Trustee Council Use Only
Project No: 050757
Date Received: _____

GEM PROPOSAL SUMMARY PAGE

Project Title:	Implementing the Pink Salmon Survival Model: Phase 1- Project Development Submitted under the BAA # AB133F-04-RP-0032
Project Period:	FY 2005
Proposer(s):	Kenneth Adams and Ross Mullins, Prince William Sound Fisheries Research Application and Planning
Study Location:	Prince William Sound
Abstract:	Funds are requested to plan the implementation of a numerical model of pink salmon survival within a framework of long- term monitoring and resource prediction. The plan will be prepared by an interdisciplinary team. PWSFRAP will coordinate workshops, internet assets, conferencing, report and proposal preparation and submission and will facilitate information exchange between the resource dependent community and the planners. The resulting plan will identify a team of implementers, a design and schedule for field sampling, modeling activities and parameterization, data management and information protocols stipulated by GEM. It is anticipated that this planning effort will be followed by a multi-year implementation phase. When fully implemented, the pink salmon modeling program will become a functional component of the GEM whole-ecosystem model and responsive to questions of pink salmon production, harvest, management and enhancement. This proposal is a companion to the interrelated ADF&G proposal (Moffitt: Management Applications: Implementing the Pink Salmon Survival Model- Tagging technology).
Funding:	EVOS Funding Requested: FY 05 $ 93.7K Non-EVOS Funds to be Used: FY05 $ 00
Date:	Date proposal prepared: April 12, 2004

GEM Research Plan

I. NEED FOR THE PROJECT

A. Statement of Problem

A major result of the Sound Ecosystem Assessment (SEA) program in Prince William Sound (PWS; Restoration Project 320), was the development of an evolution equation representation of the marine subsystem associated with hatchery reared juvenile pink salmon and the post-release period of outmigration. This time/space “model” simulates predator-prey interactions between the fry and their forage, and between the major fry predators and their prey, including juvenile pink salmon and macrozooplankton (Patrick et al., 2001and 2004; Willette et al., 2001). Completion of the SEA program in 1999 discontinued the support needed for further model refinements and its eventual implementation.

Funds are requested in this proposal to plan an implementation program for the pink salmon survival model as part of the GEM whole-ecosystem model of the Gulf of Alaska. This need is clearly identified in the overall GEM plan and FY05 Invitation for Proposals from the EVOS Trustee Council. We anticipate the submittal of a proposal to initiate the model’s implementation in FY06 and subsequent years.

In 1999, the SEA Program provided strong evidence for the proposition that pelagic marine subsystems involving juvenile fish can be represented by evolution equations--the class of equations used to represent ocean circulation and the dynamics of the combined physical and planktonic subsystem. For a subsystem with fish, the ``current" biological *state* of the subsystem is the ``current" values for a finite collection of time-varying density functions--one for each trophic subgroup--for all positions in the spatial domain and for all ``conditions" in a space describing individual physiology. The evolution equations describe the change (evolution) of the *state* with time; their solution specifies the *state* throughout some time period, e.g., during spring migration of fry through Prince William Sound.

From this perspective, the commencement of controlled releases of hatchery fry each April marks the beginning of another three-month experiment in the pelagic ecosystem of Prince William Sound. The goals and the results of the SEA Program included the tools to track the course of this experiment--to ``forecast" the state of physical, planktonic, and fry subsystems over the relevant spatial domain and throughout the period of fry outmigration.

However, comparisons between theory and experiment are necessarily limited to comparisons based on variables which are observable. Two types of observable variables were used for such comparisons in the SEA Program: for each separate fry and predator trophic group, (*a*) variables associated with individual physiological state for samples from a local area and from a small time interval (Willette et al., 2001); and, for a given hatchery, (*b*) the *relative* estuarine survival of each group of fry in the finite set of "release groups" defined by day of release (Patrick et al, 2001 and 2004, Ch 2). During

the SEA Program, estuarine survival for hatchery fry ***was not*** directly observable, but the (overall) marine survival by release group ***was*** directly observable because of the high resolution marking of the temporal release sequence provided by binary-coded wire tags. The *relative* estuarine survival of release groups is observable under the assumption that oceanic (post-PWS) survival is the same for all release groups from a given hatchery.

In a separate but interrelated GEM FY05 proposal (Moffitt: Management Applications: Implementing the Pink Salmon Survival Model-Tagging Technology) , the Alaska Department of Fish and Game will request funding to conduct limited field studies to evaluate the feasibility of observing the estuarine survival of hatchery reared pink salmon; more precisely, observing the fraction of a hatchery's release or of a release subgroup which survives to transit from PWS and into the Alaska Coastal Current. These feasibility studies will provide a means for validation of the pink salmon model.

B. Relevance to GEM program Goals and Scientific Priorities.

Implementation of the SEA pink salmon survival model addresses the development of two principal GEM program areas – Modeling and Management Applications. GEM intends to create a whole ecosystem natural resource model as an adaptive management tool for guiding future long-term monitoring efforts. GEM has also identified the area of Management Applications to describe intended programs that incorporate the results of monitoring and research to address management issues associated with marine mammal, bird and fisheries resources. Pink salmon in PWS support one of the largest mixed stock commercial, subsistence and sport fisheries in the world. Major questions about wild and hatchery stock interactions continue to be debated (Hilborn and Eggers, 2001; Wertheimer, et al., 2001), as do speculations about production performance under changing conditions of ocean climate. The resolution of these and other issues will require a variety of approaches, including ever-more sophisticated resource models. Because of the work completed by SEA, a pink salmon survival model has already been developed.

II PROJECT DESIGN

A. Objectives

1. Develop a comprehensive plan for the implementation of the SEA pink salmon survival model. (A list of all proposal planning team members, their affiliations, plus project advisers is included as addendum item #1).

2. Conduct limited field studies to evaluate the feasibility of partitioning early marine and oceanic survivals of pink salmon using PIT tags. (to be addressed by the referenced ADF&G proposal)

B. Procedural and Scientific Methods

Objective 1

The planning effort will be supported by workshops, web-site assets, and conferencing coordinated by the PWS Fisheries Research Applications Planning group (PWSFRAP) in Cordova. Program development is expected in four related areas identified recently by a pink salmon forecasting workshop held in Cordova on March 16-18, 2004. (Proceedings of this workshop are attached as addendum #2). Workshop attendees recommended the following interdependent components:

1. Implementation, refinement (as needed) and evaluation of the existing numerical model of pink salmon survival (University of Maryland);

2. Direct censusing of pink salmon populations emigrating from PWS, and double marking experiments to estimate early (in PWS) and late (in the ocean) survival rates (ADF&G, NOAA, University of Alaska). (This component will be addressed by the separate but interrelated ADF&G submitted proposal referenced above)

3. Acoustic censusing of juvenile salmon predators and macrozooplankton each spring (PWS Science Center).

4. Realization and evaluation of the maximum performance from contemporary and emerging technologies for thermal and chemical otolith marking in terms of numbers of unique highly detectable marks to be applied at low cost to specific release groups of fry at each hatchery.

This plan will include a description of the necessary field infrastructure needed to drive and validate the model, and to partition the survival of a year-class between early (in PWS) and later (oceanic migration) stages.

The plan will identify an interdisciplinary team of implementers, the kinds and scheduling of field sampling, modeling activities and parameterization, hardware and software needs (if any), and data management and information transfer policies as specified by GEM. The plan will emphasize a multi-agency approach to the work including share-costing and in-kind contributions of ship time and other logistic and science support. Participants are expected to represent ADF&G, NOAA, the PWS Science Center, the PWS Aquaculture Corporation, the Valdez Fisheries Development Association, the University of Alaska, and members of the fishing industry – the fleet, processors, and other stakeholders.

The present pink salmon survival model is the result of collaboration between observationalists and modelers working together in the SEA program (Cooney, et al., 2001). SEA discovered that juvenile pink salmon in PWS are subject to high rates of mortality due to predation by adult pollock, Pacific herring, and juvenile gadids in April, May and June. Willette et al., (2001)

reported that as many as 75 % of all fry (hatchery and wild pink salmon) could be lost to local food webs in the first 45 days of early marine residence. SEA also found that the fry and their predators shared a common zooplankton forage at this time, and further that if macrozooplankton stocks were weak, the larger planktivorous fishes would switch to feeding on smaller fishes to augment their diets. In this way, the production of large zooplankton each year partially regulated the eating of small fish by larger fishes. The SEA model captured these relationships for juvenile salmon but also explored the ramifications of different release schedules by hatcheries and fry losses to different sizes and densities of predators. The model simulates the physiology and foraging of juvenile salmon and their predators. Early model results demonstrated important aspects of satiation and linear feeding in reducing the number of juvenile salmon by pollock and herring near hatcheries. These kinds of loss functions cannot be observed directly, but instead arise from the simulation.

Validation of the pink salmon modeling will require independent measures of fry surviving the critical early marine period in PWS. A recently completed workshop on resource prediction recommended that model validation could be approached by direct censusing of juveniles as they are leaving PWS. Catching juveniles emigrating from PWS would also enable application of a second mark to partition survival between the early marine and oceanic lifestages. At present, all juveniles of hatchery origin in PWS (approximately 550 million) have their otoliths thermally marked in the early embryonic rearing phase. Combining estimates of early marine survival and stock composition of the juvenile population will enable estimation of early marine survivals of each hatchery release group and a very robust evaluation of pink salmon survival determined from model simulations.

The Prince William Sound Science Center currently surveys the stock of macrozooplankton (euphausiids and large calanoids) and large pelagic fishes each spring. Early analysis of these surveys suggests the results may have strong predictive power (Dick Thorne, per. comm.). Annual monitoring of macrozooplankton and large pelagics in the critical April-June fry survival window each year would provide important additional information needed to initiate and run the survival model and evaluate its results.

We envision the planning team would accommodate these different programs by creating a sampling structure designed to exploit the efficiencies afforded by sharing costs, logistics, and expertise.

Objective 2 *(This objective is being addressed in a separate FY05 proposal submitted by the Alaska Department of Fish and Game to comply with budgetary protocol. It is referenced in this proposal to emphasize the integral role that objective 2 plays in the general planning effort required to implement the pink salmon fry model and its validation. A copy of ADF&G's proposal summary page is included as Addendum #3)*

D. Description of the Study Area

An implemented pink salmon modeling survival program would be sited in PWS. Major elements of the FY05 planning process will be conducted in Cordova.

E. Coordination and Collaboration with Other Efforts

Planning the implementation of the pink salmon survival model and related studies will be undertaken by an interdisciplinary team. Team members will represent federal and state resource agencies, academia, the PWS Science Center, PWSFRAP, the pink salmon hatchery sector and the salmon industry. ADF&G and the regional aquaculture corporations provide annual forecasts of adult pink salmon returns and desire to increase the reliability of these activities by a close association with future juvenile pink salmon direct censusing and modeling. Every opportunity will be taken to involve and inform the stakeholders of the pink salmon resource (commercial, subsistence, and sport) in the planning process. In this sense, the resource dependent communities of PWS will have an opportunity to play a vital role in developing the implementation of the pink salmon model.

III. SCHEDULE

A. Project Milestones

Objective 1. Develop a comprehensive implementation plan – Completed by 1 March, 2005.

After receiving notice of funding, planning team members will attend a three day workshop in Cordova in October ’04 to begin the planning process for project implementation.

The plan will be continuously reviewed in development using a website, conference calls and at a second workshop in Cordova where the near-completed document will be subject to peer and public review – February, 2005

The final draft of the plan will be submitted to GEM for review – 1 March, 2005

If acceptable, a proposal will be re-submitted to GEM for FY’06 funding (15 April, 2005)

A final report of the planning process (and the plan) will be submitted to GEM – 30 September, 2005.

The form of the implementation plan will take that of a formal GEM proposal for purposes of expediting the submission in April.

B. Measurable Project Tasks

FY05 1st quarter (October 1-December 31, 2004) – The planning team will be assemble at a three day workshop in Cordova in October ’04 to outline the plan, assign writing tasks, and draft deadlines. Team members will function as a virtual committee using conferencing and web assets. The first draft of the plan/proposal is completed by the end of the 1st quarter.

FY05 2nd quarter (January 1-March 31, 2005) – The plan is completed and reviewed by a comprehensive workshop in Cordova. The plan is then submitted to GEM for evaluation and if the plan is accepted, a formal proposal is prepared for the April 15 submission deadline for FY06 proposals.

FY05 3rd quarter (April 1-June 30) – The proposal is submitted by 15 April for work beginning in FY06 and continuing for 3 years.

FY05 4th quarter (July 1-30 September) – A final report of the planning process is submitted to GEM.

IV. RESPONSIVNESS TO KEY TRUSTEE COUNCIL STRATEGIES

A. Community Involvement and Traditional Ecological Knowledge (TEK)

The process used to produce a plan for implementing the SEA pink salmon survival model and related infrastructure will be driven primarily from the bottom-up. Members of the resource dependent communities of PWS will be invited to attend the fall planning workshop so their concerns about the salmon resource, its management, enhancement, and harvest can be presented and discussed in an open forum. As described above, the planning team will have as members, representatives of the fishing industry and other users of pink salmon. This strategy will assure a comprehensive "product", developed within a consensus process designed to address the broadest possible concerns of pink salmon users in PWS. The process will also assure that members of the resource dependent community understand what is being planned, and have the opportunity to endorse the effort if they so desire.

B. Resource Management Applications

The wild pink salmon resource in PWS is managed by ADF&G to sustain its productivity over time. A regional escapement goal has been adopted to assure optimal reproduction each year in the face of changing marine and freshwater survivals. Over the years, ADF&G has attempted to design a reliable forecasting tool to alert managers, and the fishing industry about anomalous returns – huge or very small. For a variety of complex reasons, a reliable forecasting tool has yet to be developed. The pink salmon survival model discussed here has demonstrated some predictive capability in a limited evaluation (Willette, et al., 2001). However, the primary forecasting tool developed during the proposed planning process will be direct censusing of numbers of juveniles emigrating from PWS each year and double marking of juveniles to partition early marine and oceanic survivals. Fully implemented in a program of long-term monitoring and direct juvenile census each year, the pink salmon survival model will provide an increasingly refined means to understand the ecological processes causing observed changes in annual survivals. The model will also be used to assist hatchery managers in determining optimal release strategies for fry entering the Sound under different conditions of ocean climate. Finally, the model has demonstrated promise for “experimental” studies of wild and hatchery stock interactions in PWS.

V. PUBLICATIONS AND REPORTS

The planning process will produce a comprehensive plan for the implementation of the SEA pink salmon survival model in PWS. The plan will be reviewed for possible inclusion in the FY06 invitation by April 15, 2005. A final report of the planning process will be submitted to GEM in September, 2005.

No funding is requested for professional conferences. A representative of PWSFRAP will attend the GEM annual meeting in January, 2005.

Literature Cited:

Cooney, R. T., J. R. Allen, M. A. Bishop, D. L. Eslinger, T. Kline, B. L. Norcross, C. P. McRoy, J. Milton, J. Olsen, V. Patrick, A. J. Paul, D. Salmon, D. Scheel, G. L. Thomas, S. L. Vaughan, and T. M. Willette. 2001. Ecosystem controls of juvenile pink salmon (*Oncorhynchus gorbuscha*) and Pacific herring (*Clupea pallasi*) populations in Prince William Sound, Alaska. Fish. Oceanogr. 10(Suppl. 1): 1-13.

Hilborn, R. and D. Eggers. 2001. A review of the hatchery programs for pink salmon in Prince William Sound and Kodiak Island, Alaska: response to comment. Trans. Amer. Fish. Soc., 130:720-724.

Patrick, V., D. M. Mason, T. M. Willette, R. T. Cooney, R. H. Nochetto, J. R. Allen, S. P. Rao, and R. Kulkarni. 2001 and 2004. A time evolution representation of the marine subsystem associated with hatchery reared pink salmon fry and the post-release period of outmigration in Prince William Sound, Alaska. Initially a Technical Report (2001); to appear during 2004 in two volumes from CFIMS Press, P.O.Box 122, Savage, Maryland 20763

Prentice, E.F. 1986. A new internal telemetry tag for fish and crustaceans. *In* Marine farming and enhancement: Proceedings of the 15th U.S.-Japan meeting on aquaculture, Kyoto Japan, NOAA Tech. Rep. NMFS 85: 1-9.

Prentice, E.F., T. A. Flagg, and C.S. McCutheon. 1990a. Feasibility of using passive integrated transponder (PIT) tags in salmonids. Am. Fish. Soc. Symp. 7: 317-322.

Quinn, T.P., and N.P. Peterson. 1996. The influence of habitat complexity and fish size on overwinter survival and growth of individually marked juvenile coho salmon (*Oncorhynchus kisutch*) in Big Beef Creek, Washington. Can. J. Fish. Aquat. Sci. 53: 1555-1564.

Wertheimer, A. C., W. W. Smoker, T. L. Joyce, and W. R. Heard. 2001. Comment: a review of the hatchery programs for pink salmon in Prince William Sound and Kodiak Island, Alaska. Trans. Amer. Fish. Soc., 130:712-720.

Willette, T. M., R. T. Cooney and K. Hyer. 1999. Predator foraging mode shifts affecting mortality of juvenile fishes during the subarctic spring bloom. Can. J. Fish. Aquat. Sci. 56: 364-376.

Willette, T. M., R. T. Cooney, V. Patrick, D. M. Mason, G. L. Thomas, and D. Scheel. 2001. Ecological processes influencing the mortality of juvenile pink salmon (Oncorhynchus gorbuscha) in Prince William Sound, Alaska. Fish. Oceanogr. 10 (Suppl. 1):14-41.

Willette, T.M., R. DeCino, N. Gove. 2003. Mark-recapture population estimates of coho, pink, and chum salmon runs to upper Cook Inlet in 2002. ADF&G Regional Information Report 2A03-20.

RESUMES

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Brief Summaries of Professional Histories

In late February of FY02 and continuing in FY03, Adams and Mullins were provided funding for a "pilot project" by the EVOSTC entitled "Fisheries Management Applications" (02636 and 03636). Adams and Mullins have acted as co-coordinators for this **Community Involvement Project.** The name adopted by the Co-PI's for their project is Prince William Sound Fisheries Research Applications and Planning group (PWSFRAP).

In FY03 PWSFRAP group incorporated into the project a volunteer Science Advisory Panel that was comprised of Mr. Mark Willette, former SEA PI and ADF&G research biologist; Mr. Tim Joyce, a former ADF&G management biologist, hatchery operator, US Forest Service subsistence biologist and currently serving as mayor of Cordova; Dr. Richard Thorne, a scientist at the PWS Science Center working on zooplankton and acoustic bio-mass fishery issues. Dr. Tom Kline, a scientist with PWSSC working in the area of marine isotope linkages in the ecosystem, and Dr. Ted Cooney (retired) a PI in the SEA program with a long history of PWS science involvement

PWSFRAP was funded in FY'04 for continuation of the needs identification and resolution project begun in FY '02 and '03. After extensive collaboration with Dr. Ted Cooney and financial support from the EVOS Trustee Council and the Oil Spill Recovery Institute, Adams and Mullins hosted a successful three day workshop in Cordova from March 16-18, '04 aimed at improving pink salmon forecasting accuracy in PWS. This proposal is the main product of that workshop.

Ken Adams has been a commercial fisherman for 25 years. During that time he has held permits and owned vessels in a number of the fisheries of PWS. Currently Adams holds permits and is owner operator of vessels for the drift gillnet fishery and salmon purse seine fishery for PWS. He also holds IFQ halibut quota shares.

Adams obtained an MA degree in biology from San Francisco State College and a BA in Science from Trenton State College in Trenton, New Jersey. In addition Adams has completed approximately 30 credit hours toward a PHD degree in biology at the University of California, Santa Barbara. He has taught science classes in high school and at the community college level.

Adams has held an active membership in all of the fishery organizations of the region. He has held seats on the Board of Directors of PWSAC, CDFU, and PWSSC. He is currently serving as a Board member of the American Seafood's community advisory board. During 1993 Adams was a participant in the four-month planning process that created the Sound Ecosystem science plan. That plan was the guiding document for the SEA program. Adams served on the BOD of the PWSSC for nine years. During the period since the close of the SEA program Adams has remained involved in the review and assessment of the results and the technical assets and resources acquired through the SEA program. Adams has actively followed the progress of the overall restoration plan with the goal of identifying results that can now contribute to securing and sustaining the recovery of commercial fishing.

Ross Mullins has resided in Cordova since 1963 where he has pursued an active career in the varied commercial fisheries of the PWS-Copper River area. He has been both the owner operator of various vessels and, during the time that the herring fisheries were viable, he was President of MSP Corporation, a processor of herring products for export to Japan.

Mr. Mullins has been active in the various fishery related organizations of the region. He has served on the BOD and Executive Committee of PWSAC for many years since that organizations inception. Mullins has been a member of the BOD of CDFU and the former Cordova Aquatic Marketing Association for many years. In the late 60's and early 70's Mullins created the "Marine Pollution Committee" of the Cordova District Fisherman's Union with the intent to alert the community to the dangers posed by the transportation of oil by super tanker through PWS. This group funded an effort to prevent the siteing of the oil terminus at Valdez and promoted transport of oil to the lower 48 via pipeline through Canada. Mullins is a member of the Copper River Salmon Producers Assn. Mullins served on the BOD of the Alaska Commercial Fishing and Agriculture Bank for 13 years. Mr. Mullins is the founder and chairman of the PWS Fishermen Plaintiff's Committee, an organization that serves to provide that serves to provide an interface for information to the local community relating to the Exxon Valdez oil spill litigation. Mullins was a participant in the planning process that created the Sound Ecosystem science plan. That plan was the foundation document for the SEA program. During the period since the close of the SEA program Mullins has remained involved in attempting to understand the results of the technical assets and resources acquired through the SEA program.

Mr. Mullins attended the University of New Hampshire, the University of Michigan, and obtained a BFA degree in photography from the San Francisco Art Institute.

EXXON VALDEZ OILSPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 05 - FY 07

Budget Category:	Proposed FY 05	Proposed FY 06	Proposed FY 07	TOTAL PROPOSED
Personnel	$37.7	$0.0	$0.0	$37.7
Travel	$9.9	$0.0	$0.0	$9.9
Contractual	$31.9	$0.0	$0.0	$31.9
Commodities	$0.3	$0.0	$0.0	$0.3
Equipment	$0.0	$0.0	$0.0	$0.0
Subtotal	$79.8	$0.0	$0.0	$79.8
Indirect (rate will vary by proposer)	$6.2			$6.2
Project Total	$86.0	$0.0	$0.0	$86.0
Trustee Agency GA (9% of Project Total)	$7.7	$0.0	$0.0	$7.7
Total Cost	$93.7	$0.0	$0.0	$93.7

Cost-share Funds:

There are no cost share funds available at this time.

Indirect rate: 7.8% (It includes office lease @$4.3 ($360 x 12mo); utilities@$1.2 ($100 x 12mo); liability insurance @$0.7)

FY 05

Date Prepared:04/10/04

Project Number: 050757-BAA
Project Title: Implementing the SEA pink salmon survival model: Phase I - Project development (FY05)
Proposer: Ken Adams & Ross Mullins
PWS Fisheries Research Applications and Planning group.
Lead Agency: NOAA

FORM 4A NON-TRUSTEE SUMMARY

EXXON VALDEZ OILSPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 05 - FY 07

Personnel Costs:			Months	Monthly		Personnel
Name	Description		Budgeted	Costs	Overtime	Sum
Ken Adams	Co-PI		2.5	4.8		12.00
Ross Mullins	Co-PI		2.5	4.8		12.00
Liz Senear	Tech/Admin		2.0	3.0		6.00
Dick Thorne	Consult		0.8	6.4		5.12
Ted Cooney	Consult		0.4	6.4		2.56
*EV Patrick	see contractual		4.0	0.0		0.00
*Mark Willette (ADF&G Fisheries Research)	agency consult at no cost		0.5	0.0		0.00
*Steve Moffitt (ADF&G Fisheries Research/Mgmt)	agency consult at no cost		0.5	0.0		0.00
		Subtotal	13.2	25.4	0.0	[illegible]
					Personnel Total	$37.68

Travel Costs:			Ticket	Round	Total	Daily	Travel
Description			Price	Trips	Days	Per Diem	Sum
Ken Adams			0.28	1	4	0.10	0.68
Ross Mullins			0.28	1	4	0.10	0.68
October Workshop: 4 participants travel :	Patrick	1 at $1200	1.20	1	3	0.15	1.65
	Coon ey	1 at $1100	1.10	1	3	0.15	1.55
	Willette	1 at $400	0.40	1	3	0.15	0.85
	other	1 at $400	0.40	1	3	0.15	0.85
February Workshop: 3 participants travel:	Patrick	1 at $1200	1.20	1	2	0.15	1.50
	Coon ey	1 at $1100	1.10	1	2	0.15	1.40
	Willette	1 at $400	0.40	1	2	0.15	0.70
							0.00
							0.00
							0.00
						Travel Total	$9.86

FY 05

Project Number: 050757-BAA
Project Title: Implementing the SEA pink salmon survival model: Phase I - Project development (FY05)
Proposer: Ken Adams & Ross Mullins
PWS Fisheries Research Applications and Planning group.
Lead Agency: NOAA

FORM 4B
Personnel
& Travel
DETAIL

EXXON VALDEZ OILSPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 05 - FY 07

Contractual Costs:		Contract Sum
Description		
Phone	$60.00 month x 12	0.72
Internet	$188.27 month x 12	2.26
Photocopies	annual	0.20
Conference Calls	2 per month @ $200 ea. X 12 (avg $17/hr/person)	2.40
Cater for 2 workshops		0.75
Subcontract: Univ- Maryland/ Carlos Berenstein PI and E.V. Patrick PI. *(See description breakdown sheet attached at end of budget just		25.60
Contractor will create and maintain a virtual website for use by planners for developing a pink fry survival model and forecasting implementation plan.		
Contractor Patrick was the principal PI in the SEA pink salmon fry survival model development and will cooperate with project planners in all aspects		
of developing and designing a usable model implementation plan. Dr. Berenstein will receive rate of $80/hr for 1 day =$734.00.		
Dr. E.V. Patrick agrees to work on the planning effort for whatever time is required for the project completion. This results in a rate of		
1.78 months totaling $15.822k. Expendables, phone etc is $670.00 The remainder is Univ. of Md overhead at 48.5% totaling $8.355k.		
If a component of the project will be performed under contract, the 4A and 4B forms are required.	**Contractual Total**	31.93

Commodities Costs:	Commodity Sum
Description	
Computer and office supplies	0.30
Commodities Total	0.30

FY 05

Project Number: 050757-BAA
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PWS Fisheries Research Applications and Planning group.
Lead Agency: NOAA

FORM 4B
Contractual & Commodities
DETAIL

EXXON VALDEZ OILSPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 05 - FY 07

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
There are no new equipment purchases.			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency
Computer equipment obtained in FY02-FY03 will be utilized in this project.		

FY 05

Project Number: 050757-BAA
Project Title: Implementing the SEA pink salmon survival model: Phase I - Project development (FY05)
Proposer: Ken Adams & Ross Mullins
PWS Fisheries Research Applications and Planning group.
Lead Agency: NOAA

FORM 4B
Equipment
DETAIL

EXXON VALDEZ OILSPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 05 - FY 07

Personnel Costs:			Months	Monthly		Personnel
Name	Description		Budgeted	Costs	Overtime	Sum
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
		Subtotal	0.0	0.0	0.0	
					Personnel Total	$0.0

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$0.0

FY 06

Project Number:
Project Title:
Proposer:

FORM 4B
Personnel
& Travel
DETAIL

EXXON VALDEZ OILSPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 05 - FY 07

Contractual Costs:	Contract Sum
Description	
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$0.0
Commodities Costs:	Commodity Sum
Description	
Commodities Total	$0.0

FY 06

Project Number:
Project Title:
Proposer:

FORM 4B
Contractual &
Commodities
DETAIL

EXXON VALDEZ OILSPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 05 - FY 07

New Equipment Purchases:		Number	Unit	Equipment
Description		of Units	Price	Sum
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
			New Equipment Total	$0.0

Existing Equipment Usage:	Number	Inventory
Description	of Units	Agency

FY 06

Project Number:
Project Title:
Proposer:

FORM 4B
Equipment
DETAIL

EXXON VALDEZ OILSPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 05 - FY 07

Personnel Costs:			Months	Monthly		Personnel
Name	Description		Budgeted	Costs	Overtime	Sum
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
		Subtotal	0.0	0.0	0.0	
					Personnel Total	$0.0

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$0.0

FY 07

Project Number:
Project Title:
Proposer:

FORM 4B
Personnel
& Travel
DETAIL

EXXON VALDEZ OILSPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 05 - FY 07

Contractual Costs:	Contract
Description	Sum
Contractual Total	$0.0

Commodities Costs:	Commodity
Description	Sum
Commodities Total	$0.0

FY 07

Project Number:
Project Title:
Proposer:

FORM 4B
Contractual &
Commodities
DETAIL

EXXON VALDEZ OILSPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 05 - FY 07

New Equipment Purchases:	Number	Unit	Equipment
Description	of Units	Price	Sum
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$0.0

Existing Equipment Usage:	Number	Inventory
Description	of Units	Agency

FY 07

Project Number:
Project Title:
Proposer:

FORM 4B
Equipment
DETAIL

BUDGET JUSTIFICATION

FY-05-Implementing the SEA Pink Salmon Fry Survival Model: Phase I -Project Development

Total funding requested: $93.7K

Personnel:
Co-PI's Adams and Mullins are each budgeted @ $30/hr for 2.5 man months for a total of 5.0 man months and a gross amount of $24.0 k annually. Senear the tech/admin office person is budgeted @ $20.hr for 2.0 man months for a total of $6.0 k annually. All personnel work essentially year round on the project with the exception of part time in the months of June, July, August and September when Adams and Mullins are engaged in commercial fishing activity. FY05 will be require the organization of an effective interdisciplinary project design for the implementation of a multi-year observational and fry survival model prototype. This task will require a blending of disciplines and communication skills that rely on previous personal interrelationships and assets brought forth in a series of workshops held in Cordova from late FY02-FY04. Total for Adams, Mullins and Senear is $30.0k. There is no set hourly rate.

Richard Thorne is budgeted for compensation of $5.12k. Dr. Thorne is chief scientist with the Prince William Sound Science Center and will be devoting considerable time helping to design an implementation plan for the FY06 season. Dr. Thorne is currently working on hydro-acoustic measurement of fish populations and conducts seasonal zooplankton assessments in selected areas of PWS. Total for Dr. Thorne $5.12k. There is no set hourly rate.

Ted Cooney is budgeted for compensation of $2.56k. Dr. Cooney is a retired researcher from the University of Alaska School of Fisheries. Dr. Cooney has extensive experience in PWS with top down observational studies and project design dating back to the early 1970's and will contribute invaluable insights to the overall planning process. Total for Dr. Cooney is $2.56k.
There is no set hourly rate.

E.V. Patrick will be compensated through a contract with the University of Maryland that will be signed between the PWS Fisheries Research Application and Planning group and the University of Maryland upon approval of this planning grant proposal. Dr. Patrick was the principal PI in the EVOSTC funded SEA project (1993-1999) in PWS that developed the Pink Salmon Fry Survival Model and the Herring Distribution Model. Dr. Patrick is presently at the University of Maryland and is planning to provide his expertise consulting on the issues relating to model implementation anticipated for FY06. Dr. Patrick will also be providing and maintaining a virtual web presence for project planners to utilize for the posting of writing and editing assignments required during the project plan development process. This web presence will be an invaluable adjunct to the planning group for maintaining active communication and plan development in between the two primary workshops that will be held in Oct of 05 and Feb of 06. Working closely in cooperation with Dr. Patrick is fundamental to the successful plan development and to the anticipated implementation of the SEA Pink Salmon Fry Survival Model in the FY06 GEM fiscal year. (See contract amount of $25.6k under contractual section of this proposal budget.)

Mark Willette and Steve Moffitt are ADF&G researchers that will be devoting time to the planning process and will be the primary PI's for the fieldwork involving the PIT tag feasibility portion of the project. (The budget request for the FY05 PIT tag feasibility study is submitted under trustee agency submission)

The personnel costs of $37.68 will be expended on time relating to preparation for and the conducting of two planning workshops in Cordova and for compensation of time expended by planners. The planning team will meet by teleconference approximately twice per month for five months for discussion and

problem resolution. Writing tasks will be assigned and planners will be expected to meet timeline goals for project development that will be developed during the first workshop. A virtual website that will be structured and maintained by Dr. Patrick and this will provide a valuable interactive resource for the posting, editing and communication between the planners. This website will enhance the ability of planners to interact with each other at times that are convenient and available for each planning team members' circumstance.
Total personnel budget request is $37.68.

Travel:
Each Co-PI is budgeted for $0.68 k for attending the EVOS/GEM annual symposium. This includes round trip travel, lodging and meals. Total for this is $1.36 k.
The remaining travel budget of $8.50 k is for bringing planners together at two workshops to be held in Cordova. One workshop will be in October of FY05 and a second wrap-up workshop will be held in February of FY06. This travel budget includes the cost of lodging and meals while attending the workshops.
Total travel requested is $9.86 k.

Contractual Costs:
Contractual costs consists of telephone @ $60 per month totaling $.72k
Internet (high speed)@ $187.27 per month totaling $2.25k
Photocopying is budgeted annually at $0.2k
Conference calls for meetings is budgeted annually @ $2.40k. Our experience shows that costs are on average .27 cents per minute per person and we anticipate several conference calls per month at approximately $200 each.
Catering for two planning workshops is budgeted @ $.0.75k
Subcontract with the University of Maryland for the purpose of obtaining the services of Dr. E.V. Patrick and Dr. C. Berenstein at the Institute for Systems Research. This includes computer assets available through ISR. Subcontract cost is $25.6k.
Total contractual requested is $31.93k.

Commodities Cost:
The cost of office supplies, computer/printer/ disks/consumables is budgeted at $.3k annually.
Total commodities requested is $.3k.

New Equipment Purchases: None

Indirect Rate: 7.8%
Indirect rate cost includes office lease @360 mo x 12 totaling $4.3k, Utilities @$100/mo x12 totals $1.2k. Liability and workman's compensation insurance for the project is $0.7k annually. The indirect costs are for maintenance of a small office where project business is conducted and office equipment is housed. This office serves as an important interface with the community and creates a local presence for the GEM program. The total for all indirect costs is $6.22k.

Trustee Agency GA (9% of project total) is $7.74k.

The total requested for all of the proposed budget items is: $93.73k.

**See addendum that follows for complete explanation of the Patrick/Berenstein/UMD subcontract.

Budget Justification – Addendum

Background and Explanations for the Proposed Subcontract Budget and Institutional Affiliation for Contributing Investigator E. V. Patrick

Affiliation:
Dr. Patrick currently holds an appointment as Research Associate in the Institute for Systems Research at the University of Maryland College Park. This is a year-to-year appointment which Dr. Patrick has held since 1989. The appointment was originally established and is annually renewed at the request of Professor Carlos A. Berenstein, a permanent and founding faculty member of the Institute, for the purpose of supporting and continuing his collaborative involvement in new and potentially high-impact applications of mathematics. A copy of the letter of renewal for the current fiscal year is attached.

Background:
The collaboration with Professor Berenstein has at several times had a key role in the development of one of the technologies that is the subject of this proposal.

- The application of evolution equations to juvenile pink salmom and to the pelagic ecosystem of Prince William Sound was based on a prior application by Mason and Patrick (1993, Trans. Amer. Fish. Soc., 122, 884-901) for Lake Michigan developed during 1990 through 1992. The development of that application became Mason's dissertation topic, one that required a multi-disciplinary committee. Professor Berenstein served on Mason's committee and contributed the essential extra-disciplinary review and guidance needed for a successful outcome.

- Based on the understanding of the area of application gained through service on the dissertation committee, Professor Berenstein, from his own research funds, provided partial support for Dr. Patrick during 1993 for the further development of both the representation and its numerical solution and for their application to Prince William Sound. This support made it possible to formulate, debate, and document during two months in the fall the two nekton models of the SEA Science Plan.

- Professor Berenstein has made important contributions to the preservation of the development history and results from 1990 through the present. The appointment with ISR provides access to network services. Since 1990, the ISR network has provided a stable and reliable archive for R&D records and results. This role expanded to the sole archive in May 2003 due to a closure. At that time, Professor Berenstein made available to this project a major fraction of his own space within ISR. During May 2003, all infrastructure and archives were relocated to space within ISR and integrated into the ISR networks. The opportunity to recover and continue with progress and results which have been idle for more

than five years is possible because of foregoing critical contribution to this project.

Today:
The collaboration with Professor Berenstein and the appointment with ISR are essential aspects of the future fiscal feasibility of the proposed project. Although the ISR appointment is unfunded in terms of salary, it conveys major resources which are prohibitively expensive to reproduce. A partial list of such resources includes:

- All university library services including online subscriptions;

- The ISR "supported" network, which includes current and maintained versions of all licensed commercial software and of a comprehensive set of public domain software.

  For purposes of efficient development, the numerical solution for the pink salmon model was written in the proprietary language IDL. A single-user UNIX license for a non-academic site costs well over $3000.

- The ISR "unsupported" network gives the project the flexibility needed to continue with its current infrastructure, all of which is too old for the network support. The advantage of site licensing reduces license costs from several thousand to a few hundred dollars.

- Maintained office services and project accounting.