

**DEPARTMENT OF
NATURAL RESOURCES**



**Geographic Information Systems (GIS)
Protocols**

for the Alaska Coastal Management Program
and Coastal Impact Assistance Program

February 23, 2002
Office of Project Management and Permitting

Frank Murkowski Governor
Thomas Irwin Commissioner

Introduction

The Protocols identified below establish the minimum requirements for projects funded by the Alaska Coastal Management Program (ACMP) or the Coastal Impact Assistance Program (CIAP) that include a geographic information system (GIS) or computer aided design (CAD) component. For purposes of these Protocols, the term “GIS” also applies to CAD projects. These Protocols seek to maximize public benefits by supporting broad distribution of consistent and compatible ACMP- or CIAP-funded GIS data.

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Acronyms

AAC	Alaska Administrative Code
ACMP	Alaska Coastal Management Program
AGDC	Alaska Geospatial Data Clearinghouse
ASGDC	Alaska State Geospatial Data Clearinghouse
CAD	Computer Aided Design
CIAP	Coastal Impact Assistance Program
FGDC	Federal Geographic Data Committee
GIS	Geographic Information System
NAD	North American Datum
NAVD	North American Vertical Datum
SDTS	Spatial Data Transfer Standard
TIC	Telecommunications Information Council
UTM	Universal Transverse Mercator

Section I

Grant Applications

Protocol 1

Grant Applications Must Include the Following Information

Note: This Protocol does not apply to CIAP projects.

Proposals for ACMP-funded projects that include a GIS or CAD component must complete the following information for evaluation:

A. What scale will geographic information be collected? Though not always practical, inch-to-the-mile (1:63,360) or larger (e.g., 1:25,000) scales are preferred.¹ If data will be collected at a scale smaller than 1:63,360 (e.g., 1:250,000), explain why.

B. Will the public have free and unrestricted access to the data? All data, including the underlying “raw” data, must be placed in the public domain. Refer to Protocol 4 for more information.

C. What themes from the ACMP Standards and Guidelines at 6 AAC 80 and 6 AAC 85 will the GIS information address? Appendix A (*Spatial Data Themes Addressed in the ACMP*) identifies Required Themes and Mentioned Themes in the Standards and Guidelines. Identify the themes for which data will be collected, mapped or analyzed.

D. The Grantee and any subcontractors shall agree to follow the latest version of these Protocols. Copies of the latest Protocols can be obtained by contacting OPMP or DCED or at the ACMP website: <http://www.alaskacoast.state.ak.us/>. *The Grant Application shall identify any desired exceptions to the Protocols and provide a rationale.*

¹ Ideally, data developed for the ACMP should be useful for potential applicants and project review participants. Data developed at scales smaller than 1:63,360 (inch-to-the-mile), such as 1:1,000,000, generally do not provide sufficient detail to confidently use on an individual project. New data should be collected at a scale of 1:63,360 or larger, if the data and baseline information will accommodate that level of detail.

Section II

GIS Data

Protocol 2

The Grantee Shall Provide OPMP with GIS Digital Data

Upon completion of an ACMP- or CIAP-funded project with a GIS or CAD component, the grantee must provide OPMP a copy of all data and metadata files created as part of the project. The data must be submitted in an ESRI-compatible file format (e.g., shapefile or export file).

Protocol 3

GIS Digital Data Shall be Submitted in the Following Format²

The grantee or its contractor must affirm the data files:

A. Comply with the latest Open GIS Specifications

Open GIS is a consortium of industry, universities and government agencies developing geoprocessing specifications that support interoperable solutions to make spatial information and services accessible and useful with all kinds of applications. Data submitted to OPMP shall not require a proprietary software program that does not comply with Open GIS Specifications. (<http://www.opengis.org/>)

B. Conform to the format, datum, and projection requirements described below
(unless OPMP and DCED approve exceptions based on justification in the Grant Application)

1. Geodetic Model: This defines the shape and center of the earth for calculations.

- a. *Ellipsoid* – Geodetic Reference System (GRS) 80
- b. *Horizontal Datum*³ – North American Datum of 1983 (NAD 83)⁴
- c. *Vertical Datum* – North American Vertical Datum of 1988 (NAVD 88)⁵

² Please note grantees may develop GIS data in whatever format meets their particular needs. However, grantees must submit data to OPMP as noted in this Protocol, if practicable. Alternatively, grantees may submit a reference polygon as described in the *Projections* Note with prior approval. The intent of establishing common data formats is to simplify use of data by GIS novices within the ACMP network, and to establish a common statewide format for ACMP-funded data within OPMP.

³ Alaska Telecommunication Information Council (TIC) GIS policy recommends using the National Geodetic Survey software, NADCON, to convert digital GIS files between datums. TIC GIS policy also recommends permanently storing data captured in NAD 83 in its original coordinates to protect the integrity of the source.

⁴ Unless related data commonly uses another datum.

2. Projections: This defines which method is used to “flatten” a three-dimensional sphere into two dimensions. In order of preference:

- a. *Decimal Degree (Geographic) coordinates*
- b. *Alaska Albers Conical Equal Area projection*⁶

Note: Data submitted to OPMP in other than Alaska Albers must submit a digital *vector* polygon of the project area in Alaska Albers projection. This polygon will be used to reference the availability of the project data in another projection.

- c. *Alaska State Plane Coordinate System*⁷; or
- d. *Mercator, Universal Transverse Mercator (UTM), or other coordinate systems and projections may be submitted with prior approval on a case-by-case basis and adequate justification in the Grant Application.*

3. Vector Data: These are digital points, lines, arcs and polygons.

- a. *Base Maps* – Use the best USGS maps available as the upland base map for all projects.
- b. *Referencing* – Document in metadata sufficiently to reference the data on 1:63,360 (inch-to-the-mile) USGS quadrangles.
- c. *Registering* – Digitizing shall be completed to a root mean square (RMS) error of 0.003 or better in registering base maps to data.
- d. *Submitting* – Vector data must be submitted in ESRI compatible format (e.g., .e00 or .shp) as identified in the metadata.

4. Raster Data: These are images or grids in cells or pixels (e.g., USGS maps, satellite imagery, and aerial photography). Raster data must comply with federal standards for Spatial Data Transfer Standard (SDTS) Raster Profile and Extensions (SRPE).⁸

5. Data Table Attributes: This refers to information associated with the geographic image, usually in a database table. Data tables shall include the following information, if applicable:

- a. *Coastal district or agency identification*
- b. *Data origination dates*
- c. *Origination scale information*

⁵ Unless related data commonly uses another datum and the metadata specifies the zero elevation and whether ellipsoidal or orthometric elevations are used.

⁶ Standard Parallel 55; Standard Parallel 65; Longitude of Central Meridian –154; Latitude of Projection Origin 50; False Easting 0.00000; False Northing 0.00000

⁷ For projects that do not span more than one State Plane region, and when State Plane is the local standard for the use and collection of digital geographic data.

⁸ Includes Basic Image Interchange Format (BIIF) and Tagged Image File Format (TIFF).

Protocol 4

GIS Data Shall be Freely Available to the Public

Grantees shall provide all GIS data created as part of an ACMP- or CIAP-funded project free to the general public. Data that is created using ACMP or CIAP funds, including the underlying source data, shall be in the unrestricted public domain. Data may be made available to the public by:

1. ***Clearinghouse:*** Three internet clearinghouses have been created for sharing Alaska spatial data and metadata (see *Protocol 8*).⁹
2. ***District or other Web or File Transfer Protocol (FTP) site:*** Data may be made available for downloading through a district or other ACMP-related internet site.¹⁰
3. ***Other Format:*** If data will not be downloadable via the Internet, ACMP-funded spatial data should be accessible by diskette, CD-ROM, tape or other readily usable format upon request. A grantee may only charge for the cost of reproducing the data.

Sensitive Data: Grantees may specify with adequate justification in the Grant Application that sensitive cultural resource or use information will be withheld from broad public access. The metadata (see *Protocol 7*) should state the reasons why the data will not be readily available to the public and any use constraints, and provide sufficient information for discovery on a clearinghouse search that the data exists (see *Protocol 8*).

Commissioner Consideration: If the only opportunity to acquire essential data for a project is through exclusive or proprietary licensing that restricts data from the public domain, an applicant or grantee may bring their case before the DNR Commissioner or designee by submitting a request to the Director of OPMP. At a minimum, the Commissioner will consider the value of the project, alternatives to using restricted data, and the merits of using public funds for data that has restricted use.

⁹ GIS data subject to frequent or periodic editing may not be appropriate for posting on a clearinghouse because the data manager must continually ensure the latest version of the coverage is posted on the clearinghouse. ¹⁰ Spatial data subject to frequent or periodic editing may best be made available on such a website that is “closer to home.”

Protocol 5

Conform with Existing Statewide ACMP Themes

Coastal districts or state agencies delineating new or modified boundaries for the four ACMP statewide spatial data themes shall, at a minimum, conform to the data structure of the existing themes (available from OPMP or DCED).¹¹ To the extent practicable, new data shall be developed at inch-to-the-mile (1:63,360) or larger scale (e.g., 1:25,000). The four statewide themes include:

- 1. Coastal zone boundaries***
- 2. Coastal district boundaries***
- 3. Special area plan boundaries***
- 4. Permit notification areas***

Protocol 6

Geo-reference Computer Aided Design (CAD) Data

ACMP funded projects that use CAD software must ensure new data is geo-referenced to real-world coordinates using established datums and projections. Some CAD programs do not work in a coordinate system. Converting non-geo-referenced data into a GIS presents challenges. This limits the data's utility by other entities that use GIS. Exceptions to this Protocol may be granted with justification in the Grant Application on a case-by-case basis if compliance would be prohibitive.

¹¹ For example, a data set delineating a portion of the state's coastal zone boundary must include an "Inside" attribute with the following values, consistent with the current dataset:

Value: 0 Land outside the coastal zone

Value: 1 Landward areas inside the coastal zone

Value: 2 Federal waters outside the coastal zone

Value: 3 Offshore waters within the coastal zone

Metadata for the four statewide themes can be obtained at: http://www.asgdc.state.ak.us/homehtml/tb_bnd.html

Section III

Metadata – GIS Data Documentation

Protocol 7

FGDC-Compliant Metadata Shall Accompany All GIS Data

Metadata is "documentation about data." Metadata describes the who, what, where, when, why, and how, along with any other information that people need to use and understand the data.

Spatial data created as part of an ACMP- or CIAP-funded project must have associated metadata developed in compliance with the standard developed by the Federal Geographic Data Committee (FGDC).¹² The FGDC web site explains the metadata standard at <http://www.fgdc.gov/metadata/metadata.html>. The seven comprehensive elements of the FGDC metadata standard include:

- 1 *Identification Information* (required)
- 2 *Data Quality Information* (highly recommended)
- 3 *Spatial Data Organization Information* (highly recommended)
- 4 *Spatial Reference Information* (required)
- 5 *Entity and Attribute Information*
- 6 *Distribution Information*
- 7 *Metadata Reference Information* (required)

The FGDC standard requires metadata to include all known and applicable elements.¹³ Several metadata tools are available from a variety of sources that help complete metadata to FGDC standards.

¹² The federal Coastal Zone Management Act requires the following statement be attached to all grants. Therefore, ACMP-funded projects that include a GIS component must comply with the following direction. *For any CZM [Coastal Zone Management] award that is providing federal funds for collection or production of geospatial data (e.g., GIS data layer), the recipient will comply to the maximum extent practicable with Executive Order 12906 'Coordinating Geographic Data Acquisition and Access: the National Spatial Data Infrastructure' Federal Register vol. 59, Number 71, pp. 17671-17674, the award recipient shall document all new geospatial data it collects or produces using the standard developed by the Federal Geospatial Data Center (FGDC), and make that standardized documentation electronically accessible to OCRM [Office of Coastal and Ocean Resource Management]. The standard can be found at <http://www.fgdc.gov/>.*

¹³ Data Quality and Entity and Attribute Information (elements two and five) shall, if not described in the FGDC metadata, be addressed in separate documentation and referenced in the FGDC metadata. These elements are often difficult to set down in machine-readable form, and are sometimes best left to descriptions in text documentation associated with data sets. Separate documentation could define the key terms and attributes of a data layer. For instance, clarifying the criteria used to identify "major tourist destinations" in the Recreation theme or "flood hazards" in the Geophysical Hazards theme could improve the data's usefulness and transferability for other purposes.

Protocol 8

Metadata Must be Posted on a Clearinghouse

A clearinghouse functions as a detailed catalog service for locating information about spatial data as described in the metadata. Clearinghouses provide query and search functions, allowing researchers and the public to locate and identify existing digital spatial data through FGDC compliant metadata. Metadata for ACMP- or CIAP-funded data must be formatted for posting on one of the two clearinghouses dedicated to Alaska. Each clearinghouse shares metadata (and some data) developed from different sources (as identified below).

A clearinghouse may review data and metadata for acceptability before posting. Metadata must pass a “metaparser test” before it can be posted on a clearinghouse.

Alaska clearinghouses include:

1. ***The Alaska State Geospatial Data Clearinghouse (ASGDC)***: Data developed by or for state agencies or local governments may post data and metadata on the ASGDC website: <http://www.asgdc.state.ak.us/>
2. ***The Alaska Geospatial Data Clearinghouse (AGDC)***: Federal agencies and non-profit organizations may post data and metadata on the AGDC website: <http://agdc.usgs.gov/>.

If a clearinghouse will not post a project’s metadata, consult with OPMP or DCED to identify an appropriate site that can be accessed by the general public.

Data with Restricted Access

Metadata for spatial data with restricted public access must provide sufficient information for researchers to determine general applicability of the coverage and who to contact for more information. Complete metadata must accompany the coverage if it is distributed to an eligible party.

Section IV Published Products

Protocol 9

Mapped GIS Data Must Include the Following Information

A. Required

Digitally created published maps must be provided to OPMP and DCED in digital format, such as .tif or .pdf. Maps must include at a minimum:

1. ***Title*** – Place, Alaska
2. ***Sources*** – Accurate citation of the data source(s)
3. ***Date*** – Year published
4. ***Legend*** – Map attributes
5. ***Disclaimer*** – If applicable
6. ***Scale*** – A bar or ruler that will change proportionally when copying
7. ***Logos*** – NOAA and ACMP logos (available from OPMP or DCED)
8. ***Funding*** – The following funding statement is required for all ACMP-funded products:¹⁴

Funding for this publication was provided by the Alaska Coastal Management Program under the Coastal Zone Management Act of 1972, as amended in 1990 and 1996, administered by the Office of Ocean and Coastal Resource Management, National Oceanic and Atmospheric Administration, U.S. Department of Commerce.

B. Optional

To help users, maps produced using ACMP funds should also include the following information, if appropriate:

1. ***Projection*** – (optional)
2. ***Producer*** – Who produced the map and where (optional)
3. ***North arrow*** – (optional)
4. ***Index map*** – (optional)
5. ***Technical references*** – software program, where plotted, filename, cartographer (optional)

¹⁴ Consult with the OPMP (907-465-3562) if inclusion of the statement is graphically problematic.

Appendix

Spatial Data Themes Addressed in the ACMP

Geo-referenced Information Required or Mentioned in Regulation

ACMP Grant Applications for projects that include a GIS component must identify the themes from the Standards and Guidelines (6 AAC 80 and 6 AAC 85, respectfully) the project will address (see Protocol 1). The ACMP Standards and Guidelines regulations encourage, and in many instances require, districts or state agencies to provide information on certain topics. Much of this information has a geo-spatial component. In GIS language, information topics containing a common feature type are often referred to as “themes,” “layers,” or “coverages.”

Although maps are rarely required, the ACMP regulations suggest a geo-referenced aspect by using terms like “designate,” “identify,” and “describe or map.” Of course, a GIS is just one option for providing this information.

ACMP Geo-spatial Themes Table

The following table alphabetically identifies the themes of coastal resource information the ACMP Standards and Guidelines require or suggest districts or state agencies provide during coastal district program planning or individual project reviews.

- The “Who’s Responsible” column identifies whether a district, state agency, or both are required to provide the information mentioned in a theme found in the Standards and Guidelines.
- The “Required Themes” column identifies geo-spatial information required in the Standards and Guidelines.
- The “Mentioned Themes” column identifies geo-spatial information that is mentioned but not required in the Standards and Guidelines.

AAC refers to the title and section of the Alaska Administrative Code (AAC), the regulations that implement Alaska’s statutes.

Spatial Data Themes Addressed in the ACMP

Standard or Guideline		
<i>Purpose:</i>		
Who's Responsible	Required Themes	Mentioned Themes
Coastal Development		
6 AAC 80.040		
<i>Purpose:</i> To identify where water-dependent and water-related coastal district policies apply.		
Districts and State Agencies		Coastal areas for applying water-dependent and water-related priorities
Coastal Zone Boundary		
6 AAC 85.040		
<i>Purpose:</i> To delineate where coastal uses and resources occur for application of ACMP policies.		
Districts	Must include a map and description of the boundaries of the coastal zone subject to the district program.	Coastal district boundary; Lands subject to the exclusive jurisdiction of the federal government; Extent of marine coastal water; Transitional and intertidal areas, salt marshes, saltwater wetlands, islands, and beaches; Areas likely to be affected by or vulnerable to sea level rise; Political jurisdictions within the district, cultural features, planning areas, watersheds, topographic features; Coastal zone boundaries of adjacent coastal districts
Energy Facilities		
6 AAC 80.070		
<i>Purpose:</i> To identify suitable sites for development of major energy facilities.		
Districts and the state in cooperation with districts	Sites suitable for the development of major energy facilities must be identified.	<ul style="list-style-type: none"> • 6 AAC 80.070 paragraph (2) Existing uses and projected community needs • 6 AAC 80.070 (7) Existing infrastructure, including roads, docks, and airstrips

Standard or Guideline <i>Purpose:</i>		
Who's Responsible	Required Themes	Mentioned Themes
		<ul style="list-style-type: none"> • 6 AAC 80.070 (8) Harbors and shipping routes; reefs, shoals, drift ice, and other navigation obstructions • 6 AAC 80.070 (10) Harbor bathymetry; productive habitats • 6 AAC 80.070 (11) Fishing grounds, spawning grounds; habitats vulnerable to contamination, including marine mammal rookeries, hauling out grounds, and waterfowl nesting areas • 6 AAC 80.070 (12) Migratory patterns of fish and wildlife; areas of particular scenic, recreational, environmental, or cultural value • 6 AAC 80.070 (13) Ranked areas of relative biological productivity, diversity, and vulnerability • 6 AAC 80.070 (14) Wind and air current patterns • 6 AAC 80.070 (15) Areas designated for industrial purposes; population centers
Fish and Seafood Processing 6 AAC 80.090 <i>Purpose:</i> To identify suitable sites for locating commercial fishing and processing facilities.		
Districts	Shall identify areas suitable for location or development of facilities related to commercial fishing and seafood processing	May designate areas suitable for location or development of facilities related to commercial fishing and seafood processing
Forests 6 AAC 85.050 <i>Purpose:</i> To identify areas and types of timber resources		
Districts	Must include description of forests	

Standard or Guideline		
<i>Purpose:</i>		
Who's Responsible	Required Themes	Mentioned Themes

<p>Geophysical Hazards 6 AAC 80.050 <i>Purpose:</i> To identify the location of known geophysical hazard areas.</p>		
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Districts and State Agencies	Shall identify known geophysical hazard areas	
Districts and State Agencies	Shall identify areas of high development potential in which there is a substantial possibility that geophysical hazards may occur	

<p>Habitats 6 AAC 85.050 – 060 <i>Purpose:</i> To identify the location of sensitive habitats</p>		
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District programs	Must include description of habitats in 6 AAC 80.130, wetlands, and fish and wildlife. 6 AAC 80.130 includes: Offshore areas; Estuaries; Wetlands and tideflats Rocky islands and seacliffs; Barrier islands and lagoons; Exposed high energy coasts; Rivers, streams, and lakes; and Important upland habitat.	Areas of present and anticipated needs, demands, and uses for coastal zone habitats Ranking of the suitability and sensitivity of habitats for development
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<p>Historic, Prehistoric, and Archaeological Resources 6 AAC 80.150 <i>Purpose:</i> To identify the location of important cultural and historic resources.</p>		
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Districts and state agencies	Shall identify areas of the coast which are important to the study, understanding, or illustration of national, state, or local history or prehistory	
District programs	Must include description of major cultural, historic, prehistoric, and archaeological resources	

Standard or Guideline		
<i>Purpose:</i>		
Who's Responsible	Required Themes	Mentioned Themes
Land and Water Uses and Resources		
6 AAC 85.050 - .060		
<i>Purpose:</i> To identify major uses and management responsibilities.		
Districts	Must describe or map major land or water uses or activities that are or have been conducted or designated within or adjacent to the district	Areas of present and anticipated needs, demands, and uses for coastal zone resources.
	Must describe or map major land and resource ownership, jurisdiction, and management responsibilities within or adjacent to the district.	Ranking of the suitability and sensitivity of resources for development
Minerals		
6 AAC 85.050		
<i>Purpose:</i> To identify likely locations for mineral development.		
Districts	Must include description of minerals	
Recreation		
6 AAC 80.060		
<i>Purpose:</i> To identify areas of existing or potential recreational use.		
Districts	Shall designate areas for recreational use, including <ul style="list-style-type: none"> • Areas that receive significant use by persons engaging in recreational pursuits • Major tourist destinations • Areas with potential for high quality recreational use because of physical, biological, or cultural features 	Areas of existing and desired public access to coastal water
Soils		
6 AAC 80.050		
<i>Purpose:</i> To identify soils.		
District programs	Must include description of soils (6 AAC 85.050)	Ranking of the suitability and sensitivity of natural hazard areas for development

Standard or Guideline <i>Purpose:</i>		
Who's Responsible	Required Themes	Mentioned Themes

Special Areas 6 AAC 85.090 <i>Purpose: To identify areas subject to ACMP enforceable policies.</i>		
District programs	Must describe or map areas sensitive to development subject to enforceable policies; special area management plan areas; and areas which merit special attention.	
Subsistence 6 AAC 80.120 <i>Purpose: To identify areas where subsistence is a dominant use.</i>		
Districts	(b) Shall identify areas in which subsistence is the dominant use of coastal resources	May, after consultation with appropriate state agencies, Native corporations, and any other persons or groups, designate areas identified in (b) as subsistence zones in which subsistence uses and activities have priority over all nonsubsistence uses and activities. Migration routes of fish and game resources
Water 6 AAC 85.050 <i>Purpose: To identify locations and types of water resources.</i>		
Districts	Must include description of water	

**Geographic Information System Protocols
for the
*Alaska Coastal Management Program and
Coastal Impact Assistance Program***

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Funding for this publication was provided by the Alaska Coastal Management Program under the Coastal Zone Management Act of 1972, as amended in 1990 and 1996, administered by the Office of Ocean and Coastal Resource Management, National Oceanic and Atmospheric Administration, U.S. Department of Commerce.

