Data Management Plan for EVOSTC Funded Research

FY 2012 – 2016

INTRODUCTION

The Biological and Chemical Oceanography Data Management Office (BCO-DMO, URL: http://bco-dmo.org/) was created to serve principal investigators funded by the National Science Foundation (NSF) Biological and Chemical Oceanography Sections and the Office of Polar Programs Antarctic Organisms & Ecosystems Program. The BCO-DMO is a facility where marine biogeochemical and ecological data and information developed in the course of scientific research can easily be disseminated, protected, and stored on short and intermediate time-frames. The Data Management Office also provides research scientists and others with the tools and systems necessary to work with marine biogeochemical and ecological data from heterogeneous sources with increased efficacy. To accomplish this, two data management offices (former- U.S. JGOFS[1] and U.S. GLOBEC[2]) were united in 2006 and enhanced to provide a venue for submission of electronic data and metadata and other information for open distribution via the World Wide Web. (See Appendix 1 for additional information.)

Our data management philosophy is based on many years of experience in collecting, processing and managing biological, chemical, geological, and physical oceanographic measurements and can be summarized as providing support "from proposal to preservation". Consistent with this philosophy, our methodology is to:

- partner with individual investigators and those associated with collaborative research projects;
- provide data management support throughout the project;
- capture and record documentation (metadata) sufficient to support data reuse and re-purposing;
- load metadata into a relational database, provide easy access to the processed data, and ensure their availability online; and
- safeguard the metadata and data by archiving them at the appropriate national data center (e.g. NODC); and contribute to special repositories (e.g. CDIAC, OBIS, GenBank) if appropriate

[1] United States Joint Global Ocean Flux Study
[2] United States GLOBal Ocean ECosystems Dynamics

The software and procedures developed to handle the data and information produced during the US JGOFS (Glover et al., 2006) and US GLOBEC (Wiebe et al., 2011) programs have been further enhanced to manage the data and information generated by current NSF funded projects. The BCO-DMO data system can accommodate many different types of data including biological, chemical, and physical measurements and results. It is important to note that our system provides access to the data (numbers, images, and/or documents) in a consistent manner, with sufficient metadata, so that others can make full use of these data for their own purposes. It is not simply a catalog of data resources, but a system that takes full advantage of a MySQL database storing documentation (metadata) for each dataset, and a data management backend that allows data to reside at multiple sites (including the originating investigator's location if they wish).

Because the data produced by the EVOSTC funded projects (those proposed for FFY 2012 and in previous Long Term Monitoring and Herring Research programs) are very similar to the complex and heterogeneous data produced by the US GLOBEC research program, we believe we are well qualified to provide data management support for EVOSTC funded researchers.

We have read your well thought out EVOSTC Data Policy[3] and will ensure that our procedures are consistent with your policy.

MANAGEMENT of EVOSTC FUNDED RESEARCH DATA

We propose to manage the data collected by EVOSTC funded projects starting in Fiscal Year 2012 and continuing pending annual reviews. We would hire one or two new data managers to manage the EVOSTC research data, as described in Appendix 2. Year 1 activities would involve significant time and effort to train the new hires. Since the FY2012 datasets would not be contributed until later in the year, we envision processing the historical datasets (see Appendix 3) as part of the training process for the newly hired data managers. As we progress through year 1, personnel will have developed the requisite skills to work more independently and will be prepared to provide data management for the new FY 2012 data. Our goal in year 1 would be to use the datasets identified in Appendix 3 to train the new data managers, adding as many as possible to the BCO-DMO database. As the datasets are contributed from FY 2012 research these would receive priority attention to ensure that the FY2012 data are made available in a timely manner consistent with the EVOSTC data policy. We view helping researchers adhere to the data policy as one of our major responsibilities. It is to everyone's advantage that complete metadata and data are identified, collected, and made available to others as soon as possible.

[3] http://www.evostc.state.ak.us/Universal/Documents/Policies/datapolicy.pdf

In our experience, active participation of data managers in Principal Investigator (PI) workshops increases awareness of good data management practices and improves the quality of the database. In particular, we would very much like to attend and provide a data management presentation at your upcoming Fall 2011 PI meeting. We encourage participation by all supported investigators, not just the lead PIs, since anyone generating data would potentially benefit from the meeting.

Timely management of scientific data is essential to subsequent use of the data by other researchers and the public. Rescuing "old data" is much more time consuming than managing recently acquired data. As the time gap increases between data acquisition and preservation in a publicly accessible archive, so does the potential for information loss. The ability to accurately record critical information about data acquisition, sampling and analytical methodology, and data processing steps becomes increasingly difficult as time passes. Enabling investigators to document the data sets in near real time is essential to creating a well-documented database. The effort required to rescue and manage "old data" can be easily three to ten times more effort than that required for more recent data.

Our focus is on managing data to make them useful to the investigators who collected the data and to enable the reuse of these data by others. We do not provide data synthesis services or tools for generating synthesis products, nor do we offer advanced graphics capabilities. We believe that these activities are best done by the scientists. Our primary objective is to make the data easily discoverable and accessible to these scientists and their colleagues with the expectation that the data resources are sufficiently documented to support accurate reuse by others including those wishing to generate data products. Should the researchers generate any data products, we would welcome the addition of those products to the database. We are open to the possibility of partnerships with Axiom and/or NCEAS, but feel it is premature to discuss either at this time.

In addition to funding the new data managers, funding is requested for the project's principal investigator (PI) activities including training and oversight, and the training team: D. Allison, C. Chandler, and R. Groman (representing more than 100 years of combined experience in managing marine data). We also include modest funding for W. Sass, computer programmer, and E. Cunningham, systems programmer.

TWO DATA MANAGEMENT OPTIONS

The funding requests mentioned previously are presented as two data management options, each with a cost estimate and itemized budget (Appendix 4). The biggest unknown to us, and it is a fairly important one, is the actual quality and diversity of the metadata and data we will have to manage and the variability of the time series data from year to year. Our preference is to request two full time people to

work on your data (plus funding for initial training and subsequent supervision). We feel that this level of support will be needed to properly manage data coming from an estimated twelve investigators generating approximately 54 datasets, many of which are updated several times a year. This assumes the full cooperation of the EVOSTC funded researchers. Our cost estimate for this level of effort, for Option 1, is $2,060,110 for five years of support.

Based on our initial conversations, we realize that this level of support may not be available, so we have looked into how we could reduce the costs. We decided to offer Option 2, where we only request one full time person to work on your data. However, we are concerned that this level of effort may not be sufficient to make adequate progress on managing your data and making them web accessible. If this proves to be the case, then we will request that our agreement be canceled after the first year unless additional funding can be found to support the needed personnel. Our cost estimate for Option 2 is $1,437,632 for five years of support.

APPENDIX 1

Description of the Biological and Chemical Oceanography Data Management Office (BCO-DMO)

The Biological and Chemical Oceanography Data Management Office (BCO-DMO, URL: http://bco-dmo.org/) was created to serve principal investigators funded by the National Science Foundation (NSF) Biological and Chemical Oceanography Sections and the Office of Polar Programs Antarctic Organisms & Ecosystems Program as a facility where marine biogeochemical and ecological data and information developed in the course of scientific research can easily be disseminated, protected, and stored on short and intermediate time-frames. The Data Management Office also provides research scientists and others with the tools and systems necessary to work with marine biogeochemical and ecological data from heterogeneous sources with increased efficacy. To accomplish this, two data management offices (former- U.S. JGOFS and U.S. GLOBEC) were united in 2006 and enhanced to provide a venue for submission of electronic data and metadata and other information for open distribution via the World Wide Web.

The BCO-DMO data management system is composed of a metadata database, the distributed client-server JGOFS/GLOBEC data system, and a Web browser interface with simple text-based and map-based user interfaces that provide access to the information and data available from the BCO-DMO repository. A distinguishing characteristic of the BCO-DMO approach is the provision of direct access to data, not just the metadata. To accomplish this, the underlying object oriented JGOFS/GLOBEC data management system (Flierl, et al., 1992), used by both US JGOFS (Glover et al., 2006) and US GLOBEC (Wiebe et al., 2011), was retained as a very flexible, Web-based system that easily serves both data and images. It is compatible with all standard browsers. The JGOFS/GLOBEC data management system supports both distributed data servers and

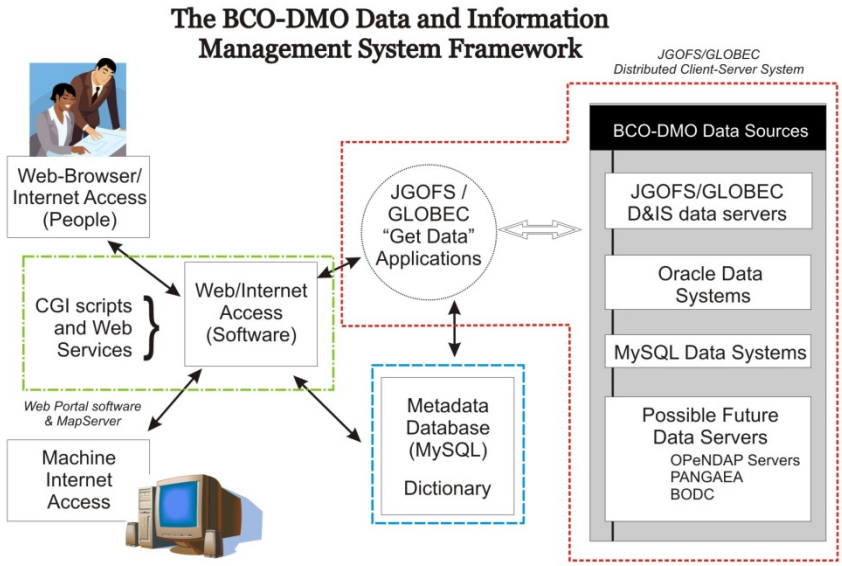

Figure 1. A drawing of the BCO-DMO data management system framework.

distributed clients through the use of standard Web protocols. It provides a simple and relatively straightforward way to make ASCII data and images available on the Web. Consequently, the BCO-DMO data management system is composed of three major components (Figure 1): the metadata database[4], the JGOFS/GLOBEC data management system, and the Web interface supporting simple text-based and geospatial user interfaces that provide access to the information and data available from the BCO-DMO repository.

The office manages existing and new datasets from individual scientific investigators and collaborative groups of investigators, and continues to make these available online. The office works with principal investigators and other data contributors on data quality control; maintains an inventory and program thesaurus of strictly defined field names; generates metadata Directory Interchange Format records required by Federal agencies; ensures submission of data to national data centers; supports and encourages data synthesis by providing new, online, web-based display tools; and facilitates regional, national, and international data and information exchange. The data being served provide the scientific investigators with an opportunity to explore the complex and multifaceted datasets wherever they reside world-wide and to collaborate with colleagues in addressing pressing environmental questions, problems, and challenges that are exacerbated with the increasing pace of climate change.

The BCO-DMO collection of datasets is a publicly available resource accessible via the BCO-DMO website (http://www.bco-dmo.org). It supports synthesis and modeling activities, reuse of oceanographic data for new research endeavors, availability of "real data" for teachers/students at K-12 and college level to use in their classes, and provides decision-support field data for policy-relevant issues. BCO-DMO outreach activities help to foster long-term collaborative partnerships between data management professionals and research investigators through participation in community training courses and workshops both National and International. Our participation in these activities also helps to reduce community barriers by fostering the sharing of ideas between synergistic but independent research. A key component in the development of interoperable data repository systems is adoption of cyber-infrastructure standards to enable exchange of data and information between distributed data systems. Exchange of knowledge at oceanographic and informatics meetings is an important mechanism by which standards development and adoption occurs.

The website for the geospatial interface to the BCO-DMO managed data is http://mapservice.bco-dmo.org/mapserver/maps-ol/index.php. Below are sample screen shots displaying some of the interface's features.

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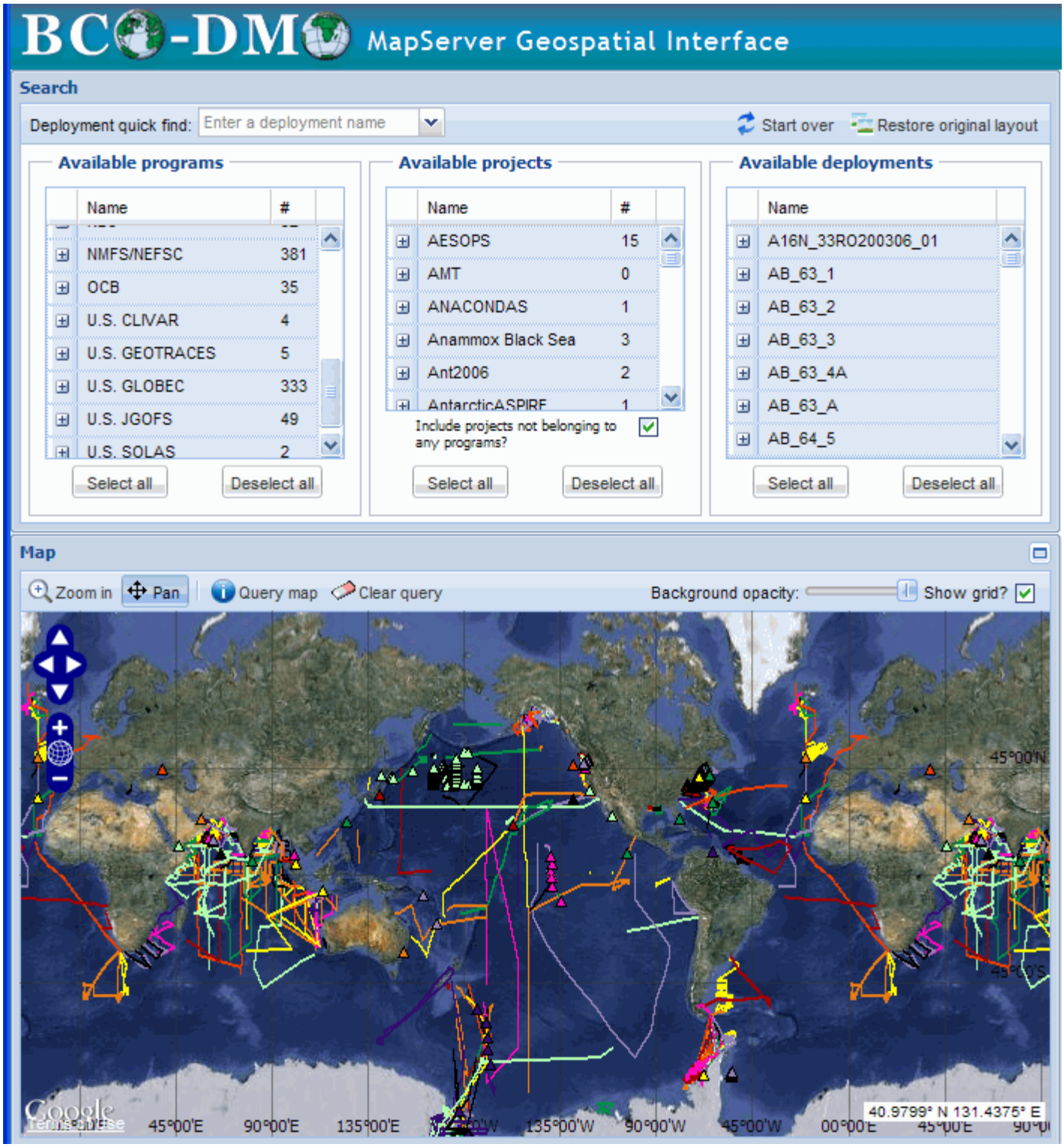
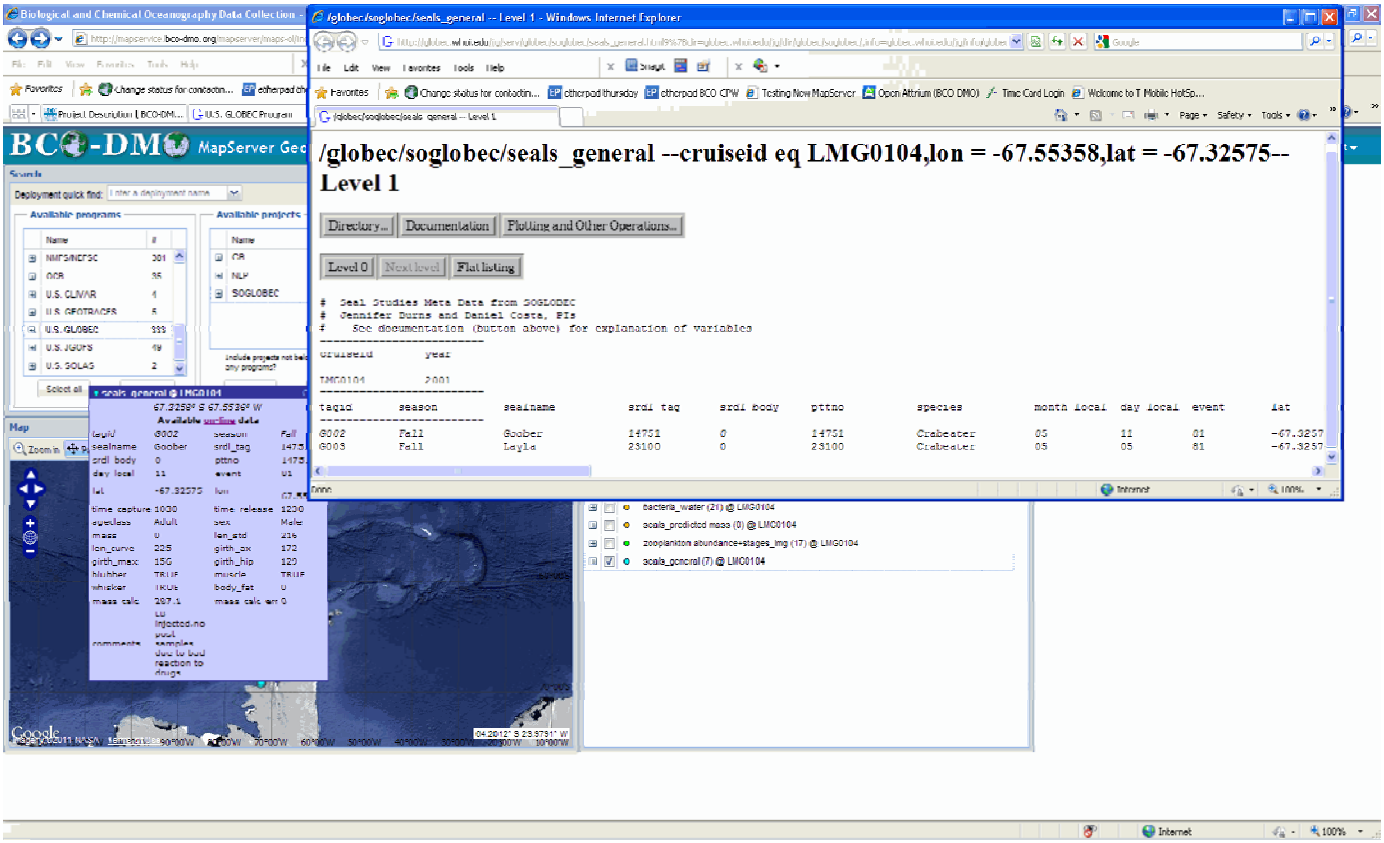
[4] The existence of sufficient metadata enables the discovery and accurate reuse of data by more than just the initial investigators who collect and process the data.



This screen shot shows the initial display of all available deployments (cruises, moorings, etc.) from which data are available through the BCO-DMO system.



This composite of screen shots highlights several of the features of the geospatial interface. We selected a particular program (U.S. GLOBEC), then a project within this program (SOGLOBEC -- Southern Ocean GLOBEC), and then a particular cruise (LMG0104, but not shown). We clicked on the cruise to display the available list of datasets taken during this cruise (partial display shown in lower right hand corner). We clicked on one of the datasets (seals_general) which caused the locations of the data to be displayed (only one of the blue dots is seen near the bottom of the map). From the panel showing the values of the measurements taken at this location (blue panel in the lower left), we clicked on the "on-line" link which brought up the display of the data (panel in upper right hand corner.) This panel provides access to several additional download (export format) options including flat (ASCII) text (comma, space or tab separated), Matlab binary file, Ocean Data View (ODV) compatible file, and NetCDF.

Program	Acronym	Geolocation	Year
Census of Marine Life	CoML	global	Jan 1, 2001
Comparative Analysis of Marine Ecosystem Organization	CAMEO		Jan 1, 2008
Emerging Topics in Biogeochemical Cycles	ETBC	global	Jan 1, 2007
Gulf of Mexico - Deepwater Horizon Oil Spill	GoMX - DHOS	Northern Gulf of Mexico	Jan 1, 2009
Historical datasets	Historical	global	
Integrated Marine Biogeochemistry and Ecosystem Research -US	IMBER-US	global	Jan 1, 2004
Iron Synthesis	FeSynth	Global	Jan 1, 2007
Long Term Ecological Research network	LTER		Jan 1, 1980
NACP-OCB Coastal Synthesis	NACP-OCB Coastal	global coastal zones	Jan 1, 2008
National Marine Fisheries Service / Northeast Fisheries Science Center	NMFS/NEFSC	U.S. Continental Shelf	Jan 1, 1977
North American Carbon Program	NACP	North America	Jan 1, 2005
NorthEast Consortium	NEC	Georges Bank, Gulf of Maine	Jan 1, 1999
Ocean Carbon & Biogeochemistry	OCB	Global	Jan 1, 2006
U. S. Climate Variability and Predictability	U.S. CLIVAR	global	
U.S. GEOTRACES	U.S. GEOTRACES	Global	Jan 1, 2003
U.S. GLOBal ocean ECosystems dynamics	U.S. GLOBEC	Global	Jan 1, 1991
U.S. Joint Global Ocean Flux Study	U.S. JGOFS	Global	Jan 1, 1984
United States Surface Ocean Lower Atmosphere Study	U.S. SOLAS	Global	Jan 1, 2006

This screen shot shows all programs currently supported by BCO-DMO. Clicking on one of the program names or acronyms in the actual display then lists the names of the projects comprising that program. This screen shot is part of the text-based interface that provides access to the metadata available for data sets, as well as access to the actual data sets. A new program would be identified to reflect the EVOSTC funded research projects.

APPENDIX 2

FFY 2012 Long Term Monitoring Program

June 2011

LTM project level data manifest for planned research/sampling efforts[5]

Team Member	LTM or IHRP	Data Set Name	Description/Parameters Collected	Collection Location	Frequency/Collection Period	Storage Formats	Size (KB, MB, GB)?
Sonia Batten	LTM	Continuous Plankton Recorder data	Mesozooplankton and larger phytoplankton near surface abundances with taxonomic resolution	transect from Cook Inlet to open ocean	6 times per year, monthly between about March and September. Collected over 1-2 days	Samples stored in an archive. Data stored in spreadsheets	less than 1 MB per year
Mary Anne Bishop	LTM	Seabird Monitoring	species, number, activity, gis location, time, date, weather	throughout Prince William Sound	~1x month, Oct - March, beginning 2011	text files, excel, access database	access database ~1gb when complete
Rob Campbell	LTM and IHRP	PWS plankton	Plankton taxonomy (surface sample)	12 stations throughout PWS (SEA bays, Entrances, central PWS)	6 times/year, focus on spring and autumn blooms	flat file	KB
Rob Campbell	LTM and IHRP	PWS nutrients	Nitrate, Phosphate, Silicate (six near surface depths)	12 stations throughout PWS (SEA bays, Entrances, central PWS)	6 times/year, focus on spring and autumn blooms	flat file	KB

[5] From Table 1, Elise Hsieh email received 3 June 2011

Rob Campbell	LTM and IHRP	PWS Hydrography	Pressure, Temperature, Salinity	12 stations throughout PWS (SEA bays, Entrances, central PWS)	6 times/year, focus on spring and autumn blooms	flat file	KB
Rob Campbell	LTM and IHRP	PWS biogeochemistry	Submisible Ultraviolet Nitrate Analyser (SUNA) nitrate concentration, In situ fluorescence, In situ backscatter turbidity	12 stations throughout PWS (SEA bays, Entrances, central PWS)	6 times/year, focus on spring and autumn blooms	flat file	KB
Rob Campbell	LTM	PWS high frequency mooring	Pressure, Temperature, Salinity, Submisible Ultraviolet Nitrate Analyser (SUNA) nitrate concentration, In situ fluorescence, In situ backscatter turbidity	Central PWS (approximate site of CFOS buoy deployed in the 1990's)	Daily	Electronic, near real-time, direct to Data Management Group database)	MB
Brenda Ballachey	LTM	Sea otter aerial survey	aerial surveys used to calculate sea otter abundance	PWS, Katmai, Kenai Fjords, Kachemak Bay	every 3 years in Katmai, Kenai Fjords, and Kachemak Bay, annual for WPWS	GIS files, .pdf reports generated from ArcPad	MB
Brenda Ballachey	LTM	Sea otter forage	forage data collected to calculate energy recovery rates, species size and composition	PWS, Katmai, Kenai Fjords, Kachemak Bay	annual	excel	MB
Brenda Ballachey	LTM	Sea otter carcass	collected to determine age-at-death; includes carcass location, condition, sex if it can be determined, age at death; skulls are collected, cleaned and stored	PWS, Katmai, Kenai Fjords, Kachemak Bay	annual	excel	MB
Brenda Ballachey	LTM	Soft sediment inverts	clam density, size distribution and species composition	PWS, Katmai, Kenai Fjords, Kachemak Bay	every 2 years	excel	MB
Brenda Ballachey	LTM	percent cover for various algae and invertebrates	random point counts collected to calculate percent cover of dominant algae and	PWS, Katmai, Kenai Fjords, Kachemak	annual	excel / Access	MB

		- rocky sediment	large sessile invertebrates	Bay			
Brenda Ballachey	LTM	sea star density - rocky sediments	sea star density and species distribution	PWS, Katmai, Kenai Fjords, Kachemak Bay	annual	excel	MB
Brenda Ballachey	LTM	Nucella/Katharina density - rocky sediments	Nucella and Katherina density along rocky sediment substrates	PWS, Katmai, Kenai Fjords, Kachemak Bay	annual	excel	MB
Brenda Ballachey	LTM	limpet size distribution - rocky sediments	L. persona size distribution along rocky sediment substrates	PWS, Katmai, Kenai Fjords, Kachemak Bay	annual	excel	MB
Brenda Ballachey	LTM	Temperature	temperature collected every 30min. - 1 hour at the 0 MLLW tidal elevation at various rocky sediment sites	PWS, Katmai, Kenai Fjords, Kachemak Bay	annual	HOBO Onset proprietary software,	MB
Brenda Ballachey	LTM	Salinity	salinity collected every hour at the 0 MLLW tidal elevation at various rocky sediment sites	PWS, Katmai, Kenai Fjords	annual	StarOdi proprietary software,	MB
Brenda Ballachey	LTM	Mussel density	Mussel density of all size classes as well as density of mussels > 19mm collected at mussel bed sites	PWS, Katmai, Kenai Fjords, Kachemak Bay	annual	excel	MB
Brenda Ballachey	LTM	Mussel size distribution	Mussel size distribution of mussels > 19mm collected at mussel bed sites	PWS, Katmai, Kenai Fjords, Kachemak Bay	annual	excel	MB
Brenda Ballachey	LTM	Eelgrass percent cover	Presence/absence of eelgrass bed data collected using sonar for a set of random transects within a bed	PWS, Katmai, Kenai Fjords	annual	excel	MB
Brenda Ballachey	LTM	marine bird and mammal nearshore	density and distribution collected along nearshore transects	Katmai, Kenai Fjords	annual	Can be excel if that is what fits best for	MB

		surveys				import into larger data structure	
Brenda Ballachey	LTM	black oystercatcher nest density	active nest density along 20 km transects	PWS, Katmai, Kenai Fjords	annual	excel	MB
Brenda Ballachey	LTM	black oystercatcher diet	size distribution and species composition of prey brought back to the nest to provision chicks	PWS, Katmai, Kenai Fjords	annual	excel	MB
Brenda Ballachey	LTM	contaminants	trace metals, organics (PAH, PCB, OC) in mussels; includes grain size of sediments collected concurrently with mussels	PWS	one time, scheduled for 2012	excel	MB
Brenda Ballachey	LTM	Mussels - stable isotopes	stable isotopes in mussel tissue; n of isotopes to be determined	PWS	annual	excel	MB
John Moran	LTM	Humpback Whale Fluke ID	Fluke photographs, counts of whales, Location, behavior, prey type	PWS	3 - 6 day surveys/winter	Access database	GB
David Irons					Every two years/ summer, every three years/winter	access database, North Pacific Pelagic Seabird Database	< 10 GB per survey
Mark Carls					Annual, probably < 100 samples + lingering oil time series every 5 years	Excel, Access	mb to gb
John Piatt	LTM	sample station log	randomly selected grid locations, time, date, transect distance, geographic and topographic parameters (distance to shore, distance to pour	PWS (possibly also Katmai, Cook Inlet, Kachemak Bay)	Annual, July	Access	< 100 KB

			points, distance to tidewater glacier, bottom depth, etc,)				
John Piatt	LTM	hydroacoustics (sample = transect)	depth-integrated biomass (1 x 100 m cell resolution), nearshore fine-scale bathymetric features, GIS	PWS (possibly also Katmai, Cook Inlet, Kachemak Bay)	Annual, July	Access	2-5 GB
John Piatt	LTM	trawl catch and morphometrics (sample = station)	fish CPUE by species (number of fish/km towed, gelatinous zooplankton and euphausiid biomass/km towed); fish length-weight by species; euphausiid weights, counts per volume by species;	PWS (possibly also Katmai, Cook Inlet, Kachemak Bay)	Annual, July	Access	< 5 MB
John Piatt	LTM	seabird and marine mammal survey (sample = transect)	observation conditions, predator GIS locations and group size by transect	PWS (possibly also Katmai, Cook Inlet, Kachemak Bay)	Annual, July	Access	< 5 MB
John Piatt	LTM	zooplankton (sample = station)	zooplankton abundance and biomass by species	PWS (possibly also Katmai, Cook Inlet, Kachemak Bay)	Annual, July	Access	< 1 MB
John Piatt	LTM	CTD (sample = station)	temperature, conductivity, depth, fluorescence, beam transmission, photosynthetically active radiation, oxygen concentration	PWS (possibly also Katmai, Cook Inlet, Kachemak Bay)	Annual, July	Access	< 5 MB
John Piatt	LTM	Chlorophyll a (sample = station)	acetone extracted chlorophyll a concentration, pheopigment ratio	PWS (possibly also Katmai, Cook Inlet, Kachemak Bay)	Annual, July	Access	< 100 KB
John Piatt	LTM	nutrients (sample = station)	NO_2, NO_3, NH_4, $Si(OH)_4$, PO_4 concentration (µM)	PWS (possibly also Katmai, Cook Inlet, Kachemak	Annual, July	Access	< 100 KB

				Bay)			
Tom Weingartner	LTM	GAK 1 moored time series	Temperature, salinity, pressure	59° 50.7' N, 149° 28.0' W, Water depth = 263 m	15 minutes - year-round	ASCII	1-2MB
Tom Weingartner	LTM	GAk 1 monthly CTD vertical profiles	Temperature, salinity, pressure	59° 50.7' N, 149° 28.0' W, Water depth = 263 m	10 times per year	ASCII	0.5 MB
Russ Hopcroft	LTM	Seward Line Chlorophyll	total extracted chlorophyll	Northern Gulf of Alaska, Prince William Sound	Surveys twice annually	File by year as Excel and CSV	KBs per year
Russ Hopcroft	LTM	Seward Line Nutrients	Nitrate, ammonia, phosphate, silicate	Northern Gulf of Alaska, Prince William Sound	Surveys twice annually	File by year as Excel and CSV	KBs per year
Russ Hopcroft	LTM	Seward Line CTD	temperature, salinity, fluorescence profiles	Northern Gulf of Alaska, Prince William Sound	Surveys twice annually	File by year as Excel and CSV	MBs per year
Russ Hopcroft	LTM	Seward Line meszooplankton	species composition, abundance and biomass	Northern Gulf of Alaska, Prince William Sound	Surveys twice annually	File by year as Excel and CSV	MBs per year
Russ Hopcroft	LTM	Seaward Line Carbonate chemistry	Ocean pH and saturation states	Northern Gulf of Alaska, Prince William Sound	Surveys twice annually	File by year as Excel and CSV	KBs per year
Craig Matkin	LTM	Annual photographic census of killer whales	Photographs of individual killer whales/pods/groups	Prince William Sound/Kenai Fjords	Annual	Individual digital photos	10GB
Craig Matkin	LTM	Annually updated catalogue of	ID number/Date of birth/genealogy of individual KWs	Prince William Sound/Kenai	Annual	Digital catalogue	50MB

		individuals		Fjords			
Craig Matkin	LTM	Annual photographic census summary by pod/group	Individuals/pods in each encounter	Prince William Sound/Kenai Fjords	Annual	Digital spread sheets	2MB
Craig Matkin	LTM	Annual summary of biopsy results	Animals biopsied/date/time/location/haplotype	Prince William Sound/Kenai Fjords	Annual	Digital spread sheet	1MB
Craig Matkin	LTM	Annual summary of tag attachments	Animals tagged/date/time/location/other data	Prince William Sound/Kenai Fjords	Annual	Digital spread sheet	1MB
Craig Matkin	LTM	Annual Survey/Encounter summaries	Details of each survey day and each encounter	Prince William Sound/Kenai Fjords	Annual	Access database	15MB
Angela Doroff	LTM	Zooplankton	Plankton (surface sample)	Multiple stations throughout LCI and KB	4 times/year, focus on spring and autumn blooms; monthly for inner KB	Access	GB
Angela Doroff	LTM	KB Nutrients	ammonium, nitrate + nitrite, orthophosphate, and chlorophyll-a	2 stations in KB; surface and deep sampling at Homer and Seldovia harbors	Nutrient monitoring will occur at the SWMP datalogger stations for monthly baseline grab samples (consisting of two replicates) and monthly diel samples will be collected at the Homer Harbor station	Access	GB
Angela Doroff	LTM	KB Hydrography	Pressure/depth, Temperature, Salinity, DO, turbidity, pH	2 stations in KB; surface and deep sampling at Homer and Seldovia	Standard SWMP water quality data will be collected at four stations every 15 minutes. Sondes will be regularly	Access	GB

				harbors	deployed, retrieved, calibrated, and maintained		
Angela Doroff	LTM	KB Meteorological Station	air temp, relative humidity, barometric pressure, wind (speed & direction), PAR, total solar radiation, precipitation	2 stations in KB (Homer Spit and Anchor Point)	Weather data will be collected every 15 minutes according to the standard SWMP protocols	Access	GB
Angela Doroff	LTM	CTD (sample = station)	temperature, conductivity, depth, fluorescence, beam transmission, photosynthetically active radiation, oxygen concentration	LCI and KB	Quarterly	Access	< 5 MB

APPENDIX 3

Known and available historic data sets voiced by LTM PIs to be of potential value to LTM project[6]

Team member	Data Set Name	Description/Parameters Collected	Frequency/Collection Period	Storage Formats	Size (KB, MB, GB)?	Location
Sonia Batten	Continuous Plankton Recorder data	Mesozooplankton and larger phytoplankton near surface abundances with taxonomic resolution	monthly between about March and September, 2000-2011	spreadsheets	<2 MB	Gulf of Alaska, Cook Inlet
Mary Anne Bishop	Seabird Predation on Herring	species, number, activity, gis location, time, date, weather	Nov and March; 2007-2011; Jan 08 & 09, Sept 08, Oct 08,	text files, excel, access database	DB= 525 mb; other files = ~100mb	Prince William Sound Science Center
Mary Anne Bishop	ShoreZone	various		raster files		NOAA web site & PWS Science Ctr has copy
Brenda Ballachey	Master site location for rocky / soft / mussel	locations (lat/lons) for all rocky and soft sediment sites as well as mussel beds	measurements taken once during initial site set-up	excel . GIS files	MB	WPWS, Kenai Fjords, Katmai
Brenda Ballachey	Rocky site slope	slope measurements taken at initial site visit	measurements taken once during initial site set-up	excel	MB	WPWS, Kenai Fjords, Katmai
Brenda Ballachey	Eelgrass sonar track (d-log)	locations (lat/lons) for all eelgrass bed sampling including track logs	measurements taken annually during eelgrass sampling	excel . GIS files	MB	WPWS, Kenai Fjords, Katmai

[6] From Table 2, Elise Hsieh email received 3 June 2011

Brenda Ballachey	Sea otter aerial survey	aerial surveys used to calculate sea otter abundance	every 3 years in Katmai and Kenai Fjords, annually in WPWS	GIS files, .pdf reports generated from Arc Pad	MB	WPWS, Kenai Fjords, Katmai, some data for Kachemak Bay
Brenda Ballachey	Sea otter forage	forage data collected to calculate energy recovery rates, species size and composition	annually	excel	MB	WPWS, Kenai Fjords, Katmai, some data for Kachemak Bay
Brenda Ballachey	Sea otter carcass	collected to determine age-at-death; includes carcass location, condition, sex if it can be determined, age at death; skulls are collected, cleaned and stored	annually	excel	MB	WPWS, Kenai Fjords, Katmai, some data for Kachemak Bay
Brenda Ballachey	Soft sediment inverts	clam density, size distribution and species composition	every 2 years	excel	MB	WPWS, Kenai Fjords, Katmai, some data for Kachemak Bay
Brenda Ballachey	percent cover for various algae and invertebrates - rocky sediment	random point counts collected to calculate percent cover of dominant algae and large sessile invertebrates	annually	excel / Access	MB	WPWS, Kenai Fjords, Katmai, Kachemak Bay
Brenda Ballachey	sea star density - rocky sediments	sea star density and species distribution	annually	excel	MB	WPWS, Kenai Fjords, Katmai, Kachemak Bay

Brenda Ballachey	Nucella/Katharina density - rocky sediments	Nucella and Katherina density along rocky sediment substrates	annually	excel	MB	WPWS, Kenai Fjords, Katmai, Kachemak Bay
Brenda Ballachey	limpet size distribution - rocky sediments	L. persona size distribution along rocky sediment substrates	annually	excel	MB	WPWS, Kenai Fjords, Katmai
Brenda Ballachey	Temperature	temperature collected every 30min. - 1 hour at the 0 MLLW tidal elevation at various rocky sediment sites	annually	HOBO Onset proprietary software	MB	WPWS, Kenai Fjords, Katmai, some data for Kachemak Bay
Brenda Ballachey	Salinity	salinity collected every hour at the 0 MLLW tidal elevation at various rocky sediment sites	annually	StarOdi proprietary software	MB	WPWS, Kenai Fjords, Katmai, some data for Kachemak Bay
Brenda Ballachey	Mussel density	Mussel density of all size classes as well as density of mussels > 19mm collected at mussel bed sites	annually	excel	MB	WPWS, Kenai Fjords, Katmai, some data for Kachemak Bay
Brenda Ballachey	Mussel size distribution	Mussel size distribution of mussels > 19mm collected at mussel bed sites	annually	excel	MB	WPWS, Kenai Fjords, Katmai
Brenda Ballachey	Eelgrass percent cover	Presence/absence of eelgrass bed data collected using sonar for a set of random transects within a bed	annually	excel	MB	WPWS, Kenai Fjords, Katmai, some data for Kachema

						k Bay
Brenda Ballachey	marine bird and mammal nearshore surveys	density and distribution collected along nearshore transects	annually	Can be excel if that is what fits best for import into larger data structure	MB	Kenai Fjords, Katmai, some data for Kachemak Bay
Brenda Ballachey	black oystercatcher nest density	active nest density along 20 km transects	annually	excel	MB	WPWS, Kenai Fjords, Katmai
Brenda Ballachey	black oystercatcher diet	size distribution and species composition of prey brought back to the nest to provision chicks	annually	excel	MB	WPWS, Kenai Fjords, Katmai
Brenda Ballachey	contaminants	trace metals, organics (PAH, PCB, OC) in mussels; includes grain size of sediment samples collected concurrently with mussels	one time	excel	MB	Katmai, Kenai Fjords
John Moran	Humpback Whale Fluke ID from EVOSTC Project 100804	Fluke photographs, counts of whales, Location, behavior, prey type	Fall/Winter 2007-2009	Access	GB	PWS
David Irons	North Pacific Pelagic Seabird Database	birds/km2, sea surface variables, weather	every 2 to 3 years from 1989 to 2010	access database	< 50GB	USGS Anchorage, Gary Drew contact
Mark Carls	ABLHCD	naphthalene through benzo(ghi)perylene (currently 44 PAH compounds) + C9 through C36 alkanes (n=30), including pristane and phytane. Some analyses also include biomarkers (triterpanes, hopanes, and steranes; n = 51)	1989 through present	Access database.	about 10 gb	ABL, Carls, Larsen

John Piatt	Herring Assessment data (ADFG, PWSCC, NOAA)	forage fish bycatch data, hydroacoustic data, energetics, stable isotope, zooplankton	1994-2011 (ongoing, annual)	Excel		PWS
John Piatt	Areial forage fish surveys	schools, species, locations	1995-1999 (SEA, APEX), 2010-13 (PWS Herring Survey)	excel		PWS
John Piatt	Forage fish biomass data	hydroacoustic survey data	1997-1999 (APEX)	Excel		PWS
John Piatt	Forage fish size data	fish morphometrics (length weight by species)	1997-1999 (APEX)	Excel		PWS
John Piatt	Proximate composition of forage fish	lipid, protein, energy density	Oct-Nov 1995	Excel		PWS
John Piatt	ADFG large mesh trawl surveys	forage fish bycatch data	1999-2009 (ongoing, biennial)	Excel		PWS
Russ Hopcroft	Seward Line Chlorophyll	total extracted chlorophyll	1998-2004 frequency was 4-7 times per year, twice per year 2005-2011	File by year as Excel and CSV	KBs per year	UAF, NPRB, WHOI, NODC
Russ Hopcroft	Seward Line Nutrients	Nitrate, ammonia, phosphate, silicate	1998-2004 frequency was 4-7 times per year, twice per year 2005-2011	File by year as Excel and CSV	KBs per year	UAF, NPRB, WHOI, NODC
Russ Hopcroft	Seward Line CTD	temperature, salinity, fluorescence profiles	1998-2004 frequency was 4-7 times per year, twice per year 2005-2011	File by year as Excel and CSV	MBs per year	UAF, NPRB, WHOI, NODC
Russ Hopcroft	Seward Line meszooplankton	species composition, abundance and biomass	1998-2004 frequency was 4-7 times per year, twice per year 2005-2011	File by year as Excel and CSV	MBs per year	UAF, NPRB, WHOI, NODC
Russ Hopcroft	Seward Line Carbonate	Ocean pH and saturation states	twice annually 2009-2011	File by year as Excel and	MBs per year	UAF

	chemistry			CSV		
Craig Matkin	Annual photographic census of killer whales	Photographs of individual killer whales/pods/groups	Annually since 1984 (film negative format until 2010)	Digital since 2010	20GB plus negatives	Pacific Biological Station, Nanaimo BC and NGOS, Homer, Alaska
Craig Matkin	Annually updated catalogue of individuals	ID number/Date of birth/genealogy of individual KWs	Annually since 1984	Digital since 2000	Current 50MB	NGOS, Homer, AK
Craig Matkin	Annual photographic census summary by pod/group	Individuals/pods in each encounter	Annually since 1984	Digital spread sheets	10MB	NGOS, Homer, AK
Craig Matkin	Annual summary of biopsy results	Animals biopsied/date/time/location/haplotype	Annually since 1994	Digital spread sheets	1MB	NGOS, Homer, AK
Craig Matkin	Annual summary of tag attachments	Animals tagged/date/time/location/other data	Annually since 2006	Digital spread sheets	1MB	NGOS, Homer, AK
Craig Matkin	Annual Survey/Encounter summaries	Details of each survey day and each encounter	Annually since 2002 (prior years in non digital formats	Access data base, data sheets prior to 2002	50MB and data sheets	NGOS, Homer, AK
Angela Doroff	KB Nutrients	ammonium, nitrate + nitrite, orthophosphate, and chlorophyll-a	2 stations in KB; surface and deep sampling at Homer and Seldovia harbors	monthly baseline grab samples	Access	KB
Angela Doroff	KB Hydrography	Pressure/depth, Temperature, Salinity, DO, turbidity, pH	2 stations in KB; surface and deep sampling at Homer and Seldovia harbors	collected at four stations every 15 minutes.	Access	KB

Angela Doroff	KB Meteorological Station	air temp, relative humidity, barometric pressure, wind (speed & direction), PAR, total solar radiation, precipitation	2 stations in KB (Homer Spit and Anchor Point)	collected every 15 minutes	Access	KB
Angela Doroff	CTD (multiple transects)	temperature, conductivity, depth, fluorescence, beam transmission, photosynthetically active radiation, oxygen concentration	LCI and KB			

APPENDIX 4

Budget estimates (3 pages each) for the two data management plan options: the first with two full time data managers (Budget Option 1: With Research Assistant) and the reduced-cost plan with only one data manager (Budget Option 2: No Research Assistant).

Data Management for EVOSTC Funded Research FY 2012-2016

ROBERT C GROMAN (Non-Federal Gov (US))

Oct 1, 2011 to Sep 30, 2016

Budget Option 1: With Research Assistant

	Approximate Labor Months					
	10/01/11 09/30/12	**10/01/12 09/30/13**	**10/01/13 09/30/14**	**10/01/14 09/30/15**	**10/01/15 09/30/16**	**Total**
A. Senior Personnel						
1. D. GLOVER, Sr Res Spec	1.00	1.00	1.00	1.00	1.00	5.00
2. R. GROMAN, Info Sys Spec	1.00	1.00	1.00	1.00	1.00	5.00
3. P. WIEBE, Sci Emeritus	0.00	0.00	0.00	0.00	0.00	0.00
4. C. CHANDLER, Info Sys Assoc III	0.00	0.00	0.00	0.00	0.00	0.00
B. Other Personnel						
2. Other Professionals						
M. ALLISON, Res Assoc II	1.00	1.00	1.00	1.00	1.00	5.00
RESEARCH ASSOC II A, Res Assoc II	12.00	12.00	12.00	12.00	12.00	60.00
6. Other						
RESEARCH ASST II A, Res Asst II	12.00	12.00	12.00	12.00	12.00	60.00
C. Total Direct Labor & Benefits	**$186,290**	**$194,514**	**$202,294**	**$210,420**	**$218,842**	**$1,012,360**
E. Travel (see detail)						
1. Domestic	3,718	1,859	1,859	1,859	1,859	11,154
Total Travel	**3,718**	**1,859**	**1,859**	**1,859**	**1,859**	**11,154**
G. Other Direct Costs (see detail)						
1. Materials and Supplies	8,500	0	500	4,000	0	13,000
4. Computer Svc	2,100	2,160	2,250	2,340	2,430	11,280
6. Other	3,363	3,863	3,863	3,863	3,863	18,815
Total Other Direct Costs	**13,963**	**6,023**	**6,613**	**10,203**	**6,293**	**43,095**
H. Total Direct Costs	**$203,971**	**$202,396**	**$210,766**	**$222,482**	**$226,994**	**$1,066,609**
I. Indirect Costs						
1. Lab Costs	108,446	114,568	119,151	123,937	128,898	595,000
2. General & Administrative	54,808	57,829	60,142	62,559	65,062	300,400
Total Indirect Costs	**163,254**	**172,397**	**179,293**	**186,496**	**193,960**	**895,400**
J. Total Direct & Indirect Costs	**$367,225**	**$374,793**	**$390,059**	**$408,978**	**$420,954**	**$1,962,009**
K. Fee at 5.0000%	**18,361**	**18,740**	**19,503**	**20,449**	**21,048**	**98,101**
L. Amount of this Request	**$385,586**	**$393,533**	**$409,562**	**$429,427**	**$442,002**	**$2,060,110**

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Data Management for EVOSTC Funded Research FY 2012-2016
ROBERT C GROMAN (Non-Federal Gov (US))
Oct 1, 2011 to Sep 30, 2016
Budget One Reseach Assit

Travel Detail

Period 1 10/01/11 - 09/30/12

1. Domestic

EVOSTC Researchers Meeting (Woods Hole, MA to Anchorage, AK)

Airfare	Round Trip	2 Tickets			@700	1,400
Ground	General Grnd Transport.	2			@200	400
Lodging	Nightly Rate (inc. Tax)	2 Rooms	3	Nights	@181	1,086
Per Diem	Other Domestic	2 People	4	Days	@104	832
					Trip Total:	3,718

Total Domestic Travel - Period 1 **3,718**

Period 2 10/01/12 - 09/30/13

1. Domestic

EVOSTC Researchers Meeting (Woods Hole, MA to Anchorage, AK)

Airfare	Round Trip	1 Tickets			@700	700
Ground	General Grnd Transport.	1			@200	200
Lodging	Nightly Rate (inc. Tax)	1 Rooms	3	Nights	@181	543
Per Diem	Other Domestic	1 People	4	Days	@104	416
					Trip Total:	1,859

Total Domestic Travel - Period 2 **1,859**

Period 3 10/01/13 - 09/30/14

1. Domestic

EVOSTC Researchers Meeting (Woods Hole, MA to Anchorage, AK)

Airfare	Round Trip	1 Tickets			@700	700
Ground	General Grnd Transport.	1			@200	200
Lodging	Nightly Rate (inc. Tax)	1 Rooms	3	Nights	@181	543
Per Diem	Other Domestic	1 People	4	Days	@104	416
					Trip Total:	1,859

Total Domestic Travel - Period 3 **1,859**

Period 4 10/01/14 - 09/30/15

1. Domestic

EVOSTC Researchers Meeting (Woods Hole, MA to Anchorage, AK)

Airfare	Round Trip	1 Tickets			@700	700
Ground	General Grnd Transport.	1			@200	200
Lodging	Nightly Rate (inc. Tax)	1 Rooms	3	Nights	@181	543
Per Diem	Other Domestic	1 People	4	Days	@104	416
					Trip Total:	1,859

Total Domestic Travel - Period 4 **1,859**

Period 5 10/01/15 - 09/30/16

1. Domestic

EVOSTC Researchers Meeting (Woods Hole, MA to Anchorage, AK)

Airfare	Round Trip	1 Tickets			@700	700
Ground	General Grnd Transport.	1			@200	200
Lodging	Nightly Rate (inc. Tax)	1 Rooms	3	Nights	@181	543
Per Diem	Other Domestic	1 People	4	Days	@104	416
					Trip Total:	1,859

Total Domestic Travel - Period 5 **1,859**

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Data Management for EVOSTC Funded Research FY 2012-2016

ROBERT C GROMAN (Non-Federal Gov (US))

Oct 1, 2011 to Sep 30, 2016

Budget One Reseach Assit

Other Direct Costs - Detail

	10/01/11 09/30/12	10/01/12 09/30/13	10/01/13 09/30/14	10/01/14 09/30/15	10/01/15 09/30/16	Total
G. Other Direct Costs						
1. Materials and Supplies						
a. Computer Software	500	0	500	0	0	1,000
b. Computer(s)						
1. Data Server	4,000	0	0	0	0	4,000
2. Desktop Computers	4,000	0	0	0	0	4,000
3. Replacement Desktop Computers	0	0	0	4,000	0	4,000
Total Materials and Supplies	**8,500**	**0**	**500**	**4,000**	**0**	**13,000**
4. Computer Svc						
a. Technical Assistance (CIS)	2,100	2,160	2,250	2,340	2,430	11,280
Total Computer Svc	**2,100**	**2,160**	**2,250**	**2,340**	**2,430**	**11,280**
6. Other						
a. Communications	125	125	125	125	125	625
b. Duplicating	125	125	125	125	125	625
c. Miscellaneous						
1. Server Installation Fee	300	0	0	0	0	300
d. Other Outside Services	2,813	2,813	2,813	2,813	2,813	14,065
e. Repairs & Maintenance	0	800	800	800	800	3,200
Total Other	**3,363**	**3,863**	**3,863**	**3,863**	**3,863**	**18,815**
Total Other Direct Costs	**13,963**	**6,023**	**6,613**	**10,203**	**6,293**	**43,095**

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Data Management for EVOSTC Funded Research FY 2012-2016

ROBERT C GROMAN (Non-Federal Gov (US))

Oct 1, 2011 to Sep 30, 2016

Budget Option 2: No Research Assistant

	Approximate Labor Months					
	10/01/11 09/30/12	**10/01/12 09/30/13**	**10/01/13 09/30/14**	**10/01/14 09/30/15**	**10/01/15 09/30/16**	**Total**
A. Senior Personnel						
1. D. GLOVER, Sr Res Spec	1.00	1.00	1.00	1.00	1.00	5.00
2. R. GROMAN, Info Sys Spec	1.00	1.00	1.00	1.00	1.00	5.00
3. P. WIEBE, Sci Emeritus	0.00	0.00	0.00	0.00	0.00	0.00
4. C. CHANDLER, Info Sys Assoc III	0.00	0.00	0.00	0.00	0.00	0.00
B. Other Personnel						
2. Other Professionals						
M. ALLISON, Res Assoc II	1.00	1.00	1.00	1.00	1.00	5.00
RESEARCH ASSOC II A, Res Assoc II	12.00	12.00	12.00	12.00	12.00	60.00
C. Total Direct Labor & Benefits	**$128,135**	**$134,137**	**$139,501**	**$145,095**	**$150,899**	**$697,767**
E. Travel (see detail)						
1. Domestic	3,718	1,859	1,859	1,859	1,859	11,154
Total Travel	**3,718**	**1,859**	**1,859**	**1,859**	**1,859**	**11,154**
G. Other Direct Costs (see detail)						
1. Materials and Supplies	8,500	0	500	4,000	0	13,000
4. Computer Svc	2,100	2,160	2,250	2,340	2,430	11,280
6. Other	3,363	3,863	3,863	3,863	3,863	18,815
Total Other Direct Costs	**13,963**	**6,023**	**6,613**	**10,203**	**6,293**	**43,095**
H. Total Direct Costs	**$145,816**	**$142,019**	**$147,973**	**$157,157**	**$159,051**	**$752,016**
I. Indirect Costs						
1. Lab Costs	74,592	79,006	82,166	85,461	88,880	410,105
2. General & Administrative	37,698	39,879	41,474	43,138	44,863	207,052
Total Indirect Costs	**112,290**	**118,885**	**123,640**	**128,599**	**133,743**	**617,157**
J. Total Direct & Indirect Costs	**$258,106**	**$260,904**	**$271,613**	**$285,756**	**$292,794**	**$1,369,173**
K. Fee at 5.0000%	**12,905**	**13,045**	**13,581**	**14,288**	**14,640**	**68,459**
L. Amount of this Request	**$271,011**	**$273,949**	**$285,194**	**$300,044**	**$307,434**	**$1,437,632**

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Data Management for EVOSTC Funded Research FY 2012-2016
ROBERT C GROMAN (Non-Federal Gov (US))
Oct 1, 2011 to Sep 30, 2016
Budget No Reseach Assit

Travel Detail

Period 1 10/01/11 - 09/30/12

1. Domestic

EVOSTC Researchers Meeting (Woods Hole, MA to Anchorage, AK)

Airfare	Round Trip	2 Tickets		@700	1,400	
Ground	General Grnd Transport.	2		@200	400	
Lodging	Nightly Rate (inc. Tax)	2 Rooms	3 Nights	@181	1,086	
Per Diem	Other Domestic	2 People	4 Days	@104	832	
				Trip Total:	3,718	

Total Domestic Travel - Period 1 **3,718**

Period 2 10/01/12 - 09/30/13

1. Domestic

EVOSTC Researchers Meeting (Woods Hole, MA to Anchorage, AK)

Airfare	Round Trip	1 Tickets		@700	700	
Ground	General Grnd Transport.	1		@200	200	
Lodging	Nightly Rate (inc. Tax)	1 Rooms	3 Nights	@181	543	
Per Diem	Other Domestic	1 People	4 Days	@104	416	
				Trip Total:	1,859	

Total Domestic Travel - Period 2 **1,859**

Period 3 10/01/13 - 09/30/14

1. Domestic

EVOSTC Researchers Meeting (Woods Hole, MA to Anchorage, AK)

Airfare	Round Trip	1 Tickets		@700	700	
Ground	General Grnd Transport.	1		@200	200	
Lodging	Nightly Rate (inc. Tax)	1 Rooms	3 Nights	@181	543	
Per Diem	Other Domestic	1 People	4 Days	@104	416	
				Trip Total:	1,859	

Total Domestic Travel - Period 3 **1,859**

Period 4 10/01/14 - 09/30/15

1. Domestic

EVOSTC Researchers Meeting (Woods Hole, MA to Anchorage, AK)

Airfare	Round Trip	1 Tickets		@700	700	
Ground	General Grnd Transport.	1		@200	200	
Lodging	Nightly Rate (inc. Tax)	1 Rooms	3 Nights	@181	543	
Per Diem	Other Domestic	1 People	4 Days	@104	416	
				Trip Total:	1,859	

Total Domestic Travel - Period 4 **1,859**

Period 5 10/01/15 - 09/30/16

1. Domestic

EVOSTC Researchers Meeting (Woods Hole, MA to Anchorage, AK)

Airfare	Round Trip	1 Tickets		@700	700	
Ground	General Grnd Transport.	1		@200	200	
Lodging	Nightly Rate (inc. Tax)	1 Rooms	3 Nights	@181	543	
Per Diem	Other Domestic	1 People	4 Days	@104	416	
				Trip Total:	1,859	

Total Domestic Travel - Period 5 **1,859**

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Data Management for EVOSTC Funded Research FY 2012-2016

ROBERT C GROMAN (Non-Federal Gov (US))

Oct 1, 2011 to Sep 30, 2016

Budget No Reseach Assit

Other Direct Costs - Detail

	10/01/11 09/30/12	10/01/12 09/30/13	10/01/13 09/30/14	10/01/14 09/30/15	10/01/15 09/30/16	Total
G. Other Direct Costs						
1. Materials and Supplies						
a. Computer Software	500	0	500	0	0	1,000
b. Computer(s)						
1. Data Server	4,000	0	0	0	0	4,000
2. Desktop Computers	4,000	0	0	0	0	4,000
3. Replacement Desktop Computers	0	0	0	4,000	0	4,000
Total Materials and Supplies	**8,500**	**0**	**500**	**4,000**	**0**	**13,000**
4. Computer Svc						
a. Technical Assistance (CIS)	2,100	2,160	2,250	2,340	2,430	11,280
Total Computer Svc	**2,100**	**2,160**	**2,250**	**2,340**	**2,430**	**11,280**
6. Other						
a. Communications	125	125	125	125	125	625
b. Duplicating	125	125	125	125	125	625
c. Miscellaneous						
1. Server Installation Fee	300	0	0	0	0	300
d. Other Outside Services	2,813	2,813	2,813	2,813	2,813	14,065
e. Repairs & Maintenance	0	800	800	800	800	3,200
Total Other	**3,363**	**3,863**	**3,863**	**3,863**	**3,863**	**18,815**
Total Other Direct Costs	**13,963**	**6,023**	**6,613**	**10,203**	**6,293**	**43,095**

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