Southeast Sustainable Salmon Fund
Statement of Work

I. Project Title: ASLC: Restore Salmon Runs in Resurrection Bay at Alaska SeaLife Center – Year 2

II. Project Manager

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III. Project Start and End Date: January 1, 2005 – June 30, 2009

IV. Project Description

The Alaska SeaLife Center (ASLC), in collaboration with MariCal, Inc., a marine technology company based in Portland, Maine, the Alaska Department of Fish and Game (ADF&G) and Cook Inlet Aquaculture Association (CIAA) propose to restore salmon runs in Resurrection Bay through a coordinated program involving releases of naturally produced and hatchery-origin Chinook, coho and sockeye salmon smolt. *Related AKSSF projects: 45439, 45646, 45742.*

The program consists of two goals.

The first goal is to continue the current salmon restoration effort in Resurrection Bay for Chinook and coho salmon. Specifically, the ASLC proposes to rear 100,000 Chinook fry at the ASLC for release into Resurrection Bay as age-0 smolt (n=75,000) and age-1 smolt (n=25,000) in June 2005 and June 2006, respectively. These fry will be supplied to the ASLC by the ADF&G in December 2004. In addition, we propose to rear and release approximately 400,000 age-1 coho smolt produced at the CIAA Trail Lakes hatchery into Resurrection Bay in June 2005. These releases will be part of a project designed to evaluate the potential for new technology developed by MariCal, Inc., to increase ocean survival and adult returns of coho and Chinook salmon stocked into Resurrection Bay. The patented process is based on MariCal's unique understanding of the role of polyvalent cation sensing receptor proteins (CaR's) as salinity sensors in fish (1). If successful, application of the MariCal process will provide significant improvement in the technical and economic performance of the public and private-non-profit salmon enhancement program in Alaska.

The second goal of this program is to aid in the restoration of sockeye salmon in Bear Lake. The native population of sockeye salmon in Bear Lake was largely extirpated following efforts in the 1960's to control predator and competitor salmonid populations in Bear Lake to initiate coho stocking for sport fisheries. CIAA, in a cooperative agreement with the ADF&G initiated a program to restore sockeye salmon production from Bear Lake to historic harvest levels through fry stocking beginning in 1990. Since then, approximately

17 million fry have been stocked. More recently, the program was expanded to stock fall pre-smolt as well as yearling smolt in the spring. However, little is known about the physiological characteristics and molecular fitness traits (e.g. growth rates, gill Na+K+ATPase activity, hypo-osmotic competence) of the smolt that originate from natural spawning, fry or pre-smolt stocking, or full-term smolt released into the lake in the spring. Such differences have been shown to influence ocean survival and subsequent adult returns (2). Determining whether such differences exist among the various natural and hatchery-origin cohorts of the Bear Lake smolt will help guide stocking efforts to restore this population. As part of our effort, we propose to treat ≥ 50% of the yearling smolt with MariCal's process to determine if this technology can increase the rate and size of returning adults produced by hatchery-origin smolt. Hatchery-origin smolt often fail to survive in the ocean at rates comparable to those achieved in natural populations, in part because the environmental and nutritional conditions in the hatchery exacerbate the osmotic stress associated with ocean entry and thereby reduce early seawater growth. Since seawater acclimation of hatchery smolt prior to release can significantly increase the number and size of returning adult salmon compared to fish released directly from freshwater (3), hatchery-origin salmon may benefit from culture techniques such as MariCal's process that functionally acclimates pre-smolt to seawater while remaining in fresh water.

Additionally, we plan to identify the numeric contributions of the various smolt cohorts (e.g. natural production, fry to smolt hatchery stocking) to adult returns and measure the qualitative characteristics of returning adults that affect reproductive performance. Specifically, we intend to quantify the proximate composition (e.g. protein, lipid, moisture, amino acids, fatty acids) and presence of environmental contaminants (e.g. PCB's) in the muscle, sensory and reproductive tissues of returning adults because of the potential effects of these factors on sockeye salmon restoration. Egg composition, for example, is a direct function of the diet and nutritional state of female salmon prior to and at the time of maturation, and has a significant effect on hatching success and size of emergent fry. Moreover, pollutants such as PCB's, which are known teratogens, concentrate in tissue lipids in salmon and thereby present additional risk for reproductive success. Environmental contaminants transported by spawning salmon to their natal habitats can also enter the freshwater food chain and amplify in the fry to smolt stages of the life cycle (4). Improved understanding of the relationship between the physiological status of migrating smolt and their subsequent quantitative and qualitative influence on the spawning population will aid in effective evaluation of impacts through enhancement and escapement of respective smolt and adult components of the populations least affected by nutritional limitations or persistent environmental pollutants.

Finally, the data from these studies will complement those recently obtained by the Alaska Department of Environmental Conservation Fish Monitoring Program (http://www.state.ak.us/dec/eh/vet/fish.htm) that quantified the presence of selected pesticides, PCBs and heavy metals in various fish species throughout Alaska. This survey found significant variability within almost all substances tested including, for example, a more than 4-fold variation in arsenic, nickel, methyl mercury and PCB within the 24 sockeye salmon tested (of which 12 were obtained from the Gulf of Alaska). These studies will complement the ADEC Fish Monitoring Program in two ways. First, we propose to obtain data on multiple tissues of sockeye salmon from a specific population to provide a more focused survey of environmental contaminants. Secondly, we will be able to directly

relate the level of various contaminants to the physiological characteristics and reproductive status of returning adult salmon. All sample collection and analysis will be coordinated with and conducted under guidelines provided by the ADEC. The collection of sockeye salmon will follow the sampling protocol outlined in the Fish Tissue Monitoring Program's Quality Assurance Project Plan (QAPP). Salmon will be shipped to the Environmental Health Laboratory with a sample form and chain of custody form. The fish samples will be processed according to procedures in the QAPP and analyzed for trace metals at the Environmental Health Laboratory or Public Health Laboratory. A portion of the homogenized tissue will be sent to a contract laboratory for low concentration individual congener analysis of the following contaminants: PCB congeners, total PCBs, dioxins, furans, 40 different pesticides, brominated fire retardants (PBDEs) and inorganic arsenic. These data will be validated by the ADEC and a report of the results will be provided to the Alaska SeaLife Center, MariCal researchers, and ADF&G.

V. Project Objectives

Goal I: Continue the current salmon restoration effort in Resurrection Bay for Chinook and coho salmon to augment the existing sport fisheries.

Objective A: Rear approximately 75,000-80,000 age 0 Chinook and 15,000-25,000 age 1 Chinook salmon at the ASLC for release into Resurrection Bay in spring 2005.

Task 1. Obtain 15,000-25,000 brood year 2003 fry from ADF&G for release as age 1 Supersmolt® in 2005.

Task 2. Obtain 100,000 Chinook fry from ADF&G in December 2004.

Task 3. Raise ~ 75,000 fry, for release as age 0 Supersmolt® in 2005.

Task 4. Raise ~ 25,000 fry, for release as age 1 Supersmolt® in 2006.

Objective B: Treat approximately 200,000 coho age 1 pre-smolt at Trail Lakes Hatchery and approximately 200,000 coho age 1 pre-smolt stocked at Bear Lake weir using the Supersmolt® process in spring 2005.

Objective C: Collect, process, and analyze ~ 400 gill samples for Na+K+ATPase activity and blood ion samples from Supersmolt® treated and Control untreated fish within the various groups described above as Tasks 1-4. Integrate and compare these data to the database begun as part of the Phase I effort.

Objective D: Collect, process and analyze otoliths from 400 adult coho salmon that return to Resurrection Bay in 2005 and in 2006 to estimate the size at return and the proportion of the sport fishery contribution from CIAA (Trail Lakes and Bear Lake Supersmolt® and ADF&G (control smolt) hatchery stocking that entered Resurrection Bay in 2004 and 2005, respectively. *See Section VII. Project Evaluation for description of protocol.*

Objective E: Examine 400 adult Chinook salmon annually that return to Resurrection Bay from 2005-2008 for pelvic fin marks (acknowledging a smaller sample size in 2005)

to estimate the size at return and the proportion of the sport fishery contribution from ASLC (Supersmolt® treated fish) and ADF&G (control smolt) hatchery stocking in Resurrection Bay in 2004. Collect, process and analyze otoliths from 400 adult Chinook salmon that return to Resurrection Bay from 2006-2009 to estimate the size at return and proportion of the sport fishery contribution from ASLC (Supersmolt® treated fish) and ADF&G (control smolt) hatchery stocking in Resurrection Bay in 2005 and 2006, respectively. *See Section VII. Project Evaluation for description of protocol.*

Objective F: Develop a web based data storage device to disseminate information and data regarding restoration of Salmon in Resurrection Bay.

<u>Goal II</u>: Aid in the restoration of sockeye salmon in Bear Lake.

Objective A. Treat ~ 200,000-300,000 BY 2003 Bear Lake sockeye at Trail Lakes hatchery using the Supersmolt ® process for release as age-1 smolt into Bear Lake in spring 2005.

Objective B: Collect, process and analyze ~ 100 gill Na+K+ATPase, blood ion samples and RNA/DNA muscles samples from Supersmolt® treated and Control untreated hatchery sockeye smolt released into Bear Lake in May-June 2005. Collect, process and analyze ~ 200 gill samples for Na+K+ATPase activity, blood ion samples and RNA/DNA muscle samples from wild smolt and smolt originating from fry and pre-smolt stocking that emigrate from Bear Lake in May-June 2005. *See Section VII. Project Evaluation for description of protocol.*

Objective C: Collect, process and analyze otoliths from 400 adult sockeye salmon harvested annually in the commercial fishery and from 400 adult sockeye salmon captured at the Bear Lake weir or used for hatchery spawning from 2005-2008 to determine the smolt cohort origin (wild, fry and pre-smolt and smolt stocking) from Bear Lake sockeye salmon that enter(ed) Resurrection Bay from 2002-2005. *See Section VII. Project Evaluation for description of protocol.*

Objective D: Collect, process and analyze sensory, muscle and reproductive tissue and blood from 200 adult sockeye salmon harvested in the commercial fishery in Resurrection Bay and from 200 adult sockeye captured at the Bear Lake weir or used for hatchery spawning from 2005-2008 to determine the variation in the characteristics listed below among smolt cohorts contributing to the adult return. Collect environmental data including date and time of capture, location, depth, conductivity (FW) and salinity (SW) and temperature to relate to maturational status. *See Section VII. Project Evaluation for description of protocol.*

Task 1. Measure weight, length and gonad weight.

Task 2. Measure plasma Na+, K+, Cl- and Ca2+ concentrations in the blood and circulating levels of reproductive hormones (gonadotropic, gonad releasing) and proteins (vitellogenin).

Task 3. Measure gill Na+K+ATPase activity in the gills and olfactory epithelia.

Task 4. Measure RNA/DNA ratios in the muscle.

Task 5. Determine the proximate composition (protein, lipid, moisture) and concentration of persistent environmental pollutants present (e.g. analysis of PCBs, dioxins, pesticides and heavy metals to be conducted by Alaska State DEC) in the muscle and gonads.

Task 6. Determine the amino acid and fatty acid composition in the muscle and gonads.

VI. Results and Deliverable Products

The purpose of this project is to restore salmon runs to Resurrection Bay. Returning adults from releases of Chinook and coho salmon from the ASLC and Trail Lakes hatchery are expected to contribute significantly to the salmon sport fishery in Resurrection Bay in 2005-2009. Sport fish harvest of coho in Resurrection Bay is approximately 100,000 adults annually from both wild salmon and from hatchery releases by ADF&G and Cook Inlet Aquaculture Association. Based on an ocean survival of 10% or greater, we anticipate that this project will contribute an additional 20,000 adult coho salmon to the sport fish harvest. Sport fish harvest of Chinook in Resurrection Bay ranges from approximately 2000-3000 adults annually from stocking of hatchery smolt by ADF&G. Although Chinook smolt released from the ASLC in 2004 and 2005 are a subset of smolt produced by ADF&G Sportfish Division, we expect that the use of MariCal's smolt enhancement technology will increase marine survival from present estimates of 1.0-1.5% to 2% or greater and contribute an additional 2,500 fish over the period of return (2006-2009). Further, we anticipate the application of this technology for stocking of sockeye smolt into Bear Lake (~300,000 in 2005) will contribute an additional 45,000-60,000 adult fish to the commercial fisheries in 2007-2008.

VII. Benefits to Salmon and Salmon Fisheries

The Pacific Salmon Coastal Recovery Program was created to support projects to help ensure that the salmon stocks, salmon habitat, and the salmon-related economy in Alaska are sustained. Resurrection Bay supports runs of coho and sockeye salmon and hatchery-origin Chinook salmon that contribute to salmon fisheries and the fishing based economy in southcentral Alaska. However, growing demand for sport fisheries targeting Chinook and coho and lost commercial harvests of sockeye due to the near extirpation of the Bear Lake population means that salmon producers, managers and harvesters may need to expand existing programs and invest in new culture technology to provide for sustainable fisheries. This project will benefit the Resurrection Bay area by augmenting the presently minimal natural sockeye production from Bear Lake through more efficient supplemental hatchery fry stocking program and to salmon fisheries through increased fishing opportunities for sockeye, as well as Chinook and coho. Additionally, our efforts to evaluate new technology for enhancing smolting in hatchery salmon will have application for salmon enhancement programs throughout Alaska. If successful, salmon producers utilizing this technology will realize increased ocean survival from smolt releases and significant economic improvement in hatchery operations. Finally, data gathered to establish the relationship between smolting characteristics and adult returns will contribute to identifying the molecular basis for fitness traits that influence marine survival. Such understanding will aid importantly in forecasting

adult salmon returns and provide a valuable tool for sustainable salmon fisheries management.

Project Evaluation

All Chinook treated with the Supersmolt® process and released at the ASLC in 2004 were marked with a right pelvic fin clip. All Chinook currently held at the ASLC and scheduled for release in 2005 (~ 75,000) and 2006 (~ 20,000) have a unique otolith thermal mark and thus are different from the Chinook scheduled for release in Resurrection Bay in 2005 by the ADF&G (~210,000). These marks will be used to distinguish adult Chinook produced by Supersmolt® treated fish released from the ASLC from those produced by ADF&G smolt releases.

Supersmolt® treated coho released by CIAA in 2004 and scheduled for release by CIAA in 2005 (~400,000 each year) also have a unique otolith mark to distinguish these fish from the coho released by ADF&G in Resurrection Bay (~210,000), from coho produced through CIAA fry stocking at Bear Lake and from other wild coho originating in the Resurrection Bay watershed.

The contribution of ASLC Supersmolt® treated Chinook within the waters of Resurrection Bay sport fish harvest in 2006-2010, and the contribution of CIAA Supersmolt® treated coho to the sport fish harvest in 2005 and 2006 will be estimated from a combination of pelvic fin examination and otoliths (Chinook) or otoliths only (coho) from fish landed in Seward during May to September. For purposes of evaluation, the sampling distribution in both cases can be considered binomial: Supersmolt® treated and not treated, and with 100% of the fish marked, the sample size needed for a given level of precision is unaffected by the total population size. Under this scenario, the maximum sample size needed for a mixed stock fishery where the 95% confidence intervals fall within ± 5% of the estimated marked proportion is 400 fish (5). We propose to sample both species (Chinooks – mid-May through the end of June; coho – last week in June through the end of September) according to the following schedule to approximate run strength over the historical peak 5 week period for their respective fisheries:

Week	Number sampled or examined
1	50
2	75
3	150
4	75
5	50

These are estimates and the actual numbers of fish sampled each week may vary depending on the timing and strength of the return. Salmon harvested only within the waters of Resurrection Bay sport fisheries will be sampled at the Seward Boat Harbor and from shore catches by the ASLC personnel. Due to the small number of Chinook salmon caught, we plan to post notices with the charter and private fishing fleets that we are seeking heads from harvested fish to sample for otoliths. Sampling personnel will be assigned to the Seward Boat Harbor and shore fisheries in order to achieve proportional targets (7 days per week) during peak angler return times each day for recreational anglers. Anglers will be interviewed and samples obtained either directly from fish on board the vessels or at the

central fish cleaning station. Additional equivalent time will be spent surveying and collecting samples from shore-based fisherman between the waterfront (RV) park and Lowell Creek. The overall otolith sampling effort will be conducted under the guidelines established by previous otolith collections in Resurrection Bay (6). More specifically, the time allocated to sampling the catches from boat and shore anglers will be designed to obtain otolith samples in proportion to the most recent estimates of the annual harvest of Chinook and coho salmon, respectively. During the mid-May through third week of June period that is primarily directed at sampling the Chinook salmon fishery, the following target allocations of sampling time will be directed at the corresponding components of the sport fishery:

- 37% for private vessels
- 27% for charter vessels
- 36% for shore-based anglers

Following the sampling efforts directed at Chinook salmon, the time allocations will be shifted towards sampling coho salmon in proportion to recent patterns of harves by the following components of the sport fishery:

- 57% for private vessels
- 33% for charter vessels
- 10% for shore-based anglers

Anglers will be interviewed prior to sampling to ensure that all fish sampled were caught within the waters of Resurrection Bay. Interviewers will also record whether the angler is military, a key component of recreational anglers in Resurrection Bay. We propose to sample every observed returning Chinook salmon by examining pelvic fins or collecting otoliths from adult fish. We propose to systematically sample returning coho based upon our ability to obtain an interview with the angler and the dynamics of the returning fish harvest. Otoliths (left and right saggitae) will be washed and rinsed in ethanol, dried and stored in 1 ml polyethylene vials for shipment to the ADF&G Mark Lab and post-season determination of contributions of Supersmolt® treated fish and non-treated fish to the adult harvests for Chinook and coho. Each fish sampled or examined will be measured for fork length. **To encourage and maximize the sport fish harvest of experimental fish, no areas, including those in the vicinity of the ASLC, will be closed to fishing except as required by ADF&G regulations. Sport fish harvest of fish released from the ASLC will conform to ADF&G regulations.**

Sockeye salmon stocked into Bear Lake by CIAA also possess a unique otolith mark for each smolt cohort (wild – no mark, hatchery stocked fry, pre-smolt and smolt). The sampling schedule and estimates of the various wild and hatchery-origin cohorts to the smolt population emigrating from Bear Lake in 2005 will be based on the methods detailed in the CIAA Bear Lake Salmon Enhancement Progress Report submitted annually to the ADF&G. The tissue and blood sampling identified under Goal II Objective B will be conducted directly in conjunction with CIAA smolt cohort assessment. **Samples will be obtained only from those fish collected by CIAA for otolith analysis as part of the cooperative agreement between CIAA and the ADF&G for Bear Lake and the CIAA PNP, FTP and FRP permits issued for Bear Lake by the ADF&G. No other sockeye smolt will be sampled.**

Sampling of adult sockeye in the commercial fishery and at Bear Lake from 2005-2008 described under Goal II Objectives C&D will be coordinated with the ADF&G Commercial Fisheries Division and CIAA. We propose to collect otoliths from 400 adult salmon from the commercial fishery and 400 from fish collected for cost recovery by CIAA at the Bear Lake weir or used as brood stock. **The methods for collection, processing, shipping and analysis of adult sockeye otoliths to identify the smolt cohort contribution to these samples will be identical to those described above for adult Chinook and coho.** We propose to collect tissues and blood from 200 of the adult salmon sampled for otoliths in the commercial fishery and from 200 of the adult salmon sampled for otoliths from CIAA cost recovery at the Bear Lake weir or used as brood stock. Sampling in the commercial fishery will be conducted under contract with commercial seine permit holder for Cook Inlet (L. Cabana, F/V Paragon). The harvester possesses all necessary catcher/seller permits to meet the requirements of the contract. Adult sockeye harvested during commercial openings will be held live on board the vessel for sampling by ASLC personnel after the opening has closed. The permit holder will provide space on board the vessel for samplers to collect blood, tissues and in some cases whole fish. Whole fish will be purchased from the permit holder for analysis by DEC. Fish that are sampled and not purchased for DEC analysis will be retained by the permit holder. Samples will be obtained onboard and fish not utilized for DEC sampling will be retained by the permit holder. Weekly reports of commercial fisheries sampling will be provided to the ADF&G Commercial Fisheries Division during sampling periods. **Otolith, tissue and blood samples will be collected from fish landed on board the seine vessel only during ADF&G permitted commercial openings. No other samples will be collected from adult sockeye in the marine waters of Resurrection Bay.** Sampling of adult sockeye salmon in freshwater will be conducted as part of the CIAA permitted harvest for cost recovery at the Bear Lake weir or for brood stock collected for spawning by CIAA personnel in Bear Lake. We propose to divide the total number of fish sampled in fresh water (200) evenly between fish collected at the weir for cost recovery and those used for spawning to determine if the physiological status (e.g. hypo-osmotic ability, proximate composition, contaminant concentration) near the time of fresh water entry affects spawning success as measured by the fertility and survival to the eyed stage of gametes collected and transferred by CIAA personnel to Trail Lakes Hatchery.

A total of fifteen adult sockeye salmon will be collected during commercial fisheries in marine waters of Resurrection Bay according to the sampling protocol outlined in the Fish Tissue Monitoring Program's Quality Assurance Project Plan (QAPP). Salmon will be placed in a food grade plastic bag (fish sleeve), frozen and shipped to the Environmental Health Laboratory with a sample form and chain of custody form. The skinless fillets obtained from these samples will be homogenized and analyzed for trace metals (total mercury, selenium, cadmium, lead, nickel, total arsenic and chromium) at the Environmental Health Laboratory or Public Health Laboratory. Additional homogenized tissue will be analyzed by a contract laboratory for low concentration individual congener for PCBs, total PCBs, dioxins, furans, 40 different pesticides, brominated fire retardants (PBDEs) and inorganic arsenic. Low concentration congener specific analysis is a specialized procedure run by only a few laboratories, such as AXYS Analytica; it is tedious and expensive. Toxicologist prefer these type of data for performing risk assessments and consumption advice for fish advisories. The PCBs, dioxins, furans and some polycyclic aromatic hydrocarbons (PAHs) all have similar toxic actions on living cells elicited by stimulating the

Ah receptor on the cell surface. The analysis of congener specific PCBs, dioxins and furans is used to calculate the dioxin TEQ (Toxic Equivalent Quotient). The TEQ is derived by establishing a baseline chemical toxicity value with which to compare the toxicity of other chemical contaminants. The most potent dioxin congener, TCDD, is assigned a TEQ of "1". This value is then used as a baseline for comparison of other chemical forms with similar toxic action. The TEQ (for the fish tissue in this case) is the sum of the quotient of the toxicity multiplied by the total concentration of each chemical congener present in the sample. TEQ is a numeric expression that illustrates more of an over all toxic risk associated with exposure to a mixture of contaminants. The cost for the congener analysis organic contaminants from the 15 samples collected in the commercial fishery is approximately $3,000/sample and will originate from a DEC funding source.

Instead of using individual congener analysis, an alternative method to estimate TEQ of a substance is to use a bioassay that measures the cells response to these contaminants; such as reporter gene assay or by calculating the activity of a liver enzyme (7-ethoxyresorufin-O-deethylase or EROD). Xenobiotic Detection Systems has developed a reporter gene assay using genetically engineered cell cultures that produces luciferase (the enzyme that makes fireflies light up) when dioxin like compounds interact with the cells' aryl-hydrocarbon receptors (AhR), and light is generated . The amount of light generated is highly correlated to the 2,3,7,8-tetrachlorodibenzo-p-dioxin equivalents (TEQ's) that are typically used to measure dioxin concentration. EROD can metabolize planar molecules (PCBs, dioxins, furans and PAHs). The greater the exposure, the higher the activity of the enzyme will be, thus making EROD an indicator for chemical contamination of the fish. Either of these two methods may be used as a cost effective way to evaluate the contaminant exposure of the sockeye collected in the study. The 15 samples obtained in the commercial fishery will be evaluated using one of these two methods. Additionally, we intend to analyze egg samples obtained from fish on the spawning ground using the reporter gene or EROD method. These egg samples will be provided from fish collected by CIAA at the Bear Lake weir. These results will be used to determine whether persistent pollutants are passed vertically to offspring and contribute to the contaminant load early in the life cycle.

References

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3. Beckman et al. 1999. Growth, smoltification and smolt-to-adult returns of spring Chinook salmon from hatcheries on the Deschutes River, Oregon. Trans. Am. Fish. Soc. 128:1125-1150.
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5. Hagen, P., K. Munk, B. Van Alen, and B. White. 1995. Thermal mark technology for in season fisheries management: A case study. Alaska Fishery Research Bulletin 2(2):143-155.

6. Miller, M.G. and D.E. Bosch. 2004. Area management report for the recreational fisheries in Resurrection Bay, 2002. Alaska Department of Fish and Game, Fishery Management Report No 04-10, Anchorage.

VIII. Milestones/Project Timeline:

May 2005 over-wintered Chinook released
May 2005 coho released
May 2005 Chinook Age-0 smolt released FRP 04-026
June-August 2005 first return of coho from previous year's release
Fish sampling summer 2005
December 2005 – preliminary results summary & project modification to ADF&G
May 2006 return of first batch of mature Chinook
Fish sampling summer 2006
December 2006 – preliminary results summary & project modification to ADF&G
Fish sampling summer 2007
December 2007 – preliminary results summary& project modification to ADF&G
Fish sampling summer 2008
December 2008 – preliminary results summary& project modification to ADF&G
Fish sampling summer 2009
December 2009 – Final results summary to ADF&G

IX. Partners

ADF&G, MariCal, Cook Inlet Aquaculture Association

X. Budget Summary

	FY 05	FY 06	FY 07	FY08	FY09	Total
100 Personnel	103,055					103,055
200 Travel	9,418					9,418
300 Contractual	482,330	230,169	7,300	7,438	7,583	734,820
400 Supplies	125,000					125,000
500 Equipment	233,000					233,000
Total Direct Costs	952,803	230,169	7,300	7,438	7,583	1,205,293
ASLC Indirect (23.50% based on non-equip)	169,154	54,090	1,716	1,748	1,782	228,490
Total Cost	1,121,957	284,259	9,016	9,186	9,365	1,433,783

Budget Narrative:

Personnel

Personnel costs are requested for a full-time salmon project technician. This person will be dedicated to this project and is the primary caretaker of the Chinook salmon housed at the Alaska SeaLife Center. A temporary salmon technician will assist during 3 months of peak seasonal activity. Also included are 25% of the Salmon Curator to provide oversight to the salmon culture and to liaison with the onsite MariCal scientists, 6.2% of the Principal Investigator for overall project management, and 50% of the Web Content Manager to

create the web-based portal to store data and disseminate information on salmon restoration (Goal I, Objective F). Fringe benefits are calculated at 28% of personnel costs.

Travel

Travel costs include two 3-night trips to Juneau in early May and in July for 2 people to present this program to state officials, and to evaluate fish pass options as displayed at DIPAC. Airfare (4 @ $367), hotel (12 nights @ $120), per diem (12 days at $64), and one roundtrip from Seward to Anchorage by vehicle are budgeted. Two people will travel to Sitka and hatcheries in southeast Alaska for one week to evaluate state of the state hatcheries operations and management. Airfare (2 @ $1200 to include float-plane access to hatcheries), hotel (10 nights @ $120), per diem (6 days at $53), and one roundtrip from Seward to Anchorage by vehicle are budgeted. Additional local travel includes travel on the Kenai Peninsula meetings with CIAA and to treat and care for coho at Trail Lakes Hatchery (per diem for 4 days at $40, mileage), roundtrip mileage to the Trail Lakes Hatchery (22 trips at 64 miles), and roundtrip mileage to Anchorage (4 trips at 260 miles).

Contracts

The major contract is with MariCal, our collaborator in coordinating this restoration program. Their contract ($400,049 in Yr 1; $223,000 in Yr 2) contains all funding for Goal II (Aid in the restoration of sockeye salmon in Bear Lake), including all required staff and expenses to complete the following:

- Treating 200,000 to 300,000 sockeye salmon using the Supersmolt® process (Objective A)
- Collection, processing, shipping and analysis of adult sockeye otoliths (Objective B)
- Collection, processing and analysis of blood and other tissue samples (Objectives C and D)
- Access to seine vessel charter to collect samples
- Analysis of egg samples for contaminants

Facilities costs are not included in the ASLC indirect rate, but rather are charged as direct costs based on actual space utilization, a method that has been approved by the U.S. Department of Commerce along with our indirect rate. This project will use a total of 2,173 square feet of space (1200 square feet of high cost space at $54.12/square foot and 973 square feet of low cost space at $9.02/square foot) at a total cost of $6,459 per month. The space dedicated to this project includes the following:

Room	Space name	Project sq ft	Total room sq ft	Space type	% of room
188	South Holding	1,200	2,035	High cost	59%
159	Central Lab	84	836	High cost	10%
184	Office	73	73	Low cost	100%
n/a	Outdoor tank pad	816	816	Low cost	100%

Other contracts include otolith laboratory testing for coho and Chinook salmon ($5.68 each for 400 coho samples in 2005 to 2009 and 400 Chinook samples in 2006 to 2009), and intern housing and stipend costs ($2500/year for 5 years with a 5% annual increase).

Required supplies include a large purchase of 200,000 coho smolt ($100,000), salts for the Supersmolt® process ($18,600), feed ($4,600), and other laboratory and sampling supplies for Goal I.

Equipment

Equipment requested includes an expansion to ASLC's salmon rearing lab ($135,000 for additional tanks, plumbing of salt and fresh water, to increase the capacity of the holding facility and reduce crowding of Sea Ready Fish. A predator containment system for the outside holding area to reduce potential predation by river otters and avian predators ($25,000) and freshwater control system ($25,000) which will enhance our ability to manage flows through our fish rearing system. Finally, $48,000 is requested for upgrades to saltwater laboratory tanks, including plumbing, pumps, and a filtration system sea water grow out of treated fish.

Indirect

The Alaska SeaLife Center's 2005 indirect rate has been determined to be 23.50% of MTDC (modified total direct costs; proposal submitted to the Department of Commerce for approval). Equipment and subawards greater than $25,000 are excluded from MTDC. The contract with MariCal is a services contract as opposed to a subaward, and so is not excluded from MTDC in this budget or in our indirect rate calculation.

Budget Detail

see next page

XI. Project Number: 45536; **NOAA Category:** CD – EN

Revised Project Budget: Restore Salmon Runs in Resurrection Bay at Alaska SeaLife Center

		Annual	2005	2006	2007	2008	2009	BUDGET
SALARIES	**% Effort**	**Rate**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**TOTAL**
Salmon Project Technician	100%	35,000	35,000					35,000
Temporary Salmon Technician (100%, 3 mo)	25%	30,000	7,500					7,500
Salmon Curator	25%	51,000	12,750					12,750
Web Content Manager	50%	40,950	20,475					20,475
Principal Investigator	6.2%	77,250	4,787					4,787
Fringe Benefits @ 28%		28%	22,543					22,543
			103,055	-	-	-	-	103,055
TRAVEL	**Quantity**	**Cost each**						
Travel for 4 persons to Juneau:								
Airfare: Anchorage-Juneau	4	367	1,468					1,468
Hotel: Juneau	12	120	1,440					1,440
Per diem: Juneau	12	64	768					768
RT Mileage Seward-Anchorage (RT 260 mi)	2	105.3	211					211
Travel for 2 persons to SE Alaska:								
Airfare: Anchorage-Sitka-hatcheries	2	1200	2,400					2,400
Hotel: Sitka	10	120	1,200					1,200
Per diem: Sitka	6	53	318					318
RT Mileage Seward-Anchorage (RT 260 mi)	1	105.3	105					105
Travel for 4 persons to Kenai:								
Per diem: Kenai Peninsula max day rate	4	40	160					160
RT Mileage Seward-Kenai (RT 220 mi)	4	89.1	356					356
RT mileage Seward-Trail Lakes (RT 64 mi)	22	25.9	570					570
RT mileage Seward-Anchorage (RT 260 mi)	4	105.3	421					421
			9,418	-	-	-	-	9,418
CONTRACTS								
MariCal contract for sockeye salmon			400,049	223,000				623,049
Otolith lab testing for coho and Chinook			2,272	4,544	4,544	4,544	4,544	20,448
Direct facilities cost 2173 ft^2			77,509					77,509
Intern housing/stipend for fish sampling			2,500	2,625	2,756	2,894	3,039	13,814
			482,330	230,169	7,300	7,438	7,583	734,820
SUPPLIES								
Coho salmon purchase: 200,000 smolt			100,000					100,000
SuperSmolt process salts			18,600					18,600
Feed for smolt			4,600					4,600
Lab and sampling supplies			1,800					1,800
			125,000	-	-	-	-	125,000
EQUIPMENT								
Salmon rearing lab (tanks, plumbing, etc)			135,000					135,000
Predator containment equipment			25,000					25,000
Freshwater control system			25,000					25,000
Saltwater lab tanks, plumbing, pumps, filtration			48,000					48,000
			233,000	-	-	-	-	233,000
DIRECT COSTS			952,803	230,169	7,300	7,438	7,583	1,205,293
TOTAL MTDC (excluding equipment)			719,803	230,169	7,300	7,438	7,583	972,293
INDIRECT								
23.50% indirect on MTDC	23.50%		169,154	54,090	1,716	1,748	1,782	228,489
TOTAL PROJECT COST			1,121,957	284,259	9,016	9,186	9,365	1,433,782