergency managers and first responders to be completely mobile and take their response efforts out of the command center, and creates an environment that all responders involved can utilize.

ERMA
**Environmental Response Management Application (ERMA)** is an online mapping tool created by NOAA and the University of New Hampshire. ERMA integrates static and real-time data, to allow emergency managers and first responders to quickly, easily and securely upload data, edit, and display spatial data into a map. For more information about ERMA see: <http://response.restoration.noaa.gov/erma>

## GIS Products and Presentations

There are several critical factors that GIS professionals must consider when working with Unified Command and ICS staff during an event.

1. Needs assessment/Common Oil Spill Products – This assessment addresses several things. First, it establishes the importance of data during an incident. As a general rule, all available data should be taken to be used during an oil spill. These events change rapidly, and it is better to have all datasets on hand to handle any issues or requests that arise. Convey this message to staff and management. Second, it determines what products you are going to be producing, such as data layers, maps and analyses. It is recommended that mapping products be discussed pre-event. This allows the GIS professionals to create templates, familiarize themselves with the data commonly used, and have input on various ways GIS can be used during a coastal oil spill event. Examples of common products produced include: boom locations, environmentally sensitive areas relative to the spill, predicted movement of the spill, actual movement of the oil, and locations of emergency responders and equipment in the field. Finally, it will indicate if there will be any analysis to be performed. Examples of analysis could include: calculating amount of boom needed to deploy, area potentially covered by dispersants, hotspot analysis of critical species/archaeological sites that will be impacted, and after the initial environmental impact assessment, economic impact on businesses along the effected shoreline. Key datasets collected and utilized during an incident also include: resources at risk, ACP data (strategy) to deploy, wildlife and field observation and sampling, SCAT assessment.

2. GIS is a powerful tool, and can be used for so much more than basic mapping. It is important to ensure that the products produced are useful to the incident command staff. It is also important to demonstrate the many other ways that GIS can be used during an incident. GIS has the ability to contribute answers to questions that emergency responders don’t know to ask. Determine what questions emergency responders are trying to answer about the event, and suggest products beyond basic maps that will help. For example: if the GIS team has been asked to create maps showing boom and platform locations, and the emergency manager is also concerned with having teams properly deployed, the GIS team could suggest using the oil trajectory data created with modeling to show the path the oil might take, and use that analysis to send teams to the appropriate locations. GIS can be used beyond its basic function in other ways such as: predictive modeling, remote sensing mashups, equipment tracking, temporal displays (fly throughs and animation), spatial dataset reporting, form generation, rapid field reporting using mobile devices which allow data to be uploaded to the server in real-time and pushed back to the field crews, spatial division of labor, GeoPDF production, georeferencing photographs.

3. The importance of producing products in a timely manner. During an incident it is crucial to get information out as quickly as possible, and is not necessarily the time to focus on cartographic elements such as colors, titles, etc. Creation of templates pre-event is recommended to set up the basic map elements ahead of time. This will result in quicker production at the time of the incident.

4. Keep presentations, situational reports and briefings straightforward and simple. GIS professionals may not be working with individuals who are familiar with the technical terminology of GIS. It is most productive to focus on the subject matter being depicted instead of the technical aspects of the work.

# keys to the successful use of gis that gis professionals should know

The most important keys to a successful GIS aided response are integration, training, communication, cooperation, and understanding. GIS professionals also need to understand what data, software and hardware are keys to a successful incident response. This section discusses the key elements that a GIS professional needs to understand during an event.

1. Know what products are required for an oil spill. In addition, know where the data for those products is located and the time frame that each must be produced. If possible, establish a schedule for delivery of standard products. Identify what data is required to produce those products and place as much as possible in a centralized file location so that it can be quickly copied and moved when staff is deployed. In most cases, that data will include: boom types, ACP and ESI boundaries, archaeology sites, critical facility locations (hospitals, police and fire stations), oil platforms, businesses along the coast, and demographic data. Imagery will be a crucial component during a coastal oil spill, and you’ll want access to the most recent available. Prior to the event, data sharing and information sharing agreements, or general outlines (for quick modification) should be in place through the RRT. If possible, become familiar with what agreements are in place in your area.
2. Ensure that you have the proper bandwidth (or establish what you have available), Internet connectivity, servers, printers/plotters and any other equipment. If bandwidth is inadequate or unstable, or you are lacking key equipment, communicate these requirements to management, so that steps can be taken to meet these needs. It is important to note that even with the best planning sometimes what is needed is not available. Establish a risk avoidance plan for what to do without the items/services discussed with management and/or other key items with high probabilities of failure.
3. Standardize the products to be produced during an event such as maps showing booming locations and types, environmentally sensitive areas, locations of oil impacting the land, etc., as well as situational reports, standard analysis, etc. It is beneficial to do pre-event planning. Create basemaps, templates and standard forms whenever possible. After event-specific information has been incorporated, work with emergency management staff to integrate these elements into the daily briefings and emergency management workflow.
4. Speed is critical! Products need to be delivered on time in order for emergency managers and responders to make informed decisions. GIS professionals must remember that their work is time sensitive for decision makers. If geospatial products are not delivered in a timely manner in an emergency, important decisions may be made without them.
5. Develop training on software/tools, scenarios, and emergency management drills, and conduct this training on a regular basis. Ensure that you know what products are expected for an oil spill and train to produce those products in a timely manner. During emergency management drills, ensure that geospatial products are incorporated into the emergency manager’s workflow so they know what to expect and how it can aid them. Technology is constantly changing, and it is beneficial to be current in all elements. This includes not only software versions, but also emergency management protocols and regulations. Performing training on a regular schedule allows for you to be current when an emergency occurs.
6. Communication is critical during a response. It is important to:
	1. Communicate on all levels with management and requestors about expectations, needs, and products available as well as ingestion and distribution capabilities versus needs;
	2. Establish a procedure for processing standard products as well as new product requests and communicate that with management and likely requestors;
	3. Conduct regular GIS team communication, coordinate on partner tools and their integration; and
	4. Coordinate with State and Federal Governments when appropriate.
7. It is important to understand the benefit of metadata. During an event you will most likely not have the time to create complete metadata. It is recommended that metadata ‘lite’ be established for the event. It will help others to understand the data and use it in the best way possible, although does not eliminate the requirements for full metadata (i.e., ISO/TC 211 compliant) for data intended to be released beyond the ICS. Metadata ‘lite’ should include basic information such as the incident name, description, source of the data, contact information (if practical), the date and time it was created/collected and any limitations the data may have.
8. Understand the organization chart in place during the event. This allows the GIS professional to know who to go to for information, permission, and questions, and ensures that the information is coming from and going to the correct people. It also helps with the command staff needs and workflow. Consider creating a staff list with contact information and shift preference pre-event that can be used during the response. During an event the ICS organizational chart will be used.
9. Coordinate with State and Federal Government GIS professionals where appropriate.

# Standard operating procedures for coastal oil spill response

This chapter discusses the main components involved in a coastal oil spill response, including a SOP checklist, GIS staffing and resource requirements, mapping and data protocols and metadata guidelines among other elements.

## SOP Checklist

This document provides a general checklist, summing up the organization’s SOP of what steps should be taken during an event. The checklist provided in Appendix 1 should be used as a guideline, and customized by individual organizations to best suit their response to emergency events.

## GIS Resource & Staffing Requirements

**Background:**  This chapter details the physical resources and personnel skill sets required for GIS responders to fulfill GIS needs & expectations in an emergency event. Potential GIS responders should be identified and trained prior to an incident.

Not all MACC’s are alike. Please be sure to modify the sections and examples below to fit your MACC needs. For example if the local MACC does not have computers loaded with GIS software or data, the document will need to provide instructions on where the equipment is located. In addition, some MACC’s may have a GIS Unit within the Planning Section, while some may have a GIS Branch within the Intel/Info Section of the NIMS structure. The GIS Staffing Requirements section is also solely provided as an example and should be modified based on your jurisdictional needs are scalable based on the size of the jurisdiction as well as the size of the incident.

Be sure to consider that the guidance on staffing is for MACC (where a “GIS Unit” or a “GIS Branch” is likely to exist) and may or may not be organized in the same fashion as the Incident ICS. EOC’s do not have to be organized around ICS. NIMS states in the Command and Management chapter that "EOC’s may be organized by major discipline (e.g., fire, law enforcement, or emergency medical services); by emergency support function (e.g., transportation, communications, public works and engineering, or resource support); by jurisdiction (e.g., city, county, or region); or, more likely, by some combination thereof. One point to note is that in ICS the GIS unit often falls within the Planning Section, either as its own unit or as part of the Situation Unit. Also in some cases, a Geospatial Task Group may be constructed to support the GIS needs for ICS.

*Examples are for reference purposes only and are not intended to set a standard.*

* ***Purpose:*** This chapter details the resources and skill sets required for GIS Responders to fulfill GIS needs & expectations in an emergency event.

### Resource Requirements

**Example GIS Supply List**

The table below serves as an example for the “GIS Supply List”. The needs and availability of resources for each agency or jurisdiction will vary. Use this list as a guiding example and not as a fixed set of requirements.

|  |  |  |
| --- | --- | --- |
|  | **REQUIRED** | **Location** |
| **Office** | **Field** | **Primary** | **Secondary** | **Tertiary** |
| HARDWARE (Where possible, field hardware should be ruggedized) |
| Laptop and/or Desktop  | √ | √ | [ ]  | [ ]  | [ ]  |
| License keys, dongles and codes written down | √ | √ | [ ]  | [ ]  | [ ]  |
| Plotter &/or printer & software driver | √ |  | [ ]  | [ ]  | [ ]  |
| Projector | √ |  | [ ]  | [ ]  | [ ]  |
| GPS Hardware |  | √ | [ ]  | [ ]  | [ ]  |
| Projection Screen |  |  | [ ]  | [ ]  | [ ]  |
| Multi-Gb Flash Drive (32 Gb or more) | √ | √ | [ ]  | [ ]  | [ ]  |
| Portable, External Hard Drive (1 Terabyte or more) | √ | √ | [ ]  | [ ]  | [ ]  |
| Backup Laptop Battery |  | √ | [ ]  | [ ]  | [ ]  |
| Broadband Access Card Activated | √ | √ | [ ]  | [ ]  | [ ]  |
| Cell phone with published number and TXT or SMS activated | √ | √ | [ ]  | [ ]  | [ ]  |
| SOFTWARE |
| GIS Software license to machine | √ | √ | [ ]  | [ ]  | [ ]  |
| MS Office | √ | √ | [ ]  | [ ]  | [ ]  |
| Adobe Reader | √ | √ | [ ]  | [ ]  | [ ]  |
| Adobe Acrobat Full Version |  |  | [ ]  | [ ]  | [ ]  |
| GPS device and GIS software support GPS analyst (e.g. ArcGIS GPS Analyst extension) |  | √ | [ ]  | [ ]  | [ ]  |
| Metric Converter | √ |  | [ ]  | [ ]  | [ ]  |
| DATA RESOURCES |
| Commercially Available Imagery | √ |  | [ ]  | [ ]  | [ ]  |
| Locally Available Downloaded Data | √ |  | [ ]  | [ ]  | [ ]  |
| Spare Copies of the above | √ |  | [ ]  | [ ]  | [ ]  |
| MAP RESOURCES |
| Department Specific Maps |  |  | [ ]  | [ ]  | [ ]  |
| Wall Maps |  |  | [ ]  | [ ]  | [ ]  |
| Locally Used Road Maps | √ |  | [ ]  | [ ]  | [ ]  |
| Campus Maps |  |  | [ ]  | [ ]  | [ ]  |
| Transit Maps |  |  | [ ]  | [ ]  | [ ]  |
| POI Maps/Boater’s Guides |  |  | [ ]  | [ ]  | [ ]  |
| GENERAL RESOURCES |
| GIS Desk Book\* | √ |  | [ ]  | [ ]  | [ ]  |
| Markers (Dry Erase)/Pens/Pencils | √ |  | [ ]  | [ ]  | [ ]  |
| Compass (Magnetic not scribing type) |  |  | [ ]  | [ ]  | [ ]  |
| Ruler or map scale | √ | √ | [ ]  | [ ]  | [ ]  |
| CDs/DVDs - Writeable | √ |  | [ ]  | [ ]  | [ ]  |
| Push Pins | √ |  | [ ]  | [ ]  | [ ]  |
| Plotter Ink Cartridges | √ |  | [ ]  | [ ]  | [ ]  |
| Plotter Paper (to include Mylar) | √ |  | [ ]  | [ ]  | [ ]  |
| SAFETY |
| Personal Phone with Texting ability or SMS (to communicate with relatives) | √ | √ |  |  |  |
| Personal hot drink cup | √ | √ |  |  |  |
| A supply of your business cards (Current business cell phone on card) | √ | √ |  |  |  |
| Snack Food, e.g., energy bar | √ | √ |  |  |  |
| Your emergency contact list printed up and current – The emergency GIS group members, your family personal contacts. | √ | √ |  |  |  |

Figure 4-Example GIS Supply List. Examples are for reference purposes only and are not intended to set a standard.

\*GIS Desk book to include – SOP, Contact List, Data/Map Matrix, Symbology Quick Guide, GIS EOC Staff Checklist, Map/Schematic of the Room (where are resources located), GIS Software Tips/Tricks, How to Access/Use your EOC Software.

### Staffing Requirements

To ensure access to critical geospatial information and products, personnel must be readily available to support the many entities engaged in incident operations. This level of specific operational support provides situational awareness and geospatial tools to the managers of MACC’s and field facilities.

During an event the number of GIS staff members can vary greatly. Your particular organization will need to assign roles based on team size. It would be ideal to include: manager/team lead, deputy manager/team lead, analyst(s), database administrator, and web/mobile application developer. Some of these roles may be filled by the same person (for example: one of your analysts may also be able to develop mobile apps), but having a team large enough so that an individual can be dedicated to a specific task is ideal.

The skills required for a GIS support staff are varied by the event, duration of the event, and phase of disaster, i.e. response, damage assessment, recovery. The <<EOC/DOC/MOC Unit/Branch/ etc>> is responsible for collecting, analyzing, and disseminating information across all emergency support functions. One focus of the team (which should include emergency managers, first responders and at least a part of the GIS group to be most effective) will be to develop an integrated common operational picture of an emergency event. It will review information coming from the field, DOC and EOC personnel to quality control the data, identify gaps, and develop intelligence products for staff. Most of the <<branch/unit/etc>> products will be built around geospatial information. The structure is modular. In a smaller incident, one person could fill multiple roles and in a large-scale incident several people could staff the same role.

**Example Geospatial Roles and Responsibilities:**

Provided below, in Figure 6, is an example list of key geospatial position titles and associated responsibilities similar to the DHS GeoCONOPS, Section 2.1, Table 2-1. This list provides a good example of the types of roles you may want to have identified for your facility; however the roles and position titles will need to be modified to fit your facility. These roles are scalable, and one person may fill multiple roles during smaller incidents, while multiple people may need to fill one role during larger scale disasters.

|  |  |
| --- | --- |
| **Position Title**  | **Roles &/or Responsibilities**  |
| Team Leader  | * Responsible for the coordination of geospatial information system (GIS) production, remote sensing, and geospatial database efforts.
* Conducts briefings, attends meetings, and directs overall geospatial support operations.
* Interfaces with federal, state, and local authorities establishing Memorandums of Understanding (MOU’s), partnerships, and data sharing agreements.
* Proactively seeks opportunities to integrate geospatial products into executive decision-making.
 |
| Deputy Team Leader  | * Reports to the Geospatial Team Leader.
* Responsible for maintaining the coordinated efforts of the geospatial team.
* During times of absence of the Team Leader, becomes the representative of the Team. (Potentially, the Team Leader on alternate shifts.)
 |
| Geospatial Liaison  | * Reports to the Team Leader.
* Meets with EOC section heads, task forces, etc. Determines latest needs, suggests potential geospatial solutions, determines if standard map products are meeting needs, lets the Geospatial Team know what is happening across EOC and works with them to develop needed and potential geospatial solutions to current and anticipated issues.
* Greets customers and assists them in filling out request forms.
 |
| Geospatial Production Manager  | * Reports to the Team Leader.
* Coordinates GIS requirements and supervises assigned Geospatial Analysts.
* Prioritizes GIS production and activities.
* Defines and insures timely delivery of standard and unique products.
* Works with product requesters to properly define requirements and ensures the timely preparation and delivery of recurring and ad hoc GIS products.
 |
| Geospatial Analyst  | * Reports to the Geospatial Production Manager.
* Prepares recurring and ad hoc GIS products.
* Compiles various types of geospatial information into map and data products.
* Analyzes geospatial data from various sources to answer diverse questions and populate geospatial products.
 |
| Geospatial Imagery Manager  | * Reports to the Team Leader.
* Responsible for the coordination of RS requirements, resources, and requests for the team.
* Operates as task originator & collection manager for assets related to the operation.
* Works with Geospatial Production Manager to ensure imagery- derived products are delivered in a timely manner.
* Supervises Imagery Analysts.
 |
| Imagery Analyst  | * Reports to the Geospatial Imagery Manager.
* Processes and interprets acquired imagery.
* Processes imagery in native and/or other formats.
* Prepares image data files for use by the Geospatial Analyst Staff.
* Creates imagery-derived datasets and products.
 |
| Geospatial Database Manager  | * Reports to Team Leader.
* Responsible for creating and managing the file-based data storage system, updating and distributing associated documentation, answering all queries for use, and briefing teams on use of data.
* Initiates data sharing agreements or purchases for data as required and arranges for data updates as necessary.
 |
| Geospatial Database Administrator  | * Reports to the Geospatial Database Manager.
* Develops, maintains, and coordinates the geospatial data used.
* Sets database access rights and privileges.
* Responsible for data backups as required.
 |
| Geospatial Data Analyst  | * Reports to the Geospatial Database Manager.
* Designs and builds custom database queries as requested by task force members.
* Performs quality control and corrects anomalies in the data.
* Loads data sets under direction of Database Manager.
 |

Figure 5-Geospatial Roles and Responsibilities – Similar to the DHS GeoCONOPS, Section 2.1, Table 21. Examples are for reference purposes only and are not intended to set a standard.

## Staffing and Team Transition

**Background:** It is recommended that GIS staff expectations & team structures are identified prior to an incident. Potential GIS responders should be made aware of these expectations before agreeing to become a GIS Responder. The environment during an incident in a MACC can be very frantic with request for information and maps coming from a variety of people and disciplines. Responders are also expected to work long hours while keeping a high performance level and intensity. Some GIS staff may not function well in this type of environment and may not be an ideal candidate as a GIS Responder.

It is also very important that personnel are educated on the value and use of geospatial information and how it can & should be integrated into their workflows. Conducting exercises & cross training for GIS personnel is an important part of implementing your agency’s SOPs.

Not all MACC’s are alike, please be sure to modify the examples below to fit your facility needs. Examples are for reference purposes only and are not intended to set a standard.

* **Purpose:** In order to facilitate a smooth transition between shifts, it is important that GIS staff accurately maintain a record of all requests and their priority level as well as what has been delivered and what is pending. It is also important that GIS staff are named, teams identified, and back-up staff arranged in the planning process. The purpose of this chapter is to identify GIS Staffing periods and team transition requirement.

### GIS Responder Expectations

**Example GIS Responder Expectations:**

GIS is considered an essential emergency function and GIS Staff are consequently considered essential personnel during an emergency event. Staff that is directly affected by the event is not expected to report to work. It is the responsibility of GIS staff to communicate their availability status to the GIS Team Leader. The GIS Team Leader will keep track of which staff is available to report and which staff has been affected by the event and unable to report.

### ICP/DOC/MOC GIS Staffing

ICP’s, DOC’s and MOC’s employ **<<enter shift length, ex: 12 hour>>** shifts. During most emergency events the EOC, DOC and MOC are staffed 24 hours/day.

<<Outline how EOC, DOC, and MOC are staffed. Detail the process for obtaining additional GIS support and identify reserve staff resources>>

### Team Transition

#### Start of Shift

At the beginning of a shift, GIS staff should complete the following tasks: **<<Enter local protocols>>.**

**Example Beginning of Shift Tasks:**

* Sign in on your operations center’s Staffing Log.
* Communicate your role and availability via <<Identify appropriate communication systems and channels>>
* Assess GIS needs of Incident Command and your operations center and the needs of fellow GIS staff at other operations centers.
* Debrief the outgoing GIS team to determine products completed, in progress or due in the coming shift as well as other important details
* As necessary or requested, provide data, map products and progress reports through relevant communication channels
* As necessary or requested, provide data, map products and progress reports through relevant communication channels

#### End of Shift

At the end of a work shift, GIS staff will debrief their replacement with the following information: **<<Enter local protocols>>.**

**Example End of Shift Tasks:**

* Wrap up the project/map/data that you are working on to the best of your ability.
* Communicate the end of your shift via **<<Identify appropriate communication systems and channels>>**. Include the name of your replacement.
* Brief your replacement in the following:
	+ What deliverables have been requested?
	+ What has been created, what is left to be created?
	+ Where are the necessary scratch files?
	+ What base data have been modified?
	+ Where are your notes?
	+ Provide the last Media Report.
	+ What next steps have been identified?
	+ Provide your replacement with your contact information.
	+ Provide your replacement with contact information for other GIS Staff that are currently staffing the event or that are due to report.
	+ What are the standard products and which is coming due in the next shift.

## File Naming and Directory Structure

**Background:** This chapter is intended to provide GIS staff with a common, standardized file naming convention and directory structure. The examples provided are for reference purposes only and are not intended to set a standard.

The example directory structure was borrowed from the GIS Standard Operating Procedures (GSTOP) used by GIS Specialists to fulfill the GIS needs of the Planning Section of the Incident Management Teams. Standard naming conventions and directory structures foster easier collaboration between varying shifts of GIS Responders. The directory structure is set up with the date and time at the beginning of each folder and file to facilitate easy chronologic sorting ensuring that the most recent map information is at the top or bottom of a file list depending on sort order. For more information on GSTOP, please visit <http://gis.nwcg.gov/gstop_sop.html>

Per section 2.3, Information Sharing and Data Dissemination, of the GeoCONOPS, DHS recommends federal agencies share data in compliance with the National Information Exchange Model (NIEM). NIEM is a program supported by DHS and other Federal agencies to facilitate data sharing by providing a common vocabulary to ensure consistency and understanding amongst disparate agencies. NIEM utilizes Open Geospatial Consortium (OGC) standards for geospatial data. The emergency management domain data elements and attributes were derived from current standards set forth by the Emergency Data Exchange Language (EDLX). For more information on NIEM, please visit [https://www.niem.gov](https://www.niem.gov/).

Not all MACC’s are alike. Please be sure to modify the sections and examples below to fit your facility needs. Examples are for reference purposes only and are not intended to set a standard.

* **Purpose:**  This chapter provides GIS staff with a common, standardized file naming convention and directory structure. The structure and naming conventions set herein are intended to support an efficient work flow process by providing self-evident naming protocols that are specific not only to each individual incident but also to each incident’s time(s) and date(s).

**Example Directory Structure:**

The example directory structure convention provided here was borrowed from the GSTOP. This structure will be accessible on the*<<Folder location>>* however; it is also suggested to maintain a copy on your desktop/laptop C:\ drive in the event that a network connection is not possible. The directory structure is set up with the data and time at the beginning of each folder and file to facilitate easy chronologic sorting.

### GIS File Directory Structure

During an emergency event, incident related data and maps are to be retrieved from: 1. <<Folder location>> and/or 2. <<Web application>> per the file structure guidelines defined below.

**Example Directory Structure**

* <<Folder (for example, P:\ICPGIS)>>\BaseData - This folder contains base map data; data specific or derived from the event are NOT stored here.
	+ DEMs - Digital Elevation Models
	+ Logos – logos and data disclaimers
	+ Raster – Hillshade, Eagle Aerial Imagery, Air Photo Imagery
	+ Vector – Transportation, Admin Boundaries, Points of Interest, etc
* <<Folder>>\Tools This folder contains extensions, scripts, models, DMS-DD conversion macro/script, other software used during the incident
* <<Folder>>\Incidents\ - This is the top tier GIS Emergency Response directory:
	+ YYYY\_IncidentName – This is the top tier Folder for a unique event. 4-digit year and the name of the Unique Incident (e.g. 2003\_CedarFire)
		- Date (YYYYMMDD) date/time stamped incident spatial data layers; one folder for each day of the incident
			* Incident Data – All data stored in this folder are data that are specific to the incident and include a date/time stamp – DATA SHOULD NOT BE PUBLISHED TO THE WEB UNTIL THE PRODUCT IS READY FOR USE/DISSEMINATION AND APPROVED BY THE INCIDENT COMMANDER. Consideration should be given to breaking ‘incident data’ into sub-groups 1) DEM, 2) Raster, and 3) Vector – as incident data could be collected in these forms.
			* Products – GIS analysis and map products produced for the event on that day
			* Workspace – Workspace for that day
			* External Maps – Daily maps produced outside the organization



Figure 6-Example Directory Structure

*NOTE*: In addition to incident related maps and data, resources such as basemap data, GIS Map templates, layer files, scripts and other tools will be accessible on <<Folder location>>.

### GIS File Naming Convention

**Example GIS File Naming Convention:**

Provided below is a recommended GIS file naming convention that can be applied. Be sure to consider your local regulations when defining this component of your SOP or SOG.

All data files (\*.shp, \*.xls, \*.dbf, \*.kml, etc.) must contain <<enter local regulations>>. Similarly, map document names (\*.pdf, \*.jpg, etc) must contain <<enter local regulations>>.

**Example GIS File Naming Convention**

All data files (\*.shp, \*.xls, \*.dbf, etc.) must contain date/time, incident agency responsible for creating a map and subject matter qualifiers. Similarly, map document names (\*.pdf, \*.jpg, etc.) must contain date/time, incident name, subject matter information as well as size (e.g. 11X17, ANSI B, Custom32X66, etc.) and orientation (i.e. portrait vs. landscape) of the map.

* + Data file – yyyymmdd\_hhmm\_IncidentName\_Subjectmatter\_Agency.
	+ Map document - yyyymmdd\_hhmm\_IncidentName\_Subjectmatter\_Agency\_Size\_Orientation.\*\*\*
	+ Example
		- MISS\_CanyonIncident2010\_06\_04\_2330\_ColorIndexMap\_FWRL.pdf – MODIS Color Index of Ocean Features and Circulation Patterns along with trajectories for June 4, 2010

For field collected data, also include a Source Code tag when naming the data file:

* GPS\_Name = Global Positioning System\_Collector’s Name
* FOBS = Field Observer
* SITL = Situation Unit Leader

For data/maps that were provided by Local, State or Federal Agency tag with Agency’s Acronym:

* CalFire (or relevant state agency)
* CDC
* Etc

NOTE: When adding non-standard tags ALWAYS notify GIS staff of their presence and meaning.

NOTE: It is the responsibility of each GIS responder to ALWAYS communicate the file naming convention that they are using to those with whom they are sharing the data.

Figure 7-Example File Naming Conventions

## Communication

Communication is a key component during a coastal oil spill response. Typically, there may be several different local and state agencies/organizations involved, and depending on the size of the incident may involve any number of agencies. Even minor spills always involve the USCG or EPA notification, and potentially support as needed from other agencies such as NOAA or the United States Fish and Wildlife Service (FWS). Efficiency is a very important part of a response, and good communication is critical in achieving goals quickly. Besides communication with the responding team directly involved in the response, there are several other communication opportunities that GIS professionals should be aware of. In all cases, the GIS professional should go through the EOC public information officer for communication to the public.

1. Local or State GIS Emergency Responders – It is suggested that you go through the ICS resource request structure. Also, there is the potential that the lead federal agency or responsible party would be providing additional resources and support. You can also contact your State GIS Coordinator, if you would like an additional resource. A listing of State Coordinators is available at: <http://www.nsgic.org/state-representatives.>
2. GIS coordination calls and distribution lists – Determine how to get on relevant State or Federal Government GIS coordination calls and/or distribution lists. Many states have active distribution lists even when there is not a current incident. Also, during an event, there are typically coordination calls that occur between groups that are working on the incident. It is important for a representative from the GIS group be involved in these calls. To learn about these groups/calls it is suggested that you contact your State GIS Coordinator or State Geographic Information Officer’s office (GIO) (refer to 2 above).
3. Special Interest Groups – During a coastal oil spill, there are many special interest groups that will want to be involved. During the BP Deepwater Horizon event in 2010 groups such as The Natural Resources Defense Council, VoteVets.org, and Americans United for Change were all actively involved. Consider who will respond to GIS-based questions special interest groups submit. This will most likely be the Public Information Officer. The GIS staff should direct all requests to that individual, and should never send out information directly. Having one point of contact or knowing who within the response group will be responding to special interest groups will ensure good, consistent communication.
4. The Public – During a small coastal oil spill event, the public may not be aware of the incident. However, during a large-scale event, the public will not only be aware but will also be looking for information. Press releases and news-based information will be handled through the Public Information Officer that the Unified Command establishes. However, the GIS team should explore creating a web-based application to disseminate information to the public if approved by the incident’s Joint Information Center (JIC) and/or Public Information Officer.

## Mapping Protocols

**Background*:*** It is recommended that map templates populated with base data and symbolized similar to local map products be compiled prior to an incident. Templates speed up the process of getting the maps out to the Emergency Management Team especially during the first response period. You may find that map templates and elements need to be changed as the incident expands and contracts.

The use of the US National Grid (USNG) should also be incorporated into your agency’s SOG’s and policies where appropriate. Resources to support the implementation of USNG are available from the USNG Implementation Center (<http://mississippi.deltastate.edu/>), the Federal Geographic Data Committee (FGDC) (<http://www.fgdc.gov/usng>) and from NAPSG (<http://www.napsgfoundation.org/blog/napsg-blog/128-usng-pre-incident>).

It is important to establish QA/QC procedures. Before a map is released from the GIS Unit/Branch all map elements must be updated including date/time, scale bar, file location information, title, legend, and symbology. Special attention should be paid to time and date information. This information is critical when asked to reproduce a map or for after action reporting or for litigation purposes.

There is not a nationally adopted incident-level symbology set. This is a gap that DHS, FEMA, and NAPSG are currently working to address. There are however, standard symbol sets put forth by the Homeland Security Working Group (<http://www.fgdc.gov/HSWG/index.html>). NAPSG is working toward a standardized symbology set, and hope to have it finished in the near future (<http://www.napsgfoundation.org/blog/napsg-blog/131-the-incident-map-symbology-story>).

Agencies may want to establish standard and optional map products based on coastal oil spills. Determine what products you will be producing, such as data layers, maps and analysis. It is recommended that mapping products be discussed pre-event. This allows the GIS professionals to create templates, familiarize themselves with the data commonly used, and have input on various ways GIS can be used during a coastal oil spill event. Examples of common products produced include: boom locations, environmentally sensitive areas relative to the spill, predicted movement of the spill, actual movement of the oil, and locations of emergency responders and equipment in the field

It is important to recognize the potential that an on-line mapping application may need to be made available to the public. It is recommended that the viewer and what information will be included be determined pre-incident.

Not all MACC’s are alike. Please be sure to modify the examples below to fit your facility needs. Examples are for reference purposes only and are not intended to set a standard.

* **Purpose:** In order to maintain a uniform look and feel, to facilitate interpretability and ease of use, all GIS Staff will follow the guidelines listed below when creating map products in support of an emergency event.

### Common Operating Platform

In the past, many emergency managers and first responders utilized a Common Operating Picture (COP) during an incident. A COP is a single viewer that contains relevant GIS data (such as boom locations, ESI data, or oil rig locations) and tools that several different command centers or groups can utilize during an incident

Most recently, GIS technology is moving towards the use of a Common Operation Platform. A Common Operating Platform is the underlying infrastructure that data, tools and various applications are built on. It is built on a geospatial enabled database web server (such as ArcServer, or the open source equivalent). It has the capability to manage content and operations, display situational awareness, engage the public, gather data and deliver content. The most powerful thing about a Common Operating Platform is the ability to push the content to many different target applications. The information stored in the COP can be used on a computer, through a tablet or Smartphone application, or a web-based viewer. This allows emergency managers and first responders to be completely mobile and take their response efforts out of the command center, and creates an environment that all responders involved can utilize.

### Consumable Services

Consumable services are web-based APIs that are accessed over a network, allowing data, maps, tools and other GIS services to be shared. One benefit of using consumable services is that changes to the data and maps can be seen by everyone using the service as soon as the updates are made. Another benefit is that one dataset can be used on several different maps or web applications. This allows for data to be created once and utilized in unlimited maps or applications. It is important to note that when using consumable services the data archive will need to be maintained, and a process to do so during an incident should be established pre-event.

Examples of consumable services include:

Cloud-hosted services from BP’s Gulf Response used to share public facing maps, which can be used by state EOC’s for mapping or in their COP. <http://www.gulfofmexicoresponsemap.com/ArcGIS/rest/services/>

Digital Area Contingency Plan’s Geographic Response Plans map service created by the Florida Fish and Wildlife Research Institute (FWRI) for the USCG. <http://myfwc.com/research/gis/projects/oil-spill/acp/>

<http://ocean.floridamarine.org/arcgis/rest/services/Oil_Spill/ACPGRP/MapServer>

### Obtaining Event Data

It is recommended that agencies establish protocols for collecting data and creating maps when technology is not available (i.e., no internet connection, no electricity, etc.). If field collection devices are not available, having a large-scale plotter to print paper maps is invaluable for staff going out in the field. Ideally, a mobile system will be available. This allows data updates to be pushed directly to the systems for immediate consumption. If a designed technology is not available, then consider other options that allow field collection. Examples include: taking geo-referenced photographs with a smart phone that can be uploaded later, phone calls where data (such as the presence of oil) are called into the ICP, or paper-based forms that can be used in the field when no technology is available.

Also, is it important to establish protocols for verifying data that is collected in the field. This is particularly important when that data is collected using paper forms or other non-technology-based methods. Establish these protocols early in the process to ensure consistent data is being collected for the duration of the incident. At a minimum, a standardized data collection form should be used.

### Map Templates

* + Map Templates are available at: <<Folder location or hyperlink>>
	+ Use the Templates available at this location to create all map products

Data that may be included in templates that is specific to coastal oil spills may include:

* + Booms – individual types and deployed configuration
	+ ACP boundaries and Geographic Response Plans
	+ ESI shoreline classification and biology, other resources at risk
	+ Locations of oil platforms/rigs
	+ Maritime boundaries
	+ Coastal and benthic habitats
	+ Archaeology sites (this is sensitive data and may require special handling)

***Note:*** *In a future version of this document, example map templates may be provided. Additional research is required to create the map templates for coastal oil spill needs for MACC’s. Additionally through the development of this guidance, NAPSG Foundation has identified a need for map templates for incident command, NIMS, and other key applications.*

### Map Elements

**Example Required Map Elements:**

* Title – Includes Incident Name, Map theme, Geographic Extent, time/date stamp of data
* Legend
* Scale Bar
* Logos and Data Disclaimers
	+ Logo and data disclaimer to recognize data sources
	+ Logo and data disclaimer to recognize County Group/Dept/Division
* File Location– provide the full path name for the network location of the map document; ex: C:\GIS\Incidents\yyyy\_IncidentName\YYYYMMDD\Products\yyyymmdd\_hhmm\_IncidentName\_Subjectmatter\_Agency\_Size\_Orientation.mxd
* North Arrow
* Projection – Name of the projection, datum, and units
* Data Sources – who, what, where, when, why and how (source codes - refer to page 21 of <http://www.nwcg.gov/pms/pubs/GSTOP7.pdf> NWCG SOP)
* “Time Sensitive Data” Disclaimer Stamp – for all maps that are time sensitive
* “DRAFT” stamp – if map is a draft

### Product Format Conventions

* + Share completed map products with **<<enter agency/section>>** in **<<enter format>>** format.
	+ Export maps with 100 dpi resolution to keep file size down, unless higher resolution is necessary to see detail (300 dpi is recommended for hard copy print maps). This eases data sharing and load on networks.

### Map Distribution Regulations

Example map distribution guidelines:

* + GIS Staff is not at liberty to distribute maps or GIS incident data to media or public. This is the decision of incident command.
	+ Incident maps may be distributed to the Public if requested/instructed by **<<enter position>>.**

### Map Symbology Guidelines

* + Reference the most widely used symbol set by your jurisdiction.
	+ Working with DHS and FEMA, NAPSG has developed a symbol set specifically for MACC’s, which is available through the NAPSG website at: http://www.napsgfoundation.org/.
	+ The FGDC offers some suggested symbology that may or may not support the needs of your agency. For these resources visit - <http://www.fgdc.gov/HSWG/index.html>.
	+ If you are an ArcGIS user, additional resources on how to use the FGDC symbology are available at - <http://resources.arcgis.com/content/kbase?fa=articleShow&d=29213>

### QA/QC

* + Strive for excellence on the first go. If a bad map or bad data are discovered, update the <<enter GIS position>> immediately. The GIS group (and all individuals referring to map/data) will be notified via <<Identify channels for communicating QC related issues>>, identify what exactly the flaw is, work to correct the map and redistribute immediately.
	+ Remove incorrect data or maps from locations such as published web applications as soon as possible, but do not delete the bad information from the disk drive. Instead, add a tag to the file name indicating that it is bad data and should not be used. A record of any bad data that was released may need to be accessed at some point during or after the event.

### Standard Map Product Definitions

The standard map product definitions section outlines the product objectives, target audience, data content and cartographic requirements for those map products. These map products communicate incident specific details as well as general environment and infrastructure information to support emergency management operations.

<<Enter standard map product definitions>>

### Optional Map Product Definitions

The optional map product definitions section outlines the product objectives, target audience, data content and cartographic requirements for those map products that are *optional* for all State or Regional Multi-Agency Incidents. These map products provide supplementary and specialized information for use during the response and recovery phases of the incident. Other ad-hoc map products may also be requested to meet incident specific needs.

<<Enter optional map product definitions>>

Note: In a future version of this document, example map product definitions will be provided. Additional research is required to create a list of the most broadly relevant list of map product definitions. Additionally through the development of this guidance, NAPSG Foundation has identified a need for map product definitions for incident command, NIMS, and other key applications.

##  Data Protocols

**Background:** It is recommended that data formats, data and map transfer protocols, and back up policies be standardized prior to an incident. Things to consider are native data and file formats that emergency responders and other GIS responders will be accessing. For example, if a .dbf table is distributed out to emergency management officials and they use Microsoft Excel to open the file they will receive a warning message, most responders will not go beyond the warning message to access the file. Another example is if a .pdf or .kml file is distributed to field personnel and they do not have Adobe Acrobat Reader or Google Earth on their mobile device the field personnel will not be able to open the file.

It is recommended that consideration be given to sorting all data and information in a cloud service. This would prevent any data loss due to network connectivity issues, and ensures that it is being backed up and stored properly. If using the cloud is not an option data should be stored locally at the IC on a computer/ hard drive designated for the incident. This storage should be on a scheduled backup to ensure data/information is not lost due to network/ Internet connectivity issues. Storing data on a back-up DVD or thumb-drive may also be beneficial.

The briefing cycles section is intended to give GIS responders direction for responsibilities and a timeframe for which products may need to be ready.

The damage assessment section is intended to give direction on how damage assessment data can be collected.

Not all MACC’s are alike. Please be sure to modify the examples below to fit your facility needs. Examples are for reference purposes only and are not intended to set a standard.

***Purpose*:**  This chapter discusses data format conventions, data backup and data sharing policies.

### Data Format Conventions

**Example Data Format Conventions:**

GIS staff should adhere to the following Data Format Conventions. Examples provided here serve only as examples and do not set standards for the use of any particular software.

**

**Example Data Format Conventions**

* Acceptable Data Formats include - <<Example: .xls, .dbf, .shp, File Geodatabase, KML
* Post tables for GIS staff as .dbf for quick import into ArcGIS
* When working with Excel spreadsheets remember that cell values linked to calculations will not be translated between .xls and .dbf. If there are values of consequence that are linked to a calculation, create a new field for the data values and perform a paste special (Values only) before converting to .dbf. Make sure that there are no spaces in the header row and worksheet tabs.
	+ Also note Microsoft 2007and 2010 do not support saving as a .dbf; however, ArcMap now intakes .xls and has always accepted .CSV files.
* Tables posted for consumption of use outside of GIS should be in an MS Excel (.xls) or (.xlsx) format to avoid software compatibility warnings when opening the file.
* Acceptable Map [Output] Formats include - <<Example: .jpg, .pdf, .mxd
* When exporting to .jpg or .pdf use a resolution of 100 dpi (for printing hard copies 300 dpi is the recommended resolution) unless higher resolution is necessary to see detail. This reduces file sizes to accommodate file sharing and network limitations.
	+ Use Relative Paths Option when sharing .mxd’s with others - Select the Document Properties option from the File Menu, followed by the Data Sources button in the “Map Title” Properties dialog. Then select “Store relative path names to data sources” and “Make relative paths the default for new map documents I create.”

NOTE: When posting zip files, use same naming convention as associated data file (refer to above naming conventions).

Figure 8-Example Data Format Conventions

### Data Backup Policy

**Example Data Backup Policy:**

GIS staff should adhere to the following Data Format Conventions to avoid loss of data.

******To avoid duplication of effort and loss of work products GIS staff are to adhere to the following practices <<Enter data backup policy>>

Figure 9-Example Data Backup Policy

### Briefing Cycles

**Example Data Backup Policy**

* Perform and save all work in the Workspace directory under the incident (or on your C: Drive if the network is unavailable or sluggish)
* Create backup copies of the files you are working on, on a regular basis
	+ At a specific time interval, it is recommended this be done every 2-4 hours
* Save/Backup work to USB memory stick or to portable, external hard drive
	+ Tip: Purchase a portable, external hard drive with backup software.
	+ IMPORTANT – *Legal action* is often associated with post disaster mitigation, relief, and funding. Saving all your work and keeping a time log or journal of events, people, and requests made is highly suggested.

During an emergency event, the <<Emergency Operation Center (or IC/DOC/MOC/etc)>> operates on a <<enter briefing cycle times, ex: 12 hour>> briefing cycle. Often <Enter briefing times>>, EOC Officials and/or Elected Officials and/or staff brief the media/public. These briefings provide information as to the extent of the area and population affected as well as actions enlisted by the <<jurisdiction or entity>> and other agencies to show the incident progression (if applicable) and reconcile the damage.

### US National Grid

The use of a standardized grid, such as the USNG should also be incorporated into your agency’s SOG’s and policies. The USNG is a point reference system of grid references commonly used in United States. It provides a nationally consistent language of location in a user-friendly format. Utilization of the USNG will aid in interoperability between local, state, and federal agencies. Resources to support the implementation of USNG are available from the USNG Implementation Center (<http://mississippi.deltastate.edu/>) and from the FGDC (<http://www.fgdc.gov/usng>). For more information on USNG see: <http://www.napsgfoundation.org/blog/napsg-blog/128-usng-pre-incident>

## Data Acquisition and Dissemination

**Background:**  This section is intended to familiarize GIS Responders with the types of data that may be requested of them, data they may need to acquire, data they may need to create, and how that data is transferred. This section also provides GIS responders with federal geospatial products and programs available to them. GIS Responders may want to refer to and become familiar with the DHS GeoCONOPS. The DHS GeoCONOPS lists various datasets and essential elements of information required to support federal geospatial activities.

The Public Data Sharing/Exchange Policy section establishes the rules for the sharing of data and policy for release to the news media and for public release. It is important to note that GIS responders are not allowed to release incident information to anyone outside the incident without following the policies identified within the jurisdiction.

The Minimum Essential Datasets section provides an example of datasets that GIS responders may want to have at their disposal prior to an incident. GIS responders may also want to refer to and become familiar with the DHS GeoCONOPS and its Appendices. Section 2.2.2 of the DHS GeoCONOPS lists essential elements of information and relevant datasets used to support federal geospatial activities. It may not be necessary to include the list in the local document, but it is recommended that a list is available in case GIS assistance is provided by individuals or entities that are not familiar with the local data. It is also a good idea to have this data available on an Emergency DVD/CD or hard drive that can be shared with other responding agencies or to easily reload data in case of hardware failure.

Data connection information is important to include in case automatic data connections fail. Data connection protocols are not easily remembered when hurried or tired.

Not all MACC’s alike. Please be sure to modify the examples below to fit your facility needs. Examples are for reference purposes only and are not intended to set a standard.

Not all Multi-Agency Coordination Centers are alike especially related to the release of damage assessment information. Please be sure to modify the sections and examples below to fit your Multi-Agency Coordination System (MACS) facility needs. Examples are for reference purposes only and are not intended to set a standard.

* **Purpose:** This chapter provides GIS staff with an understanding of the media briefing cycles, incident data, and damage assessment protocols.

### Data Management Plan

A Data Management Plan should address the following:

* Determination of what data is available for use versus what data needs to be acquired/produced;
* Sharing protocols, data delivery schedules, data expectations, data formats, information flow, roles of staff, methods and systems used, documentation/archiving; and
* Need for a DBA (database administrator) for the GIS data

A Data Management Plan, whether for a simple or complex incident, should be drafted and reviewed by all data providers to ensure standards are followed. This includes items such as expected data formats, data collection formats, data delivery schedule, and data repositories. Having this kind of agreement in place in the early stages of an incident is essential so that initial data management is done properly and the GIS staff are operating effectively and not having to expand efforts correcting QA/QC problems or data flow issues from the start of the response.

### Essential Elements of Information

The recommended datasets list details GIS datasets that are optional in support of the mapping functions outlined in these standards. Section 2.2.2 of the DHS GeoCONOPS provides additional detail on Essential Elements of Information (EEI) supporting federal emergency management operations. The relevant datasets are listed in Appendix B of the DHS GeoCONOPS. These EEI’s may vary by specific incident type, but generally include information such as disaster boundaries, socioeconomic impacts, critical infrastructure, etc.

There are many ways for local jurisdictions to obtain base and incident specific geospatial data. It is recommended that MACC’s leverage existing data warehouse, from local jurisdictions and state agencies, to locate needed data. Contact your states’ geographic information council to find out what state or regional data warehouses or portals are available or contact your State GIS Coordinator. For a listing of State GIS Coordinators visit, <http://gisinventory.net/summaries/state_reps/State-Reps-05.05.2011.pdf?PHPSESSID=dce35f9a7bc71ce1e890e6830548afd>.

**Example Minimum Essential Datasets:** The recommended datasets list details GIS datasets that are optional in support of the mapping functions outlined in these standards. The DHS GeoCONOPS provides additional detail on EEIs supporting federal emergency management operations. The relevant datasets are listed in Appendix B of the DHS GeoCONOPS.

**Example Minimum Essential Datasets**

**Oil Event Data**

* Purpose: Identify data that is specific to a coastal oil spill incident
* Booms – locations and types
* ACP boundary
* ESI boundary
* Platform locations – BOEM/BSEE data

**Transportation**

* Purpose: Identify access routes to the incident, evacuation routes, and other related transportation reference points. Support routing of public vehicles (evacuation/avoidance).
* Streets (name, hierarchy – primary vs. interstate)
* Private roads
* Traffic control points
* Access control points
* Road construction
* Transportation resources - buses, school buses (with wheelchair access), ambulances
* Navigable waterways
* Boat ramps
* Vessel mooring areas
* Potential staging areas
* Maritime infrastructure
* Railways
* Airports
* Helicopter landing zones

**Population**

* Purpose: Identify impacted and at-risk populations.
* Daytime population
* At need populations (schools, daycares, public meeting places, senior’s homes, universities etc.)
* Wildlife populations and T/E critical habitats

**Buildings**

* Purpose: Identify affected facilities or facilities in use for the incident.
* Critical Infrastructure
* Building footprints
* EPA regulated facilities

##

**Example Datasets Continued:**

**Utilities**

* Purpose: Identify infrastructure that could be damaged. Identify infrastructure that could be hazardous. Provide guidance for access by first responders.
* Utility pipelines
* Power lines (underground)
* Propane farms
* Sanitary Sewers
* Water Treatment Plants
* Storm water facilities - catch basins, storm sewers, outfalls
* Potable water mains
* Extremely Hazardous Sites and Hazardous Sites (SARAH Title 3 sites)
* Public Service facilities (public works, water treatment, waste water treatment, electric plants

**Communications**

* Purpose: Identify potential communication outages due to the incident.
* Cell towers
* Radio communication
* Main Internet hubs/lines

**Land Ownership/Administrative**

* Purpose: Identify land ownership. This data may be managed by the tax assessor’s office.
* Address points
* Parcel boundaries with CAMA data
* Jurisdictions
* Businesses located on the property

**Environment**

* Purpose: Identify physical environment conditions that may influence hazard behavior or response.
* Topography/Bathymetry
* Water courses
* Lakes
* Rivers
* DEM
* FEMA flood zones
* NOAA NWS forecasts, NowCOAST, CO-OPS
* DHS Homeland Security Infrastructure Program (HSIP)
* NOAA NWS National Data Buoy Center
* NOAA nautical charts and electronic navigation charts
* Commercial and recreational fisheries
* Sensitive data-archaeology sites, endangered/threatened species, protected marine areas

##

**Example datasets continued**

**Imagery**

* Aerial imagery with Date
* Oblique aerial imagery (i.e., Pictometry)

**Grid Reference System**

* United States National Grid (USNG)

**Dynamic Datasets**

* Purpose: Gain perspective on incident within context of current conditions
* Atmospheric conditions (wind direction, etc.)
* Incident Datasets
* Overflights
* Vessel locations (AIS)

**Incident Specific**

* Purpose: Visualize location and extent of incident
* Location and extent of tactical area or incident boundaries (point, line, or polygon)
* Oil slick location
* Modeled trajectory forecasts
* MODIS, NESDIS, SLAR

**Incident Command**

* Purpose: Identify incident operations sites and zones
* Incident command post
* Staging areas
* Wildlife recovery centers
* Equipment storage locations
* Oil collection sites
* Access locations (beach, boat ramps, marinas, managed areas)
* Hot/warm/cold zones
* Shelter sites
* Decontamination site
* Evacuation zone
* Police/fire stations
* Hospitals/emergent care
* Heliports
* Airports
* Landmarks

Figure 10-Example Minimum Essential Datasets

### NOAA Trajectory Forecasts

Using datasets and modeling software called GNOME (General NOAA Operational Modeling Environment) NOAA creates trajectory forecasts in the event of an oil spill. GNOME predicts the possible route oil might follow in or on a body of water. During a coastal oil spill incident emergency managers and first responders rely on estimates of the movement and spreading of the oil to assist with containment and cleanup. For more information on NOAA Trajectory Forecasts see: <http://www.response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills/response-tools/gnome>

NOAA provides a tool called GNOME Trajectory Import Tool for download. This tool is designed to import the trajectory products into ArcMap 9.X and 10.X. Additional information about the tool and how to download it is available here: <http://response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills/response-tools/gnome-trajectory-import-tool.html>

There is also NOAA Emergency Response Imagery often available. Post-event aerial imagery is often acquired by the NOAA National Geodetics Survey (NGS) to support NOAA national security and emergency response requirements. Access to that data may be obtained via: <http://ngs.woc.noaa.gov/eri_page>.

NOAA also provides a Guide to Responder Tools through the Office of Response and Restoration. This guide provides links to some of the most commonly used tools and resources offered by the Office of Response and Restoration. The information can be found here: <http://response.restoration.noaa.gov/oil-and-chemical-spills/chemical-spills/response-tools/guide-responder-tools.html>

### Compiled Imagery

During disasters, Glenn Bethel, USDA Remove Sensing Advisor, frequently distributes a listing of data sources relevant to that disaster. You can email Glen Bethel at glenn.bethel@usda.gov to be added to the distribution list.

### National & Federal Geospatial Products and Programs

There are many Federal geospatial data and tools resources available to local agencies. This list is not inclusive of all programs, but will provide a broad overview of products available to local agencies.

#### The International Charter

The International Charter is an international collaboration among space agencies to provide a mechanism for rapid tasking of satellites for immediate response to emergencies. Free satellite-based information is provided to national disaster management authorities and humanitarian organizations to support immediate response to major natural or man-made disasters.

The Charter has been activated for more than 325 disasters (as at the end of 2011) in over 120 countries since its inception in 2000. The Charter gives access to a constellation of satellites equipped with radar and optical sensors. Information on the Charter can be obtained from going to: <http://www.disasterscharter.org/web/charter/home>. For more information regarding the Charter, including requesting an activation of the Charter in response to a disaster, please contact Brenda Jones: bkjones@usgs.gov or Ryan Lamb: lamb@usgs.gov.

#### HIFLD

The Homeland Infrastructure Foundation-Level Data (HIFLD) working group was established to address desired improvements in collection, processing, sharing, and protection of homeland infrastructure geospatial information across multiple levels of government and to develop a common foundation of homeland infrastructure data to be used for visualization and analysis on all classification domains. For more information on federal geospatial products and programs please visit HIFLD Working Group website at <http://www.hifldwg.org/>.

#### NSGIC GIS Inventory

The GIS Inventory is managed by the National States Geographic Information Council (NSGIC) as a tool for states and their partners. Its primary purpose is to track data availability and the status of GIS implementation in state and local governments to aid the planning and building of Spatial Data Infrastructures. It can used by public safety agencies, mutual aid groups, EOC’s, and MACC Facility’s as a “yellow pages” directory for GIS information and also as a tool to share links to data & web mapping services to support public safety at the local and state levels. More information can be found at <http://gisinventory.net/>.

#### Geospatial Platform

The Geospatial Platform is envisioned as a managed portfolio of common geospatial data, services and applications contributed and administered by authoritative sources and hosted on a shared infrastructure. More information can be found at <http://www.geoplatform.gov>

#### Digital Coast

Digital Coast is a resource provided by NOAA that provides access to data, tools, case studies, and training for professionals working with coastal oil spill incidents. It was established with the concept that good data is not always enough, and can be most effective when communities have access to information that can be used to fully understand how to address coastal issues. For more information see: <http://www.csc.noaa.gov/digitalcoast/>

#### Virtual USA

Virtual USA was a collaborative effort developed by DHS. It aims to connect various disparate state emergency management geospatial data into one common operational picture by utilizing current information-sharing platforms to permit new and existing technologies to seamlessly exchange information with one another. For more information see: <https://vusa.us/Login.aspx>

#### HSIN

Public Safety Responders may also want to obtain a Homeland Security Information Network (HSIN) GIS Portal credential. HSIN is a national secure and trusted web-based portal for information sharing and collaboration between federal, states, local, tribal, territorial, private sector, and international partners engaged in the homeland security mission. More information on HSIN can be found on the DHS website, <http://www.dhs.gov/files/programs/gc_1156888108137.shtm>. HSIN credentials can be requested by emailing hsin.helpdesk@dhs.gov or calling (866) 430-0162.

The HSIN GIS portal is located at <https://government.hsin.gov/sites/gis> and also contains a link to download HSIP Freedom data. Your HSIN GIS credential can also be used to *view* HSIP Gold data in OneView and DHS Earth.

Within HSIN, the main Geospatial Information Infrastructure (GII) website is located at <https://gii.dhs.gov> where you can access GII web services, the OneView map, and download the DHS Earth kml file for use in Google Earth. More information on the DHS OneView can be found in Appendix E of the DHS GeoCONOPS.

According to the DHS GeoCONOPS, the formal location for federal posting and accessing geospatial data is through the HSIN and DHS GII tools such as OneView.

#### HSIP Freedom and Gold

HSIP Freedom data is a subset of the HSIP Gold datasets developed and compiled by the National Geospatial-Intelligence Agency (NGA) over the past few years. Approximately 190 datasets were identified from HSIP Gold as license free and distributable to state and local Homeland Security/Homeland Defense mission areas. HSIP Freedom can be shared and distributed among state and local government agencies and is being made available through the HSIN GIS Community of Interest (COI). HSIP Gold can be requested after a federal disaster declaration through HIFLD.

#### HSIP-NAVTEQ State Release

The commercial street & transportation data from HSIP Gold is also available separately upon special request by eligible state agencies. This data set is the only commercial dataset found in HSIP Gold that is available to States without a presidentially declared disaster. This data release includes street data, points of interest data, and route analysis information as generated by NAVTEQ. It includes the navigation features for routing and route analysis that are particularly valuable in public safety GIS. At this time this data product is only available on special request via HIFLD and only to eligible state agencies. For more information about the HSIP-NAVTEQ State Release visit HIFLD Working Group website at <http://www.hifldwg.org/>.

### State/Local Geospatial Products and Programs

Included in this document are examples of state and local geospatial products and programs that are used during an emergency event. We encourage you to customize this list, and add any products or programs relevant to individual agencies.

Examples can be found in Appendix 3

### Data Dissemination

According to the DHS GeoCONOPS, the formal location for federal posting and accessing geospatial data is through the Homeland Security Information Network (HSIN) and DHS Geospatial Information Infrastructure tools (GII) such as OneView. However each local agency will have different data dissemination protocols. Section 2.2.3 of the DHS GeoCONOPS gives an overview of recommended ways to share data:

*Vector data products are fairly compact in individual file size, facilitating data sharing through web services, e-mail, and web postings. With agile delivery options, emergency managers have access to these data products in a timely manner to assist in their decision-making. Larger data files such as imagery or national datasets are more difficult to manage. Frequently these data types are shared through the physical transfer of external hard drives and other portable media.*

For dynamic data exchanges, DHS supports NIEM and OGC standards to facilitate data dissemination and information exchange. NIEM represents a collaborative partnership of agencies and organizations across all levels of government (federal, state, tribal, and local) and with private industry. The purpose of NIEM is to effectively and efficiently share critical information at key decision points throughout the whole of the [justice](http://en.wikipedia.org/wiki/United_States_Department_of_Justice), [public safety](http://en.wikipedia.org/wiki/Department_of_Public_Safety), [emergency and disaster management](http://en.wikipedia.org/wiki/Emergency_management), [intelligence](http://en.wikipedia.org/wiki/Director_of_national_intelligence), and [homeland security](http://en.wikipedia.org/wiki/United_States_Department_of_Homeland_Security) enterprise. NIEM is designed to develop, disseminate, and support enterprise-wide information exchange standards and processes that will enable [jurisdictions](http://en.wikipedia.org/wiki/Jurisdictions) to automate information sharing. NIEM includes twelve domains. NIEM emergency management domain data elements and attributes were derived from existing messaging standards promulgated by the EDXL initiative, including the Common Alert Protocol (CAP v1.1), Distribution Element (DE), and Hospital Availability Exchange (HAVE), EDXL functions as a stand-alone suite of messaging standards. NIEM leverages EDXL concepts and methods. OGC is an international industry consortium of government agencies and organizations, universities, and the private sector that develops publicly available interface standards that are geo-enabled and interoperable.

A common information storage system must be identified to maintain transparency and access to response information as well as for archival purposes. This system should not be based on proprietary software (unless information sharing agreements are in place) and should have the ability to store high volumes of multiple types of information (databases, GIS files, documents, maps, photos, etc.). The system must be accessible by all responders and must account for certain software and hardware restrictions that both private industry and government organizations require. For GIS files, the system must offer the ability to quickly refer back to the previous day’s data view. If an ESRI ArcGIS server environment is used, it must allow for easy access to old data views and the “archiving” process must not include overwriting old datasets. If a Secure FTP (SFTP) site is used, it must be backed up daily, have restricted access, and be closely managed.

In the past events a SFTP has been stood up for incidents. This technology is useful since it is accessible to all including the USCG. We recommend an SFTP type structure be used as a “working” information environment. An SFTP allows personnel distributed across the country to access and upload documents. Other more appropriate archival databases could be utilized as well.

### Data Dissemination Protocols

Data dissemination is a vital part of incident response. A detailed work plan of designated paths by which data can be transferred from an ICP in the field to MACC’s to State Operations Centers to Federal Operations Centers should be outlined if possible.

**Example Data Connections**

Example: <<Server name>>

Personal/File GDB, Shapefiles, Coverages: <<Folder location>>

CD/DVD: <<CD/DVD name>>

### Information Dissemination Protocols

Local agencies should research visualization platforms as well as data transfer protocols as a way of sharing information. Location information can be easily shared via visualization tools and provide decision makers with needed information to effectively manage disasters.

### Data Connections

###  Enterprise Geodatabase

**Example Enterprise Database**

<<Provide process and connection properties for SDE databases>>

Open GIS File Management Program

* Double Click Database Connections
* Select Add Spatial Database Connection
* Enter connection information:
	+ Server: <server>
	+ Service: <service>
	+ Database: <database>
	+ Username: <username>

Password: <password>

<<Data from the coastal oil spill event should be stored in an enterprise geodatabase. Create the file structure the data will be stored in, and save all data there. It is recommended that someone monitors the database to ensure the organization and accuracy of the data>>

### GIS Emergency DVD

<<If applicable, describe the datasets and other content provided on CD/DVD. Include information on how the CD/DVD is produced and distributed and identify any usage restrictions. Identify the physical location of the media>>

### Public Data Sharing/Exchange Policy

#### Web Applications

<<Describe web applications and systems. Provide guidance and outline the processes for sharing data and map products. provide step by step instructions for working with these systems>>

#### GIS Press Package (optional)

<<If data will also be shared with the public outline policies and procedures for data release or reference existing policies >>

Figure 11-Example GIS Press Package Policy

**ExampleGIS Press Package Policy**

To further ensure the security and/or confidentiality of all incident related data:

* Do not share files through web applications unless the data are complete, ready-for-use, and where applicable you have been given the proper authority.
* When sharing GIS files, ALWAYS attach a projection file. Projection files are REQUIRED to be posted with all GIS data file formats. Projection to be used should be determined before emergency situation.
* When using web applications to share files, use the meta\_tag to alert GIS users as to status of the data/map/etc. (i.e. FACT, DRAFT, etc.)
* Clear data and map transfer with your Operation Center Manager or Director, as needed, when sharing data and map products between ICP, DOC and/or MOC GIS Staff and/or through web applications. Data should not go out through the GIS shop directly.
* The Public Information Officer is responsible for sharing ALL data and/or maps with the media.
* Public Access to <<jurisdiction>> GIS Data During a Disaster
* When the need to distribute certain types of GIS information is first apparent, certain assurances must be made. In order for a data layer to be made available publicly in a GIS press package, it must meet the following eight criteria. The questions must be applied individually to each data set that is to be included in the GIS press package. A “No” answer on any of the following questions should prohibit the release of the specific data layer in the press package.
1. Is the Incident the source of the information (the data is not base data)?
2. Data is essential in the press package; otherwise the press package will not make sense?
3. Has the data has been cleared to be in the press package by its authors, GIS Manager and the PIO?
4. Has the data been cleared to be released by the incident PIO in this briefing cycle (if any doubt see question 3)?
5. Has the data been checked for quality and consistency?
6. Is the data or subject matter releasable and not described on the Release Constrained Data layer list?
7. Is the data still current with recent events?
8. Does the data have metadata (see standard in definition)?

Additionally, if the data passes the above questions with a “Yes” answer to all of them, the data must be summarily vetted.

Documentation and Metadata

**Background:** It is recommended that metadata be provided for all GIS data leaving the Multi-Agency Coordination Center, especially any data to be released to the public. Due to the proliferation of geospatial data during an incident from other agencies, news organizations, and social network crowd sourced information, it is very important to attach a minimum set of metadata on data released to the public to distinguish the data as authoritative. Due to the time needed to complete FGDC (Federal Geographic Data Committee) compliant metadata, the file naming convention may serve as a good fit for data maintaining residency in the Multi-Agency Coordination System (MACS) facility during extremely busy periods of time.

Not all MACC’s are alike. Please be sure to modify the examples below to fit facility needs. Examples are for reference purposes only and are not intended to set a standard.

* ***Purpose*:** This chapter provides guidance for the creation of metadata for all incident data and modified base data.

### Dissemination of Metadata

Metadata should be created/updated in GIS File Management System in compliance with the ISO/TC 211. <<Reference any materials/policies that outline metadata guidelines>>.

If during an event it is not possible to create metadata in compliance with the FGDC, establish a guideline for the minimum metadata to be captured. Metadata ‘lite’, as discussed earlier in the document will help others to understand the data and use it in the best way possible. However, it does not eliminate the requirements for full metadata (i.e., ISO/TC 211 compliant) for data intended to be released beyond the ICS. Metadata ‘lite’ should include basic information such as the incident name, description, source of the data, contact information (if practical), the date and time it was created/collected and any limitations the data may have.

The metadata file can be exported in HTML, SGML or .txt format and should be named in the same convention as the data to which it refers (date/time stamp, incident name, etc.)

Recovery
Damage Assessment as outlined in Section 3.1 of the DHS GeoCONOPS,

*Damage assessments are conducted by multiple entities in support of their mission specific information requirements. These efforts are time and labor intensive and often focus on long-term recovery missions as opposed to critical response operations. The immediate needs of the post-event response are assessed using reports from field observations, localized damage reports, imagery sources, models, and subject matter expertise.*

National Resource Damage Assessment (NRDA) – The United States Department of the Interior’s National Resource Damage Assessment (NRDA) Restoration Program was created to restore natural resources affected by a coastal oil spill. Damage assessments are conducted with the assistance of state, tribal and federal trustee agencies. The damage assessments are used to negotiate legal settlements or to take legal actions against the responsible parties. For more information about NRDA see: <http://www.doi.gov/restoration/about>

Shoreline Cleanup and Assessment Technique (SCAT) – SCAT is a systematic method for surveying an affected shoreline after an oil spill, and was created in response to the Exxon Valdez oil spill in 1989. Standarized terminology is used to document shoreline conditions, and is used to support cleanup decisions. For additional information on SCAT see: <http://www.response.restoration.noaa.gov/oil-and-chemical-spills/resources/shoreline-cleanup-and-assessment-technique-scat>

One helpful resource when conducting damage assessments is the use of a common grid to divide up responders. Utilization of a common grid reference system, such as the USNG, is recommended for damage assessments and should be included in your agency’s SOP.

Information availability – There is a large amount of data collected during a coastal oil spill that will be relevant beyond the initial response. The impacts of a coastal oil spill can continue to be felt long after the command center has been dispersed. It is recommended that the GIS team work with the emergency managers and first responders to establish a timeline for how long the data will be available, what the process will be for requesting/obtaining the data and what data will be available versus what data will need to be kept confidential. Communication about the post-event data will ensure that data distribution is done properly.

Training/Exercise
Coastal oil spills can occur at any time. Preparedness is a crucial component to a successful emergency response. Pre-event training and exercises can help to greatly ensure that the emergency managers, first responders and GIS team are prepared to respond to a coastal oil spill incident. It will help them know what types of situations to expect, decide what GIS products are most useful and how rapidly they must be protected to be effective, and encourage overall teamwork and smooth communication during an actual event.

### National Preparedness for Response Exercise Program (PREP)

The National Preparedness for Response Exercise Program or PREP was developed as a collaborative effort between the United States Coast Guard, the United States Department of Transportation, the United States Environmental Protection Agency, and the United States Department of the Interior. The goal of the program was to establish a workable exercise program under the Oil Pollution Act of 1990. The PREP represents the minimum guidelines for ensuring adequate response preparedness during an oil spill incident. For more information on PREP see: <http://www.au.af.mil/au/awc/awcgate/uscg/prep_gid.pdf>

Suggested Content and Frequency of Pre-Event Training
The PREP recommends that the training process be repeated every three years – a triennial cycle. It also states that it is much more efficient to perform the recommended training exercises spread out over the course of 3 years, as opposed to doing all components all at once every third year. Section 2 of the National Preparedness for Response Exercise Program (PREP) Guidelines discuss the recommended training exercises organizations should participate in

It may not be practical to conduct training over a 3-year cycle, employee turnover and changing technologies may require a more frequent schedule. In particular this is important for GIS professionals who may not work in the emergency management field on a regular basis. The GIS team that will be assisting emergency managers and first responders need to be familiar with responding to incident in order to be the most effective.

Examples of Training/Exercises
PREP: Any organization interested in conducting training exercises can reference the PREP. There are examples of exercises of various types and length outlined in that document.

# Appendix 1: SOP Checklist

This checklist was based on a National Research Council report titled *Successful Response Starts with a Map: Improving Geospatial Support for Disaster Management*, which was published by The National Academies Press.

**Integration**

❑ Does your incident command post (ICP) have geospatial technology available?
❑ Do you have a permanent workspace or office for your geospatial team?
❑ Have you met with the emergency managers/responders to determine their geospatial needs for coastal oil spills?
❑ Have you published a list of and schedule for the delivery of standard geospatial products for coastal oil spills based on those needs?
❑ Is the use of geospatial information integrated into your emergency management operations and used in emergencies?
❑ Do your written standard operating procedures include the use of geospatial information in your workflow and decision-making processes?
❑ Do you know the name of your state GIS coordinator?
❑ Do you have contact information for the state GIS coordinator and his or her backup?
❑ Have you established agreements with adjoining jurisdictions and with state and federal governments to share data and products?
❑ Have you established agreements with adjoining jurisdictions and with state and federal governments that determine what data and tools will be used during an emergency?
❑ Have you developed agreements between geospatial professional teams at the municipal, state, and federal levels that identify the roles that each level will play and who will produce what in order to avoid duplication of effort during a large event?
❑ Have you worked with the state GIS coordinator to develop an inventory with around-the-clock contact information for GIS coordinators, their emergency management counterparts, and their respective backups in each county or major municipality in your state?
❑ Has this information been distributed to the emergency management community and the GIS coordinators in each county or major municipality in your state?

**Human Resources**

❑ Do you have a designated geospatial team that is regularly deployed during coastal oil spill incidents?
❑ Have you developed an organizational structure for your team that defines the roles of team members (manager, liaison, and technical support staff)?
❑ Does your organization have a geospatial team (away team) that you can deploy to incident sites to assist in emergency response?
❑ Does your organization have a geospatial team established, with expertise and training in coastal oil spills?
❑ Have you developed a secure web site to distribute this information to authorized users?

**Training**

❑ Is the use of geospatial data and tools included as part of your emergency training exercises?
❑ Are these exercises conducted on a regular schedule?
❑ Do your emergency response professionals understand the capabilities that geospatial data and tools offer to improve their ability to plan for and respond to coastal oil spill incidents?
❑ Have you established a training program for your geospatial team in emergency management organization concepts and operational procedures?
❑ Does your geospatial team train with pre-developed map templates?
❑ Do you conduct scenario-based training exercises that include geospatial professionals and the use of geospatial data and tools in the emergency management work cycle and decision-making process?
❑ Are the geospatial professional team manager and liaison included in the scenario training exercise meetings and briefings to allow them to understand better how geospatial data and tools are being used in the decision-making process?
❑ Are the results of these exercises posted to a secure web site so that other authorized responders not involved in the exercise can learn from them?

**Data Access**

❑ Have you developed relationships through the Regional Response Teams (RRT’s) with the data custodians and established protocols and agreements, where required, to ensure access to and use of the data you require for planning, training, and emergency response activities?
❑ Have you developed a methodology to ensure regular updates to those data?
❑ Are your geospatial data backed up on a regular basis?
❑ Do you have a full copy of the data?
❑ Do you have copies of the data securely stored in different geographic regions of your state?
❑ Do you have a copy of the data securely stored in a different state or geographic region of the country?
❑ Have you tested your methodologies for rebuilding your servers using the backed-up data within the past year?
❑ Have you tested the process for accessing data from data-sharing partners during simulations to ensure the viability of your methodology?
❑ Have you established a web-based GIS service to encourage rapid access to and delivery of event-based data?
❑ Have you worked with the RRT’s and state GIS coordinators to:
 ❑ Develop a secure web site within each state with an inventory (with around-the-clock contact information for the data custodians) of geospatial data in each state for use in emergency management operations?
 ❑ Have you developed links to each of these state inventories and made this resource available to local, county, state, and federal agencies that would respond to a catastrophe?

**Data**

❑ ESI Index boundaries
❑ ACP boundaries
❑ EPA regulated areas
❑ Potential access points
❑ Fishing areas
❑ Critical facilities
❑ Maritime infrastructure (boat launches, moorings, docks, etc.)
❑ Archaeology sites
❑ Managed areas
❑ Platform locations (BOEM/BSEE data)
❑ Beaches
❑ Airports/Helicopter landing zones
❑ Property owners
❑ Endangered species habitat/bird rookeries
❑ Land use/land cover
❑ Utilities (water, sewer, electric, gas, and petroleum lines and their related facilities);
❑ Telecommunications lines including phones, networks, and cable;
❑ Cell and other communication towers;
❑ Transportation systems;
❑ Shelters
❑ Dams
❑ Petroleum and chemical storage sites;
❑ Hazardous waste sites
❑ Ambulance services;
❑ Imagery
❑ FEMA flood zones
❑ Census data
❑ Daytime population data
❑ Business and industry locations
❑ Agricultural data
❑ Data from surrounding regions and/or states
❑ Has your geospatial data team determined the quality and usability of the geospatial data gathered for emergency response?
❑ Do the metadata provide an adequate description of data quality, including accuracy and currency?

**Data Gathering**

❑ Have you established a team to identify and gather all geospatial data needed for coastal oil spill incidents?
❑ Has your geospatial data team determined the quality and usability of the geospatial data gathered?
❑ Have you developed an inventory of municipal, county, state, and federal data that you require for use in emergency response?
❑ Does this inventory include metadata documenting and describing the geospatial data?
❑ Does your state have contracts in place for emergency aerial imagery?
❑ Do you have agreements in place to acquire digital images via government or private-sector plane or helicopter, of event sites immediately after an event occurs?
❑ Do you have live or near-live geospatial weather data?
❑ Do you have the capability to track the distribution of your emergency equipment or supplies geographically?
❑ Have you established data gathering procedures for coastal oil spills and tested those methodologies in training exercises?
❑ Do you have a geospatial web-based service application that provides rapid access to your event-related data by regional, state, or federal organizations responding to a large event?

**Data Improvement**

❑ Has the geospatial data team identified which data require improvements and which data not currently available need development?
❑ Do you get updates to your data (not including imagery) on an annual basis at a minimum?
❑ Is the imagery for your state less than five years old?
❑ Do you have a system for improving geospatial data to meet your emergency response requirements?

**Information Delivery**

❑ Has your geospatial team practiced rapid delivery of geospatial information to meet emergency management decision-making requirements?
❑ Has your geospatial team developed templates to improve the speed of delivery of geospatial information during a coastal oil spill incident?
❑ Do you have automated geocoding capabilities that will allow your geospatial team (or nontechnical staff) to convert field data and address locations to latitude and longitude quickly.
❑ Are your requests for assistance during an emergency tracked in a database and tracked via a GIS application to provide visual analysis of problem patterns, etc.?
❑ Have your geospatial professionals developed agreements with geospatial professional teams in adjacent communities or the state, and at the federal level, to determine the data and tools to be used and shared during coastal oil spills?
❑ Have your geospatial professionals developed agreements with geospatial professional teams in adjacent communities or the state, and at the federal level, on the roles that each level will play and the products that will be generated in order to avoid duplication of effort during a disaster?

**Equipment and Infrastructure**

❑ Do you have up-to-date geospatial software and hardware available?
❑ Do you have electronic field data collection methods (using GPS, smart phones, tablets, etc.) available to collect field data?
❑ Do you have capabilities of obtaining digital photographs of incident sites and transmitting them wirelessly to the ICP?
❑ Does your state have geospatial equipment and data prepared for deployment near an incident site?
❑ Do you have the ability to push out or pull in geospatial data or web-based services across the Internet?
❑ Do you have backup satellite communications systems to transmit geospatial data when necessary?
❑ Have you developed an up-to-date inventory of geospatial hardware available for use in an emergency (and around-the-clock contact information) in your state?
❑ Have you developed a secure web site with this inventory and around-the-clock contact information for each state?
❑ Have you developed a secure, national GIS web-based application to enable data to be accessed by authorized users across the country?

# Appendix 2: List of Acronyms, Terms and Definitions

AC Area Committee

ACP Area Contingency Plan

ActBalt Activities Baltimore, U.S. Coast Guard

AIRSTA Coast Guard Air Station

AIS Automatic Identification System

AOR Area of Responsibility

ART Alternative Response Technologies

ATSDR Agency for Toxic Support and Disease

BNTM Broadcast Notice to Mariners

CERCLA Comprehensive Environmental Response, Compensation and Liability Act of 1980

CFR Code of Federal Regulation

COP Common Operating Picture

COP Common Operating Platform

COTP Captain of the Port

CWA Clean Water Act

DHS Department of Homeland Security

DNR Department of Natural Resources

DOC Department Operations Center

DOI Department of the Interior

DRAT District Response Advisory Team (Coast Guard)

DRG District Response Group (Coast Guard)

EEZ Exclusive Economic Zone

EMAC Emergency Management Assistance Compact

EMT Emergency Medical Technician

EOC Emergency Operations Center

EPA Environmental Protection Agency

ERT Emergency Response Teams

ESI Environmentally Sensitive Index

FCPTF Florida Coastal Protection Trust Fund

FGDC Federal Geographic Data Committee

FOG Field Operations Guide

FOSC Federal On-Scene Coordinator

FOSCR Federal On-Scene Coordinator Representative

FPDPRA Florida Pollutant Discharge Prevention and Removal Act

FRP Facility Response Plan

FWPCA Federal Water Pollution Control Act

FWRI Florida Fish and Wildlife Research Institute

GeoCONOPS Department of Homeland Security’s Federal Interagency Geospatial Concept of Operations

GIS Geographic Information System

GRP Geographic Response Plan

HASP Health and Safety Plan

HAZWOPER Hazardous Waste Operations and Emergency Response

HHS Health and Human Services

HIFLD Homeland Infrastructure Foundation-Level Data

HSIN Homeland Security Information Network

IAP Incident Action Plan

IC Incident Commander

ICP Incident Command Post

ICS Incident Command System

IO Information Officer

LO Liaison Officer

JIC Joint Information Center

MAC Multi-Agency Coordination (Unit)

MACS Multi-Agency Coordination System

MOA Memorandum of Agreement

MOC Medical Operations Center

MOU Memorandum of Understanding

MSC Marine Safety Center

NCP National Contingency Plan

NGA National Geospatial-Intelligence Agency

NRT National Response Team

NIEM National Information Exchange Model

NIMS National Interagency Incident Management System

NOAA National Oceanic and Atmospheric Administration

NPFC National Pollution Fund Center

NRDA Natural Resource Damage Assessment

NRF National Response Framework – Stafford

NRS National Response System

NRT National Response Team

NSGIC National States Geographic Information Council

OPA-90 Oil Pollution Act of 1990

OPS Office of Pipeline Safety

OSC On-Scene Coordinator

OSHA Occupational Safety and Health Administration

OSLTF Oil Spill Liability Trust Fund

OSP Office of Oil Spill Prevention

OSRO Oil Spill Response Organization

OSROS Oil Spill Removal Organizations

POLREP Pollution Report

QI Qualified Individual

RP Responsible Party

RCP Regional Contingency Plan

RRT Regional Response Team

SAV Submerged Aquatic Vegetation

SO Safety Officer

SOG Standard Operating Guidance

SONS Spill of National Significance

SOP Standard Operating Procedure

SOSC State On Scene Commander

SSC NOAA Scientific Support Coordinators

SUPSALV US Navy Supervisor Salvage

TIPS Tidal Inlet Protection Strategies

UC Unified Command

USC United States Code

USCG United States Coast Guard

USNG US National Grid

VOO Vessels of Opportunity

VRP Vessel Response Plan

# Appendix 3: State/Local Geospatial Products and Programs

<http://www.map.floridadisaster.org/GATOR>

<https://cop.vdem.virginia.gov>

<https://virtual.alabama.gov>

<http://www.disasterresponse.maps.arcgis.com>

<http://ocean.floridamarine.org/acpgrp>

<http://atoll.floridamarine.org/Quickmaps/KMZ_download.htm>

<http://myfwc.com/research/gis/projects/oil-spill/acp/>

<http://myfwc.com/research/gis/data-maps/marine/>

<http://myfwc.com/research/gis/data-maps/terrestrial/>

<http://myfwc.com/research/gis/game/>

<http://www.maris.state.ms.us/>

<http://www.gsa.state.al.us/gsa/gis_data.aspx>

<https://www.dnr.sc.gov/pls/gisdata/download_data.login><http://www.bsee.gov/BSEE-Newsroom/Offshore-Stats-and-Facts/Offshore-GIS-Data/Maps.aspx>

<http://www.fws.gov/gis/index.html>

Appendix 4: List of Referenced Links

Federal Interagency Geospatial Concept of Operations (GeoCONOPS), Department of Homeland Security, Geospatial Management Office. For a digital copy visit: <http://www.napsgfoundation.org/attachments/article/113/DHS_Geospatial_CONOPS_v3.0_8.5x11.pdf>

International Charter Space and Major Disasters, <http://www.disasterscharter.org/home>

National Alliance for Public Safety GIS Foundation (NAPSG), A Quick Guide to Building a GIS for Your Public Safety Agency. For a digital copy visit: <http://www.napsgfoundation.org/attachments/article/81/Quick-Guide-GIS-Public-Safety-May-2011-PDF.pdf>

National Alliance for Public Safety GIS Foundation (NAPSG), Geospatial Standard Operating Guidance for Multi-Agency Coordination Centers (September 2011). For a digital copy visit: <http://www.napsgfoundation.org/attachments/article/119/NAPSG-SOG-V-2-Final-pdf.pdf>

National Oceanic and Atmospheric Administration (NOAA), Office of Response and Restoration. For more information visit: <http://response.restoration.noaa.gov/>

National Research Council, Successful Response Starts with a Map: Improving Geospatial Support for Disaster Management, Washington, DC: The National Academies Press, 2007. For more information visit: <http://www.nap.edu/openbook.php?record_id=11793&page=163>

National Wildlife Coordinating Group, GIS Standard Operating Procedures (June 2006). For a digital copy visit: <http://www.nwcg.gov/pms/pubs/GSTOP7.pdf>

Oil Pollution Act (OPA-90), signed into law August 1990. For more information visit: <http://www.epa.gov/osweroe1/content/lawsregs/opaover.htm>

United States Coast Guard, Department of Homeland Security, Homeport, <https://homeport.uscg.mil/mycg/portal/ep/home.do>

United States Coast Guard, Department of Homeland Security, Incident Management Handbook (IMH) (August 2006). For a digital copy visit: <http://www.uscg.mil/hq/nsfweb/docs/FinalIMH18AUG2006.pdf>