ESS / SST

Application of GIS and Data Management for ArcticNet 1.6 The Opening NW Passage: Resources, Navigation, Sovereignty & Security

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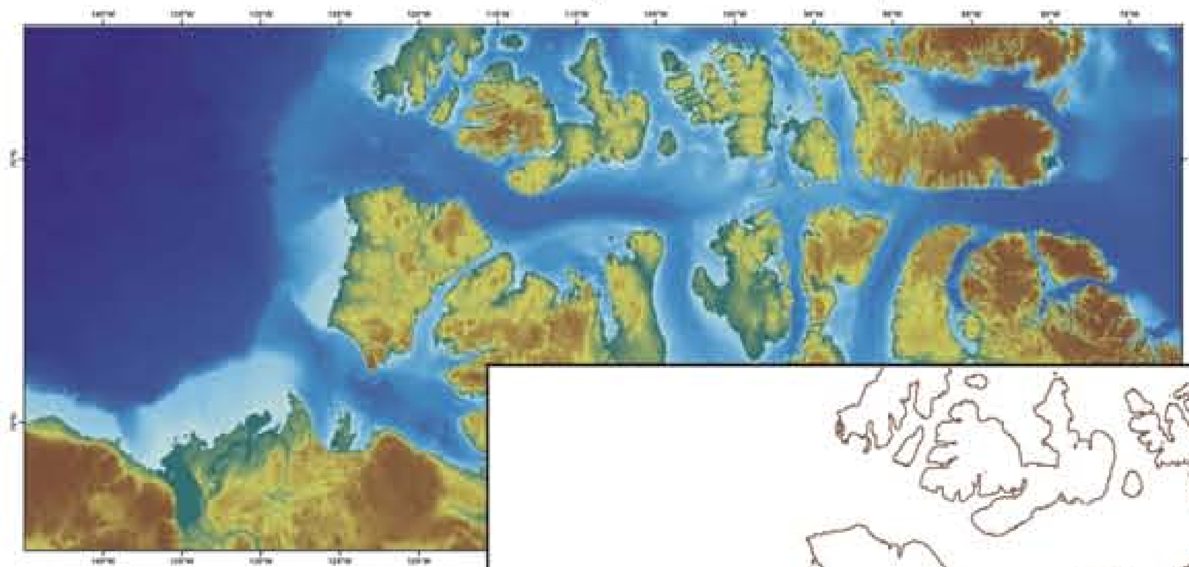
ABSTRACT

The application of GIS technology to Arctic Net project 1.6 is essential for the delivery of scientific, database and archival products. Most historic data prior to 1991 exist only as analogue hard copy while all newly acquired maps and data are digital. Historic analogue data and maps are digitized, georeferenced and imported into a GIS environment for correlation with new digital data. Newly acquired data, such as mulitbeam bathymetry, are then incorporated into a GIS for analysis, correlation, interpretation and archiving for future access. GIS technology is required to meet scientific objectives through the correlation and integration of multidisplinary geophysical, geological, geographical and biological datasets. In addition, all data will meet Natural Resources Canada, Earth Science Sector (ESS) Information Management and Information Technology standards which include the creation of metadata for all products, information, data and physical collections. Metadata profiles have been established by Natural Resources Canada GeoConnections and are based on FGDC standards. As well, the metadata will be registered in on-line searchable data catalogues and product delivery will conform to the Open GIS Consortium and web map server interface.

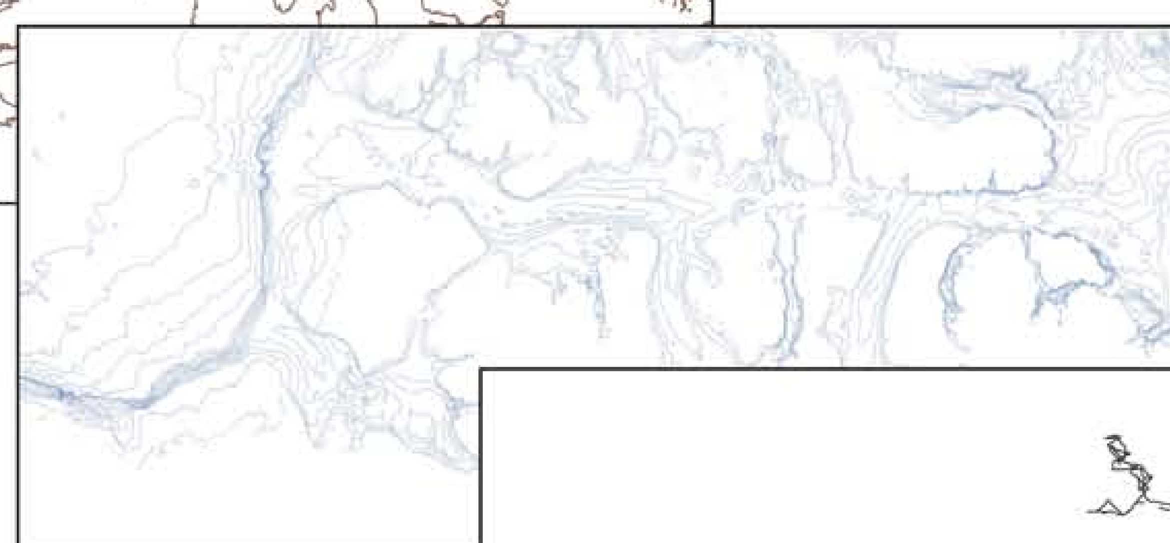
GIS technology is being applied to mapping the morphology and geological structures of the Northwest Passage and other areas of the Canadian Arctic which will facilitate the creation of much needed base maps. GIS technology is currently being used to create a georeferenced digital Northwest Passage seabed morphology base map that will be the foundation for spatial and temporal analyses in a GIS environment. Spatial and temporal correlation of sediment cores through a GIS environment will aid in paleoceanographic analyses which will provide new information on sea level variability, climate change and past sea ice conditions. With the use of a GIS, it will be possible to produce good quality, web accessible navigational and geological maps, open file reports and journal articles. GIS will also be vital to other Arctic Net projects, giving them a solid foundation on which to build and display their science. Adapting and adhering to the Information Management and Information Technology standards for data management will ensure that high-quality scientific products are delivered.

ArcticNet Project 1.6 Basemap

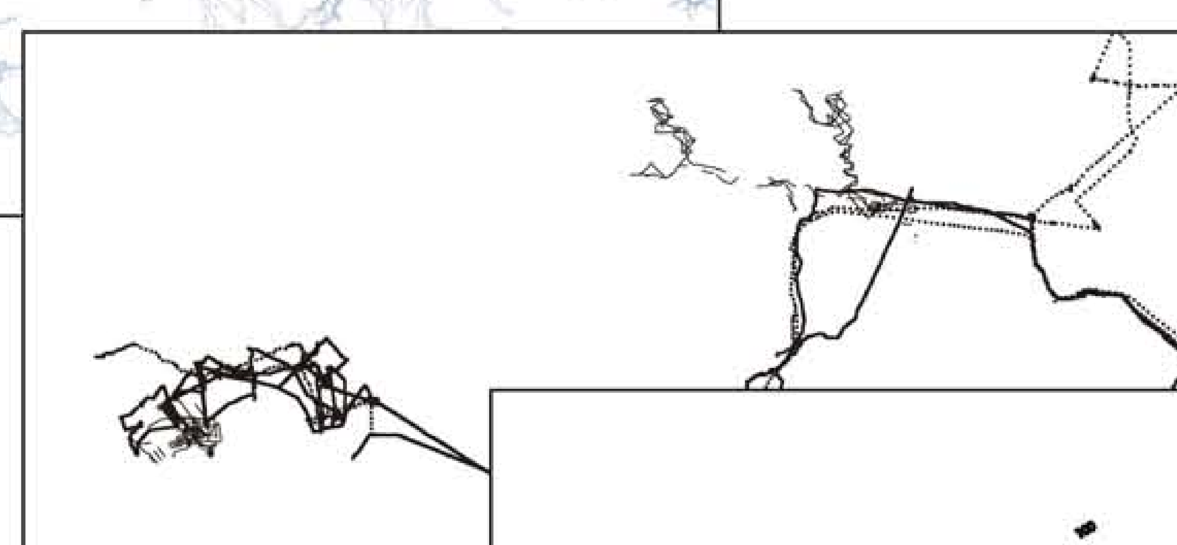


This map was generated from 2-minute Gridded Global Relief Data (ETOPO2) supplied by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), National Geophysical Data Center(NGDC) (2001). For display purposes, the data has been projected to World Mercator projection. The horizontal datum is WGS-84, the vertical datum is Mean Sea Level, and the vertical resolution is 1m.

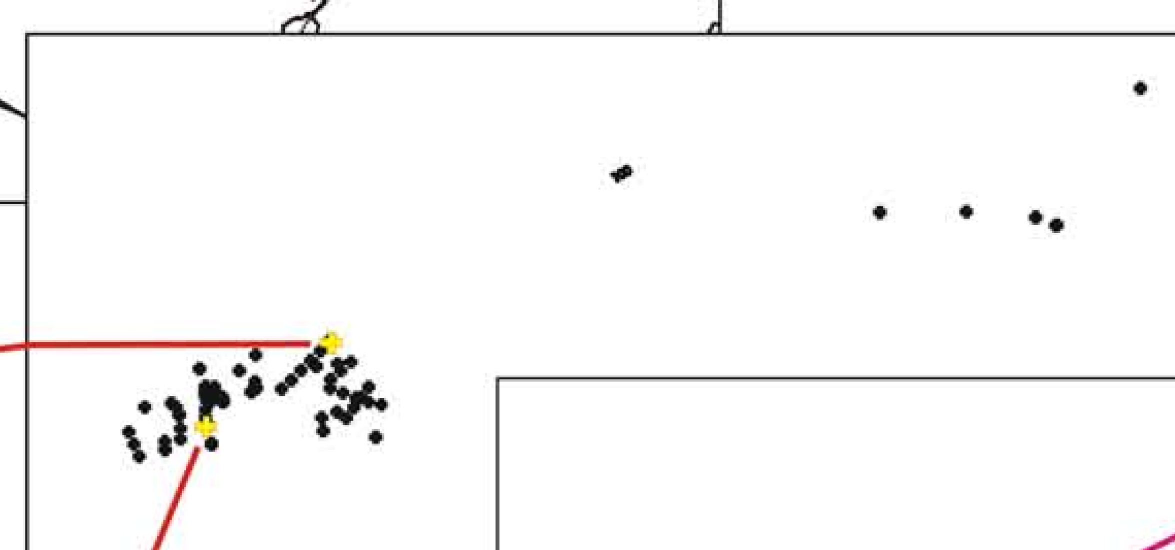
Shoreline extracted from ETOPO2 data using ESRI ArcInfo Raster Calculator



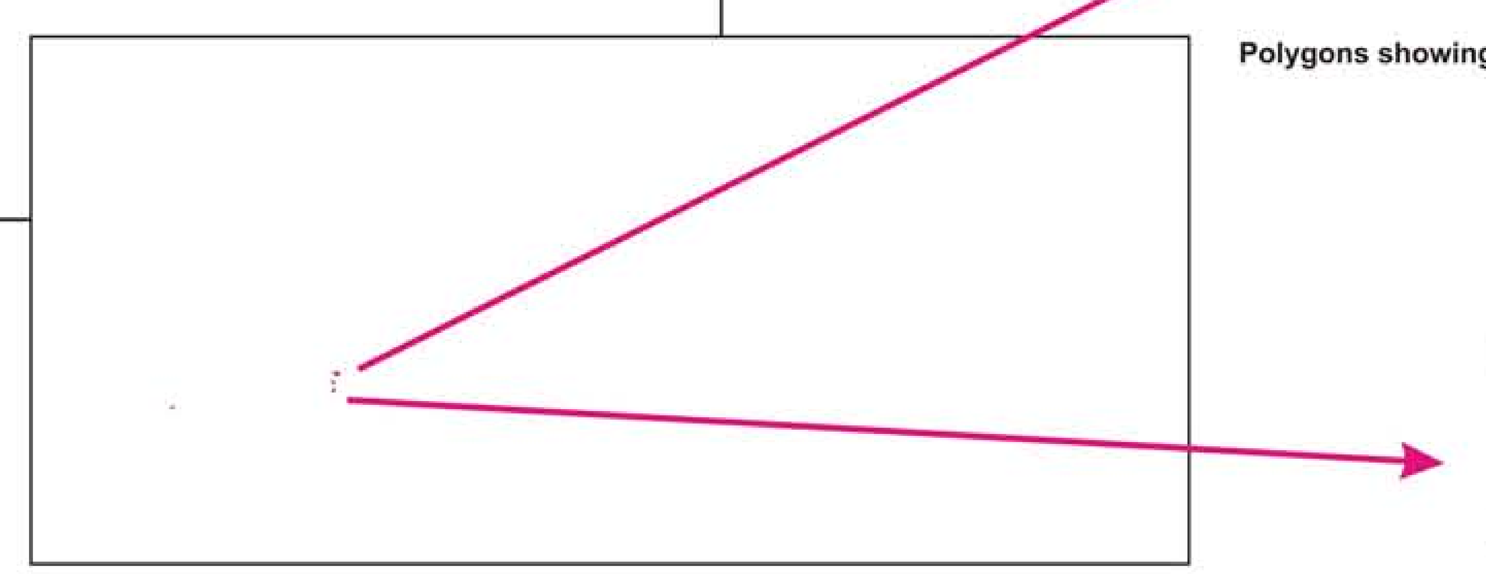
Bathymetric isobaths extracted from ETOPO2 data using ESRI ArcInfor Raster Calculator data



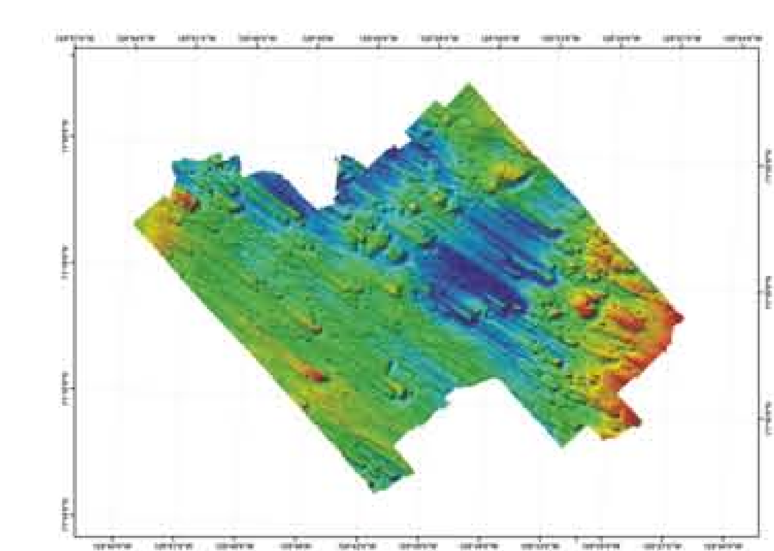
Tracklines showing ships navigation and geophysical data coverage

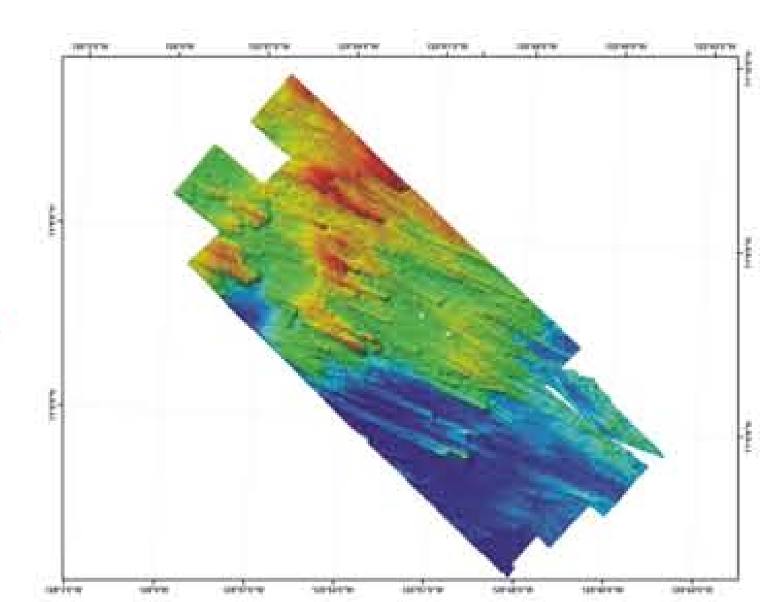


Sample locations of cores and bottom photos

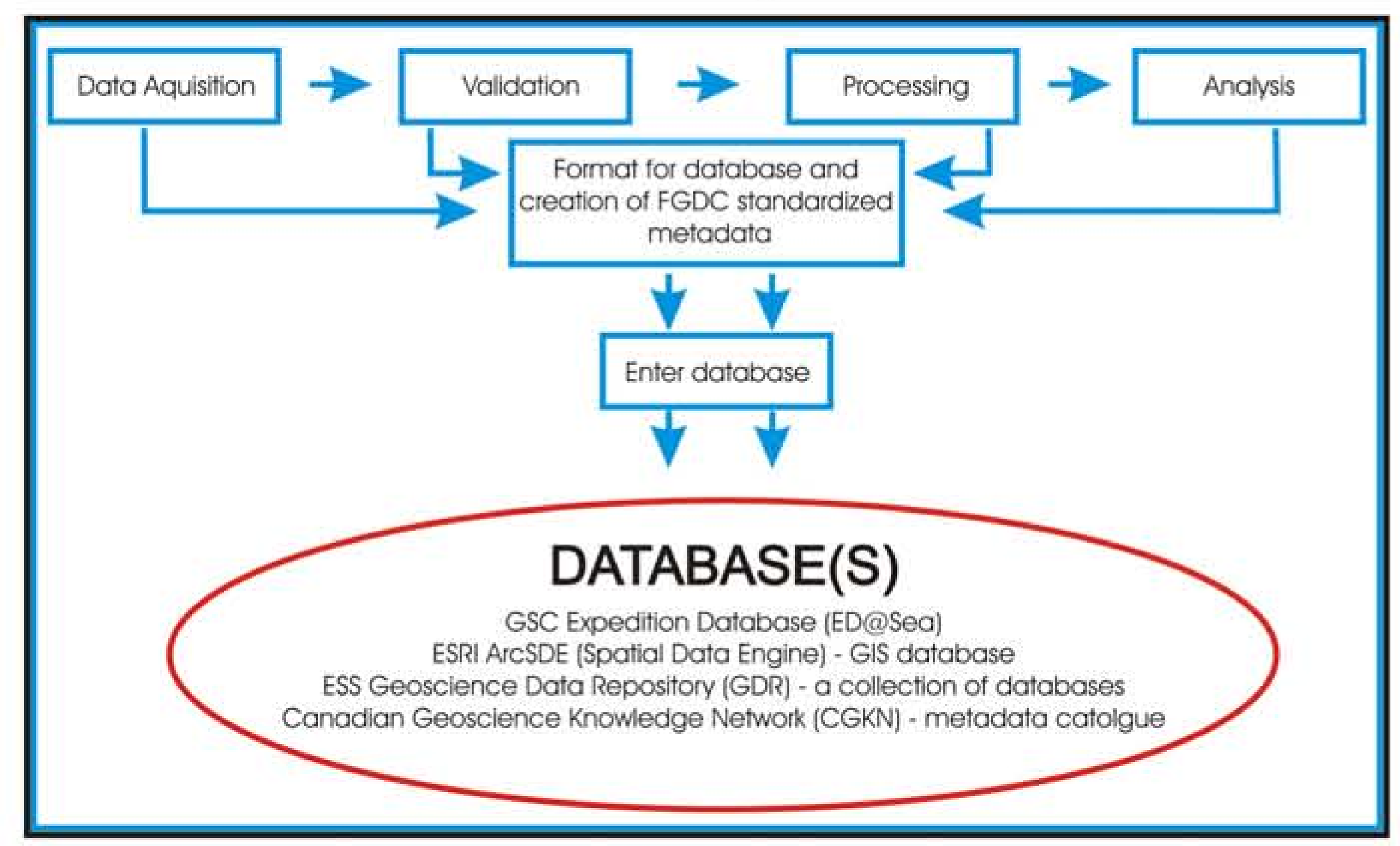


Polygons showing multibeam bathymetry data coverage





Data Management



Metadata
"data about data"
All data must be accompanied by FGDC standardized metadata

Metadata for ArcticNet Project 1.6 Basemap

Identification_Information:

Citation_Information:
Originator: Walta-Anne Rainey
Publication_Date: December 2005
Title: Application of GIS and Data Management for Arctic Net
Geospatial_Data_Presentation_Form: raster digital data
Publication_Information:
Publication_Place: Dartmouth, Nova Scotia, Canada
Publisher: Natural Resources Canada, Geological Survey of Canada
Online_Linkage: http://gsm.nrcan.gc.ca/beaufort/index_e.php

Description:
Abstract: Arctic basemap created for the purposes of the 2nd Annual ArcticNet Conference, 13-16 December 2005, Banff, Alberta Canada
Purpose: To aid in the interpretation of seafloor topography and composition.
Supplemental_Information: English

Time_Period_of_Content:
Single_Date/Time:
Calendar_Date: 2005
Currentness_Reference: ground condition
Status:
Progress: Complete
Maintenance_and_Update_Frequency: None planned

Spatial_Domain:
Bounding_Coordinates:
West_Bounding_Coordinate: -145.000000
East_Bounding_Coordinate: -69.966674
North_Bounding_Coordinate: 77.033332
South_Bounding_Coordinate: 67.000000

Keywords: Theme:	Place:
Theme_Keyword_Thesaurus: none	Place_Keyword_Thesaurus: none
Theme_Keyword: bathymetry	Place_Keyword: Canada
Theme_Keyword: multibeam	Place_Keyword: Northwest Territories
Theme_Keyword: grid	Place_Keyword: Nunavut
Theme_Keyword: topography	Place_Keyword: Beaufort Sea
Theme_Keyword: seafloor	Place_Keyword: Northwest Passage
Theme_Keyword: morphology	Place_Keyword: Lancaster Sound
Theme_Keyword: GIS	Place_Keyword: Amundsen Gulf
Theme_Keyword: arctic	

Access_Constraints: Data Accessible 2 Years After First Collected
Use_Constraints: Her Majesty the Queen in Right of Canada 2004. For more information, please contact the Copyright Officer at the following address: ESS Copyright Officer Business Development Office Earth Sciences Sector 615 Booth St., Ottawa, Ontario K1A 0E9

Contact_Information:
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Native_Data_Set_Environment: Microsoft Windows 2000 Version 5.1 (Build 2600) Service Pack 2; ESRI ArcCatalog 8.3.0.800

Data_Quality_Information:
Positional_Accuracy:
Horizontal_Positional_Accuracy:
Horizontal_Positional_Accuracy_Report: This data was collected using Differential Global Positioning System (DGPS) with an accuracy of 3 to 5 meters.

Vertical_Positional_Accuracy:
Vertical_Positional_Accuracy_Report: Depth readings were collected using an echo sounder with decimeter accuracy.

Process_Step:
Process_Description: 2 minute gridded global relief data (ETOPO2) was extracted from the National Oceanic and Atmospheric Administration, National Geophysical Data Center as ESRI Arcgrid format. The data was gridded using ESRI ArcInfo 8.3.
Process_Date: 2005

Process_Step:
Process_Description: From the newly gridded data, values for land and sea coverages were separated using the ArcInfo raster calculator.

Process_Step:
Process_Description: For the purposes of this poster and presentation, the projection of the grid was defined as World Mercator, Datum WGS84. Using the define projection wizard tool in the ArcTool Box, the projection was defined.

Process_Step:
Process_Description: Metadata imported and edited.

Spatial_Data_Organization_Information:
Direct_Spatial_Reference_Method: Raster
Raster_Object_Information:
Raster_Object_Type: Grid Cell
Row_Count: 301
Column_Count: 2251
Vertical_Count: 1
Spatial_Reference_Information:
Horizontal_Coordinate_System_Definition: Geographic:
Geographic_Coordinate_Units: Decimal degrees
Geodetic_Model:
Horizontal_Datum_Name: D_WGS_1984
Ellipsoid_Name: WGS_1984
Semi-major_Axis: 6378137.000000
Denominator_of_Flattening_Ratio: 298.257224

Distribution_Information:
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Metadata_Reference_Information:
Metadata_Date: 20051209
Metadata_Review_Date: One Year after Creation Date

Acknowledgements
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