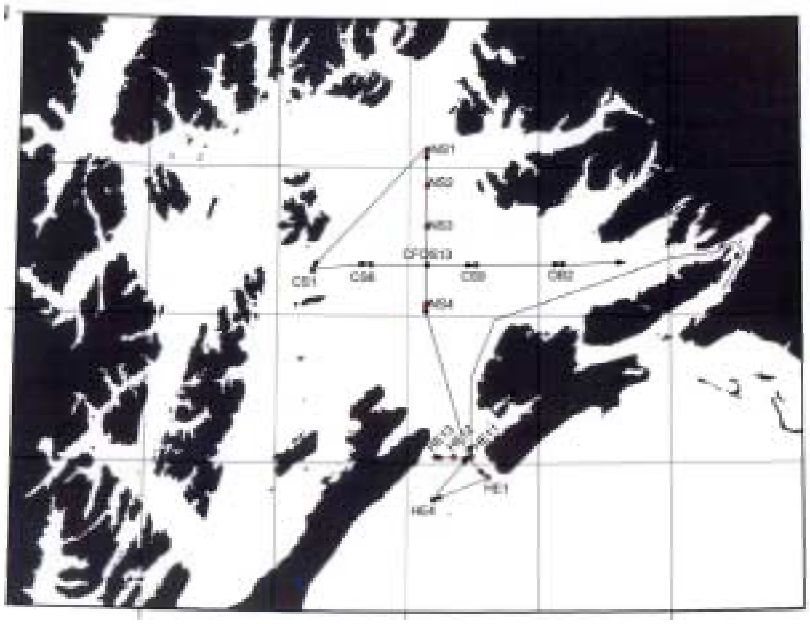
Prince William Sound Nowcast-Forecast & Biological Modeling Workshops Report



June 16, 17 &18, 2003
Anchorage, Alaska
Millennium Hotel

Report prepared by:

Walter Cox
&
Ted Cooney

Content

Conveners

The planning committee for the pair of workshops (PWSNF & Biological Modeling) consisted of: John Goering, Ph.D., University of Alaska Fairbanks, Institute of Marine Science; Thomas C. Royer, Ph.D., Old Dominion University, Center for Coastal Physical Oceanography; Ted Cooney, Ph.D., University of Alaska Fairbanks, Institute of Marine Science; Walter Cox, M.Sc., Prince William Sound Science Center, Prince William Sound Ocean Observing System. Session Chairs: Tom Royer, Physical PWSNF Workshop, June 16, 2003; Ted Cooney, Biological Modeling Workshop, June 17, 2003; John Goering & Walter Cox, Co-convention and Solicitation Writing, June 18, 2003. Funding for the physical PWSNF workshop was provided by the Oil Spill Recovery Institute.

Introduction

Prince William Sound Nowcast-Forecast (PWSNF) is an ongoing marine research program funded primarily through the Oil Spill Recovery Institute (OSRI) and housed within the Prince William Sound Science Center (PWSSC). PWSNF is directed at developing an ecosystem level understanding of the Prince William Sound and Copper River Delta regions. Consisting of numerical models of the region's oceanic and atmospheric conditions as well as physical and biological monitoring programs, PWSNF is intended to provide information for evaluating oil spill response strategies, managing the region's coastal resources, and providing environmental information to local residents and industry.

PWSNF began in 1999 with the awarding of research grants to conduct oceanographic data collection and numerical modeling of Prince William Sound. PWSNF Phase I was designed as a five-year comprehensive research program which would expand ongoing oceanic research to include atmospheric and biological components. OSRI awarded

grants to begin biological assessment of dominant fisheries in Prince William Sound and of the Copper River Delta ecosystem in 2000 and 2001 respectively. In 2002 OSRI awarded research grants for initiating atmospheric modeling and data collection efforts. Conceptually linked, the PWSNF projects vary in their level of integration and stage of development.

Major planning efforts for PWSNF include the December of 2000 Prince William Sound Meteorology Workshop in Anchorage, Alaska and the April of 2002 Intensive Observing Period Workshop in Cordova, Alaska. These two workshops included participants from a number of usergroups and stakeholders within the Prince William Sound region as well as researchers involved with the PWSNF program and representatives from agencies and academia.

During 2001 and 2002 the Oil Spill Recovery Institute underwent a review by the National Academy of Science's Polar Research Board (PRB). After completing an extensive review the Polar Research Board issued a report, *The Oil Spill Recovery Institute: Past, Present and Future Directions* (The National Academies Press, 2003), which included recommendations for additional planning and coordination of future PWSNF development with other major marine research programs in Alaska; such as, the Exxon Valdez Oil Spill Trustee Council's Gulf Ecosystem Monitoring (EVOSTC-GEM) program, the North Pacific Research Board program, and the emerging Alaska Ocean Observing System (AOOS).

As part of the planning process for Phase II of PWSNF, spanning the fiscal years 2004 – 2006, the Oil Spill Recovery Institute hosted the Prince William Sound Nowcast-Forecast workshop and the PWS Biological Modeling Workshop, June 16, 17 & 18, 2003 in Anchorage, Alaska. The goals of these workshops were; 1) Science planning effort for PWSNF Phase II physical monitoring and modeling activities, 2) Examine means for incorporating biological modeling within PWSNF (see Biological Modeling RFP, this document), 3) Provide for increased interaction with research funding organizations.

The format of the workshop's first day consisted of invited presentations from representatives of similar operational marine programs distributed throughout the country as well as presentations of the PWSNF physical monitoring and modeling efforts. A panel discussion moderated by the workshop chair culminated the first day's meeting and focused on a series of questions and issues concerning the PWSNF Phase II program. The concurrently held biological modeling workshop, utilizing a similar presenter and panel format, was convened the following day, June 17, 2003, and a final half-day co-convening of the two workshops completed the schedule on Wednesday, June 18.

While the planning committee for the workshops anticipated substantial overlap between the compositions of the two workshop's participants, the workshops were identified as separate but parallel efforts and variation in the groups attending was anticipated. Ultimately, attendance of the workshops slightly exceeded expectations, averaging 35 to 40 participants, but the composition of the groups varied less from day to day than originally anticipated.

Part 1: Physical Nowcast-Forecast Workshop, June 16 & 18, 2003

PWSNF Background

The Oil Spill Recovery Institute (OSRI) was created by Congress as a result of the *Exxon Valdez* Oil Spill in 1989. The 1989 spill released approximately 11 million gallons of Alaska North Slope crude oil into Prince William Sound. At the time little detail was known of the Prince William Sound ecosystem and the response to the spill proved both ineffective and controversial. The lack of information on the physical and biological systems of the region also complicated efforts at assessing damage and evaluating restoration activities. Events such as the "crash" of the Prince William Sound herring population in the mid 1990's, while never causatively proven to be an aftereffect of the spill, further raised concerns over the potential for oil spills to produce long-term ecosystem level impacts.

The Sound Ecosystem Assessment (SEA) was an interdisciplinary research program focused on the Prince William Sound marine environment and funded by the Exxon Valdez Oil Spill Trustee Council. Elements of the SEA program focused on oceanographic data collection and numerical ocean modeling of Prince William Sound, as well as acoustical assessment of dominant fish stocks, have formed the foundation of the PWSNF program.

As the SEA program came to a close in the late 1990's the Oil Spill Recovery Institute was just beginning to develop a research program, having been appropriated funding through the Coast Guard Authorization Act of 1996. OSRI chose to focus much of its energies on developing a Nowcast-Forecast system for Prince William Sound, the only major maritime oil shipping port in the U.S. Arctic or subarctic.

While OSRI integrated elements of the SEA program into the developing PWSNF program a significant difference in the approaches should be noted. PWSNF is predictive in nature and builds on the emergence of operational oceanography and improvements in telemetry, computational capacity, and Internet connectivity developed over the past decade to facilitate the efficient generation and rapid transfer of relatively large data sets over significant distances. PWSNF provides information on present (Nowcasts) and anticipated (Forecasts) conditions for the region's physical environment. PWSNF is also able to provide simulations of past events (Hindcasts) for evaluations of oceanic and atmospheric events of scientific or societal interest and for evaluating oil spill response simulations.

The physical PWSNF program is comprised of five primary components; 1) a Princeton Ocean Model implemented for the Prince William Sound region (also denoted as PWS-POM), 2) an Observational Oceanography program, 3) a Regional Atmospheric Modeling System (PWS-RAMS) implemented for the region, 4) a meteorological data collection network, and, 5) an implementation of the Oil Spill Contingency and Response

(OSCAR) model for oil spill trajectory, chemical fates and effects, and biological exposure modeling. The three modeling components, PWS-POM, PWS-RAMS, and OSCAR, are linked in a preliminary, prototype configuration via automated Internet data transfers.

The Princeton Ocean Model serves as the central component of PWSNF and has been implemented by Professor C.N.K. Mooers of the Ocean Predication Experimental Laboratory at the Rosenstiel School of Marine and Atmospheric and Science. PWSPOM is implemented on a ~1.1km grid utilizing 15 vertical sigma (terrain-following) layers with boundaries at Hinchinbrook Entrance and Montague Straits. A non-uniform freshwater runoff model (Simmons) provides freshwater input along the PWS coastline. Tidal forcing is provided from a Northeast Pacific tidal model (Foreman). Surface winds are derived from the PWS-RAMS atmospheric model, though prior to early 2003 they were treated as a spatially invariant field based on hourly-observed winds at the mid-sound buoy.

The Regional Atmospheric Modeling System has been implemented by Dr. Peter Olsson of the University of Alaska's Alaska Experimental Forecast Facility (AEFF). RAMS for Prince William Sound (PWS-RAMS) is configured on a triple nested grid with 64km/16km/4km grid spacing and 36 vertical levels to 25km altitude. The National Centers for Environmental Prediction (NCEP) Eta model is utilized for initial and boundary conditions. At the time of the workshop the atmospheric modeling program had been in progress for approximately one year and initial linkages between PWS-POM and PWS-RAMS had been developed. Initial model runs at 64km and 16km were conducted in fall of 2002 and winter 2003.

The Observational Oceanography program, led by PI Dr. Shari Vaughan of the Prince William Sound Science Center, supports the Ocean Modeling program through seasonal hydrographic cruises in Prince William Sound. The cruises consist primarily of Acoustic Doppler Current Profiler (ADCP) surveys for measuring ocean currents in the mid sound and Hinchinbrook Entrance as well as expendable conductivity, temperature, and depth (XCTD) profiler measurements at three stations (northern PWS, mid-sound, and Hinchinbrook Entrance). The OSRI funded program has been supplemented by an EVOSTC-funded moored ADCP in Hinchinbrook Entrance from 1999 through 2002.

The Meteorological Data Collection project, led by PI Mr. Mike Lilly of GW Scientific, supports the overall PWSNF program by providing meteorological data for the modeling efforts, for use in the event of a spill, and use by the general public. Meteorological monitoring stations have been established at seven locations throughout the PWS region; the Cordova Boat harbor, Tripod hill (elevated site in Cordova), Tatitlek, Chenega Bay, Pigot Point, Applegate Rocks, Port Etches, Kolenhenic Island (a Copper River Delta barrier island). Data collected includes temperature, wind speed and direction, relative humidity and barometric pressure. Tide gauges exist at Tatitlek, Chenega Bay, and Pigot Point. A tide gauge was installed at Grass Island, which was also a prior meteorological monitoring site, but was destroyed by a winter storm in 2002. Tide information is not yet available from the OSRI sponsored network.

The Oil Spill Contingency and Response (OSCAR) modeling effort, led by PI Dr. Mark Reed of SINTEF Applied Chemistry, provides oil spill trajectory, chemical fates and effects, and biological exposure modeling capacity to the PWSNF system. Processes calculated by OSCAR include surface spreading, emulsification, dispersion (both natural and chemically enhanced), dissolution, evaporation, sedimentation, resurfacing, degradation, and stranding. Trajectories are derived from PWS-POM current predictions and surface winds (presently surface wind files are manually created for a scenario). Chemical processes are calculated based on 27 components and psuedo-components. Spatially explicit biological models ported to interact with OSCAR, such as may be proposed for the OSRI sponsored herring modeling effort, should be able to provide exposure estimates through interactions with OSCAR. Advance planning for this capacity is critical in the development of biological modeling components within PWSNF.

Issues and Considerations for PWSNF Phase II

The physical PWSNF workshop culminated in a panel discussion of issues and questions for consideration in planning Phase II of the program. The session chair, Dr. Tom Royer of Old Dominion University and a member of the OSRI Science and Technology Committee, led the panel discussion. The panel consisted of the day's presenters, both the invited speakers and OSRI PIs.

Point 1

The first issue the panel addressed concerned the linking of the PWS-RAMS and PWS-POM models. Discussion centered on the level of interaction that is desirable between the two models and determining the exchanges necessary for the models to realistically simulate existing conditions. The present configuration exchanges information in one direction with PWS-POM ingesting values for surface pressure and wind speed and direction from PWS-RAMS. While this unidirectional exchange of a limited number of variables reflects an initial effort at linking the models, it was noted that it may not be desirable to link all of the possible variables, but rather the decision should be based on the capacity of a specific configuration to accurately simulate actual conditions.

A related issue is the difference in forecast periods of the two models, PWS-RAMS produces a 36-hour forecast and PWS-POM generates a 72-hour forecast. The parameters PWS-RAMS provides for ingesting by PWS-POM cease 36 hours into the PWS-POM 72-hour forecast run and PWS-POM then calculates the values as remaining constant. Uncertainties in forecasting PWS meso-scale atmospheric conditions beyond 36 hours remained an open issue for future examination. The panel reached consensus that sensitivity studies and interaction between Mooers and Olsson as the PWS-RAMS model matures in its implementation should play a critical role in establishing optimum model interactions.

Point 2

The second point addressed by the panel was the location of the boundaries for the PWS-POM. Present boundaries are at Hinchinbrook Entrance and Montague Straits, the two primary routes of exchange between the Gulf of Alaska and Prince William Sound. An extended domain for the PWS-POM (EPWS-POM) has been proposed by Mooers that would extend the boundary into the northern Gulf of Alaska to allow for boundary interaction with the North Pacific Princeton Ocean Model (NPAC-POM) operated by the Naval Research Laboratory (NRL) and establishing the western boundary as an open boundary. The relative scarcity of data in the proposed extended model domain versus the limited availability of moored ADCP data, ADCP transect survey and XCTD data for Hinchinbrook raised concerns with some of the panelists.

Discussion then focused on the dynamic conditions in Hinchinbrook Entrance. Flow at Hinchinbrook Entrance varies significantly over time and consists of complex current structures often transporting volumes in and out of the Sound simultaneously. The panel ultimately favored not utilizing that location as a boundary to avoid having complex, highly dynamic conditions on the model boundary. The consensus of the panel favored moving the boundaries from their present locations and examining the extended domain proposed as an appropriate configuration. Also, Prof. Royer volunteered to make available an extensive and intensive GLOBEC oceanographic dataset on the NGOA shelf.

Point 3

The third point addressed by the panel concerned data required to initialize and operate the models. Presently the PWS-POM is initialized using the SEA oceanic data from 1996. Discussion by the panel indicated consensus that the SEA data represented the best comprehensive data available. Concerns were voiced over the appropriateness of using data that might be from a different ocean climate regime and considerations regarding the Pacific Decadal Oscillation (PDO) in selecting data as representative for initial conditions.

PWS-RAMS utilizes NCEP's Eta model for initial and boundary conditions. The general consensus of the panel was that this was an appropriate approach.

A relative scarcity of data available for operating the PWSNF system was noted by the panel. Discussion turned to the efforts of OSRI to address the shortage of meteorological and oceanographic data (particularly the extreme scarcity of real-time ocean data for assimilation in PWS-POM operations) in the Prince William Sound region through the Observational Oceanography program and the met and tide station network. It was noted that data from the meteorological stations has come online over the past year. Early instabilities in the telemetry of data through the network have been addressed and it was

reported that data should begin to be consistently available for assimilation by the atmospheric modeling program. Work remains in progress for stabilizing the OSRI tide gauge network. The panel agreed that all available PWS data should be utilized in operating the model.

No specific minimum criteria for either operating or initializing the models were established. The panel indicated that the PWSNF effort should focus on developing new sources of data, particularly real-time oceanic data, identifying the best sources of data and optimizing allocation of its limited observational resources.

Point 4

The fourth point focused on developing and integrating biological modeling within the PWSNF program. Discussion touched on the parallel workshop scoping biological model approaches for PWSNF occurring the following day. The panel deferred this question for the group the following day (see Biological Modeling Workshop and Biological Modeling RFP – this document).

Point 5

The final point addressed by the panel centered on the long-term operation of the PWSNF system and developing the means of financially supporting the program. Primary support of PWSNF in Phase I was through the Oil Spill Recovery Institute, averaging $700,000 dollars per year for both the physical monitoring and modeling components, comprising approximately $450,000 of the annual total, as well as the biological monitoring components, approximately $250,000 of the annual total, with numerous matching and in-kind contributions at lesser amounts. OSRI is presently planning a three-year Phase II of PWSNF which is anticipated to include a biological modeling component and is scheduled for funding at $800,000 per year for FY04-06.

Panel discussion touched on financial arrangements adopted by other operational oceanography programs. Dr. Neal Pettigrew from GoMOOS (Gulf of Maine Ocean Observing System) discussed the level of funding of their operations and the recent decline in funding. GoMOOS funding originated from a variety of sources and partnerships were formed by organizations “subscribing” to GoMOOS. Partners include local pilot’s association, the local lobsterman’s association, a marine terminal, academia and government agencies. GoMOOS’s board is derived from subscribing organizations and GoMOOS is operated as a non-profit corporation. GoMOOS program funding has ranged from approximately $2M to slightly under $1M per year. Improving partnerships within the Prince William Sound region and establishing mechanism for providing financial support of PWSNF was identified by the panel as a need for the program to sustain itself beyond FY06.

Discussion by the panel also focused on the emerging AOOS (Alaska Ocean Observing System) program. A national program for operating a coastal ocean observing system, the Integrated Ocean Observing System (IOOS), is under development in Congress and funding is possible in three to four years for regional entities such as AOOS. Funding levels have not been established for the pending effort but estimates have been made that the Alaska region might receive $10M to $15M annually. AOOS would serve as the umbrella organization and partnerships with local programs such as PWSNF would provide the mechanism for conducting the observing program. The consensus of the panel was that aligning with AOOS and the national effort offered the best prospects for establishing substantial long-term financial support of the PWSNF effort. Additionally, support was voiced for developing a collaborative effort for bringing the NOAA's National Ocean Service's Physical Oceanographic Real-Time System (PORTS) into Prince William Sound. A PORTS program in PWS offers the opportunity to partner at the federal level to improve the observing capabilities in the region.

Part 2: Biological Modeling Workshop; June 17 & 18, 2003

Biological Modeling Workshop Synopsis

The Biological Modeling Workshop, chaired by Dr. Ted Cooney, was composed of two parts: 1) a series of 11 presentations detailing OSRI biological modeling needs, several examples of biological modeling in support of ongoing or concluded programs elsewhere, and talks on related studies – the biology and physics of Prince William Sound and adjacent Gulf of Alaska waters; and 2) a panel discussion of the potential utility and need for biological modeling in Prince William Sound.

Presentations

An evaluation of the perceived modeling needs of the OSRI (Walter Cox) defined the general expectations of the workshop. Aspects of the PWSNF physical model were described as they pertained to modeling some aspects of the biology of Prince William Sound (Chris Moores, Ph.D.). An acoustic monitoring program (Richard Thorne, Ph.D.) was described for zooplankton, pollock and herring with relevance for understanding the survival of juvenile pink salmon in Prince William Sound. A benthic monitoring program on the Copper River delta (Sean Powers, Ph.D.) demonstrated an integrated approach utilizing both bottom up and top down studies of key benthic forage species. A tool-kit approach to coupled modeling (Mark Reed, Ph.D.) was demonstrated in relation to the PWSNF model of Prince William Sound. The morning session concluded with description of a large-copepod connection (Tom Kline, Ph.D.) between Prince William Sound and stocks on the shelf and nearby ocean.

The afternoon session opened with a presentation of ECOPATH type, mass-balanced biological models – their strengths and utility (Bob Christian, Ph.D.). Biological modeling (NPZ and individual-based models; Al Herman, Ph.D.) was described for the

Shelikov Strait FOCI study of walleye pollock eggs and juveniles. A first-principles model of the physical oceanography capturing flow fields and eddy formation and distributions was described for the northern Gulf (David Musgrave, Ph.D.). A 3-D coupled bio-physical model of the Columbia River estuary and plume (Antonio Baptista, Ph.D.) used in the CORIE program was presented and discussed. This talk was followed by a description of a 3-D coupled Biological/Physical model (Jia Wang, Ph.D.) for Prince William Sound.

Panel Discussion; Tuesday, June 17, 2003

The panel discussion was structured around a series of questions that began with "what biology" should be pursued in Prince William Sound given the needs of OSRI and the limitations of time and funding levels? It was the intent that after the "what" part was concluded, the panel would proceed to discussions of whether the biological model should be linked to the present PWSNF physical models, how this linkage would be accomplished in the development and operational aspects of the modeling, what data would be collected and by whom to support the modeling, how the biological model would be validated, and lastly, how the models would be made available to future users.

Unfortunately, during the Tuesday afternoon session the panel was unable to reach consensus on "what" biological phenomena would be the best candidates for biological modeling. Though there was much advice given and many suggestions made, a good deal of the information was contradictory. After the time allotted for the panel discussion had exhausted, the following suggestions were contenders: 1) What is needed is a more definitive conceptual model of the biology of Prince William Sound upon which to build a biological modeling strategy; 2) Because of limited time and resources for the biological modeling, the funds might be better spent on additional research; and 3) Since much has been learned in the previous decade about the biology of Prince William Sound, the OSRI should begin an incremental program of adding biology to the already mature PWSNF physical models. One participant suggested that OSRI write a general solicitation for biological modeling and then wait to air it until it became clearer what programs the GLOBEC, GEM and NPRB would be supporting. This would provide a chance to fine-tune the OSRI solicitation and perhaps provide the means to more easily leverage matching funding from the larger programs. While some were sympathetic to this idea, others expressed a desire to see an effort undertaken versus potentially open-ended modeling feasibility assessments. The panel was dismissed with the admonition to rethink the issues, and to be prepared to revisit the opportunities the following morning.

Continuation of the Biological Panel; Wednesday, June 18, 2003

After the general results of the physical panel discussion were presented, the biological panel was reconvened to again examine what might be the focus of biological modeling in Prince William Sound. After a period of struggling to find consensus, a suggestion was put forward that the biology of Pacific herring was well enough understood (at least in the juvenile stages) to permit some modeling of the early life history – a period for which the life stages are thought to reside entirely within Prince William Sound. This

suggestion was echoed by others, and after some additional discussion consensus was reached that OSRI should pursue some aspects of herring biology in a modeling program that would interface with the physical PWSNF models. Herring are among the most important commercial and subsistence resources in the region, and key forage resources for a host of fishes, birds and mammals in the Sound. The role of chronic effects from the *Exxon Valdez* spill in the continued depression of Prince William Sound herring stocks and the hypothesized influence of leachate from residual stranded oil on embryonic development suggest a strong relevance to the OSRI mission. An rfp for herring modeling was prepared with input from the panel (see Biological Modeling RFP – this document).

Biological Modeling RFP

Request for Pre-Proposals
Oil Spill Recovery Institute
Cordova, Alaska

Biological Modeling of Herring in Prince William Sound

The Oil Spill Recovery Institute (OSRI), located in Cordova, Alaska, is soliciting pre-proposals for herring modeling in Prince William Sound. Pre-proposals should describe how the herring model will interact with the present suite of physical models of Prince William Sound covering ocean and atmospheric physics, and oil spill trajectory and exposure and how herring would benefit from or be impacted by spill response options such as on-water mechanical, shoreline clean-up, and dispersion. More information on these ongoing modeling projects is available through www.pwsoos.org or by contacting OSRI. Pre-proposals should define and justify which life stages of herring will be modeled, identify data requirements for initializing and operating the herring model, and describe a proposed validation program. It is expected that this modeling effort will interact with other ongoing or planned studies in PWS conducted by OSRI, the Exxon Valdez Oil Spill Trustee Council's Gulf Ecosystem Monitoring program, or the North Pacific Research Board. OSRI expects to implement the herring modeling program in fiscal year 2004.

Full proposals will only be accepted from Investigators submitting pre-proposals through this RFP. Authors of successful pre-proposals will receive notification from OSRI requesting a full proposal and detailing the procedures for submission and evaluation of the proposals. Funding available through the OSRI Biological Modeling of Herring in Prince William Sound project is $100,000 for fiscal years 2004, 2005 & 2006. Matching funds are encouraged but not a requirement of this solicitation.

Pre-proposals should include the following:
1. Introductory letter on institutional letterhead (no more than 1 page)
2. Description of proposed effort (no more than 5 pages)
3. Citations
4. Resumes or curriculum vita of key personnel
5. Budget for proposed effort

Pre-proposals will be evaluated and full proposals may be sought by OSRI from one or more candidates through this process. OSRI reserves the right to reject any or all pre-proposals and makes no guarantee that an award will be issued in response to this solicitation.

Application Process

One signed original and an electronic version on compact disc of the pre-proposal (.pdf format) should be mailed to:

Herring Modeling Solicitation
Prince William Sound Oil Spill Recovery Institute
P.O. Box 705
Cordova, AK 99574

Pre-proposals must be submitted in hard copy form. Pre-proposals will not be accepted by FAX or electronically and must be postmarked by the due date of September 22, 2003.

Proposal Evaluation

Submissions will be evaluated by the methods described in the OSRI Grant Policy Manual. Evaluation criteria differ based on the type of project. In general, submissions will be evaluated by how well they meet the needs of the solicitation and fill existing research gaps. Experience of the team members will also be considered. For more information, refer to the OSRI Grant Policy Manual, Section 4.4.1, which can be found on the OSRI web page.

Awards

Pre-proposals, due by September 22, 2003 (postmarked by), will be evaluated by the method described above, and those selected for submission of a full proposal will be notified by October 13, 2003. The full proposal will be due by December 1, 2003. Awards made as a result of this competition will be administered in accordance with the terms and conditions of the OSRI Grant Policy Manual.

Additional Information

The OSRI provides awards for research relating to oil spills in the Arctic and sub-Arctic, The awardee is wholly responsible for the conduct of such programs, research and preparation of the results for publication. The OSRI, therefore, does not assume responsibility for the research findings, their interpretation or implementation of programs.

The OSRI welcomes pre-proposals from all qualified scientists, engineers and educators and strongly encourages women, minorities, and persons with disabilities to compete fully in any of the research related programs described here. In accordance with federal statutes, regulations, and OSRI policies, no person on grounds of race, color, age, sex, national origin, or disability shall be excluded from participation in, be denied the benefits of, or be subject to discrimination under any program or activity receiving financial assistance from the OSRI.

Further questions may be addressed to the OSRI by e-mail (frontdes@pwssc.gen.ak.us) or by contacting Nancy Bird, OSRI Director, at (907) 424-5800.

Agenda

Prince William Sound Nowcast Forecast Workshop
Monday, June 16, 2003
Millennium Hotel Anchorage Alaska

8:00 Continental Breakfast
8:30 Introduction, Goals, Objectives……..Tom Royer, ODU, Session Chair
9:00 Future of Coastal Observing in Alaska……...Molly McCammon, AOOS
9:30 Implementation and Early Operation of the Gulf of Maine Ocean Observing System……Neal Pettigrew, GoMOOS
10:00 BREAK
10:30 The National Ocean Service's Operational Oceanography Toolbox…..……Mark Vincent, PORTS / NOAA
11:00 Building an Offshore Ocean Observing System for Texas, the Texas Automated Buoy System, 1995-2003……Norman Guinasso, TAMU/TABS
11:30 Using a high-resolution NWP model to specify air-sea interactions in the coastal GOA…….Nick Bond, PMEL/NOAA
12:00 Catered Lunch
1:00 Overview of PWSNF & OSRI……Nancy Bird, OSRI & Walter Cox, PWSOOS
1:30 OSRI Observational Oceanography……Shari Vaughan, PWSSC
1:50 Prince William Sound POM…….……..Chris Mooers, RSMAS
2:40 Meteorological Observation Program…….Mike Lilly, GW Scientific
3:00 PWS Regional Atmospheric Modeling……...Peter Olsson, UAA/AEFF
3:30 BREAK
4:00 Panel Discussion…….Tom Royer, Chair
5:30 Recess

Agenda

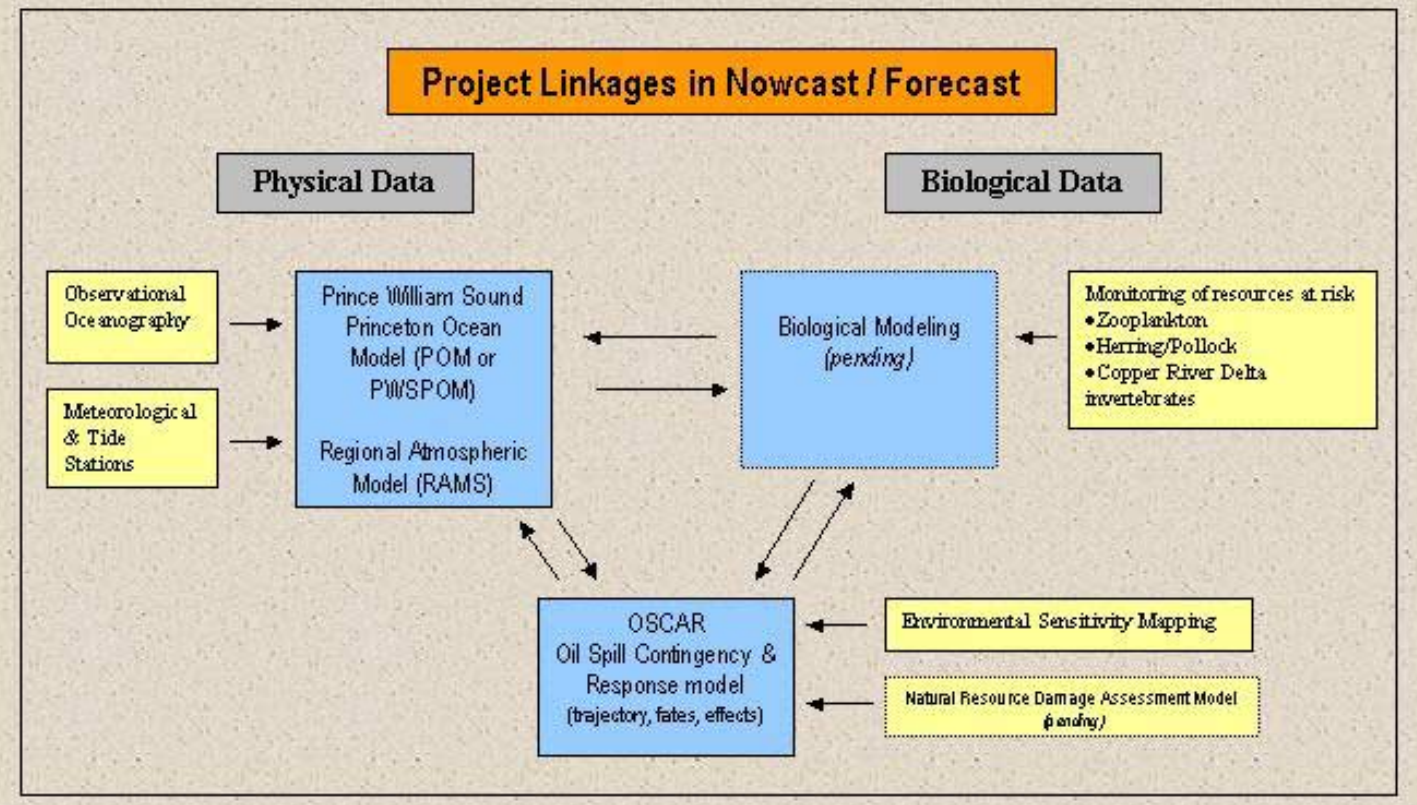
Prince William Sound Biological Modeling Workshop
Tuesday, June 17, 2003
Millennium Hotel Anchorage Alaska

8:00	Continental Breakfast
8:30	Introduction, Goals, Objectives……...Ted Cooney, UAF, Session Chair
8:45	OSRI Biological Modeling Needs and Expectations…….Walter Cox, PWSOOS
9:00	Considerations for PWSNF Biological Modeling……..Chris Mooers, RSMAS
9:30	Acoustic Monitoring in PWS……...Richard Thorne, PWSSC
10:00	BREAK
10:30	Copper River Delta Ecosystem Project……Sean Powers, USA
11:00	Biological Modeling Tool Kit & PWSNF……Mark Reed, SINTEF
11:30	Neocalanus Copepods Connecting Ocean Physics to the Biology of Prince William Sound.……..……Tom Kline, PWSSC
12:00	Catered Lunch
1:00	Uncertainty and Inference from Ecological Network Analysis of Aquatic Ecosystems……Bob Christian, ECU
1:30	Strategies for coupling physical and biological models: examples of Lagrangian and Eulerian approaches for the Coastal Gulf of Alaska..……Al Herman, PMEL
2:00	Simulations of Circulation in Prince William Sound: Implications for Control by Flow Outside PWS……..David Musgrave, UAF
2:30	A Physics-Based View of Habitat Opportunity for Juvenile Salmon in the Columbia River Estuary and Plume: The CORIE Experience.…..Antonio Baptista, OHSU
3:00	A 3-D Coupled Biological-Physical Model for the Ecosystem in Prince William Sound, Alaska ……..Jia Wang, UAF
3:30	BREAK
4:00	Panel Discussion……..Ted Cooney, Chair
5:30	Recess

Agenda

Prince William Sound Biological Modeling Workshop
Wednesday, June 18, 2003
Millennium Hotel Anchorage Alaska

8:00	Continental Breakfast
8:30	Chair Report on PWSNF Meetings……Tom Royer
9:00	Chair Report on Biological Modeling……Ted Cooney
9:30	Review & Update PWSNF 3yr & 10yr Plans....Chris Mooers
10:00	BREAK
10:30	Working Session –Developing a Solicitation for Biological Modeling in PWS……John Goering / Walter Cox
12:00	Closing Comments…….Nancy Bird
12:30	Catered Luncheon
1:30	Adjourn



Prince William Sound
Oil Spill Recovery Institute

Nowcast/Forecast Milestones

(Prepared as a planning document for PWSNF Phase II – winter 2003)

2003

POM (Physical Ocean Modeling)

- Evaluate NPAC-POM as the source of open boundary conditions
- Evaluate EPWSPOM utilizing 14 NGOA tide gauge stations, HE moored ADCP currents, etc.
- Forcing from 16km RAMS grid
- Dispersion Impact Analysis (DIA) technical evaluation

RAM (Regional Atmospheric Modeling)

- 16km resolution studies
- Evaluate fine grid requirements
- Software automation
- Incorporate near real-time sea surface temperatures
- Web site development
- DIA technical evaluation

OSCAR (Oil Spill Contingency and Response Model)

- DIA technical evaluation
- Evaluate inclusion of NRDA capabilities within OSCAR PWS
- Biological modeling integration assessment

OO (Observational Oceanography)

- Conduct towed ADCP and drifter studies
- ADCP Deployment (EVOS partnership)
- NPRB proposal submission

RAR (Resources at Risk Monitoring)

- Conduct Spring population survey
- Data Analysis and population estimation
- Evaluate model integration of data

CRDEP (Copper River Delta Ecosystem Project)

- Document the abundance and distribution of demersal fish and crabs in tidal channels
- Quantify relationships between demersal fish/crabs and benthic invertebrate prey through gut content analyses
- Characterizations of the waterfowl and non-shorebird components of the avian community
- Continue monitoring of benthic invertebrate community of the Delta
- Characterize primary producers and examine physical forcings (EVOS-GEM)

BMOD (Biological Modeling)

- Workshop to scope effort and develop solicitation
- Issue solicitation
- Evaluation of submissions

Tide and Met Station Operation

- Operate stations
- Preventative maintenance visits spring & fall
- Evaluate potential for partnering

2004

POM (Physical Ocean Modeling)

- Establish "mirror site" in Cordova and/or Anchorage
- Validation of EPWS/POM using OSRI, GLOBEC and related physical data on the continental shelf as well as in PWS
- Continue evaluation of the PWS/RAMS mesoscale atmospheric model using NDBC buoy and NDBC and OSRI coastal stations
- Begin real-time forcing of EPWS/NFS

RAM (Regional Atmospheric Modeling)

- Fine grid studies (4km)
- RAMS/POM coupling
- Validation of PWS RAMS begins

OSCAR (Oil Spill Contingency and Response Model)

- DIA analysis

OO (Observational Oceanography)

- Conduct towed ADCP / XCTD studies
- Coordinate with physical observation with biological measurements and modeling
- ADCP Deployment (EVOS partnership)

RAR (Resources at Risk Monitoring)

- Conduct Spring population survey
- Data Analysis and population estimation

CRDEP (Copper River Delta Ecosystem Project)

- Begin monitoring of demersal fish/crab community of the Eastern Copper River Delta and continued monitoring of the Western delta
- Begin motoring of benthic invertebrates of the Eastern Copper River Delta and continued monitoring of the Western delta
- Initiate resource mapping of Western Copper River Delta (GIS-based)
- Characterize primary producers and examine physical forgings (EVOS-GEM)
- Experimental assessment of top-down vs. bottom up regulation of benthic invertebrate community (OSRI & EVOS-GEM)

BMOD (Biological Modeling)

- Award of Contract (Winter board meeting)

Tide and Met Station Operation

- Operate stations
- Preventative maintenance visits spring & fall
- Evaluate potential for partnering

2005

POM (Physical Ocean Modeling)

- Begin data-assimilation with EPWS-POM utilizing the enhanced real-time observing system
- Begin integration of NPZD ecosystem and fish ecology submodels (NPRB funded models)

RAM (Regional Atmospheric Modeling)
- Collaborate on IOP studies
- Provide data for DIA studies

OSCAR (Oil Spill Contingency and Response Model)
- DIA Analysis

OO (Observational Oceanography)
- Collaborate on IOP studies
- Conduct towed ADCP / XCTD studies
- Coordinate with physical observation with biological measurements and modeling
- ADCP Deployment (EVOS partnership)

RAR (Resources at Risk Monitoring)
- Conduct Spring population survey
- Data Analysis and population estimation

CRDEP (Copper River Delta Ecosystem Project)
- Monitoring of benthic invertebrates and demersal fish/crabs of Eastern and Western Copper River Delta
- Evaluate importance of estuarine systems to existing salmonid juveniles (field sampling and otolith microchemistry)
- Expand foodweb characterization via stable isotopes
- Experimental assessments of key hypotheses for future food web modeling
- Complete resource mapping of West delta

BMOD (Biological Modeling)
- Begin integration within PWSNF (dependent upon option selected in 2004)
- Evaluation continuation / termination

Tide and Met Station Operation
- Operate stations
- Coordinate for IOP studies
- Preventative maintenance visits spring & fall
- Evaluate potential for partnering

2006

POM (Physical Ocean Modeling)
- Intense Observing Period (IOP) for barrier (alongshore, topographically trapped) jets and gap (cross-shore, orographically controlled) winds
- Assessment of unstructured grids for potential use in fjords, finite volume grids for CRD wetting and drying

RAM (Regional Atmospheric Modeling)
- Collaborate on IOP studies

OO (Observational Oceanography)
- Conduct towed ADCP / XCTD studies
- ADCP Deployment (EVOS partnership)

RAR (Resources at Risk Monitoring)

- Conduct Spring population survey
- Data Analysis and population estimation

CRDEP (Copper River Delta Ecosystem Project)

- Final year of benthic invertebrates monitoring Eastern and Western Copper River Delta
- Continue stable-isotope studies
- Continue salmonid studies
- Resource mapping of East Delta
- Initiate food web modeling in concert with larger Prince William Sound modeling efforts

Tide and Met Station Operation

- Operate stations
- Preventative maintenance visits spring & fall
- Evaluate potential for partnering

2007

POM (Physical Ocean Modeling)

- IOP for PWS mesoscale variability in Central Basin, Black Hole, and Knight Island Passage
- Evaluation and identification of final host for NF

RAM (Regional Atmospheric Modeling)

- Collaborate on IOP studies

OO (Observational Oceanography)

- Conduct towed ADCP / XCTD studies
- ADCP Deployment (EVOS partnership)
- Collaborate on IOP studies

RAR (Resources at Risk Monitoring)

- Conduct Spring population survey
- Data Analysis and population estimation

CRDEP (Copper River Delta Ecosystem Project)

- Synthesis of data
- Food-web modeling
- Validation studies for model efforts
- Final reporting

Tide and Met Station Operation

- Operate stations
- Preventative maintenance visits spring & fall
- Evaluate potential for partnering

2008

POM (Physical Ocean Modeling)

- Final data synthesis and reporting
- Deliver final version of NF to designated host

RAM (Regional Atmospheric Modeling)

- Final data synthesis and reporting
- Deliver final version to designated host as part of NF

OO (Observational Oceanography)

- Final data synthesis and reporting

RAR (Resources at Risk Monitoring)

- Conduct Spring population survey
- Data Analysis and population estimation

Tide and Met Station Operation

- Operate stations
- Preventative maintenance visits spring & fall
- Evaluate potential for partnering

Prince William Sound Nowcast-Forecast & Biological Modeling Workshops
Attendee List

Joe Banta
PWSRCAC
3709 Spenard Road
Anchorage, Alaska 99503
(907) 273-6222
banta@anch.pwsrcac.org

Nancy Bird
OSRI (Director)
P.O. Box 705
Cordova, Alaska 99574
(907) 424-5800
bird@pwssc.gen.ak.us

Mary Anne Bishop, Ph.D.
PWSSC
P.O. Box 705
Cordova, Alaska 99574
(907) 424-5800
mbishop@pwssc.gen.ak.us

Antonio Baptista, Ph.D.
OHSU
20000 NW Walker Rd.
Beaverton , Oregon 97006
(503) 748-1147
baptista@ccalmr.ogi.edu

Nicholas Bond, Ph.D.
NOAA / PMEL
7600 Sand Point Way NE
Seattle, WA 98115
(206) 526-6459
bond@pmel.noaa.gov

John Calder, Ph.D.
NOAA / OSRI
1335 East West Hwy Room 101 R/AR
Silver Spring, Maryland 20910
301-713-2518, ext 288
John.Calder@noaa.gov

Pamela Chelgren-Koterba
Alyeska – SERVS
P.O. Box 109
Valdez, AK 99686
(907) 834-6945
chelgren-koterbaPR@alyeskapipeline.
com

Robert Christian, Ph.D.
East Carolina University
S-105 Howell Science Complex
Department of Biology
East Carolina University
Greenville, NC 27834
(252) 328-1835
christianr@mail.ecu.edu

Ted Cooney, Ph.D.
PO Box 486
Choteau, Montana 59422
(406) 466-5155
windsong@montana.com

Walter Cox, M.Sc.
Prince William Sound Ocean Observing System
P.O. Box 705
Cordova, Alaska 99574
(909) 424-5800 ext. 234
cox@pwssc.gen.ak.us

Mark Fink
ADF&G / OSRI
333 Raspberry Road
Anchorage, AK 99518-1599
(907) 267-2336
Mark_Fink@fishgame.state.ak.us

Carol Fries
ADNR / OSRI
550 W. 7th Avenue
Anchorage, AK 99501
907-269-8425
carolf@dnr.state.ak.us

Shelton Gay
PWSSC
P.O. Box 705
Cordova, Alaska 99574
(907) 424-5800
shelton@pwssc.gen.ak.us

John Goering, Ph.D.
UAF / OSRI STC (Chair)
University of Alaska Fairbanks
Institute of Marine Science
School of Fisheries and Ocen Science
Fairbanks, AK 99775-1080
(907) 474-7895
goering@ims.uaf.edu

Norman Guinasso, Ph.D.
TAMU / GERG
833 Graham Road
College Station, Texas 77845
(979) 862-2323
norman@gerg.tamu.edu

Al Herman, Ph.D.
NOAA / PMEL / UW
7600 Sand Point Way NE, Bldg.3
Seattle, WA, 98115-0070
(206) 526-6495
hermann@pmel.noaa.gov

Tom Kline, Ph.D.
Prince William Sound Science Center
P.O. Box 705
Cordova, Alaska 99574-0705
(907) 424-5800
tkline@pwssc.gen.ak.us

Michael Lilly
GW Scientific
P.O. Box 81538
Fairbanks, Alaska 99708
(907) 479-8891
mlilly@gwscientific.com

Ole Mathisen, Ph.D.
UAF – SFOS / PWSSC
1632 San Juan Drive
Friday Harbor, WA 98250
(360) 378-3219
randim@rockisland.com

Molly McCammon
EVOS Trustee Council
645 G Street, Suite 401
Anchorage, AK 99501
(907) 278-8012
molly_mccammon@oilspill.state.ak.us

Christopher N.K. Mooers, Ph.D.
RSMAS / University of Miami
4600 Rickenbacker Cswy
Miami, FL 33149-1098
(305) 361-4088
cmooers@rsmas.miami.edu

Phil Mundy, Ph.D.
EVOS Trustee Council
645 G Street, Suite 401
Anchorage, AK 99501
(907) 278-8012
phil_mundy@oilspill.state.ak.us

David Musgrave, Ph.D.
University of Alaska Fairbanks
P.O. Box 757220
129 O'Neil Bldg.
Fairbanks, AK 99775-7220
(907) 474-7837
musgrave@ims.uaf.edu

Doug Mutter
Department of Interior
1689 C Street Room 119
Anchorage, AK 99501-5126
(907) 271-5011
douglas_mutter@ios.doi.gov

Peter Olsson, Ph.D.
UAA/AEFF
2811 Merrill Field Dr.
Anchorage, AK 99501
(907) 264-7449
olsson@aeff.at.uaa.alaska.edu

Walter Parker
PWSSC / NPRB / OSRI
3724 Campbell Airstrip Road
Anchorage, Alaska 99504
(907) 333-5189
wbparker@gci.net

Leslie Pearson
ADEC / OSRI
555 Cordova Street
Anchorage, AK 99501
(907) 269-7543
LPearson@envircon.state.ak.us

Neal Pettigrew, Ph.D.
U. Maine / GoMOOS
Libby Hall 202A
University of Maine
Orono, ME 04469-5741
(207) 581-4384
nealp@maine.edu

Sean Powers, Ph.D.
University of S. Alabama
Dauphin Island Sea Lab
101 Bienville Blvd.
Dauphin Island, AL 36528
(251) 861-7591
spowers@disl.org

Mark Reed, Ph.D.
SINTEF Applied Chemistry
N-7465 Trondheim
Norway
011 +47 (73) 59 12 32
Mark.Reed@chem.sintef.no

Gregory Spencer
Alaska SeaLife Center
301 Railway Avenue, P.O. Box 1329
Seward, Alaska 99664
(907) 224-6300 , ext.372
greg_spencer@alaskasealife.org

Richard Thorne, Ph.D.
PWSSC
P.O. Box 705
Cordova, Alaska 99574
(907) 424-5800
thorne@pwssc.gen.ak.us

Tom Royer, Ph.D.
ODU / OSRI / NPRB
Center for Coastal Physical
Ocenaography
Norfolk, VA 23529
(757) 683-5547
royer@ccpo.odu.edu

Shari Vaughan, Ph.D.
PWSSC
P.O. Box 705
Cordova, Alaska 99574
(907) 424-5800
vaughan@husky.pwssc.gen.ak.us

Jia Wang, Ph.D.
IARC/UAF
P.O. Box 757220
Fairbanks, AK 99775-7220
(907) 474-6877
jwang@iarc.uaf.edu

Terry Whitledge, Ph.D.
University of Alaska Fairbanks
Institute of Marine Science
Irving II Rm. 234
Fairbanks, AK 99775
(907) 474-7229
terry@ims.uaf.edu

John Whitney, Ph.D.
NOAA Hazmat
510 L St., #100
Anchorage, AK 99501
(907) 271-3593
john.whitney@noaa.gov

Han Yi, Ph.D.
AEFF
UAA/AEFF
2811 Merrill Field Dr.
Anchorage, AK 99501
(907) 264-7428
han@aeff.uaa.alaska.edu