

Exxon Valdez Oil Spill Trustee Council
Gulf Ecosystem Monitoring and Research Project

A Comprehensive Metadatabase of Marine-Related Physical and
Biological Databases of the Northern Gulf of Alaska

GEM Project 040716
Final Report

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September 2005

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Study History:

This study's origins stem directly from the Gulf Ecosystem Monitoring (GEM) Plan. According to the GEM Program Document, Chapter 3 (*Exxon Valdez* Oil Spill Trustee Council 2002), data generated by GEM projects need to be converted into useful information that is readily available in a timely fashion to the scientific communities, resource managers, resource dependent people and their communities, policy makers, and other members of the public. In addition, data sets and information regarding other research and monitoring activities in the GEM region must be readily accessible to EVOS staff and contractors, GEM committees and working groups, state and federal resource agencies, and concerned members of the public in order to facilitate gap analysis during project selection and implementation, and maximize the use of all data collected.

In its review of the GEM Program Document, the National Research Council (2002) recommended that one of the first tasks of the GEM Data Management Office should be to install the relevant body of existing data for the Gulf of Alaska into the GEM database. The NRC listed some examples, including the NOAA TAO/ENSO data collection, PDO estimates, PICES TCODE data, and other historical, regional oceanographic and climate data. Such data archives are essential to ecosystem modeling and synthesis in the GEM program.

In 1996, this project's investigators established the Bering Sea Ecosystem Biophysical Metadatabase (BSEBM) to address a deficiency identified by the National Research Council (1996). In its report on the Bering Sea ecosystem, the council concluded that a directory of data and information sources relevant to the Bering Sea, cataloged in one place, was a critical need. In 2002, the scope of the metadatabase was expanded to the whole North Pacific Ocean at the urging of the North Pacific Marine Science Organization (PICES) (Alexander *et al.* 2001). Thus, the BSEBM became the North Pacific Ecosystem Metadatabase (NPEM, <http://www.pmel.noaa.gov/np/mdb/>). Presently, the NPEM references nearly 4000 ecosystem records, of which more than 200 are to regional data sets that have been included in the NGOA Metadatabase.

Abstract:

The Northern Gulf of Alaska (NGOA) Metadatabase documents GEM and other regional marine ecosystem research products, enabling access to historical information and permitting decision making as to data appropriateness. The NGOA exists in Oracle and MS Access formats and contains 231 metadata records of environmental datasets collected within or including the GEM region of interest in the Gulf of Alaska.

Key Words: data, database, Gulf of Alaska, information management, metadata, metadatabase

Project Data:

- A final report.
- A NGOA metadatabase, in both Oracle and MS Access formats, containing 231 metadata records of the datasets collected within or including the GEM region of interest in the Gulf of Alaska.
- A Java program to read data from the NGOA metadatabase and to automatically generate EML-compliant metadata documents in XML format.
- A total of 231 EML-compliant metadata documents automatically generated using the Java program software for EML-based metadata file generation.
- A methodology for EML-based metadata relevancy evaluation.
- A Java program to score metadata for relevancy based on EML elements.
- A total of 231 metadata score reports and one metadata evaluation summary report automatically generated using the Java program software for metadata relevancy evaluation.

All deliverables are archived on a CD-ROM (see Appendix 1) as part of this project's final report.

Citation:

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Executive Summary:

The primary result of this project is a metadatabase that describes marine-related physical and biological datasets using Ecological Metadata Language (EML). A total of 231 datasets in the interests of GEM were discovered from different data sources. A metadatabase was designed to store EML-related metadata elements for these datasets, and Java-software was developed to automatically generate XML-based EML documents. A total of 231 EML-compliant metadata documents were generated using this Java software.

Introduction:

One of GEM's major program goals is to convert the datasets generated by GEM projects into useful information that is readily available in a timely fashion to the scientific communities, resource managers, resource dependent people and their communities, policy makers, and other members of the public. The most important step in achieving this goal is to describe these datasets using a metadata standard. Metadata standards facilitate the development, sharing, comparison, and use of scientific data. In the scientific community, there are several existing metadata standards, among which EML is powerful and suited to the needs of this project. EML is implemented as a series of XML documents that allow for the structural expression of metadata necessary to document a typical data set in the ecological and environmental sciences. It is compatible with many other metadata standards such as FGDC and can be used in a modular and extensible manner. This project, in cooperative discussions with the *Exxon Valdez* Oil Spill Trustee Council (EVOSTC) data managers, chose EML as the metadata standard. Data attributes of importance to GEM were identified, and then the metadata elements required by EML were retrieved and loaded into a metadatabase designed on the EML standard. We developed a Java program to read metadata from the metadatabase and to automatically generate EML-based metadata documents.

Objectives:

The primary requirement for the GEM Metadata Project was to locate data sets in the GEM geographic area and develop a structure for the storage and transfer of metadata describing those datasets. Based on this requirement, the following goals were proposed in order to meet the GEM metadata requirement:

- Work with GEM to design a metadatabase schema for storing metadata information for the datasets that are in the interests of GEM.
- Work with GEM to select a metadata standard.
- Identify metadata records that can be included in the GEM metadata project from the existing North Pacific Ecosystem Metadatabase (NPEM).
- Expand metadata information on those identified metadata records.
- Discover new metadata records from different data sources.
- Encode metadata records using the appropriate metadata standard into a relational database (NGOA metadatabase) for delivery.
- Develop Java programs to generate EML-compliant metadata documents for all metadata records.

- Develop a methodology for determining relevancy of metadata records to the overall GEM task.

Methods:

The project contracted with Xiaoping Wang of Macrostaff (11711 SE 8th St, Bellevue, WA 98005) to perform essential services. Work began in October 2004. The investigators and contractor worked closely with the GEM project data managers, holding multiple telephone and in-person conferences during the lifetime of the project. Additional contacts included data managers at the University of Alaska Fairbanks, Alaska Department of Fish and Game, Alaska Fisheries Science Center, and Pacific Marine Environmental Laboratory. After eight months of efforts, all goals were achieved.

Initial discussions with GEM data managers led to the adoption of the Ecological Metadata Language (EML). This was a significant determination. It gave us the ability to proceed with mapping of already available metadata from the NPEM (in FGDC format) into EML for the NGOA metadatabase. When this phase of the project was completed, the interim product was reviewed and accepted by GEM data managers.

Next, we opened a period of data discovery with other institutions and agencies active in data collection within the GEM area of interest. First, we contacted the Institute of Marine Science, University of Alaska Fairbanks. (We learned that little metadata are available, but we were able to enter into a metadata rescue agreement that is described later in this report. When the metadata are rescued, they should enrich the supply available for the NGOA metadatabase.) We contacted the Alaska Department of Fish and Game to learn that they have not yet established a metadatabase. However, they have the tools to develop a product that is very similar to the NPEM. When it is ready, scripts developed in this project to harvest metadata from the NPEM will likely require little or no modification to harvest metadata from the Alaska Department of Fish and Game. Finally, we turned to the Alaska Fisheries Science Center and the Pacific Marine Environmental Laboratory. From these we were able to add a significant amount of metadata on physical and biological information for the GEM area.

We prepared a draft final report and products for review by the GEM data managers, allowing time within the contract to address their concerns and requests.

Results:

Product and Achievement Descriptions

(a) Metadatabase Schema

The metadatabase schema is implemented in Oracle and located on a database Server. The design of the database structure is based on both EML schema and Java programming logic. Seven tables have been developed to hold metadata information for each dataset. Certain constraints, such as primary keys, foreign keys, unique keys, check

constraints, not-null constraints, have been created to enforce correct and consistent navigation and manipulation of each metadata record in the database tables and to ensure the accuracy and persistence of EML-compliant metadata information. Eight PL/SQL procedures have been created for automatic data input and conversion.

(b) Metadata Records

A total amount of two hundred thirty-one metadata records have been loaded into the NGOA metadatabase that was developed based on the metadata schema described previously. The dataset discovery began with metadata already contained in the NPEM, and 190 metadata records were identified from the NPEM. Then, the dataset identification continued from other data holdings. In the interest of seeking a maximum of datasets within the GEM region of interest, we contacted the University of Alaska Fairbanks (UAF) and the Alaska Department of Fish and Game (ADFG), the Pacific Marine Environmental Laboratory (PMEL) and the Fisheries-Oceanography Coordinated Investigations (FOCI) program. UAF presently has metadata in development only for their GLOBEC research; other metadata have yet to be developed from archived information (see g, below). ADFG do not presently have metadata for distribution; they are developing a relational database of their data holdings. We were successful in obtaining additional metadata records from PMEL that reference 57,696 separate CTD oceanic profiles and time series between 1901 and 2003. FOCI contributed metadata for its satellite-tracked drifter program and for its Gulf of Alaska ocean circulation model. Finally, many global and regional climate and derived-quantity datasets, such as ocean chemistry, sea surface temperature, upwelling, heat flux, wind, cloud, bathymetry, and so on, were added to the NGOA metadatabase. Thus, the final suite of NGOA metadata is identified from 200 different data sources and covers a wide range of time from 1854 to 2005.

(c) Java Program for EML Document Generation

A Java program was developed to generate EML-compliant XML metadata documents for each metadata record stored in the NGOA metadatabase. The Java program contains six classes and each class contains 1 – 8 functions for handling different tasks. All EML-compliant metadata documents generated using this Java program has been validated against EML schemas to ensure that the documents have no XML syntax errors and they follow EML rules.

(d) EML-compliant metadata documents

A total of 231 EML-compliant metadata documents were generated automatically from the NGOA metadatabase using our Java program. About 190 documents contain only core metadata information, such as dataset title, abstract and purpose, data creator(s), metadata provider(s) and contact information, keywords, data maintenance, data distribution, and geographic/time coverage. About 40 documents contain not only core metadata information, but also metadata information about data files or data tables. Data file information includes data table or data file name and description, attribute name and

definition, attribute domain code and definition, data type, data unit, and data precision. Several documents also contain metadata information about the project (title, description, participants and their roles, funding sources) and the methods (method description and instruments).

(e) Methodology for EML-based metadata relevancy evaluation

Based on our understanding of the relative importance of EML metadata elements, we developed a methodology for determining the relevancy of metadata records to the overall GEM task. The methodology is a 100-scale scoring system with certain points given to each EML metadata element or each group of EML metadata elements according to their relative importance. GEM can adjust element scores to meet established relevancy criteria.

(f) Java Program for Metadata Relevancy Evaluation

A Java program was developed to score metadata for relevancy. The Java program contains six classes and each class contains 1 – 5 functions to handle different tasks. After execution, the program will produce 231 EML metadata evaluation reports, one for each metadata record, and a summary report on EML Metadata Relevancy for all metadata records in the NGOA metadatabase.

(g) Funding for a University of Alaska Fairbanks (UAF) metadata rescue project

Early in the performance period for this task, we contacted the data manager of UAF's Institute of Marine Science. Our objective was to solicit metadata for GEM's NGOA metadatabase, as UAF has been active in ocean research within the GEM region of interest for many years. We were informed by the data manager that much of UAF's historical metadata and data are archived on ~2000 9-track tapes, and that the university no longer has access to 9-track tape hardware to recover the stored information.

Through NOAA/NMFS, we successfully applied for funds from the Climate Database Modernization Program to transport the 2000 tapes to an independent contract vendor for reading and conversion to disk images. A test batch of tapes has already been processed. The project is scheduled to run through February 2006, after which the UAF metadata available for GEM's NGOA should be vastly enriched.

Product Maintenance

EML is a flexible metadata standard that can be used in a modular and extensible manner. Therefore, as more metadata information becomes available in the future, more data fields can be added to the existing tables or new tables can be designed and created. Consequently, the Java program may need to be expanded to include more metadata information. In addition, the methodology for EML-based metadata relevancy evaluation is based on our understanding of relative importance of the EML elements. The methodology can be revised

if different understanding of the EML metadata importance is applied or new EML metadata elements are included for evaluation. As a result, the Java program for metadata relevancy evaluation may need to be revised.

Deliverables

At the close of the contract on September 30, 2005, this project will deliver to GEM the following products:

- A final report.
- A NGOA metadatabase, in both Oracle and MS Access formats, containing 231 metadata records of the datasets collected within or including the GEM region of interest in the Gulf of Alaska.
- A Java program to read data from the NGOA metadatabase and to automatically generate EML-compliant metadata documents in XML format.
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- A Java program to score metadata for relevancy based on EML elements.
- A total of 231 metadata score reports and one metadata evaluation summary report automatically generated using the Java program software for metadata relevancy evaluation.

All deliverables will be archived on a CD-ROM as part of this project report.

Conclusions:

A metadatabase schema has been designed by this project to store EML-based metadata elements for datasets. A total of 231 datasets that are in the GEM geographic area have been identified, and their metadata information has been stored in both the NGOA metadatabase and the set of EML-compliant XML documents. The Java software products developed by this project enable EML-compliant metadata documents to be generated and their relevancy to be evaluated.

References:

Alexander, V, A.S. Bychkov, P. Livingston and S.M. McKinnell (editors), 2001: Proceedings of the PICES/CoML/IPRC Workshop on "Impact of Climate Variability on Observation and Prediction of Ecosystem and Biodiversity Changes in the North Pacific". PICES Scientific Report No. 18, ISBN 0-9685100-8-6, ISSN 1198-273X, 210pp.

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National Research Council, 1996: *The Beign Sea Ecosystem*. National Academy Press, Washington, DC, 324p.

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http://www.oilspill.state.ak.us/gem/documents.html#NRC_report.

APPENDIX

1. CD-containing project final draft report.
2. Sample EML-compliant metadata document.
3. Metadata Relevancy Evaluation Methodology.
4. Summary report for the metadata relevancy evaluation.
5. Sample metadata score report.

Appendix 1. CD_ROM: A Comprehensive Metadatabase of Marine-Related Physical and Biological Databases of the Northern Gulf of Alaska -- GEM Project 040716CD-ROM Contents

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- Methodology for EML-based metadata relevancy evaluation.
- Java program to score metadata for relevancy based on EML elements.
- 231 metadata score reports and one metadata evaluation summary report automatically generated using the Java program software for metadata relevancy evaluation.

Appendix 2. Sample EML-compliant metadata document

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  there are a series of profiles of temperature and salinity measured at certain locations defined by
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    the three digits designating degrees of longitude. Longitudes west of the meridian shall be
    designated by a minus sign (-) preceding the three digits designating degrees. A point on the
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  <attributeDefinition>Water pressure at the location of float</attributeDefinition>
  <storageType>Float</storageType>
  <measurementScale>
    <ratio>
      <unit>
        <customUnit>decibar</customUnit>
      </unit>
      <numericDomain>
        <numberType>real</numberType>
      </numericDomain>
    </ratio>
  </measurementScale>
</attribute>
<attribute>
  <attributeName>Time</attributeName>
  <attributeDefinition>Date at the location of float</attributeDefinition>
  <storageType>string</storageType>
  <measurementScale>

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    <datetime>
      <formatString>MM/DD/YYYY</formatString>
      <dateTimeDomain />    </datetime>
    </measurementScale>
  </attribute>
  <attribute>
    <attributeName>Temperature</attributeName>
    <attributeDefinition>Water temperature</attributeDefinition>
    <storageType>Float</storageType>
    <measurementScale>
      <interval>
        <unit>
          <standardUnit>celsius</standardUnit>
        </unit>
        <numericDomain>
          <numberType>real</numberType>
        </numericDomain>
      </interval>
    </measurementScale>
  </attribute>
  <attribute>
    <attributeName>Salinity</attributeName>
    <attributeDefinition>Salinity concentration</attributeDefinition>
    <storageType>Float</storageType>
    <measurementScale>
      <ratio>
        <unit>
          <customUnit>PSS-78</customUnit>
        </unit>
        <numericDomain>
          <numberType>real</numberType>
        </numericDomain>
      </ratio>
    </measurementScale>
  </attribute>
</attributeList>
<entityType>Argo float CTD profile data</entityType>
</otherEntity>
</dataset>
<additionalMetadata>
  <stmml:unitList>
    <stmml:unit id="PSS-78"/>
    <stmml:unit id="decibar"/>
  </stmml:unitList>
</additionalMetadata>
</eml:eml>

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Appendix 3. Metadata Relevancy Evaluation Methodology

Metadata Element		EML Requirement	Score (100 scale)
Resource Group	Title	Required	
	Creator	Required	
	Metadata Provider	Optional	5
	Associated Party	Optional	0
	Publication Date	Optional	1
	Abstract	Optional	7
	Keywords	Optional	10
	Intellectual Rights	Optional	1
	Distribution	Optional	10
	Geographic Coverage	Optional	10
	Time Coverage	Optional	10
Purpose	Optional	1	
Maintenance	Optional	5	
Contact	Required		
Method	Optional	7	
Project	Optional	3	
Access	Optional	5	
Data Table/Entity	Physical Properties	Optional	10
	Attribute List	Optional	15
Total score			100

Note: This evaluation focuses on non-mandatory metadata elements. No score is awarded to title, creator and contact because they are mandatory EML elements and will be in every EML metadata record.

Appendix 4. Evaluation Report on EML Metadata Relevancy

Metadata ID	Score	Dataset Name
746	54	1985 U.S. Young of the Year Survey
2014	54	Alaska Pacific Herring Disease Database
2081	55	Observed patches of walleye pollock eggs and larvae in Shelikof Strait, Alaska: their characteristics, formation and persistence
4748	54	Exxon Valdez Oil Spill Persistence and Chemistry Projects: Hydrocarbon Database, 1989-Present
4780	54	1997 U.S. Hydroacoustic Pollock Survey of the Shelikof Strait Area
4781	54	1998 U.S. Rockfish Adaptive Sampling Experiment in the Central Gulf of Alaska
4796	54	2000 U.S. Hydroacoustic Groundfish Survey of the Gulf of Alaska
4797	54	2000 U.S. Hydroacoustic Groundfish Survey of the Shelikof Strait Area
4801	54	2001 U.S. Hydroacoustic Groundfish Survey of the Eastern Kodiak Island Area
4804	54	2001 U.S. Hydroacoustic Groundfish Survey of the Shelikof Strait Area
4812	54	2001 U.S. Groundfish Winter Survey of the Gulf of Alaska
4819	54	2002 U.S. Hydroacoustic Groundfish Survey of the Shelikof Strait Area
4845	54	1997 U.S. ADFG Fishing Power Experiment
4847	54	1980 U.S. ADFG Shrimp Survey of the Gulf of Alaska
4849	54	1982 U.S. ADFG Shrimp Survey of the Gulf of Alaska
4856	54	1984 U.S. Black Cod Survey of the Southeast Gulf of Alaska
4857	54	1983 U.S. Black Cod Experiment of the Gulf of Alaska
4858	54	1978 U.S. Black Cod Index Survey of the Gulf of Alaska
4859	54	1979 U.S. Black Cod Index Survey of the Gulf of Alaska
4861	54	1980 U.S. Black Cod Index Survey of the Gulf of Alaska
4864	54	1981 U.S. Black Cod Index Survey
4865	54	1981 U.S. Black Cod Index Survey
4868	54	1982 U.S. Black Cod Index Survey
4870	54	1983 U.S. Black Cod Index Survey
4872	54	1984 U.S. Black Cod Index Survey
4875	54	1985 U.S. Black Cod Index Survey
4877	54	1986 U.S. Black Cod Index Survey
4882	54	1983 U.S. Black Cod Spawn Survey
4884	54	1989 U.S. Groundfish Survey of the Central Gulf of Alaska
4897	54	2002 U.S. Hydroacoustic Groundfish Survey of the Eastern Kodiak Island Area
4898	54	1961 U.S. Exploratory Survey of the Cook Inlet
4899	54	1963 U.S. Exploratory Survey of the Fairweather-Yakutat Area
4900	54	1959 U.S. Exploratory Survey of the Kenai Peninsula
4901	54	1962 U.S. Exploratory Survey of the Kenai Peninsula
4902	54	1967 U.S. Exploratory Survey of the Kenai Peninsula
4903	54	1958 U.S. Exploratory Survey of the Kenai Peninsula
4905	54	1968 U.S. Exploratory Survey of the Kodiak Island Area
4906	54	1954 U.S. Exploratory Survey of the Prince William Sound
4907	54	1954 U.S. Exploratory Survey of the Prince William Sound
4908	54	1962 U.S. Exploratory Survey of the Prince William Sound
4909	54	1963 U.S. Exploratory Survey of the Prince William Sound
4910	54	1960 U.S. Exploratory Survey of the South East Gulf of Alaska
4912	54	1953 U.S. Exploratory Survey of the Yakutat Area
4913	54	1996 U.S. Fish Escapement Study Using Bag Trawl
4914	54	1963 Canadian FR British Columbia Rockfish Survey
4915	54	1963 Canadian FR British Columbia Rockfish Survey
4916	54	1965 Canadian FR British Columbia Rockfish Survey
4917	54	1965 Canadian FR British Columbia Rockfish Survey
4919	54	1967 Canadian FR British Columbia Rockfish Survey

Metadata ID	Score	Dataset Name
4920	54	1970 Canadian FR British Columbia Rockfish Survey
4921	54	1986 U.S. Gear Comparison Survey of the Gulf of Alaska
4925	54	1984 U.S./Japanese Cooperative Triennial Bottom Trawl Groundfish Survey of the Gulf of Alaska
4928	54	1987 U.S. Triennial Bottom Trawl Groundfish Survey of the Gulf of Alaska
4929	54	1987 U.S. Triennial Bottom Trawl Groundfish Survey of the Gulf of Alaska
4933	54	1990 U.S. Triennial Bottom Trawl Groundfish Survey of the Gulf of Alaska
4936	54	1993 U.S. Annual Longline Survey of Sablefish (<i>Anoplopoma fimbria</i>) Resources of the Gulf of Alaska
4937	54	1993 U.S. Annual Longline Survey of Sablefish (<i>Anoplopoma fimbria</i>) Resources of the Gulf of Alaska
4938	54	1972 U.S. Groundfish Survey of the Gulf of Alaska
4939	54	1973 U.S. Groundfish Survey of the Gulf of Alaska
4940	54	1973 U.S. Groundfish Survey of the Gulf of Alaska
4941	54	1975 U.S. Groundfish Survey of the Gulf of Alaska
4942	54	1977 U.S. Groundfish Survey of the Gulf of Alaska
4943	54	1981 U.S. Groundfish Survey of the Gulf of Alaska
4944	54	1981 U.S. Groundfish Survey of the Gulf of Alaska
4945	54	1983 U.S. Groundfish Survey of the Gulf of Alaska
4946	54	1984 U.S. Groundfish Survey of the Auke Bay
4947	54	1984 U.S. Groundfish Survey of the Auke Bay
4948	54	1976 U.S. Groundfish Survey of the Gulf of Alaska Inside Passage
4949	54	1977 U.S. Groundfish Survey of the Kodiak Island Area
4950	54	1978 U.S. Groundfish Survey of the Kodiak Island Area
4951	54	1980 U.S. Groundfish Survey of the Kodiak Island Area
4952	54	1980 U.S. Groundfish Survey of the Cape Ommaney
4953	54	1961 U.S. Groundfish Survey of the Prince William Sound
4954	54	1962 U.S. Groundfish Survey of the Prince William Sound
4955	54	1978 U.S. Groundfish Survey of the Prince William Sound
4956	54	1961 U.S. Groundfish Survey of the Yakutat Area
4957	54	1975 U.S. Groundfish Survey of the Yakutat Area
4958	54	1979 Groundfish and Rockfish Survey of the Gulf of Alaska
4960	54	1978 U.S. Groundfish Survey of the Kodiak Island Area
4961	54	1978 U.S. Groundfish Survey
4967	54	1995 U.S. Hydroacoustic Groundfish Survey of the Gulf of Alaska
4979	54	1978 U.S. Hydroacoustic Pollock Survey of the Gulf of Alaska
4980	54	1981 U.S. Hydroacoustic Pollock Survey of the Gulf of Alaska
4982	54	1984 U.S. Hydroacoustic Pollock Survey of the Gulf of Alaska
4983	54	1986 U.S. Hydroacoustic Pollock Survey of the Gulf of Alaska
4984	54	1987 U.S. Hydroacoustic Pollock Survey of the Gulf of Alaska
4987	54	1993 U.S. Hydroacoustic Pollock Survey of the Gulf of Alaska
4989	54	1992 U.S. Hydroacoustic Pollock Survey of the Gulf of Alaska
4991	54	1989 U.S. Hydroacoustic Pollock Survey of the Gulf of Alaska
4995	54	1962 International Pacific Halibut Commission (IPHC) Survey of the Kenai Peninsula
4996	54	1962 International Pacific Halibut Commission (IPHC) Survey of the Kenai Peninsula
4997	54	1962 International Pacific Halibut Commission (IPHC) Survey of the Kenai Peninsula
4998	54	1962 International Pacific Halibut Commission (IPHC) Survey of the Kenai Peninsula
4999	54	1962 International Pacific Halibut Commission (IPHC) Survey of the Kenai Peninsula
5000	54	1962 International Pacific Halibut Commission (IPHC) Survey of the Kenai Peninsula
5001	54	1961 International Pacific Halibut Commission (IPHC) Survey of the Kodiak Island Area
5003	54	1961 International Pacific Halibut Commission (IPHC) Kodiak Survey
5004	54	1961 International Pacific Halibut Commission (IPHC) Kodiak Survey
5010	54	1963 International Pacific Halibut Commission (IPHC) Survey of the Kodiak Island Area
5011	54	1963 International Pacific Halibut Commission (IPHC) Survey of the Kodiak Island Area

Metadata ID	Score	Dataset Name
5012	54	1963 International Pacific Halibut Commission (IPHC) Survey of the Kodiak Island Area
5013	54	1986 US/USSR Cooperative Midwater Trawl Pollock Survey of the Gulf of Alaska
5015	54	1997 U.S. NOAA/National Marine Fisheries Service (NMFS) ADFG Trawl Comparison Study of the Gulf of Alaska
5016	54	1997 U.S. NOAA/National Marine Fisheries Service (NMFS) ADFG Trawl Comparison Study of the Gulf of Alaska
5026	54	1977 Polish Pollock and Rockfish Survey of the Gulf of Alaska
5030	54	1978 U.S. Rockfish Survey of the SE Gulf of Alaska and Kodiak Island Area
5031	54	1978 U.S. Rockfish Survey of the SE Gulf of Alaska and Kodiak Island Area
5032	54	1978 U.S. Rockfish Survey of the SE Gulf of Alaska
5033	54	1982 U.S. Rockfish Survey of the SE Gulf of Alaska
5036	54	1981 U.S. Rockfish Survey of the SE Gulf of Alaska
5037	54	1988 U.S. Rockfish Survey of the SE Gulf of Alaska
5038	54	1999 U.S. Rockfish Adaptive Sampling Experiment in the Eastern Gulf of Alaska
5039	54	1996 U.S. Hydroacoustic Echo Integration Midwater Trawl Pollock Survey of the Gulf of Alaska
5040	54	1998 U.S. Hydroacoustic Pollock Survey of the Shelikof Strait
5041	54	1970 U.S. Shrimp Survey of the Kodiak Island Area
5042	54	1971 U.S. Shrimp Survey of the Kodiak Island Area
5043	54	1971 U.S. Shrimp Survey of the Kodiak Island Area
5044	54	1972 U.S. Shrimp Survey of the Kodiak Island Area
5045	54	1973 U.S. Shrimp Survey of the Kodiak Island Area
5046	54	1974 U.S. Shrimp Survey of the Kodiak Island Area
5047	54	1975 U.S. Shrimp Survey of the Kodiak Island Area
5062	54	1972 U.S. Sablefish Tagging Survey
5071	54	1973 U.S. Sablefish Tagging Survey
5085	54	1977 Canadian Sablefish Tagging Survey
5091	54	1979 Canadian Sablefish Tagging Survey
5093	54	1979 Canadian Sablefish Tagging Survey
5094	54	1979 U.S. Sablefish Tagging Survey
5095	54	1979 U.S. Sablefish Tagging Survey
5096	54	1979 U.S. Sablefish Tagging Survey
5102	54	1980 Canadian Sablefish Tagging Survey
5106	54	1980 U.S. Sablefish Tagging Survey
5107	54	1980 U.S. Sablefish Tagging Survey
5108	54	1980 U.S. Sablefish Tagging Survey
5109	54	1980 U.S. Sablefish Tagging Survey
5110	54	1981 Canadian Sablefish Tagging Survey
5111	54	1981 Canadian Sablefish Tagging Survey
5112	54	1981 Canadian Sablefish Tagging Survey
5115	54	1981 Korean Sablefish Tagging Survey
5117	54	1981 U.S. Sablefish Tagging Survey
5119	54	1981 U.S. Sablefish Tagging Survey
5120	54	1981 U.S. Sablefish Tagging Survey
5121	54	1983 U.S. Sablefish Tagging Survey
5124	54	1983 U.S. Trawl Comparison Survey of the Gulf of Alaska
5125	54	1993 U.S. Trawl Side Effects on Catchability Survey of the Gulf of Alaska
5139	54	1981 U.S./Korean Cooperative Groundfish Survey of the Western Gulf of Alaska
5140	54	1983 U.S./Korean Cooperative Groundfish Survey of the Western Gulf of Alaska
5145	54	1981 U.S. Cod Survey of the Western Gulf of Alaska Pacific
5147	54	1981 U.S. Rockfish Survey of the Western Gulf of Alaska Pacific
5153	54	1984 U.S. Young-of-the-Year Groundfish Survey
5242	54	Groundfish Bottom Trawl Survey of the Hecate Strait, BC, Canada
6032	44	Sitka CoastWatch Graphics

Metadata ID	Score	Dataset Name
6033	54	Sitka CoastWatch SST
6050	54	CODAR Surface Current Mapping in Alaska
6069	54	AFSC Marine Salmon Interactions Monitoring Data Sets: Auke Creek
6070	54	AFSC Marine Salmon Interactions Monitoring Data Sets: Little Port Walter - 2003 Returning Adult Chinook Salmon
6071	54	AFSC Marine Salmon Interactions Monitoring Data Sets: Little Port Walter - Release of 2001 Brood Year Chinook Salmon
6072	54	AFSC Marine Salmon Interactions Monitoring Data Sets: Auke Bay - Plankton Abundance
6073	34	AFSC Marine Salmon Interactions Monitoring Data Sets: Auke Bay - Water Temperature and Salinity
6075	54	Time Series of Biophysical Oceanographic Indices of the Southeast Alaska Coast
6157	54	Subsurface Mooring Data from Barnabus Canyon, Gulf of Alaska: Station Barnabus Canyon 1
6158	54	Subsurface Mooring Data from Barnabus Canyon, Gulf of Alaska: Station Barnabus Canyon 2
6159	54	Subsurface Mooring Data from Barnabus Canyon, Gulf of Alaska: Station Barnabus Canyon 3
6160	54	Subsurface Mooring Data from Barnabus Canyon, Gulf of Alaska: Station Barnabus Canyon 4
6161	54	Subsurface Mooring Data from Chiniak Bay, Gulf of Alaska: Station Chiniak Bay 1
6162	54	Subsurface Mooring Data from Chiniak Bay, Gulf of Alaska: Station Chiniak Bay 2
6163	54	Subsurface Mooring Data from Chiniak Bay, Gulf of Alaska: Station Chiniak Bay 3
6164	54	Surface and Subsurface Mooring Data from Gulf of Alaska: Station FATE 1
6165	54	Subsurface Mooring Data from Gulf of Alaska: Station GLOBEC 1
6166	54	Subsurface Mooring Data from Gulf of Alaska: Station GLOBEC 10
6167	54	Subsurface Mooring Data from Gulf of Alaska: Station GLOBEC 11
6168	54	Subsurface Mooring Data from Gulf of Alaska: Station GLOBEC 12
6169	54	Subsurface Mooring Data from Gulf of Alaska: Station GLOBEC 13
6170	54	Subsurface Mooring Data from Gulf of Alaska: Station GLOBEC 2
6171	54	Surface and Subsurface Mooring Data from Gulf of Alaska: Station GLOBEC 3
6172	54	Subsurface Mooring Data from Gulf of Alaska: Station GLOBEC 4
6173	54	Subsurface Mooring Data from Gulf of Alaska: Station GLOBEC 5
6174	54	Subsurface Mooring Data from Gulf of Alaska: Station GLOBEC 6
6175	54	Subsurface Mooring Data from Gulf of Alaska: Station GLOBEC 7
6176	54	Subsurface Mooring Data from Gulf of Alaska: Station GLOBEC 8
6177	54	Subsurface Mooring Data from Gulf of Alaska: Station GLOBEC 9
6178	54	Subsurface Mooring Data from Gore Point, Gulf of Alaska: Station Gore Point 32
6179	54	Subsurface Mooring Data from Gore Point, Gulf of Alaska: Station Gore Point 34
6180	54	Subsurface Mooring Data from Gore Point, Gulf of Alaska: Station Gore Point 36
6181	54	Subsurface Mooring Data from Gore Point, Gulf of Alaska: Station Gore Point 37
6182	54	Subsurface Mooring Data from Shelikof Strait, Gulf of Alaska: Station Shelikof Strait 1
6183	54	Subsurface Mooring Data from Shelikof Strait, Gulf of Alaska: Station Shelikof Strait 2
6184	54	Subsurface Mooring Data from Shelikof Strait, Gulf of Alaska: Station Shelikof Strait 3
6185	54	Subsurface Mooring Data from Southwest Gulf of Alaska: Station Southwest Gulf of Alaska 16
6186	54	Subsurface Mooring Data from Southwest Gulf of Alaska: Station Southwest Gulf of Alaska 18
6187	54	Subsurface Mooring Data from Southwest Gulf of Alaska: Station Southwest Gulf of Alaska 8
6209	54	Moored Autonomous Hydrophone Array Data from the Gulf of Alaska at 57°176'N and 151°176'W (PMEL Vents)
6210	54	Moored Autonomous Hydrophone Array Data from the Gulf of Alaska at 56°176'N and 151°176'W (PMEL Vents)
6243	54	Biophysical Observations aboard Alaska State Ferries (PMEL)
6324	54	Prince William Sound Nowcast-Forecast System (PWS NFS)
10001	90	Pacific CTD Profile Dataset from PMEL Data Rescue
10002	90	Alaska CTD Profile Dataset from PMEL Data Rescue
10003	90	Alaska CTD Profile Dataset from PMEL FOCI
10004	90	Alaska CTD Bottle Profile Dataset from PMEL FOCI
10005	90	OACES CTD Bottle Profile Dataset from PMEL GCC
10006	90	Pacific CTD Bottle Profile Dataset from Non_PMEL Reid / Mantyla Data

Metadata ID	Score	Dataset Name
10007	90	North Pacific CTD Profile Dataset from NODC WOD2001
10008	90	North Pacific CTD Bottle Profile Dataset from NODC WOD2001
10009	90	North Pacific (20-90N) CTD Profile Dataset from NODC WOD98
10010	90	North Pacific (20-90N) CTD Bottle Profile Dataset from NODC WOD98
10011	90	Pacific CTD Bottle Profile Dataset from PMEL Local Access
10012	90	Alaska CTD Bottle Profile Dataset from PMEL Local Access
10013	90	Pacific Non-PMEL CTD Profile Dataset from PMEL Local Access
10014	90	Pacific Non-PMEL CTD Bottle Profile Dataset from PMEL Local Access
10015	90	Alaska CTD Profile Dataset from NODC at PMEL Local Access
10016	89	Alaska Surface Meterological Time Series Dataset from PMEL FOCI at PMEL Public Access
10017	89	Alaska Ocean Time Series Dataset from PMEL FOCI at PMEL Public Access
10018	90	FOCI Alaska ARGOS Satellite-Tracked Drifter Buoys
10019	99	GEM Ferry Observations (Gulf of Alaska Ecosystem Monitoring and Research Program)
10020	99	PMEL Argo Profiling CDT Floats
10021	99	Realtime Acoustics Data
10022	84	Global Ocean Heat Flux and Wind Stress from Oregon State University Climate
10023	84	Japan Met. Agency SSTA
10024	85	World Ocean Atlas 1998 Monthly
10025	85	World Ocean Atlas 2001 Monthly
10026	84	AOMIP Cloudiness
10027	84	Atlas SSMI 5-day ocean winds
10028	84	CDC Derived NCEP Reanalysis Products Surface Flux
10029	84	CDIAC MSU Precipitation
10030	84	COADS 1-degree Enhanced
10031	84	COADS monthly climatology
10032	84	Hellerman-Rosenstein wind stress climatology
10033	84	NSCAT - Gridded Monthly Surface Wind Stress
10034	85	Oberhuber heat flux climatology
10035	84	Outgoing Longwave Radiant Flux From ERBE
10036	85	Reynolds Reconstructed SST
10037	89	Coastal Gulf of Alaska bio-physical model output

Appendix 5. Sample EML Metadata Relevancy Evaluation

Metadata ID Number: 10020

Dataset Name: PMEL Argo Profiling CDT Floats

Total Score: 99

Category	Score
Abstract	7
Purpose	1
Keyword	10
Geographic coverage	10
Time coverage	10
Metadata provider	5
Metadata maintenance	5
Data distribution	10
Data access control	1
Intellectual right	5
Project information	3
Method information	7
Data table or file	10
Data attribute	15
Publication date	-1
TOTAL	99