THE 1999 NATIONAL SPATIAL DATA INFRASTRUCTURE (NSDI) FEDERAL GEOGRAPHIC DATA COMMITTEE (FGDC) ACCOMPLISHMENTS REPORT FOR THE DEPARTMENT OF COMMERCE

June 2000

Compiled by:
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INTRODUCTION

Executive Order 12906, April 13, 1994, requires that Federal agencies participate in the National Spatial Data Infrastructure (NSDI). The Federal Geographic Data Committee (FGDC) is the focal point for these activities. The Department of Commerce, through activities in the National Oceanic and Atmospheric Administration (NOAA), the Bureau of the Census, and the National Institute for Science and Technology (NIST), has a strong commitment to the FGDC. Highlights for 1999 include:

1. In 1999 the NOAA Deputy Undersecretary, Scott Gudes, was the Department of Commerce representative to the FGDC Steering Committee that is chaired by Department of Interior Secretary, Bruce Babbitt. In mid-1999, Dr. Susan Zevin, then Deputy Assistant Administrator for the National Environmental Satellite, Data, and Information Service was appointed to assist Mr. Gudes in this capacity. In March 2000, Ms. Mary Glackin, the current Deputy Assistant Administrator for the National Environmental Satellite, Data, and Information Service succeeded Dr. Zevin in this role. Howard Diamond, the Global Climate Observing System program manager at NOAA/NESDIS has assumed the role as the NOAA representative to the FGDC Coordination Group.

2. NOAA's participation in the National Spatial Data Infrastructure was recognized with several major awards:

a. Vice President Gore's Hammer Award to the National Geodetic Survey, National Ocean Service in partnership with the Department of Transportation for its work on the Differential Global Positioning System.

b. Vice President Gore's Hammer Award to the Marine Chart Division, Office of Coast Survey, National Ocean Service — The Office of Coast Survey's Marine Chart Division accomplished a unique reinvention of the way NOAA produces and maintains the Nation's suite of 1000 nautical charts by modernizing the chart production process.

c. Vice President Gore's Hammer Award to the Office of Oceanic and Atmospheric Research — The Boulder Space Environment Center's Space Weather Operations team shortened the time it takes to assess the impact of solar events on the space environment nearest Earth, reducing analysis time from 10 years to just several months.

d. Department of Commerce Gold Medal to Commander Grady H. Tuell, of the National Ocean Service, for radically advancing the accuracy and efficiency of shoreline mapping.

e. Department of Commerce Gold Medal to Roderick A. Scofield, of the National Environmental Satellite, Data, and Information Service, for research in the use of satellite data to obtain estimates of heavy precipitation that are used in NOAA's critical flash flood forecasting program.

f. Department of Commerce Gold Medal, for design, development and implementation of the Real-Time Solar Wind System, to the Oceanic and Atmospheric Research team of Ronald D. Zwickl, Susan R. Sahm, Viola J. Raben, Richard N. Grubb, Kent A. Doggett, Thomas R. Detman and William P. Barrett.

g. Department of Commerce Silver Medal for scientific achievement in developing national high-resolution geoid model improvements, to the National Ocean Service team of Dennis G. Milbert and Dru A. Smith.

h. Department of Commerce Silver Medal for accelerating the use of advanced microwave sounding unit satellite observations to advance the nation's capability in weather prediction, to the National Environmental Satellite, Data, and Information Service team of John C. Derber, Michael W. Chalfant, Ralph R. Ferraro, Jr., Mitchell D. Goldberg, Norman Charles Grody, Thomas Joseph Kleespies, Larry Max McMillin, Tsan Mo, Anthony L.

Reale and David Q. Wark.

i. Department of Commerce Silver Medal for leadership in gaining approval of raster nautical chart systems as acceptable under the International Convention on Safety of Life at Sea, to the National Ocean Service team of Douglas L. Brown, David B. Enabnit, Lloyd C. Huff, Oren E. Stembel, Cdr. Steven R. Barnum and Lt. Edward J. Van Den Ameele.

j. Department of Commerce Silver Medal to David J. Schwab of Oceanic and Atmospheric Research, for contributions to advanced modeling and forecasting of water movements and other physical conditions on the Great Lakes.

k Department of Commerce Silver Medal to Alan E. Strong of the National Environmental Satellite, Data, and Information Service, for contributions in the field of ocean remote sensing and improved understanding of the world oceans and their fragile ecosystems.

3. The NOAA Distributed Data and Information Server (NOAAServer) Data Directory has over 14,000 descriptions of NOAA data in FGDC Metadata Standard format. These descriptions are also available on 10 NOAA data base nodes on the FGDC Clearinghouse. NOAAServer continues to provide unified data discovery and data access across 14 data bases across NOAA organizations and across the Nation. The NOAAServer can be found at http://www.esdim.noaa.gov/NOAAServer and is also available on the Internet thru a number of other NOAA web pages. The number of users accessing data on the various NOAA web pages (including NOAAServer) continued to be relatively high in 1999, averaging over 720,000 distinct users accessing them per month.

4. The NOAA Environmental Data Rescue Program (EDRP) preserves the meteorological, climatic, geophysical, and oceanographic data stored by the NOAA National Data Centers and other scientific data from throughout NOAA, and makes this information more accessible to researchers and the general public. In 1999, the EDRP rescued the following data sets by converting them to more stable storage media: 9.5 million paper-based meteorological forms; 915 thousand microfiche-based cooperative weather observations forms, 40 thousand pages of paper-based historical meteorological data; 47 thousand paper-based oceanographic surface and profile observations; 22 thousand pages of paper-based scientific publications of coastal data; 250 paper-based bathymetric maps; 25 megabytes of paper-based solar observations; and a large amount of nighttime airglow data. Many of these data sets are now available on-line from NOAA. Also in 1999, several projects were initiated to convert: shoreline data from paper-based topographic maps; Great Lakes water level observations from paper-based logbooks; and the film-based archive of the Defense Meteorological Satellite Program.

5. NOAA's National Virtual Data System (NVDS) was in the final stage of being deployed operationally. NVDS will be a unified interface to NOAA's customers with one-stop access to some of NOAA's data and data products. The concept has evolved and NVDS is an Internet-based enterprise program called the NOAA National Data Centers (NNDC) which is a web portal to 16 other environmental databases within NOAA. This web-based system integrates information services across the three National Data Centers in Asheville, NC; Boulder, CO; and Silver Spring, MD. This portal will allow users from all walks of life to browse some of the available on-line and near-line collection of environmental data and information. Currently the data are essentially those found at the three National Data Centers. Data are cataloged and metadata are created in FGDC standard. When a particular dataset is located, the user may purchase it using an e-commerce component that allows users to order and pay for NOAA data products on-line. The data then can be delivered via direct download, or placed on media (tape or CD) as appropriate. There is a vast amount of data still not yet available and there is an on-going effort to make this data available on-line or near-line as soon as possible.

With NVDS, a user can access data from a personal (at home), a business, government, or public use (library) computer. Information available are: on-line data; publications; CDS/tapes (with selected data); imagery (satellite); and maps. The user can: search, browse, obtain, look at a subset of a dataset, display, and pay for data. One can perform a data search by keyword, search by map selection (GIS), or search by place names. Data Center information available are: on-line databases consisting of: the data archives, FGDC Metadata, customer database, product catalog, and data inventory. Transparent to the user, these functions are available from each of

the Data Centers.

Briefly stated, the data discovery and display are served by the NNDC data server system. The Metadata Master has the following functions: collector, indexer, QC, dynamic keyword generator, and metadata records and index distributor. The end result: the user finds the desired data and can obtain it within minutes if downloaded or within a reasonable time if the media has to be shipped. In either event, this scenario takes place in a relatively short time and the user can look/browse through data and choose and purchase. NVDS can be found at http://nndc.noaa.gov/

6. Individual activities, including Department of Commerce personnel who have served as chairs for three FGDC subcommittees, are as follows:

a. Charles Challstrom, Director NOAA National Geodetic Survey, chairs the Federal Geodetic Control Subcommittee (FGCS).
b. Anne Hale Miglarese, Branch Chief, Coastal Information Services, chairs the Bathymetric Subcommittee.
c. Frederick Broome, Bureau of the Census, chairs the Subcommittee on Cultural and Demographic Data.
d. Gerald Barton, NOAA/NESDIS, retired in December 1999 after many years of service to NOAA and the FGDC. His many years of experience and knowledge will be missed.
d. Millington Lockwood, NOAA Office of Coast Survey, a veteran NOAA employee very much involved in FGDC activities, unfortunately passed away this past year and is sorely missed by all who worked with him.
e. Carol Gerlitz served on the national Test Method Executive Control Committee (TMECC) for Spatial Data Transfer Standard (SDTS) Conformance Testing. The TMECC oversees conformance testing of SDTS translators written by Geographic Information Systems (GIS) vendors. Basic administrative and technical TMECC tasks include controlling the Test Suite used by approved Certificate Issuing Organizations (CIOs), coordinating issues of interpretations of the standard, controlling validation procedures, resolving validation issues, and adjudicating the appeals process. The TMECC is chaired by the U. S. Geological Survey, with members from the Federal government, GIS vendors, Oracle Corporation, and CIOs. During 1999 Gerlitz participated in Beta testing of Arc/INFO GIS version 8.0, which was related later in the year by the Environmental Systems Research Institute, Inc. Gerlitz's testing focused on its point profile translation capabilities. Ms. Gerlitz retired in December 1999. Her contribution to NGDC's and the Nation's pursuit for enhanced exchange of spatial data will be missed.

7. Over 30 representatives from DOC served on FGDC Subcommittees and Working Groups. DOC representatives were active in other aspects of the NSDI/FGDC including reviewing and commenting on standards prepared by the FGDC, the American National Standards Institute (ANSI) and the International Standards Organization International Organization for Standardization (ISO), serving on FGDC grant review/evaluation teams, serving on panels at national meetings, and submitting articles for the FGDC newsletter.

The NOAA Coastal Services Center supports the NSDI through many programs and initiatives. The Center is active on a number of NSDI subcommittees, is the chair of the Bathymetric subcommittee, participates in the development of framework data, and helps build standards. The Center completed two projects that were funded by the FGDC and received funding for another under the Don't Duck Metadata program. The Center employs a full-time metadata specialist who ensures the Center's data follows FGDC standards and trains the Center's partners in creating FGDC compliant metadata. The Center supports both a Clearinghouse gateway and node. The Center participated in both the National GeoData Forum and the Southeast Regional Framework Workshop.

The Director of the National Geodetic Survey (NGS) is the designated chair of the Federal Geodetic Control Subcommittee (FGCS) of the Federal Geographic Data Committee. FGCS exercises government-wide leadership in coordinating the planning and execution of geodetic surveys, in developing standards and specifications for these surveys, and in the exchange of geodetic survey data and technical information. FGCS coordinates Federal agencies' aspects of surveying that are governmental responsibilities. These responsibilities include standards setting, testing new geodetic instrumentation and operational systems, coordination of user agency requirements, and dissemination of government data to user agencies. Of the four FGCS work groups operating in 1999, NGS personnel chaired two, Methodology and Vertical Reference, for the entire year and a third, the Instrument Work Group, for a portion of the year.

FGCS acts to ensure that the Global Positioning System (GPS) will continue to meet the positioning needs of the Federal civilian community and works to strengthen the ties between the GPS positioning and navigation communities. This responsibility will be implemented through its role as GPS Interagency Advisory Council (GIAC) to the Department of Transportation PosNav Executive Committee. The Director of NGS is also the designated chair of GIAC.

The Global Change Data and Information System (GCDIS) was originally conceived in the late 1980s as a mechanism for making available data and information produced by the US Global Change Research Program. This concept came from a recognition, by key senior managers in the agencies conducting global change research, that data and information had considerable value beyond their initial use, and that a coordinated effort across the federal agencies would be required. As GCDIS evolved, it was recognized that the interconnected nature of global change research required more than the observations made by the program, extending to virtually all of the environmental data and information and much of the socioeconomic data held by the US Federal Government. It needed to also extend to include process science, in addition to measurements and model outputs. Moreover, not only scientists, but legislators, educators, and the general public had a vital need in gaining access to these data and information. Thus, the GCDIS became the largest effort in the world to provide environmental data and information to anyone who needs it.

GCDIS, as it currently is structured, uses a world wide web-based gateway (http://www.gcdis.usgcrp.gov) to direct users to appropriate federal data centers where data and information reside. Data sets are described in searchable catalogs, such as the NASA Global Change Master Directory, which refer users to data and information in over 70 participating data centers throughout the US Federal Government. These catalogs are maintained by the individual agencies responsible for their data holdings and are supported by linked web sites in a distributed system environment. Users who need additional help may submit electronic questions to "Ask Dr Global Change" and receive answers directing them to data and information available on the web relating to their global change question. Additional user services are provided by the Global Change Research Information Office and by each participating agency data center. Participating centers adhere to the principle of full and open non-discriminatory data sharing, except for those data which are restricted by copyright, trade secret, or by law. GCDIS also reaches out to the international community through a series of linked catalogs to include holdings worldwide.

DEPARTMENT OF COMMERCE 1999 ACCOMPLISHMENTS

1.0 Goal 1: Increase the awareness and understanding of the vision, concepts, and benefits of the NSDI through outreach and education.

Intent: This goal seeks to propagate the stated NSDI vision. The concepts of NSDI, defined by Executive Order 12902, include community-based standards, public access to data through distributed clearinghouses, development of a framework of basic data, and sharing data with others among all sectors of government, academia and private industry. Organizations committed to the NSDI should communicate widely with current and potential users of geospatial data. This goal also seeks to incorporate ideas and practices that foster NSDI into the educational system at all levels, from kindergarten through university and professional training.

1.1 NSDI Objective: Demonstrate the benefits of participation in the NSDI to existing and prospective participants.

The NOAA Coastal Services Center (CSC) has developed a hands-on metadata workshop that it offers to its partners. Attendees bring a data set to the workshop and leave with an FGDC compliant metadata record for the data. The workshops typically last two days and include instructions on setting up an FGDC Clearinghouse node. During 1999, the Center trained participants from the National Estuarine Research Reserve (NERR) Program, National Marine Sanctuary Program, NSDI Community Demonstration Projects, Washington Department of Ecology, and the Oregon Department of Land Conservation and Development.

Through a Memorandum of Understanding with the FGDC, CSC hosted a workshop for FGDC partners to develop a standardized curriculum on the FGDC metadata standard and Clearinghouse. Furthermore, CSC has contracted with the Center for Clear Communication to take the materials developed at the workshop and create professional training materials and teacher notes. CSC is frequently called upon to give presentations on the value of the NSDI and FGDC standards. The purpose of the presentations is to convince the audience to support the FGDC, particularly by implementing the metadata standard and Clearinghouse. Some of the more notable presentations were given to the NOAA National Ocean Service Senior Management Council, Coastal America Partnership, Coastal GeoTools '99 Conference, Estuarine Research Federation International Conference, and the International Association of Aquatic and Marine Science Libraries and Information Centers (IAMSLIC) Annual Conference.

CSC has created a Coastal Metadata Reference Guide that is accessible on the web at http://www.csc.noaa.gov/metadata/. The site provides information on documenting coastal data using the FGDC standard.

NOAA Chairs the Federal Geographic Data Committee Subcommittee on Bathymetric and Nautical Charting Data. The primary mission of the Subcommittee is to develop and promote that aspect of the National Spatial Data Infrastructure (NSDI) that supports the marine navigation and coastal zone geographic information system (GIS) community through the development of data, metadata, standards, data exchange agreements, and data quality issues. The Subcommittee supports the overall goals and missions of the FGDC by participating on several working groups and subcommittees that have an interest in coastal and marine geographic data issues. The Subcommittee is an active member of the Standards Working Group and the Framework Working Group. Formal meetings are held approximately twice a year in the Washington, D.C. area. Additionally, the Subcommittee sponsors a number of community meetings and outreach workshops throughout the country during the year. To enhance communications, the Subcommittee has a home page on the World Wide Web at the following URL: http://chartmaker.ncd.noaa.gov/ocs/text/bathy.htm.

The CSC supported several initiatives to help its customers find geospatial data of interest. A report was completed on the "Benefits of Using a GIS for Ocean Planning and Governance" and is being edited for publication in a technical series. Additional initiatives include, the publication of geospatial data and metadata on CD-ROMs and web pages (www.csc.noaa.gov/products/); and the creation and maintenance of a web resource linking customers to sources of GIS data (www.csc.noaa.gov/products/datasites/).

1.2. NSDI Objective: Promote principles and practices of the NSDI through formal and informal education and training.

Frederick Broome, Bureau of the Census, chairs the Subcommittee on Cultural and Demographic Data (SCDD). The 1999 SCDD meetings were each hosted by a member agency and included either a presentation on a topic of interest or a tour of the host agency. The 1999 meetings included: (1) a tour of the Geography Division, Bureau of the Census, (2) a tour of the Geography and Map Division, Library of Congress, (3) two meetings held at the Centers for Disease Control and Prevention, National Center for Health Statistics in conjunction with the Center's Cartography & GIS Guest Lecture Series. Mr. Broome presented one of the lectures, titled "Benchmark Testing of GIS Capabilities for Epidemiologic Studies of Breast Cancer on Long Island, New York".

1.2.1 NOAA Objective: Foster training opportunities

A continuing DOC objective is to provide public access to information on aspects of geodetic surveying that are responsibility of civilian Federal agencies. As such the National Geodetic Survey hosted the FGCS web page and refurbished it based on the model of the FGDC Web site. The FGCS site can be found at: http://www.ngs.noaa.gov/FGCS/

1.2.2 NOAA Objective: Continue to identify and address issues associated with Global Positioning Systems (GPS) Modernization.

The National Geodetic Survey (NGS) conducted a set of workshops including four GPS-Derived Orthometric Heights Workshop and three Continuously Operating Reference Station (CORS) Workshops. In conjunction with preparing the NOAA congressionally mandated Height Modernization Study, NGS also sponsored two follow-up forums that were held in California and North Carolina to provide information to and receive input from diverse interested constituency.

1.2.3 NOAA Objective: Continue to identify and address issues associated with positioning accuracy, techniques, and reference frames.

NGS presented a set of workshops including two on Geospatial Positioning Accuracy Standards and six on the Development, Implementation, and Future of the National Spatial Reference System

1.2.4 NOAA Objective: Evaluate surveying systems, including the instrumentation, hardware, software, and procedures that comprise that system.

NGS tested three GPS receivers: Leica System 500 and the Javad Legacy and Regency. A new web site provided access to the testing schedule and test results and can be accessed by the following web address: http://www.ngs.noaa.gov/FGCS/instruments/reports.htm NGS updated standard operational procedures, forms, and documentation by putting the Deliverables List for GPS Instrument Tests and Recommended Observation Schedule on the Web at: http://www.ngs.noaa.gov/FGCS/instruments/testing/gps.htm

1.3 NSDI Objective: Identify and promote the attitudes and actions that help to develop the NSDI.
CSC Action: Implement organizational policies within the CSC to make employees aware and knowledgeable of NSDI.

Activities that support the NSDI have become an integral part of the operations at CSC. Standard operating procedure mandates that FGDC-compliant metadata accompany all data that the Center distributes and that it be made available through the NSDI Clearinghouse node. The metadata specialist provides on-site support and education to ensure that quality metadata records are written in timely fashion.

CSC employees are knowledgeable of the NSDI, and capable of and consistent about writing quality metadata. There is often a considerable time investment involved in educating and implementing the practices necessary to support the NSDI—specifically producing quality metadata. Educating employees on the importance of the NSDI

will remain a priority within CSC. CSC will hold internal metadata training for new employees as needed.

The National Geophysical Data Center (NGDC) had a FGDC-funded project on a "Hierarchical Metadata Implementation for Ecosystem Research Datasets." This project ran during 1998-1999. Accomplishments during 1999 included the following: (1) A relational hierarchy was developed for decomposing product metadata into optimal units of storage that can thus be maintained in one location and can be re-assembled for multiple purposes, including clearinghouse search and product documentation. The relational/hierarchical schema was tested in a relational database structure to resolve logical issues; and problems with the FGDC standard were identified that hinder its ability to be optimized in this manner. Implementation of the schema is possible, however, with modifications to the FGDC standard; and (2) translations were developed to convert 30 metadata records in the Global Ecosystems Database into FGDC records.

1.3.1 DOC Objective: Participate with federal and non-federal organizations to promote NSDI.

NOAA and CENSUS staff participated in the Open GIS Consortium, Inc. (OGC). CENSUS is a non-voting member. The OGC is a link to the GIS industry and provides a forum where the federal and commercial sectors can coordinate to develop GIS technology. A Next Generation Weather Radar (NEXRAD) workshop was hosted by the National Climatic Data Center (NCDC) in Asheville, NC from December 2-3, 1999. The conference focused on improving data and data access research requirements for this archived radar data. The conference had a diverse set of participation from the federal, non-profit, and university research communities. There were good discussion sessions on how best to utilize these critical NSDI data sets.

DOC staff made the following presentations:

"Improving TIGER: A DOQ Test Project" , presented at the GIS/LIS Conference, Ft. Worth Texas, November 1998.
"Improving TIGER: Potential Implications for Post-2000 TIGER", presented at the GIS/LIS Conference, Ft. Worth Texas, November 1998.
"ISO 15046-13: A Framework for Quality Information", presented at the ACSM "The Big Event" Conference, Portland Oregon, March 1999.
"Developing a Spatial Data File for Testing GIS Systems", presented at the ACSM "The Big Event" Conference, Portland Oregon, March 1999.
"ISO 15046-14: Procedures for Quality Information", presented at the ACSM "The Big Event" Conference, Portland Oregon, March 1999.
"A DOQ Test Project: Collecting Data to Improve TIGER", presented at the ESRI User's Conference, San Diego California, July 1999.
"TIGER/Line File Calculator", presented at URISA '99, Chicago Illinois, August 1999.
"ISO 15046-13: Establishing Quality Principles", published in GIM International, Volume 13, August 1999.
"Developing an Address Data Content Standard", presented at URISA's Street Smart and Address Savvy Conference, San Antonio Texas, October 1999
"Understanding the Quality of Geospatial Data", presented at the Japanese GIS Conference, Kyoto Japan, October 1999.
"A National Shoreline: Candidates Discovered Using the Internet", a poster session at GeoTools '99 (Shoreline Workshop), South Carolina, November 1999.
NSF-sponsored "Digital Gazetteer Information Exchange Workshop," held at the Smithsonian on October 12-14, 1999.

DOC staff participated in professional organizations:

Three staff members attended the GIS/LIS Conference, Ft. Worth Texas (November 1998).
Three staff members attended the ACSM "The Big Event" Conference, Portland Oregon (March 1999).
Two staff members attended the ISO/TC 211 Plenary, Vienna Austria (March 1999).
One staff member attended the ESRI Use's Conference, San Diego California (July 1999).
One staff member attended the URISA Street Smart and Address Savvy Conference, San Antonio Texas (October 1999)
Two staff members attended the ISO/TC 211 Plenary, Kyoto Japan (October 1999)

One staff member attended the Japanese GIS Conference, Kyoto Japan (October 1999)
One staff member attended the GeoTools '99 Shoreline Workshop, Charleston South Carolina (November 1999)

Professional Associations and Activities:

One staff member belongs to the American Congress on Surveying and Mapping (ACSM), Cartographic and Geographic Information Society (CaGIS)
One staff member belongs to the Association of American Geographers (AAG)
One staff member belongs to the American National Standards Institute (ANSI), National Committee for Information Technology Standards (NCITS), L1 Geographic Information Committee
Two staff members belong to the International Organization for Standardization (ISO) Technical Committee (TC) 211 Geographic Information/Geomatics
One staff member serves on the Board of Directors for the Cartographic and Geographic Information Society (CaGIS)

2.0 NSDI : DEVELOP COMMON SOLUTIONS FOR DISCOVERY, ACCESS, AND USE OF GEOSPATIAL DATA IN RESPONSE TO THE NEEDS OF DIVERSE COMMUNITIES.

Intent: The NSDI will move toward common languages and architectures for describing describe geospatial data from many applications, and common technical solutions for accessing and using these data. Individuals from many different organizations and disciplines will contribute to the definition and development of these solutions.

2.1. NSDI Objective: Continue to develop a seamless National Geospatial Data Clearinghouse.

The Census Bureau has continued to work under the direction of E.O. 12906 to provide metadata for all of its geographic datasets. The Census Bureau views geographic data in its broadest sense and includes in its definition of geographic data both geographic feature data sets, such as TIGER/Line files and related products, and georeferenced statistical data sets, such as the decennial census Summary Tape File series, the geographic series of the economic and agricultural census, the population estimates for governmental units, and all other data sets that carry geographic identification codes. Together, geographic feature and georeferenced statistical data include essentially all data that the Census Bureau provides to the public. Census Bureau metadata is currently accessed through and located on the FGDC server; the Census Bureau is working toward maintaining its metadata at its own site.

2.1.1 NOAA Objective: Continue to provide access, documentation, and guidance regarding Continuously Operating Reference Station (CORS)

NGS developed, implemented, and enhanced User Friendly CORS (UFCORS) to allow users to: (1) Obtain CORS GPS data for an exact time interval specified in international or local time; (2) Choose a sampling rate for the requested data; (3) Specify how the data should be compressed to speed data transfer to the user; (4) Receive the requested information within a few minutes; (5) Obtain CORS log files automatically retrieve adopted NAD 83 and ITRF positions and velocities for the CORS sites automatically; (6) Retrieve the highly accurate GPS orbits calculated by International GPS Service for Geodynamics (IGS), as well as the "broadcast" GPS orbits automatically; and (7) Obtain associated NGS data sheets automatically. Reference the following web site: http://www.ngs.noaa.gov/CORS/

2.1.2 NOAA Objective: Continue to identify and address issues associated with Global Positioning Systems (GPS) Modernization.

The Director of NGS, as designated chair of the FGCS, also chairs the GPS Interagency Advisory Council (GIAC). GIAC provided a position paper to the U.S. Department of Transportation PosNav Executive Committee on the selection and character of the GPS civil signal and frequencies. Reference the following web site:
http://www.ngs.noaa.gov/FGCS/info/giacmem990430.html

The CSC supported several initiatives to help its customers find geospatial data of interest. A report was completed on the "Benefits of Using a GIS for Ocean Planning and Governance" and is being edited for publication in a technical series.

Additional initiatives include:

- Publication of geospatial data and metadata on CD-ROMs and web pages (www.csc.noaa.gov/products/).
- Creation and maintenance of a web resource linking customers to sources of GIS data (www.csc.noaa.gov/products/datasites/).

The NOAA/NESDIS Environmental Information Services Office NOAAServer Environmental Services Data Directory has over 14,000 descriptions of NOAA data in FGDC Metadata Standard format. These descriptions are also available on 10 data base nodes on the FGDC Clearinghouse. Each node contains descriptions of data relating to major NOAA line offices such as the National Weather Service, the National Ocean Service, the National Satellite Data and Information Service, the National Marine Fisheries, and the Office of Atmospheric Research.

NGDC took the lead in a NOAA National Data Centers project to develop a common Data Center system to maintain data descriptions in FGDC format in a standardized RDBMS. The project team selected a COTS product, Blue Angel for the conversion and storage vehicle. Metadata are edited regularly at each of NOAA's National Data Centers. Procedures were implemented to upload records to the NOAA Data Directory, NOAAServer, and the FGDC Clearinghouse automatically as they metadata are updated or new records are created.

2.1.3 CSC Objective: Participate as an NSDI Clearinghouse node.
The CSC has a fully functional Clearinghouse node that is maintained and updated with new coastal resources on a regular basis. The Center's metadata is accessible through the Clearinghouse. This also promotes the NOAA objective to increase access to coastal data. The information about the public data is now available to anyone who has access to the Internet. The Center was selected by the FGDC to establish a Gateway to the National Geospatial Data Clearinghouse for the Southeastern United States.

2.1.4 CSC Objective: Create metadata; document data using the FGDC content standard.
All new data sets within the Center were documented using the FGDC metadata standard. Each product containing data was released accompanied by accurate, FGDC-compliant metadata. All existing data within the Center has been documented. One hundred percent of the CSC's public geospatial data has metadata. CSC organized and made accessible data that are available to the public through the Coastal Information Directory, NOAAServer, and the FGDC Clearinghouse. CSC staff will continue to document data and support data documentation in the coastal resource management community through education and outreach. CSC held formal metadata training sessions in 1999.

2.2. NSDI Objective: Support the evolution of common means to describe geospatial data sets.

The Federal Geographic Data Committee awarded NGDC a Cooperative Agreements Grant to develop a "Hierarchical Metadata Implementation for Ecosystems Research Datasets." The project is being conducted in collaboration with the International Geosphere-Biosphere Program, USGS/NSDI, and the NOAA Coastal Services Center. This project will develop a data product implementation of metadata and user interface that will link to NSDI clearinghouse functions. The objective of this project is to: 1. upgrade metadata structure and definitions in the Global Ecosystems Database (GED) to correspond with FGDC content standards; 2. establish a multi-level metadata storage structure for integrated database products, using the GED as an example; and 3. develop a flexible product interface to metadata that also provides export of FGDC compliant metadata records to meet NSDI clearinghouse requirements.

The NOAA Chaired Subcommittee on Bathymetric and Nautical Charting Data continued to work on a "profile" to the FGDC metadata standard to support information necessary for hydrographic and bathymetric data.

NGDC documented the lineage of digital elevation models using FGDC metadata. Specifically, digital elevation data associated with NGDC's Global Land One-km Base Elevation (GLOBE) model were rigorously documented to emphasize the interrelationships between multiple data sources and multiple post-source processing methods.

2.3. NSDI Objective: Support the development of tools that allow for easy exchange of applications, information, and results.

The NOAAServer Data Directory is the keystone for the NOAA Virtual Data System (NVDS) which is being developed in NOAA/NESDIS as a common access tool to data held in the NOAA National Data Centers. NVDS will provide common search, access, ordering, and payment tools for the National Oceanographic Data Center, the National Geophysical Data Center, and the National Climatic Data Center.

The Environmental Systems Research Institute (ESRI), developers of the Arc/Info Geographic Information Systems (GIS) software, announced it will support the Point Profile, Part 6 of the Spatial Data Transfer Standard (SDTS), in Arc/Info version 8.0, to be released mid-1999. The Point Profile was developed by NGDC and NGS in collaboration with the FGDC in order to provide high-precision geodetic control data in SDTS-compliant format. NGDC has coordinated the effort to gain support for the Point Profile in GIS SDTS translators, provided NOAA point data sets to ESRI to aid development work, and arranged to beta test the ARC/INFO Point Profile translators. ESRI will support the Point Profile, and this will allow users to easily import NOAA's SDTS-compliant point data into Arc/Info's coverage data model. Additionally, ESRI also included support for the point profile with ArcView 3.2, released during 1999.

Previously, NGDC was supported to develop the SDTS Point Profile and help the National Geodetic Survey place geodetic control data on the World Wide Web in SDTS format. This was done in 1998. That site remains popular, regularly appearing near the top of Web search returns for "SDTS." NGDC's own site also appears near the top of such searches on several engines. NGDC's own Website on SDTS issues receives about 200 hits per month (for the Home Page). Metadata records continue to be developed and enhanced. Most of this work is being done in word processors with templates, or with metadata development/editing software. However, NGDC is developing techniques for deriving metadata elements directly from the data, using tools in data base management systems.

2.4. NSDI Objective: Research, develop, and implement architectures and technologies that enable data sharing.

The Department of Defense Master Environmental Library (MEL) system resident at 23 different civilian and military data centers requires all metadata to be FGDC compliant. MEL integrates the data requirements of the ocean, terrestrial, air and space scientific disciplines. Relevant databases cover both geospatial and time series data structures. The site software includes an interactive tool to update or modify metadata quickly and easily for "inaccurate metadata can provide dis-information rather than information". NGDC's Space Physics Interactive Data Resource provides the space component for the MEL system and it goes a step further in that all metadata are automatically updated as new entries are added to the system.

3.0 NSDI GOAL 3: Use community-based approaches to develop and maintain common collections of geospatial data for sound decision-making.

Intent: This goal recognizes that the job of developing and maintaining large collections of geospatial data can no longer be supported by any one institution. The highest resolution, most current data are usually produced and maintained in the communities in which they are used. The goal seeks to leverage activities that are already occurring over any given piece of geography so that common data may be more easily shared. A community-based approach will emerge from the efforts of individual data producers and users coming together to cooperatively solve problems.

3.1. NSDI Objective: Continue to develop the National Geospatial Data Framework.

The Director of the NOAA Office of Coast Survey was Chair of the Subcommittee on Bathymetric and Nautical Charting Data for part of the reporting period. For the remainder of the period, a representative from the Coastal Services Center chaired the Subcommittee. Subcommittee accomplishments are as follows:

Continued to assist the Tri Services CADD/GIS center to complete the integrated feature registry for the data objects and attributes related to marine area using the S-57 standard. Continued to assist the Tri Services CADD/GIS center to complete the integrated feature registry for the data objects and attributes related to marine area using the S-57 standard. A Hydrographic Data Content Standard for Coastal and Inland Waterways was in development stages. In 1999, work on the Hydrographic Data Content Standard continued. A mapping table between the various related standards (IHO S-57, DIGEST FACC, Tri Services CADD/GIS, and USACE REEGIS) was developed and refined by a small working group consisting primarily of NOAA Office of Coast Survey, US Army Corps of Engineers (USACE), National Imagery and Mapping Agency (NIMA) personnel, as well as contract support provided by USACE. The draft version of the standard was completed and it is expected that it will be released for public comment in 2000.

Frederick Broome, Chair of the Subcommittee on Cultural and Demographic Data (SCDD), has actively participated in and will continue to participate in all FGDC-sponsored framework activities. Because the SCDD has the thematic responsibility for and is developing address standards, the SCDD is extremely interested in the address component of Framework. Through participation in the Framework meetings, the SCDD chair learns of Framework needs in the area of address standards and communicated these needs to the SCDD members along with other items of interest, such as the status and impact of Framework initiatives.

The CSC's Coastal Information Directory was developed to link customers to a variety of data, products, and information regarding the nation's coastline. It provides single query access to coastal data and information available through FGDC Clearinghouse nodes and on-line library catalog systems. It has recently been expanded to include links to web pages containing coastal data.

CSC has worked with its partners to produce a number of CD-ROMs and web pages that were designed for specific communities. Examples of these products include:

1. Creation of a common shoreline data layer.
2. Access to comprehensive ocean-related data and information for the southeastern U.S.
3. Digital line boundaries for each of the NERR sites.
4. Creation of tool to help communities use geospatial data to assess vulnerability to coastal hazards.

A full list of geospatial data products and tools is available on the Center's web site (www.csc.noaa.gov).

3.2. NSDI Objective: Provide additional geospatial data that citizens, governments, and industry need.

3.2.1 NOAA Objective: Monitor compatibility of Federal fixed reference stations with NAD 83 and their relationship to the development of a single Continuously Operating Reference Station (CORS) system to meet the requirements of Federal GPS post-processing procedures.

NGS brought on line an additional thirty-three Continuously Operating Reference Stations (CORS) to be brought online, resulting in a total of 165 stations in the National CORS Network. Further, NGS developed Cooperative CORS - a method to electronically link via the Internet to CORS which are not part of the National CORS network. The National CORS are those stations meeting NOAA geodetic standards for installation, operation and data distribution. The Cooperative CORS will supplement the National CORS network by providing a dense system of reference stations to meet local needs. Reference the following web site: http://www.ngs.noaa.gov/CORS/Coop/

3.2.2 NOAA Objective: Ongoing development, publishing, and maintenance of accuracy, collection, content, transfer, and archive standards for geodetic, land and resource surveys, and their related metadata. Promote the use of these standards by Federal, state, and local levels of government and the private sector.

NGS drafted specifications for Federal Base Network re-observations, 2 cm horizontal and 2 cm ellipsoid height accuracy standards, NGS Web site: http://www.ngs.noaa.gov/ADVISORS/FBN/GPSmanual/

3.2.3 NOAA Objective: Ongoing participation in the nationwide implementation of NAVD 88 and in the development of the Nation's geodetic height system using GPS.

NGS drafted a set of Guidelines for establishing GPS-Derived Orthometric Heights which are expected to undergo some changes will be made based on recent studies

3.2.4 NOAA Objective: On-Going Data Management Activities

Environmental Information Services staff participate in data management activities of NOAA's Office of Global Programs as focused in the Climate Change, Data, and Detection element with the goal to produce Science Quality Data Sets for the U.S. Climate and Global Change Program:

Progress is not measured solely by the amount of data that has been rescued or made accessible but also by the quality of NOAA data bases. Sound, high-quality scientific data bases are essential to support science programs that analyze and attempt to understand the Earth system. Value is added to the data sets through their use by scientists at the Data Centers and in the science community. Scientific programs contribute to and draw from the NOAA archives. These programs merge different data sets to fill gaps in the temporal and spatial coverage and conduct sophisticated analyses to ensure the quality of the resultant data sets. Metadata are appended to assist other scientists in their use of the data sets.

NOAA's Climate and Global Change (C&GC) Program has made a significant contribution to these efforts consistent with its mission to improve our ability to observe, understand, predict, and respond to changes in the global environment. C&GC has simultaneously been a beneficiary and a driver of the recent improvement in NOAA's scientific data management capabilities. The scientific focus provided by the precise and demanding data requirements of the C&GC research community has upgraded data management efforts in a number of areas, including data set development, quality assurance, data continuity, and metadata standards.

Funds provided by the C&GC Program, principally through the Climate Change Data and Detection Program element, have been key to the National Data Centers' success in engaging a high level of scientific talent in data processing and archival activities and in the eventual production of climate products tailored to the needs of the user community. The scientific goals of this program element include efforts to:

1. provide data and information management support to assure the availability of critical data sets for a variety of international programs and assessments of primary interest to NOAA's Climate and Global Change Program, e.g., GCOS (the Global Climate Observing System), the IPCC (Intergovernmental Panel on Climate Change), as well as national programs and assessments, e.g., Pan-American Climate Studies (PACS), the US National Climate Assessment, etc.;
2. develop, quality control, quantify time-dependent biases (homogeneity), and evaluate data sets for cross-cutting science needs necessary to improve our ability to describe, understand, and predict seasonal, interannual, decadal, and longer term climate variations and changes ;
3. calibrate, validate, and blend existing data sets from a variety of observing systems, including space-based, in-situ, and model data;.
4. document the quantitative character of observed climate variations and changes (climate change detection) and attribute changes in the observed climate record to specific climate forcings (climate change attribution).

Data sets from this Program support international assessments such as that conducted periodically by the Intergovernmental Panel on Climate Change (IPCC) whose next assessment is scheduled for the year 2000. Climate Change Data and Detection has funded many distributed data management efforts, including the TAO (Tropical Atmosphere Ocean) buoy array, the World Ocean Circulation Experiment Data Acquisition Centers for Current Meter, Subsurface Float, Drifter, and Sea Surface and Profile Temperature Data; the Network for the Detection of Stratospheric Change; and the Global Energy and Water Cycle Experiment (GEWEX) Continental-Scale International Project (GCIP) Data Management and Service System.

3.3. NSDI Objective: Promote common classification systems, content standards, and other common models to facilitate data development, sharing, and use.

1. The Subcommittee on Cultural and Demographic Data (SCDD), chaired by the Bureau of the Census: is producing a committee draft of the "Address Data Content Standard" in accordance with the SCDD Proposal for a National Spatial Data Infrastructure Standards Project titled "Address Data Content Standard". The SCDD began work on this standard in July 1997. Efforts in 1999 focused on presented this standard to the general public at conferences and workshops to gain further input and broader acceptance. The SCDD hopes to complete the committee draft by September, 2000 and forward it to the FGDC Standards Working Group for their approval and public review.

2 Continued work on a committee draft of the "Governmental Unit Boundary Data Content Standard" in accordance with the SCDD Proposal for a National Spatial Data Infrastructure Standards Project titled "Governmental Unit Boundary Data Content Standard". The SCDD is working with the FGDC International Boundaries and Sovereignty Subcommittee to expand the scope of this standard and share sponsorship.

4.0 NSDI GOAL 4: BUILD RELATIONSHIPS AMONG ORGANIZATIONS TO SUPPORT THE CONTINUING DEVELOPMENT OF THE NSDI.

Intent: The intent of this goal is that organizations and individuals work together to jointly build the NSDI and share data. Relationships among groups will take many forms and NSDI will be flexible enough to support a multitude of relationships. Economic, organizational, legal, and behavioral constraints can significantly influence the willingness and abilities of organizations to share data. It is also the intent of this goal that these constraints be identified and removed, where appropriate.

4.1 NSDI Objective: Develop a process that allows stakeholder groups to define logical and complementary roles in support of the NSDI.

The CSC constantly promotes the value of the NSDI to its partners. CSC requires its contractors and grant recipients to follow NSDI standards. CSC is actively pursuing the use of FGDC metadata and Clearinghouse architecture into new systems being developed in-house and by Center partners. The CSC has worked diligently with the National Association of Marine Laboratories (NAML) to ensure the data from the network of over 100 labs are documented according to FGDC standards. Furthermore, CSC is helping NAML design NAML's LabNet system, which will provide access and analysis tools for NAML data, to be based on the FGDC Clearinghouse architecture and metadata standard.

4.2 NSDI Objective: Build a network of organizations linked through commitment to common interests within the context of the NSDI.

The Subcommittee on Cultural and Demographic Data (SCDD), chaired by the Census Bureau, continues to extend an invitation to all non-Federal organizations to attend and participate in SCDD meetings. The SCDD received FGDC funds to support participation in a conference sponsored by its Ad Hoc Cultural Resources Work Group. The primary mission of the Cultural Resources Work Group is to develop, update and review recommendations for the collection and maintenance of spatial cultural resource data, as well as metadata for cultural resource data.

4.5 NSDI Objective: Identify and support the personal, institutional, and economic behaviors; technologies; policies and legal frameworks that promote the development of the NSDI.

4.6 NSDI Objective: Participate with the international geospatial data information community in the development of a global geospatial data infrastructure.

Census and NOAA staff participated in the American National Standards Institute (ANSI), National Committee for Information Technology Standards (NCITS), L1 Geographic Information Committee. Staff attended yearly meetings. Staff continue to serve as Editor of the "Spatial Data Quality Standard". Efforts on this standard are minimal as work is currently concentrated at the international level and the development of ISO/TC 211's 19113 Quality Principles, 19114 Quality Evaluation Procedures and 19115 Metadata Standards.

Census staff participated in the Organization for International Standardization Technical Committee 211 (ISO/TC 211) Geographic Information/Geomatics. As members of the US Technical Advisory Group (US TAG), staff attend a minimum of four meetings per year held in association with NCITS/L1 meetings. Additionally, staff attend two US strategy meetings per year, held prior to ISO plenaries. Staff also attend two ISO plenaries per year and associated Editing Committee meetings related to standards work. Census staff participate in two specific ISO/TC 211 standards. Staff serve as Editors of 19113 Quality Principles and 19114 Quality Evaluation Procedures. Both of these standards reached Committee Draft stage in 1999 and are progressing to Draft International Standard (DIS) stage.