1. PROJECT INFORMATION

NPMRI Project Number:	A01/T2201–T2207
Title:	Pacific Marine Arctic Synthesis of the Northern Bering, Chukchi and Beaufort Seas
Subaward period	June 15, 2012 to June 14, 2014
Amount of funding	$1,449,997
Report period	June 15, 2012 to September 26, 2012
Report submission date	September 28, 2012
Lead Author of Report*	Dr. Jacqueline Grebmeier

**Although there may be only one lead author of the report, all PIs and co-PIs of the project, as identified in the approved statement of work and listed below, are responsible for the content of the Semiannual Progress report in terms of completeness and accuracy.*

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Abbreviation	Institution
UMCES-CBL	University of Maryland Center for Environmental Science, Chesapeake Biological Laboratory
WHOI	Woods Hole Oceanographic Institution
URI	University of Rhode Island
UAF	University of Alaska Fairbanks
NCAR	National Center for Atmospheric Research
UT	University of Texas at Austin
FIT	Florida Institute of Technology

2. PROJECT OVERVIEW

A. Briefly (4-5 sentences) describe both the research purpose and the underlying need for this research: The Pacific Marine Arctic Regional Synthesis (**PacMARS**) effort will facilitate new synergies in understanding of the marine ecosystem in the greater Bering Strait region, including the northern Bering, Chukchi and Beaufort seas. This synthesis effort will contribute to NPRB's overall mission by promoting understanding of north Pacific ecosystems in order to help enable effective management and sustainable use of marine resources, from subsistence use to fisheries to industrial exploration and development.

The PacMARS research team and collaborators will:

1. **Identify and synthesize existing data sets** that are critical for evaluating the current state of knowledge of this marine ecosystem, including human dimensions.

2. **Define the high-priority, overarching scientific themes and research needs** for the next decade or more of marine ecosystem studies in the Pacific Arctic Region.

B. List the objective(s) of the research project, exactly as described in your approved Statement of Work.

1. **Identify and link existing data sets**, tabulate data archive sites and provide value-added annotated metadata for existing data that promote understanding of the marine ecosystem extending from north of St. Lawrence Island in the Bering Sea to the Chukchi and Beaufort seas, including traditional ecological knowledge where it can be readily transferred (Data synthesis).

2. **Synthesize existing scientific and traditional knowledge of the marine ecosystem**, with a focus on territorial waters of the United States and its adjoining Exclusive Economic Zone, but to also include input from beyond this region through collaborations with both Russian [e.g. Russian-American Long-term Census of the Arctic (RUSALCA)] and Canadian [e.g. Canada's Three Oceans program (C3O)] scientists who will cooperate with our effort. Other internationally generated data within the Pacific Arctic Group (PAG) international framework will also be contributed, including from Japan (point of contact, Dr. Takashi Kikuchi), Korea (point of contact, Dr. Sung Ho Kang), and China (point of contact, Dr. Jianfeng He) (Data synthesis)

3. **Develop overarching scientific themes and research needs** to facilitate the design of the next iteration of integrated marine ecosystem studies in the Pacific-influenced Arctic, including the appropriate temporal and spatial scales of data needed for ecosystem-level assessment. (Research Needs).

4. **Emphasize system-wide, synoptic understanding**, in addition to discipline-specific syntheses of the northern Bering, Chukchi and Beaufort ecosystems. Given time and resource limitations, we will prioritize our efforts towards integrating across disciplines and we will use geographical and habitat-scaled approaches to achieve linkages among biophysical observations and human communities (Research Needs).

5. **Undertake a social-ecological science synthesis** of (1) major research initiatives, (2) emerging research approaches and methods, and (3) related documented research needs and concerns. Each of these approaches will be geared toward identifying current research directions and gaps in knowledge concerning the maritime societies living within the marine ecosystems of the Northern Bering,

Chukchi, and Beaufort Seas. Cumulatively, this contribution will results in an interdisciplinary socio-ecological synopsis of these marine ecosystems (Research Needs).

C. Provide a table showing the timeline and milestones for the entire project.

Table 1. Timeline and milestones for the PacMARS project.

Date	Milestones
2012	
2012	Notification of support
July	Funds allocated; PI coordination conference call; initiated preparation of templates and data submission protocols, identify new data sets, envision synthesis products
Sept 24-26	PacMARS PI meeting, Annapolis, MD; Sue Moore participated to provide linkage to SOAR program
Oct 22	*Quarterly Report to NPRB #1: revised status report*
Dec 10-11	Data workshop at Boulder, CO, with invitees to utilize computer-aided networking of data sets already preloaded via the EOL-ACADIS website; initiate development of synthesis products, maps, and chapter outlines for written products
Dec 15	*Quarterly Report to NPRB #2*
2013	
Jan 20	1-day open community workshop on Sun Jan 20, 2013 in collaboration with SOAR (Synthesis of Arctic Research) prior to the AMSS in Anchorage; purpose to give update on preliminary synthesis results, solicit community input, and open discussion of developing themes for science direction
Jan - Mar	Alaska community "Town Hall" input meetings at 3 "hub" communities to entrain local comments from 17 local villages from St. Lawrence Island to Kaktovik; attended by designated members of the PacMARS team. The three meetings will be held in Nome, Kotzebue and Barrow.
Mar 15	*Quarterly Report to NPRB #3*
Apr-June	Draft chapters for interim report
June 15	*Quarterly Report #4-submission of PacMARS interim report*
June-Sept	Finalize draft interim report for NPRB; continue drafting synthesis publications and provide feedback to local Alaska communities via no-cost by PIs during field season community outreach
Sept 15	*Quarterly Report #5-report on community interactions; status publications*
Sept –Dec	Continuation of synthesis analyses and draft manuscript preparations
Dec 15	*Quarterly Report #6-update on synthesis products, book preparation*
2014	
Jan	PacMARs presentations at the AMSS 2014; recommendation for another PacMARS-SOAR open community meeting, with focus on social community feedback
Mar 15	*Quarterly Report #7-report from 2nd open community PacMARS-SOAR workshop, finalize all synthesis publications and submission for polar PacMARS book*
June 15	Final report to NPRB; PacMARS book in ready to publish stage

3. PROGRESS SUMMARY

A. Describe report period progress.

1. ***General Project Progress:*** During this reporting period, a PacMARS website (http://pacmars.cbl.umces.edu/) was created and we also undertook logo development (Figure 1) to assist

with outreach and to provide an internet-based presence for the project. Google Analytics tracking shows that the website is being accessed regularly. An initial PI meeting was organized at the National Socio-Environmental Synthesis Center in Annapolis, Maryland (September 24 - 25, 2012. Logistics for the next two PI meetings were also discussed. A data oriented meeting that will categorize the state of existing data sets will be held December 10-11, 2012 in Boulder, Colorado and the PacMARS and SOAR projects will hold a joint Open Science Meeting on January 20, 2013 in Anchorage immediately prior to the Alaska Marine Science Symposium.

During the PI meeting several generalized action items were identified for the near-term. In addition, as initial organizational hurdles are overcome and progress accelerates on the project, we expect to increasingly organize progress appraisals by separating out specific progress on six themes that were identified in the proposal. However, initially, a number of action items that affect all themes of the project were identified:

- Set up a monthly PacMARS conference call; Coordinate travel plans for the Data Meeting and Joint SOAR Open Science Meeting
- Add PacMARS Advisory Committee membership list to the PacMARS website
- Set up a PI discussion section (Wiki) on the NCAR website

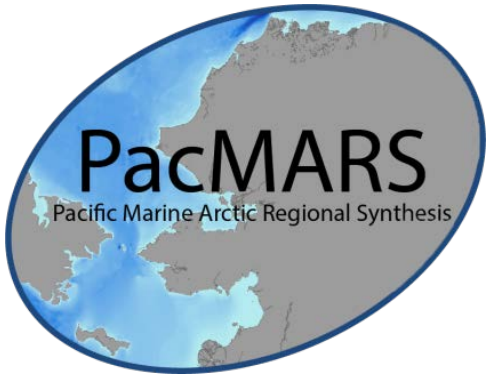

Figure 1. PacMARS logo.

2. Specific Objective Progress

a) **Identify and link existing data sets**: During this reporting period, each funded group relayed information on relevant activities, including data set and additional collaborators identification. Most of the effort has been put into compiling information on what data sets each research group can contribute, links to other already available databases and identifying gaps needed for projected analysis and synthesis.

During the initial PI meeting in Annapolis, each research group also presented results of initial data mining and organization efforts. Data sets already available in the NCAR database (SBI, BEST, etc.) were identified as well as other relevant databases (OBIS, OCSEAP, etc.). Each research group listed and explained what types of data they would be able to contribute as well as how they could provide detail for metadata.

The action item(s) related to **data sets** included:

- Data uploading consistency was discussed and examples (below) of data format for uploading to the NCAR database were presented.

Preferred Standard Fields for all files include:

1. Cruise Name; 2. Station Number; 3. Station Name; 4. Latitude (decimal degresses); 5. Longitude (decimal degrees); 4. Year and/or Date; 5. Time (UTC)

Preferred Standard Fields for Pie Chart-type displays include:

1. 1. Cruise Name; 2. Station Number; 3. Station Name; 4. Latitude (decimal degresses); 5. Longitude (decimal degrees); 4. Year and/or Date; 5. Time (UTC); 6. Totals by each Fauna Class (or, by discretion for mapping of other taxa/quantitative data); 7. Total count (e.g. Total Abundance or other quantitative data)

An example of a base map that will be suitable for data display on the EOL website in support of the PacMARS project was also developed by the EOL team (Figure 2).

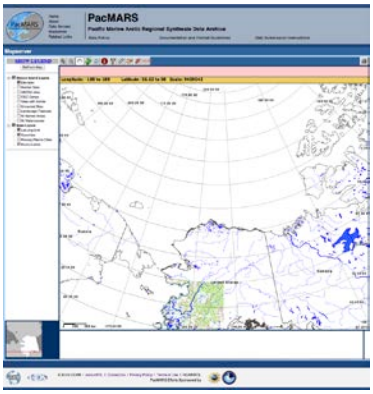

Figure 2. General Map for data display data on the EOL website.

b) **Synthesize existing scientific and traditional knowledge of the marine ecosystem:**
During the reporting period individual PacMARS PIs conducted a series of consultations with agencies and associations in Alaska to help identify available traditional knowledge and related data and programs that will be integrated with existing scientific knowledge. These activities specifically included:

- Northwest Arctic Borough Subsistence Mapping Project research methods review, with follow-up consultations and bibliographic leads provided by the Northwest Arctic Bureau Planning Department in Kotzebue.
- Participation in the 15th International Congress on Circumpolar Health, 5-10 August in Fairbanks for the latest research results on human and environmental health in the study region.
- Consultation with the Natural Resource Division of Kawerak, Inc. regarding ongoing community-based projects on walrus and ice seal harvests in the greater Bering Strait region.
- Consultations with the Bureau of Land Management Arctic Field Office regarding the BLM's sociocultural research program in the region of the National Petroleum Reserve.

Each research group also presented examples of how different data types could be used in the synthesis activities during the PI meeting. These presentations generated discussions about traditional knowledge and how it could be synthesized within the PacMARS program.

c) Develop overarching scientific themes and research needs: During the reporting period several overarching scientific themes and research needs were discussed, particularly at the PI meeting in Annapolis. Discussions included which data sets and analysis tools would be used in each research theme outlined in the original proposal. It was generally agreed that research needs would be appropriately identified during through the synthesis products and data gathering process.

The action item(s) related to **overarching themes** included:

- Generate a PacMARS/SOAR theme table that helps illustrate the differences in scope and approach of the two separate programs
- Provide written guidance to Brendan Kelly on the usability of the National Ocean Data Center archive to assist with a reporting requirement at the Office of Science and Technology Policy.

d) Emphasize system-wide, synoptic understanding: We are prioritizing our efforts towards integrating across disciplines and we are using geographical and habitat-scaled approaches to achieve linkages among biophysical observations and human communities. At this early stage, it is premature to state that we have made significant new progress on this objective.

e) Undertake a social-economic science synthesis: We are currently identifying research directions and gaps in knowledge regarding local communities within the study area of the northern Bering, Chukchi and Beaufort Seas. We expect that the formal socio-economic synthesis will be achieved at a later stage in the work effort.

3. Progress on PacMARS Research Themes

As mentioned above, we organized our PacMARS proposal around **6 research themes,** which we identified as foci for specific synthetic questions that would improve our understanding of the Pacific

Arctic region. We provide a brief summary below of these themes and actions that have been undertaken that would contribute to that effort initially. Data sources that we have identified to help address these specific questions and themes (many are appropriate for multiple themes) are tabulated in Appendix A and online at http://pacmars.cbl.umces.edu/).

a) Ice Cover (primary production relationships, currents, winds, bathymetry):
We have identified the following short-term goals as the project initiates: Compile data sets to common format, develop GIS mapping protocols, upload appropriate data to ACADIS website, interact with AOOS, use synthesis and community input to help develop a multi-agency 5-year field program, including the following elements consistent with this theme:

- Bathymetry+Seasonal and interannual changes in T, S (river discharge), winds, currents
- Regional and spatial distributions (GIS or krigged gridded data) of pelagic standing stocks (phytoplankton, zooplankton), use estimates of grazing impacts and primary and secondary production, and where possible, phenology of biological production cycles
- Sediment grain size, carbon content, and potential chemical and radioactive contaminants
- GIS maps of stable isotopic signatures for end-member sources of C and N over the western Arctic
- Geostatistical GIS overlays among stable isotopic signatures and water

b) Phenology of Biological Production Cycles in Relation to Physical Environment
We have identified the following short-term goals for addressing this theme: Regional and spatial distributions (GIS or krigged gridded data) of benthic standing stocks (infauna and epifauna); temporal/spatial variations in stratification (T, S), nutrients, winds, currents; we are using direct links with SOAR to achieve synthesis of data sets specific to higher trophic organism parameters and link to people; we will request input from SOAR into mid-term report. The zooplankton team has also started to identify zooplankton data sets and to develop an annotated list (including details of the sampling methodology) of those sets. We have also downloaded several data sets to explore synthesis strategies.

We have initiated discussions with Dr. Russell Hopcroft at UAF regarding the best way to accomplish our goals without compromising the dissertation of his graduate student, Imme Ruizen. Her work is being conducted through funding from the National Science Foundation. The goals of her research are almost identical to some of the goals of the PacMARS zooplankton effort and include developing GIS maps of both total zooplankton and specific species abundances. We are hoping to share data mining efforts with Hopcroft and Ruizen. Their effort may not synthesize data on zooplankton biomass (vs. abundance) so our proposed efforts would be complementary to their work. Hopcroft and Ruizen will be attending the Boulder Data meeting where we plan to clearly identify a plan for complementary efforts. In the meantime, we have started preparing data sets from the 2000s to be used in a synthetic map. We also have started working with the Matrai et al. chlorophyll data set that was supported by NSF.

c) Benthic-Pelagic Coupling in Relation to Physical-Chemical Environment
Several important data sets are being examined for completeness so that they can be transferred to public archives. These include data collected during annual cruises of the Sir Wilfrid Laurier through the Bering and Chukchi Seas from 1998-2012. These cruises have sampled water column, sediments and biological systems, but limited funding has not permitted the collected data to be delivered to accessible archives or made otherwise publicly available. Similar organizational efforts are being accomplished with data collected other individual researchers that have not been migrated into publicly accessible archives. The efforts with zooplankton and phytoplankton data sets (see theme 3) also are relevant to this theme.

d) Current State of Lower Trophic Prey-Base and Higher Trophic Feeding Hot Spots
During the reporting period, key coordinating activities were undertaken with higher trophic level researchers who are involved in the SOAR project. Sue Moore, for example, attended our initial

Annapolis meeting and will be working with agencies such as the Alaska Department of Fish and Game to leverage their existing data sets. Other key researchers such as Kathy Kuletz of the Fish and Wildlife Service were also contacted and will be coming to the data workshop in Boulder. Her access to bird distribution data should be important for identifying high areas of productivity in our research area. Planning for a joint meeting in Anchorage was advanced with an agreement to hold that meeting on the Sunday prior to the start of the Alaska Marine Science Symposium. Ken Dunton is leading efforts to access the significant isotopic datasets developed for trophic studies funded under RUSALCA, COMIDA-CAB, OSCEAP (Schell et al.; Feder et al), SBI, and NSF (e.g. McClelland, Dunton). We also will determine if any useable trophic information is available from various stomach content records for marine mammals. Our synthesis efforts will include close collaboration with GIS experts at UT-Austin to produce spatial maps of isotopic distributions among the key trophic groups. Other spatial distribution analysis will be undertaken of of feeding locations of marine mammals, seabirds, and fish; coordinate and link data collections through PacMARS collaborators (Jay, Kuletz, Moore)

Bluhm identified and began to track down benthic epifaunal invertebrate data for the lower trophic prey base and biodiversity-productivity objectives of PacMARS. She now has in hand data from (1) Kotzebue Sound from 1978 (published in Feder et al. 2005 Polar Biol 28:402-421) and (2) the Russian and US Chukchi Sea from 2004, 2007, 2008 (published in Bluhm et al. 2009 Aquatic Biol 7:269-293) and 2009 (Bluhm et al., unpubl.). Norton Sound trawl data collected by NMFS/ADF&G every three years since 1976 (partly in Hamazaki et al. 2005 ICES J Mar Sci 62:1597-1602) will be provided through NPRB soon. Some additional epifauna data that should become available within the duration of the project include data from (1) the NE Chukchi Sea collected during CSESP studies in 2008-2010 (Blanchard et al., to be released through AOOS), (2) Herald Valley and the S. Chukchi Sea during RUSALCA 2012 (Bluhm and Iken, unpubl.), (3) the US Beaufort Sea collected during OCSEAP (Frost and Llowry 1983 NOAA Tech Rep NMFS SSRF-764; geo-referenced species list only, currently digitized by Bluhm through BOEM support), (4) US Beaufort Sea collected during WEBSEC (Carey et al. 1977 OCSEAP final report, Contract No 03-5-022-68; presence only with some phyla missing, currently digitized by Bluhm through OSRI grant). Data from the NE Chukchi (COMIDA-CAB, 2009 and 2010) and from the US Beaufort Sea (BeauFish, BOEM, 2011) are part of a UAF graduate student thesis and might not be available for the synthesis. Trawl data from the N Bering Sea is currently processed as part of a thesis at the Southern Illinois University, but Bluhm is in discussion with advisor Dr. Jim Lovvorn, about using at least species richness values for the synthesis. Most, but not all, surveys mentioned here primarily resolve taxa to the species level with the exception of difficult groups. Different trawls, trawl duration and mesh size can also bias comparability for standing stock estimates as well as species richness/biodiversity indices. It remains to be decided which of the above data sets can reasonably be combined into maps of epifaunal diversity indices and/or standing stock of the PacMARS region. In the next quarter, Bluhm plans to identify and track down macrofaunal invertebrate data from the Pacific Arctic.

e) Subsistence Livelihoods in Times of Climate Change

During the reporting period, several key individuals who will contribute to the synthesis from the standpoint of subsistence issues were identified, and they have been invited to the Colorado data workshop. With the aim of incorporating both regionally and community-based social science projects with the larger, typically university-based international endeavors, Yamin-Pasternak has begun consultations with tindigenous organizations and government agencies administering social science research programs in the Bering Strait, Northwest Arctic, and North Slope regions. These include the (1) Bureau of Land Management Arctic Field Office in Fairbanks, working with community subsistence advisory boards and conducting long-term ethnographic fieldwork in the region of the National Petroleum Reserve of Alaska, the (2) Northwest Arctic Borough Land Management Department in Kotzebue, which is currently implementing the mapping of indigenous subsistence land use, and (3) Kawerak – a Nome-based regional non-profit, which administers social science research among 20 collaborating tribes in the Bering Strait region. She has attended a presentation on Kawerak's ongoing research, which is focusing

on local knowledge of walrus and ice seals, including a mapping component. Although the eventual research products will be available to the public, the raw data on the current project cannot be shared per agreement between the Kawerak and the collaborating tribes. These stipulations and restrictions may ultimately impinge on these and other data that could otherwise be readily incorporated into the PacMARS effort. During this period Yamin-Pasternak also worked on assembling a bibliography of subsistence reports and ethnographic literature, primarily focusing on the North Slope region. She has begun a view of recent historical data (e.g. Dawns et al., Potential Impact of the OCS Activities on Bowhead Whale Hunting Activities in the Beaufort Sea, Braun et al., 1993 North Slope Subsistence Study, Alaskan Beaufort Sea Coastal Sensitivity Analysis). Yamin-Pasternak is in addition reviewing the bibliographic database of the BLM Arctic Field Office to identify the sources pertaining to the human-marine environments in the study region. She is also reviewing social science initiatives during the International Polar Year, noting the IPY report recommendations, products, and data resources for each of the projects. In preparing for the PI meeting in Annapolis, Yamin-Pasternak reviewed primary approaches in documenting, representing, and analyzing local ecological knowledge, including various sub-disciplines of ethnobiology, indigenous resource management, and sentient ecology. PIs Sheffield and Yamin-Pasternak collaborated in preparing a presentation in Annapolis "Human-Environmental Interaction, Local Knowledge, Community-Based Observations." One of the concerns raised at the Annapolis meeting was the commitment of NPRB to considering community concerns (as they are articulated during hub meeting and in the course of this project) in the future research initiatives. This request generated a discussion on the purposes and processes of the community consultations; we expect these discussion themes will continue to reemerge in the course of the project. The scope of the responses provided Yamin-Pasternak and Sheffield with an understanding that the documentation of community concerns within the scope of PacMARS should serve the purpose of informing future research needs, but the research needs identified based on this documentation will not necessarily translate into actual calls for proposals or other action items. PIs Sheffield and Yamin-Pasternak are also working out logistics and details for the hub meetings (dates, venues, connecting with IRAs, etc.)

f) Chemical Contaminants in Sediment and Biota

We think that this theme, for which there is no corresponding SOAR effort, covers critical and challenging data synthesis, because of potential data quality and data density issues, Significant progress has been made in the migration of chemically oriented data sets such as COMIDA to public archives. We are continuing these efforts with other data sets that have been identified. Initial goals are to move data onto public data portal, and to provide a GIS layer capability for all scientists to use. Sue Moore has facilitated efforts by Trefry to identify specific contaminant scientists working in marine mammals.

4. Describe preliminary results.

No formal synthesis products are available yet because the project has just commenced.

5. Describe any concerns you may have about your project's progress.

The principal investigators are concerned that the scope of work and performance period is ambitious, but have recognized this constraint since beginning to prepare the proposal. Differences in the protocols guiding the use of human subjects data vs. most other data, differences in social and natural science perspectives on intellectual property rights, and difference in the awareness of the community perspectives surrounding the sharing and use of human subjects data are crucial issues that will require continuous attention of all PIs as we assemble the Synthesis resources.

6. Describe integration activity.

The PI meeting in Annapolis was helpful for encouraging integration activities that are likely to accelerate over the next reporting period. Each PI presented examples of data sets that they have begun to work with and much of the ensuing discussion concerned ways that individual PIs could collaborate with each other to produce a synergistic result.

7. List poster and oral presentations at scientific conferences or seminars.
Grebmeier and Cooper submitted a PacMARS poster abstract for the January 2013 AMSS 2013 meeting.

8. Communication and coordination
We are coordinating with the SOAR project that is NOAA-BOEM supported. PIs Jacqueline Grebmeier and Carin Ashjian serve on the SOAR steering committee, and Sue Moore, a SOAR PI, is the lead liaison in our cooperative efforts and attended the Annapolis PI meeting. We have developed a website to support the project (http://pacmars.cbl.umces.edu) and have begun to publicize the web address to stakeholders. Yamin-Pasternak has addressed the questions from Kawerak on how the ethnographic data will be used and how the region communities will be benefitted by the PacMARS effort. Yamin-Pasternak and Sheffield are discussing venues for scientist-community collaborations to be incorporated in the review of research methods for PacMARS.

4. PROGRESS STATUS

We think the project is proceeding according to our expectations. Again, as expressed elsewhere, the pace and ambition of the work effort may require some adjustment of practical goals and approaches as we are just initiating our work at this stage.

5. EXPECTED WORKPLAN FOR NEXT REPORTING PERIOD

- General: A meeting report will be generated from the Annapolis PI meeting summarizing the individual presentations, including goals and approaches to be used over the coming months (Lead Responsibility: Cooper and Grebmeier).
- Examples of data are to be submitted to NCAR so that appropriate formats and templates can be created (Responsibility: all PIs, as stipulated by theme below).
- Individual data sets will be evaluated and prepared for transfer to the EOL data archive to help meet needs for the December Colorado data meeting (Responsbility: All PIs, as stipulated by theme; see below).
- We will firm up participation and invitations for the hub meetings in early 2013 in Barrow, Nome and Kotzebue (Lead Responsibility: Sheffield and Yamin-Pasternak)
- Develop a formal letter of explanation for inviting traditional knowledge collaborators (Lead Responsibility: Sheffield and Yamin-Pasternak).
- The EOL data archive investigators will generate a data questionnaire to be used by the PI's and collaborators to identify what data will be submitted and in what format it will be provided. This questionnaire will also be used by the PI's to identify other collaborators and will be requested of all PacMARS data meeting participants. (Lead Responsibility: Jim Moore and Jackie Grebmeier)
- Geographic Information System (GIS) coordination. Develop agreement on shapefiles, projections, fonts and a road map for uploading files to NCAR; Generate examples of data analysis for each theme using the same GIS standards (e.g. projections, boundaries, font usage, symbols, mapping standards, shared shape files where appropriate) including those to be used at the Open Science Meeting with SOAR project. (Leads: Jim Moore, GIS personnel for Grebmeier/Cooper, Dunton and Trefry groups)**.**
- Jim Moore will send out data submission protocols, discuss connection with COMIDA CAB data portal effort (e.g., with David Maidment, GIS ESRI lead for COMIDA, UTX Austin).

Other Action Items by Theme:

Ice Cover (primary production relationships, currents, winds, bathymetry)

Action Item: Identifying appropriate data sets (e.g. Appendix A) and needs prior to data workshop
Key responsibilities: Cooper, Dunton, Frey, K (Collaborative participation in data workshop; also SOAR project); SOAR (Arrigo, Frey)

Phenology of Biological Production Cycles in Relation to Physical Environment
Action Item: Identifying appropriate data sets (e.g. Appendix A) and needs prior to data workshop Key responsibilities: Ashjian, Campbell, Okkonen; Frey, K (Collaborative participation in data workshop confirmed; also SOAR project)' Pickart (collaboration physical oceanography)

Benthic-Pelagic Coupling in Relation to Physical-Chemical Environment
Action Item: Identifying appropriate data sets (e.g. Appendix A) and needs prior to data workshop; e.g. Updating and incorporating data for Sir Wilfrid Laurier annual trips 1998-2012 with Canadian partners
Key responsibilities: Grebmeier, Cooper, Dunton, Trefry, Okkonen, Ashjian, Campbell, Bluhm

Current State of Lower Trophic Prey-Base and Higher Trophic Feeding Hot Spots
Action Item: Identifying appropriate data sets (e.g. Appendix A) and needs prior to data workshop, e.g. Updating and incorporating data for Sir Wilfrid Laurier annual trips 1998-2012 with Canadian partners
Key responsibilities: Bluhm, Cooper, Dunton, Grebmeier, Ashjian, Campbell, Okkonen, Grebmeier, Bluhm (per SOAR project), Jay, C. (collaborative PacMARS letter; also SOAR project participant), Kuletz (per collaboration with PacMARS and lead on SOAR project), Moore, S (collaboration between PacMARS and SOAR) Nelson, J (collaboration with PacMARS for zooplankton at hotspots), Norcross, B (collaboration with PacMARS for fish populations, Pickart (collaboration with PacMARS and SOAR focus project on Barrow Canyon with Grebmeier/Cooper)

Subsistence Livelihoods in Times of Climate Change
Action Items: Continue to Identify appropriate data sets using the Alaska and Polar Research Collection at UAF Rasmuson Library, Data Resources of the Alaska Center for Climate Assessment and Policy, IPY recommendations, the Subsistence and Climate Change Sections of the North Slope Borough Division of Wildlife Management, the BLM Arctic Field Office subsistence bibliography, among others; Continue to note the stipulations on the sharing and use of data in connection with each dataset considered for the Synthesis, Continue to address individual questions of the indigenous organizations and agencies about PacMARS, wanting to know about
What kind of engagement will PacMARS have, if any, with indigenous communities?
How will the project results benefit region communities?
What will be the products of the PacMARS project? How will ethnographic data be presented?
(Lead Responsibility: Yamin-Pasternak). Agendas for each of these hub meetings and the cooperative SOAR meeting in Anchorage will be developed and the meeting publicized appropriately (Lead Responsibility: Grebmeier, Cooper, Sheffield, Yamin-Pasternak, Ashjian, Campbell).

Chemical Contaminants in Sediment and Biota
Action Items: Identifying appropriate data sets (e.g. Appendix A) and needs prior to data workshop, e.g. Updating and incorporating data for Sir Wilfrid Laurier annual trips 1998-2012 with Canadian partners.
Key responsibilities: Trefry, Sheffield, Cooper

6. OTHER RELEVANT INFORMATION

We have not secured access to industry-funded data that would add value for the planned Data oriented workshop in December (2012) in Boulder. Help facilitating access to these data would be much appreciated. We would be pleased to entertain comments or requests for additional information, if needed.