FGDC Document Number XX

National Shoreline Data Content Standard
Working Draft

Standards Working Group
Federal Geographic Data Committee

August 2006

Federal Geographic Data Committee
Department of Agriculture • Department of Commerce • Department of Defense • Department of Energy
Department of Housing and Urban Development • Department of the Interior • Department of State
Department of Transportation • Environmental Protection Agency
Federal Emergency Management Agency • Library of Congress
National Aeronautics and Space Administration • National Archives and Records Administration
Tennessee Valley Authority

Federal Geographic Data Committee

Established by Office of Management and Budget Circular A-16, the Federal Geographic Data Committee (FGDC) promotes the coordinated development, use, sharing, and dissemination of geographic data.

The FGDC is composed of representatives from the Departments of Agriculture, Commerce, Defense, Energy, Housing and Urban Development, the Interior, State, and Transportation; the Environmental Protection Agency; the Federal Emergency Management Agency; the Library of Congress; the National Aeronautics and Space Administration; the National Archives and Records Administration; and the Tennessee Valley Authority. Additional Federal agencies participate on FGDC subcommittees and working groups. The Department of the Interior chairs the committee.

FGDC subcommittees work on issues related to data categories coordinated under the circular. Subcommittees establish and implement standards for data content, quality, and transfer; encourage the exchange of information and the transfer of data; and organize the collection of geographic data to reduce duplication of effort. Working groups are established for issues that transcend data categories.

For more information about the committee, or to be added to the committee's newsletter mailing list, please contact:

Federal Geographic Data Committee Secretariat
c/o U.S. Geological Survey
590 National Center
Reston, Virginia 22092

Telephone: (703) 648-5514
Facsimile: (703) 648-5755
Internet (electronic mail): gdc@usgs.gov
Anonymous FTP: ftp://fgdc.er.usgs.gov/pub/gdc/
World Wide Web: http://fgdc.er.usgs.gov/fgdc.html

CONTENTS

Page

1. Introduction

1.1 Objective and Justification

The location of our national shoreline is a baseline for legal boundaries, nautical charts, and commercial and natural resource utilization and management. Effective use of shoreline data requires a highly defined logical data structure that is interoperable, efficient and applicable to a broad base of government and private sector demands. Current practices have led to a highly variable shoreline data infrastructure. In accordance with Executive Order 12906, and subsequent Executive Order 13286 an amendment to E.O. 12906, initiatives for geospatial data standardization is underway. Domestically, Federal Geographic Data Committee (FGDC) and the American National Standards Institute (ANSI) along with international organizations i.e. Internal Organization for Standardization (ISO) are catalysts for the development of geospatial standards. As a result, FGDC-STD-001.2.-2001, Shoreline Metadata Profile of the Content Standard for Digital Geospatial Metadata was developed. The National Shoreline Data Content Standard is intended to enhance the shoreline framework by providing technical guidance on shoreline semantics, data structures and their relationships to builders and users of shoreline data.

Shoreline definition protocols currently limit agencies and organizations from effectively sharing and using shoreline coincident data. Agencies have expressed an interest for greater harmonization and uniformity to shoreline data content. Enhancing shoreline content and interoperability is technically feasible and timely in relation to

hydrographic, hydrologic and other related standards development. The proposed standard shall tie related protocols and existing content together in a new model using recognized reference material, definitions, semantics, and structures. Harmonizing shoreline content will lead to cost savings by reducing the time in design, data re-use, training, and implementation. In addition, harmonizing shoreline data content assists in areas as coastal research, historical shoreline change analysis, shoreline change prediction analysis, and the effects of relative sea rise.

Relative to data transformation and fusion, the common framework reference for shoreline data would support the recommendation of the Coastal States Organization mentioned on page 51 of "A Geospatial Framework for the Coastal Zone" by the National Research Council of the National Academies:

> ".. that the USACE together with NOAA, FEMA, USGS, and other appropriate agencies should be tasked to 'identify, compile, integrate and make available to the states data and information on shoreline change and process, and work in conjunction with states and other local project sponsors to identify further information and data collection processes needed to fill the gaps in understanding a comprehensive approach to littoral system management' (CSO 2002; pp 19-20)"

Per project example, the United States Geological Survey is undertaking the task of developing the National Map http://nationalmap.gov/. This project is an example of the requirement for a common set base information. A common framework to support data fusion and data partners specific to shoreline as the National Resource Council states above.

1.2 Scope

The geographical scope of the standard comprises all shorelines within the coastal and inland waterways for the United States, its Commonwealths, and Territories and any other possession that the United States exercises sovereignty.

The functional scope of the standard includes the definition of data models, schemas, entities, relationships, definitions, and cross-walks to related standards. Legal controversy has historically surrounded shoreline definitions because of the boundary implications. This standard will provide a framework inclusive of multiple shoreline interpretations, and will not attempt to resolve disputed terminology. Data discovery, transmittal, display, and delivery are not currently part of this standard.

1.3 Description of the Standard

The National Shoreline Data Content Standard provides a framework for shoreline data development, sharing of data, and shoreline data transformation and fusion. The standard defines attributes or elements that are common for shoreline data development. The standard provides suggested domains for the elements including a reference to the Shoreline Metadata Profile of the Content Standard for Digital Geospatial Metadata.

1.4 Applicability and Intended Uses of the Standard

Mapping, shoreline engineering, coastal zone management, flood insurance, and the natural resource management communities will be the primary audience of this standard. The standard is intended to support the shoreline community in developing

shoreline data to support data transformation, data fusion, and data sharing. The standard is not reflective of an implementation design, an implementation or application design should, however, incorporate the concepts found in this standard.

1.5 Relationship to Related Standards

Numerous logical relationships exist between the proposed standard and other standards currently published or are in development. Shoreline features are currently part of several standards providing reference to a specific shoreline definition. This standard, The National Shoreline Data Content Standard will provide information that encompasses shoreline variables and elements in greater detail and extent than existing standards.

- Content Standard for Digital Geospatial Metadata (version 2.0), FGDC-STD-001-1998
- Content Standards for Framework Land Elevation Data, March 21, 2005, standard is at FGDC Step 9. Document date January 2000.
- IHO Transfer Standard for Digital Hydrographic Data (S-57)
- Cadastral Data Content Standard, FGDC-STD-003, 3rd Revision, May 2003
- Geographic Information Framework Data Content Standards for Hydrography (ANSI)

The Metadata Profile for Shoreline Data, FGDC-STD-001.2-2001, has a direct relationship to the National Shoreline Data Content Standard. The profile preceded the content standard. The intent of the metadata profile was a first attempt to provide shoreline developers with a framework in describing processes, tools, and techniques for creating geospatial shoreline data. As a result of the metadata profile being the sole source for shoreline data descriptors, feature attribution lacked the coherence and congruence due to geospatial shoreline data variability which resulted in the call for developing The National Shoreline Data Content Standard.

With the endorsement and adoption of the National Shoreline Data Content Standard by FGDC and shoreline constituents, the metadata profile will naturally undergo a process of examination and redevelopment. Redevelopment of the metadata profile follows the current FGDC maintenance procedures as stated in the Metadata Profile for Shoreline Data.

1.6 Standards Development Procedures

This standard will follow the guidelines as prescribed by the FGDC, and will be overseen by the FGDC Marine and Coastal Spatial Data Subcommittee. The standard development and modeling advisory team will direct the project on a daily basis and report to Commander Brian K. Taggart, NOAA, as the primary sponsor. Additional direction will be provided by subscribers, contributors, and reviewers in their roles as defined in FGDC guidelines. List serve, email, teleconference and web based communications will be used to reach a broad constituency. Project team meetings will be scheduled on an as needed basis depending on available resources. The standards development and modeling advisory team will also present its findings and seek informal comments through presentations at regional and national conferences that are attended by the shoreline data community. Conferences of opportunity will be identified during the early development process.

Special attention will be given to evaluating the relationship of the proposed standard to the current Metadata Profile for Shoreline Data, FGDC-STD-001.2-2001. The Metadata Profile contains valuable references related to the proposed standard, and is a result of an early and possibly premature effort to develop a shoreline data content

standard. A recommendation will be presented to the Standards Working Group during the development process for modifying or harmonizing with the Metadata Profile for Shoreline Data.

1.6.1 Participants

Participant involvement via a Call for Participation was forwarded via e-mail to shoreline constituents nationwide. The levels of participation are described below which provides for a variety of voluntary level of support to the development group.

Standards Development and Modeling Advisory Team: Members who will be tasked with developing content definitions, assisting modelers, writing, and editing the Standard. This is the group of people who will be the most active participants in the process. A 6 month time period has been planned for the development of the National Shoreline Data Content Standard Working Draft.

Reviewer: Interested in reviewing various drafts of the Standard when ready. Reviewers will have a time requirement of up to 2 weeks depending on the review demands of the individual standard effort.

Contributor: Interested in offering model input, background information to be considered in design. The Contributor role will not require significant time commitments. However individuals who agree to this role will be expected to provide timely information when requested.

Subscriber: Interested in listening and staying informed about progress of the Standards Development and Modeling Advisory Team. The Subscriber role will

not require significant time commitments. However individuals who agree to this role will be expected to provide timely information when requested.

The list below is of individuals who have contributed to the development of the standard.

Name	Agency
Henry Norris	Florida Marine Research Institute
Bruce Potter	Island Resource Foundation
Karen J. Gray	NGA
Adam Bailey	NGA
Dennis Walker	NGA
Robert Wilson	NOAA
Greg Fromm	NOAA
Dave Stein	NOAA
Kimberly Owens	NOAA
Mike Brown	NOAA
Mike Rink	NOAA
Jeffrey Lillycorp	USACE
Jeff Williams	USGS
Richard Naito	MMS

The National Shoreline Data Content Standard Development and Modeling Advisory team was assisted by Daniel Martin of Perot Systems Government Service and chaired by William E. Linzey of NOAA. For further information regarding the standard visit the web page :

http://www.fgdc.gov/standards/projects/FGDC-standards-projects/shoreline-data-content/?searchterm=shoreline

1.7 Maintenance Authority

The U.S. Department of Commence, National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (NOS), National Geodetic Survey

(NGS) will maintain the National Shoreline Data Content Standard. Maintenance guidelines of the National Shoreline Data Content Standard will follow the FGDC guidance as described by Directive #9 "Maintenance and Support". Address questions concerning this standard to:

Commander Brian K. Taggart, NOAA, NGS,
Acting Chief, Remote Sensing Division
NOS NMAO Route: N/NGS3
BLDG: SSMC3 RM: 8209
1315 EAST WEST HWY
SILVER SPRING MD 20910-3282
brian.k.taggart@noaa.gov

2. Rationale for Design

2.1 National Shoreline

Transparent to technological methodologies, the National Shoreline Data Content Standard entail the development of a common data framework facilitating shoreline developers and users to readily share, transform, and fuse shoreline data.

The concept of a National Shoreline Data Content Standard is paramount in supporting shoreline data development and user activities. This concept is principal to shoreline due to the variety of shoreline definitions, domestic and international legal implications, methods of data capture, and lack of interoperable shoreline data among local, state, and federal entities. The existing variety of shoreline data structures provides an impediment towards the fusion of data in support of modeling tools.

Shoreline users require shoreline delineation at a variety of precision in both the horizontal and vertical datum to support a specified project purpose. Data modeling activities such as the V-Datum tool, for example, provides an effort towards developing seamless topography to hydrography data, essentially a seamless "land to sea floor" data set.

With the absence of a referencing document (a content standard) providing for a common framework for shoreline data, efforts such as data transformation and data fusion would prove to be laborious due to the incongruence of shoreline data. The shoreline data content standard resolves the issue surrounding incongruence by creating a vehicle which provides for a common framework standard for shoreline data development.

2.2 Design of the Data Content Standard

On Page seven of the FGDC March 1996 "Standards Reference Model" it states; "Data content standards provide semantic definitions of a set of objects …" In essence, a data content standard is a finite set of information that communicates an essential set of elements for and at a feature level. The effort or premise in designing the National Shoreline Data Content Standard is to create an empirical form or format that represented shoreline geospatial data. This format is viewed as the common denominators required when developing shoreline data which promotes data integrity and cohesiveness in support of data development, data sharing, and data fusing. The derived model accounts for and incorporates aspects of the Shoreline Metadata Profile of the Content Standard for Digital Geospatial Metadata, FGDC-STD-001.2-2001. As a result, the approval of this

standard provides for the opportunity in updating and enhancing the Shoreline Metadata Profile of the Content Standard for Digital Geospatial Metadata, FGDC-STD-001.2-2001.

The elements considered to be essential or primary in shoreline data are found in the shoreline_parent content. *(see diagram in Section 3 Data Model).* These elements were found to be the foundation or a common framework for shoreline geospatial data that will facilitate data sharing, transformation, and fusion.

Although the underpinnings for the content are found in the shoreline_parent table, the elements providing expanded content are found in the support element tables, *see diagram in Section 3 Data Model.* The support content describes further the parent content elements by expanding on the set of entry variables for shoreline data.

2.2.1 Shoreline Parent Table Elements

Vertical Datum

A look up table provides for the referencing of the three classes of vertical datum:

- Tidal_Datums lists datum that are affected by the tidal epoch. Datum that were and are derived for rivers, lakes, and oceans are included in this domain.
- Orthometric lists datum that are essentially equipotential surfaces of the earth tied to one or more tide stations as control points. North American Vertical Datum 1988, NAVD88 is one example
- Ellipsoidal lists datum that are based on a geometric model of the earth, an ellipsoid. WGS84, World Geodetic System is an example of an ellipsoidal datum

Horizontal Datum

Provides a reference for the entry of the horizontal datum. A look up table lists examples of horizontal datum is provided.

Date

Provides for the calendar date entry of the original shoreline data capture.

Time

Provides for the time of day of the original shoreline data capture.

Shoreline Definition

Provides for existing shoreline definitions to be referenced in the development of shoreline data. This element will not establish *the* definition of shoreline, however, the standard recognizes the variety of shoreline definitions relative to the variety of purposes of shoreline data.

NSSDA_H_Value

Provides for the entry of the National Standard for Spatial Data Accuracy, FGDC-STD-007.3-1998, tested horizontal value from the statement of conformance under the Accuracy Reporting section.

NSSDA_V_Value

Provides for the entry of the National Standard for Spatial Data Accuracy, FGDC-STD-007.3-1998, tested vertical value from the statement of conformance under the Accuracy Reporting section.

Source_Type and Source_ID

Provides information regarding the source or sources in developing shoreline data.

Geometry ID

Provides information regarding the location system utilized. The information provided in this table can be found in the Contents Standard for Digital Geospatial Metadata, FGDC-STD-001-1998 section 4.

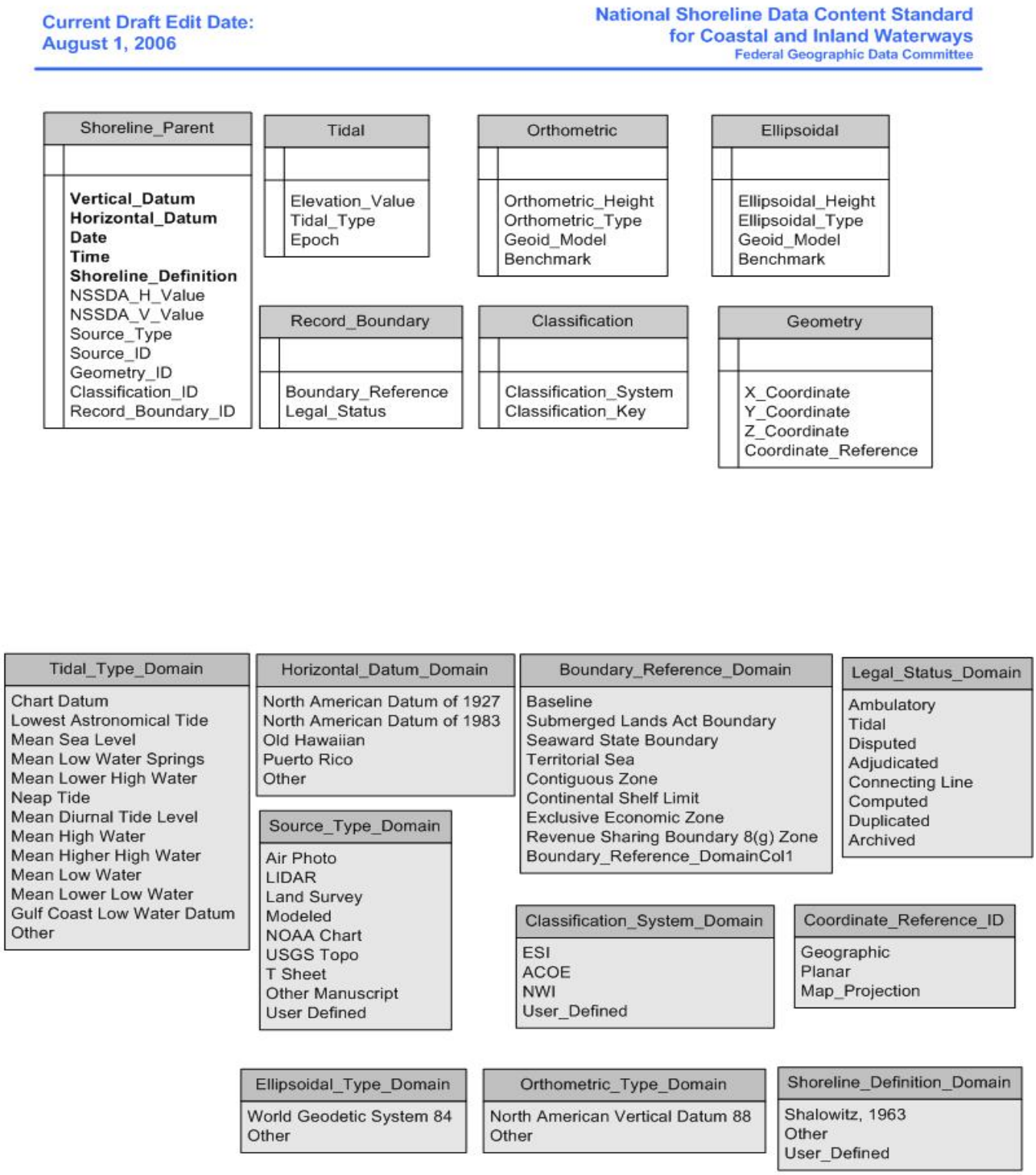
Classification and Classification_ID

Provides for the entry of a shore area that exists at the time and date of shoreline data capture. A variety of classifications can be used, such as the Environmental Sensitivity Index (ESI) to classify this predominant shore area. Shoreline classification schemes are numerous in which the Classification_ID lists the known, at the time this standard was written, shoreline classifications. A shoreline geospatial data developer is encouraged to not only classify the shoreline but to identify the source of the classification being used.

Record Boundary

The Cadastral Data Content Standard, FGDC-STD-003, 3rd Revision, May 2003 provides the attribution and suggested domain for this entry and is listed in the standard.

3. Data Model


Current Draft Edit Date:
August 1, 2006
National Shoreline Data Content Standard
for Coastal and Inland Waterways
Federal Geographic Data Committee
Shoreline_Parent
Vertical_Datum
Horizontal_Datum
Date
Time
Shoreline_Definition
NSSDA_H_Value
NSSDA_V_Value
Source_Type
Source_ID
Geometry_ID
Classification_ID
Record_Boundary_ID
Tidal
Elevation_Value
Tidal_Type
Epoch
Orthometric
Orthometric_Height
Orthometric_Type
Geoid_Model
Benchmark
Ellipsoidal
Ellipsoidal_Height
Ellipsoidal_Type
Geoid_Model
Benchmark
Record_Boundary
Boundary_Reference
Legal_Status
Classification
Classification_System
Classification_Key
Geometry
X_Coordinate
Y_Coordinate
Z_Coordinate
Coordinate_Reference
Tidal_Type_Domain
Chart Datum
Lowest Astronomical Tide
Mean Sea Level
Mean Low Water Springs
Mean Lower High Water
Neap Tide
Mean Diurnal Tide Level
Mean High Water
Mean Higher High Water
Mean Low Water
Mean Lower Low Water
Gulf Coast Low Water Datum
Other
Horizontal_Datum_Domain
North American Datum of 1927
North American Datum of 1983
Old Hawaiian
Puerto Rico
Other
Boundary_Reference_Domain
Baseline
Submerged Lands Act Boundary
Seaward State Boundary
Territorial Sea
Contiguous Zone
Continental Shelf Limit
Exclusive Economic Zone
Revenue Sharing Boundary 8(g) Zone
Boundary_Reference_DomainCol1
Legal_Status_Domain
Ambulatory
Tidal
Disputed
Adjudicated
Connecting Line
Computed
Duplicated
Archived
Source_Type_Domain
Air Photo
LIDAR
Land Survey
Modeled
NOAA Chart
USGS Topo
T Sheet
Other Manuscript
User Defined
Classification_System_Domain
ESI
ACOE
NWI
User_Defined
Coordinate_Reference_ID
Geographic
Planar
Map_Projection
Ellipsoidal_Type_Domain
World Geodetic System 84
Other
Orthometric_Type_Domain
North American Vertical Datum 88
Other
Shoreline_Definition_Domain
Shalowitz, 1963
Other
User_Defined
Martin & Linzey

4. Entities and Attributes Definitions

The entity and attribute diagram in Section 3.0, Data Model, provides an illustration of the National Shoreline Data Content Standard.

The informative annexes provides lists of domain values that can be used during implementation of the standard. Where applicable, references and explanations of the elements in the domains are provided for further clarification and explanation. It is suggested during implementation, that null or void values not be entered, rather, where applicable, the use of not applicable or unknown for that entity or the actual value of the entity be entered.

Vertical Datum

For marine applications, a base used as a reference from which to reckon heights or depths. It is called a tidal datum when defined in terms of a certain phase of the tide. Tidal datums are local datum and should not be extended into areas which have differing hydrographic characteristics with substantiating measurements. In order that they may be recovered when needed, such datums are referenced to fixed points known as bench marks (Hicks,2000)

Tidal

Elevation Value

Numeric entry expression for a value identifying positive, above the shoreline plane of reference, and negative, below the plane of reference.

Epoch

Also known as phase lag. Angular retardation of the maximum of a constituent of the observed tide (or tidal current) behind the corresponding maximum of the same constituent of the theoretical equilibrium tide. It may also be defined as the phase difference between a tidal constituent and its equilibrium argument. As referred to the local equilibrium argument, its symbol is k. When referred to the corresponding Greenwich equilibrium argument, it is called the Greenwich epoch and ids represented by G. A Greenwich epoch that has been modified to adjust to a particulate time meridian for convenience in the prediction of tides is represented by g or by k'. The relations between these epochs may be expressed by the following formula:

$$G = k + pL$$

$$g = k' = G - aS / 15$$

in which L is the longitude of the place and S is the longitude of the time meridian, these being taken as positive for west longitude and negative for east longitude; p is the number of constituent periods in the constituent day and is equal to 0 for all long-period constituents, 1 for diurnal

constituents, 2 for semidiurnal constituents, and so forth; and a is the hourly speed of the constituent, all angular measurements being expressed in degrees. (2) As used in tidal datum determination, it is the 19 year cycle over which tidal height observations are meaned in order to establish the various datums. As there are periodic and apparent secular trends in sea level, a specific 19 year cycle (the National Tidal Datum Epoch) is selected so that all tidal datum determinations throughout the United States, its territories, Commonwealth of Puerto Rico, and Trust Territory of the Pacific Islands, will have a common reference. (Hicks, 2000)

Tidal_Type

Any of the entries in the Tidal_Type_Domain, including tidal datum not listed and described by "other" in the table are to use this entry.

Orthometric

Orthometric_Height

The distance between the geoid and a point, measured along the vertical through the point and taken positive upward from the geoid. Also called orthometric elevation. Orthometric heights are used in topographic mapping.

Geoid Model

"A mathematical model that describes the surface of a geoid based upon a geodetic datum and associated reference ellipsoid. The geoid model is defined using a set of spherical harmonic coefficients or an implemented set of algorithms in a computer program."

http://www.august.com/epicentre/local/geoid_model.html

Bench Mark

A fixed physical object or mark used as reference for a horizontal or vertical datum. A tidal bench mark is one near a tide station to which the tide staff and tidal datums are referred. A primary bench mark is the principal mark of a group of tidal bench marks to which the tide staff and tidal datums are referred. The standard tidal bench mark of the National Ocean Service is a brass, bronze, or aluminum alloy disk 3-½ inches in diameter containing the inscription NATIONAL OCEAN SERVICE together with other individual identifying information. A geodetic bench mark identifies a surveyed point in the National Spatial Reference System. Most geodetic bench mark disks contain the inscription VERTICAL CONTROL MARK NATIONAL GEODETIC SURVEY with other individual identifying information. Benchmark disks of either type may, on occasion, serve simultaneously to reference both tidal and geodetic datums. Numerous bench marks of predecessor organizations to NOS, or parts of other organizations absorbed into NOS, still bear the inscriptions: U.S. COAST & GEODETIC SURVEY, NATIONAL GEODETIC SURVEY, NATIONAL OCEAN SURVEY, U.S. LAKE SURVEY, CORPS OF ENGINEERS, and U.S. ENGINEER OFFICE. (Hicks 2000)

Orthometric_Type

Any of the entries in the Orthometric_Type_Domain, including "other" in the table are used for Orthometric types not listed in this domain.

Ellipsoidal

In geometric terms, a closed surface of which all planar sections are ellipses. In general framework, GIS, and mapping practices, an ellipsoid is a specific mathematical representation of the earth that more closely approximates the shape of the surface than a sphere does.

Ellipsoidal_Height

The distance between the ellipsoid and a point, measured along the vertical through the point and taken positive upward from the ellipsoid.

Geoid Model

"A mathematical model that describes the surface of a geoid based upon a geodetic datum and associated reference ellipsoid. The geoid model is defined using a set of spherical harmonic coefficients or an implemented set of algorithms in a computer program."

http://www.august.com/epicentre/local/geoid_model.html

Bench Mark

See Orthometric Bench Mark.

Ellipsoidal_Type

Any of the entries in the Ellipsoidal_Type_Domain, including "other" in the table are used for Ellipsoidal types not listed in this domain.

Horizontal_Datum

A geodetic reference point that is the basis for horizontal control surveys and consists of five quantities: latitude, longitude, the azimuth of a line from the reference point, and two constants that are the parameters of the reference ellipsoid. The datum may extend over an area of any size.

Horizontal Datum Domain

Provides a list of datum that may be used for the identification of the horizontal datum in use. Though there are numerous horizontal datum in use, the table provides examples of datum that are used.

Date

Provides for the calendar date entry of the original shoreline data capture. In an implementation model, the reference to date representations in the Content Standard for Digital Geospatial Metadata, FGDC-STD-001.1998, is suggested.

Time

Provides for the time of day of the original shoreline data capture. In an implementation model, the reference to time representations in the Content Standard for Digital Geospatial Metadata, FGDC-STD-001.1998, is suggested.

Shoreline Definition

The content lists provides shoreline definitions in which three definitions are cited below. Though there are many legal and non-legal definitions for shoreline, data developers are encouraged to provide the definition used for shoreline data.

Shoreline (coastline) – The intersection of the land with the water surface. The shoreline shown on charts represent the line of contact between the land a selected water elevation. In areas affected by tidal fluctuations, this line of contact is the mean high water line. In confined coastal waters of diminished tidal influence, the man water level line may be used. (Hicks 2000)

Shoreline - The line of contact between the land and a body of water. On Coast and Geodetic Survey nautical charts and surveys the shoreline approximates the mean high water line. In Coast Survey usage the term is considered synonymous with coastline. (Shalowitz, 1964)

Shorelines - General term including tidelands and navigable freshwater shores below the ordinary high water mark (Coastal States Organization 1997)

NSSDA_H_Value

Provides for the entry of the National Standard for Spatial Data Accuracy, FGDC-STD-007.3-1998, tested value from the statement of conformance under the Accuracy Reporting section.

NSSDA_V_Value

Provides for the entry of the National Standard for Spatial Data Accuracy, FGDC-STD-007.3-1998, tested value from the statement of conformance under the Accuracy Reporting section.

Source Type

Provides for the definition of the source.

Source_Type_ ID

Provides for the specific identification of the source data. This instance, the “source_type_id” can be utilized in an application model.

Geometry_ID

Provides for the expression of horizontal, x and y, and the vertical, z, for feature coordinates including the Coordinate_Reference.

Coordinate_Reference_ID

Describes the coordinate system the coordinates represent.

Geographic

The quantities of latitude and longitude which define the position of a point on the Earth's surface with respect to a reference spheroid.

Planar

A two-dimensional measurement system that locates features on a map based on their distance from an origin (0, 0) along two axes, a

horizontal x-axis representing east–west and a vertical y-axis representing north–south.

Map Projection

The systematic representation of all or part of the surface of the Earth on a plane or developable surface.

Classification

Classification provides an entry for the description of the shore area. Exposed rocky shore, an example of shore area classification, is from page 12 of the NOAA Technical Memorandum NOS OR&R 11 Environmental Sensitivity Index Guidelines version 3.0. There is, to date, no one shoreline classification standard therefore citing the source of the classification utilized is recommended.

Classification ID

Shoreline Classification name for the shore area described.

Classification System

Cite the schema utilized when providing the classification of the shoreline, ex, “NOAA Technical Memorandum NOS OR&R 11 Environmental Sensitivity Index Guidelines version 3.0”

Record_Boundary_ID

Record_Boundary

Boundary_Reference_Domain

Legal_Status_Domain

The Cadastral Data Content Standard provides the attribution and suggested domain for this entry of the element Record_Boundary_ID and the associated tables, Record_Boundary, Boundary_Reference_Domain and Legal_Status_Domain. See Cadastral Data Content for the National Spatial Data Infrastructure; version 1.3 – Third Revision May 2003.

5. REFERENCES

FGDC, 1998, Content Standard for Digital Geospatial Metadata, Version 2.0, Washington, D.C.

FGDC, June 2001, Shoreline Metadata Profile of the Content Standards for Geospatial Metadata, Washington, D.C.

FGDC, May 2003, Cadastral Data Content Standard for the National Spatial Data Infrastructure, version 1.3 –Third Revision, Washington, D.C.

ANSI, April 3, 2003, Geographic Information Framework Data Content Standards for Hydrography (Draft), Information Washington, D.C.

ANSI, September 2003, Geographic Information Framework - For Geodetic Control, Washington, D.C.

ANSI, Geographic Information Framework – For Transportation Networks: Roads, Washington, D.C.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, (NOAA) April 1, 1988, "National Shoreline Data Standard, Progress Report and Preliminary Draft Standard", Silver Spring, Maryland

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, (NOAA), January 2000, "Tide and Current Glossary / [by Steacy D. Hicks ... [et al.].", Silver Spring, Maryland.

National Research Council of the National Academies, 2004, "A Geospatial Framework for the Coastal Zone – National Needs for Coastal and Mapping and Charting", Washington, D.C.

Journal of Coastal Research, Special Issue #38, Fall 2003, "Shoreline Mapping and Change Analysis: Technical Considerations and Management Implications:, West Palm Beach Florida.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, 2000, "Shore and Sea Boundaries, the development of International Maritime Boundary Principles through United States Practice", Volume 3, Washington D.C.

6. APPENDICES

6.1 Informative Appendix

6.1.1 Informative Appendix 1: Tidal Type Domain

Chart Datum – The datum to which soundings on a chart are referred. It is usually taken to correspond to a low-water elevation, and its depression below mean sea level is represented by the symbol Z_0. Since 1980, chart datum has been implemented to mean lower low water for all main waters of the United States, its territories, Commonwealth of Puerto Rico, and Trust Territory of the Pacific Islands. (Hicks 2000)

Lowest Astronomical Tide – As defined by the International Hydrographic Organization, the lowest tide level that can be predicted to occur under average meteorological conditions and under a combination of astronomical conditions. (Hicks 2000)

Mean Sea Level – A tidal datum. The arithmetic mean of hourly heights observed over the National Tidal Datum Epoch. Shorter series are specified in the name; e.g., monthly mean sea level and yearly mean sea level. (Hicks 2000)

Mean Low Water Springs – A tidal datum. Frequently abbreviated spring low water. The arithmetic mean of the low water heights occurring at the time of spring tide observed over the National Tidal Datum Epoch. It is usually derived by taking an elevation depressed below the half tide level by an amount equal to one-half the spring range of tide, necessary corrections being applied to reduce the result to a mean value. This datum is used, to a considerable extent, for hydrographic work outside of the United States and is the level of reference for the Pacific approaches for the Panama Canal. (Hicks 2000)

Spring Tides or Tidal Currents – Tides of increased range or tidal currents of increased speed occurring semimonthly as the result of the Moon being new or full. The spring tides and is most conveniently computed from the harmonic constantans. It is larger than the mean range where the type of tides is either semi diurnal or mixed, and is of no practical significance where the type of the tide is predominately diurnal. The average height of the high waters of the spring tides is called spring high water or mean high water springs (MHWS) and the average height of the corresponding low water or mean low water springs (MLWS). (Hicks 2000)

Neap Tides or Tidal Currents – Tides of decreased range or tidal currents of decreased speed occurring semimonthly as the result of the Moon being in quadrature. The neap range (Np) of the tide is the average range occurring at the time of neap tides and is most conveniently computed from the harmonic constants. It is smaller than the mean range where the type of tide is either semidiurnal or mixed and is of

no practical significance where the type of tide is predominately diurnal. The average height of the high waters of the neap tides is called neap high water or high water neaps (MHWN) and the average height of the corresponding low waters is called neap low water or low water neaps.

Mean Diurnal Tide Level – (MDTL) A tidal Datum. The arithmetic mean of the mean higher high water and the mean low lower water (Hicks, 1984)

Mean High Water – A tidal datum. The average of all the high water heights observed over the National Tidal Datum Epoch. For stations with shorter series, comparison of simultaneous observations with a control tide station is made in order to derive the equivalent datum of the National Tidal Datum Epoch. (Hicks 2000)

Mean Higher High Water – A tidal datum. The average of the higher high water height of each tidal day observed over the National Tidal Datum Epoch. For stations with shorter series, comparison of simultaneous observations with a control tide station is made in order to derive the equivalent datum of the National Tidal Datum Epoch. (Hicks 2000)

Mean Low Water – A tidal datum. The average of all the low water heights observed over the National Tidal Datum Epoch. For stations with shorter series, comparison of simultaneous observations with control tide station is made in

order to derive the equivalent datum of the National Tidal Datum Epoch. (Hicks 2000)

Mean Lower Low Water – A tidal datum. The average of all low water heights observed over the National Tidal Datum Epoch. For stations with shorter series, comparison of simultaneous observations with a control tide station is made in order to derive the equivalent datum of the National Tidal Datum Epoch. (Hicks 2000)

Gulf Coast Low Water Datum line – The line on a chart or map which represents the intersection of the land with the water surface at the elevation of Gulf Coast Low Water Datum. (Hicks 2000)

Other – tidal datums not described or defined in this domain.

6.1.2 Informative Appendix 2: Horizontal Datum Domain

North American Datum of 1927

North American Datum of 1983

Old Hawaiian

Puerto Rico

Other

6.1.3 Informative Appendix 3: Shoreline Definition Domain

Shoreline (coastline) – The intersection of the land with the water surface. The shoreline shown on charts represents the line of contact between the land and a selected water elevation. In areas affected by tidal fluctuations, this line of contact is the mean high water line. In confined coastal waters of diminished tidal influence, the mean water level line may be used. (Hicks 1984)

User Defined – Shoreline definitions as defined by the shoreline data developer.

Other – Shoreline definitions, legal, technical, and scientific that are not listed in this domain.

6.1.4 Informative Appendix 4: Boundary Reference Domain

Baseline – The line from which maritime zone are measured. The normal baseline for measuring the territorial sea (TS), contiguous zone (CZ), exclusive economic zone (EEZ), and continental shelf is the low-water line along the coast.

Submerged Lands Act – Federal Legislation that granted to the coastal states federal rights to natural resources within 3 nautical miles (up to 9 miles for Texas and the Gulf coast of Florida) of the coast line. *43 U.S.C 1301 et seq*.

Seaward State Boundary - The limit of the state's jurisdictions under the Submerged

Lands Act (SLA). Although many exceptions exist, the land and resources between the ordinary high water mark and the state seaward boundary (SSB) are generally held in trust by the coastal state for the benefit of the public (CSO 1997).

Revenue Sharing Boundary - Provided for states to claim an equitable share of revenues when a federal lease is within three miles of the territorial sea boundary. The amendments mandate that 27 percent of all revenues from production within three miles seaward of the federal/state boundary is to be given to the states.

Territorial Sea – The offshore belt in which a coastal state has exclusive jurisdiction. The territorial sea may not extend more than 12 nautical miles from the coast line.

Contiguous Zone – A zone seaward of the territorial sea in which coastal states may assert jurisdiction short of complete sovereignty. Article 24 of the Convention on the Territorial Sea and the Contiguous Zone authorizes such a zone "to prevent infringement of its customs, fiscal, immigration or sanitary regulations in territory or territorial sea…." Under the Convention the contiguous zone may extend no more than 12 miles from the coastline. See also: 1982 Law of the Sea Convention, Article 33.

Continental Shelf Limit - Article 76 of the United Nations Convention on the Law of the Sea (UNCLOS) provides a definition and a detailed formula for determining the limit of the continental shelf beyond 200 nautical miles. Consistent with Article

76 of UNCLOS and the 1958 Convention on the Continental Shelf, the U.S. continental shelf is comprised of the sea-bed and subsoil of the submarine areas that extend beyond its territorial sea throughout the natural prolongation of its land territory to the outer edge of the continental margin, including that portion beyond 200 nautical miles from the baseline. Under international law, the continental shelf is defined to include the sea-bed and subsoil beyond the continental margin out to a distance of 200 nautical miles from the baseline. The U.S. has sovereign rights and exclusive jurisdiction over the exploration and exploitation of the continental shelf.

Exclusive Economic Zone - The zone or area beyond and adjacent to the territorial sea. In this area, the U.S., like other coastal nations, has sovereign rights and exclusive jurisdiction to protect and manage its natural resources, including any economic development. The seaward limit of the EEZ is generally 200 nautical miles from the baseline. The U.S. does not have sovereignty in the EEZ as it does in its territory. Foreign vessels and nationals maintain the high seas freedoms or rights of navigation and over flight in the EEZ, as well as the right to lay and maintain submarine cables and pipelines. However, such rights are still subject to regulation by the U.S. in accordance with international law, including UNCLOS.

Offshore Lease Blocks - An offshore cadastre that defines approved subdivisions of the outer continental shelf (OCS) within federal jurisdiction.

International Maritime Boundaries - The U.S. continental shelf and exclusive economic zone (EEZ) claims cover approximately three million square miles of ocean space. Overlapping boundaries with other nations exist in 25 situations. International maritime boundaries are those agreed upon by one or more countries to resolve these overlapping claim issues.

National Marine Sanctuary Boundaries - National Marine Sanctuaries Act (16 U.S.C. §§ 1431 et seq.); *Code of Federal Regulations* (15 C.F.R. 922.41).

National Estuarine Research Reserve System Boundaries - Coastal Zone Management Act, as amended, sec. 315 (16 U.S.C. § 1461).

6.1.5 Informative Appendix 5: Legal Status Domain

Ambulatory

Tidal

Disputed

Adjudicated

Connecting Line

Computed

Duplicate

Archived

6.1.6 Informative Appendix 6: Source Type Domain

Air Photo –Remotely Sensed data collected by an airborne platform.

LIDAR – Airborne Light Detection and Ranging derived data.

Land Survey – This aspect includes GPS surveying and conventional surveying.

Modeled – Mathematically derived shoreline data.

NOAA Chart – The shoreline as cartographically depicted from officially published NOAA marine charts.

USGS Topographic Sheet - The shoreline as cartographically depicted from officially published topographic sheets from USGS.

User Defined – Other sources of information not listed in this domain would be sourced utilizing this field.

6.1.7 Informative Appendix 7: Classification System Domain

Provides lists of known shoreline classifications. Though no shoreline classification standard currently exists, the list provided were found to be most prevalently used within the shoreline community.

Environmental Sensitivity Index, ESI

Army Corp of Engineers

National Wetlands Inventory

User Defined