PROPOSAL SIGNATURE FORM

THIS FORM MUST BE SIGNED BY THE PROPOSED PRINCIPAL INVESTIGATOR AND SUBMITTED ALONG WITH THE PROPOSAL. If the proposal has more than one investigator, this form must be signed by at least one of the investigators, and that investigator will ensure that Trustee Council requirements are followed. Proposals will not be reviewed until this signed form is received by the Trustee Council Office.

By submission of this proposal, I agree to abide by the Trustee Council's data policy (Trustee Council Data Policy*, adopted March 17, 2008) and reporting requirements (Procedures for the Preparation and Distribution of Reports**, adopted June 27, 2007).

PROJECT TITLE: *PWS Herring Survey: Value of growth and energy storage as predictors of winter performance in YOY herring from PWS*

Printed Name of PI: Ron Heintz
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City, State, Zip: Juneau, Alaska 99801
Phone: 907 789-6058
Signature of PI: ______ Date: April 16, 2009

Printed Name of PI: Johanna Vollenweider
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Signature of PI: ______ Date: April 16, 2009

* www.evostc.state.ak.us/Policies/data.cfm
** www.evostc.state.ak.us/Policies/reporting.cfm

FY10 INVITATION
PROPOSAL SUMMARY PAGE

Project Title: *PWS Herring Survey: Value of growth and energy storage as predictors of winter performance in YOY herring from PWS*

Project Period: October 1, 2009 to September 30, 2013

Primary Investigator(s): Ron Heintz and Johanna Vollenweider – NOAA Alaska Fisheries Science Center – Auke Bay Laboratories

Study Location: Prince William Sound

Abstract:
This proposal examines the reliability of fall growth rates as an indicator of over winter performance among YOY herring in Prince William Sound. The Trustee Integrated Herring Restoration Program cites the need to monitor herring overwinter in order to understand recruitment processes. Consequently, the Trustee Council requires monitoring parameters that provide reliable indices of future condition. Parameters such as size or energy density can provide misleading results. For example, while size is a good predictor of over winter survival in a given year, there is no critical size that predicts survival across years. Similarly, changes in energy density may not reflect the severity of winter. We propose that growth in fall predicts performance because herring acquire the bulk of their lipid in fall. Those individuals that experience high growth in fall are likely to obtain disproportionately large energy reserves. We propose using models relating RNA/DNA ratios to growth obtained under another Trustee study to estimate growth in field specimens collected during the survey period. In addition we will examine how energy is partitioned between structural and storage compartments. Combining these data with those of other projects being proposed under the PWS Herring Survey will allow us to test the hypothesis that that growth in fall is the most consistent indicator of over winter survival because fall growth provides for the greatest provisions of stored energy.

Estimated Budget:
EVOS Funding Requested *(must include 9% GA)*

FY10	FY11	FY12	FY13	Total
99.0	99.0	99.0	9.6	306.6

Non-EVOS Funds to be used:

FY10	FY11	FY12	FY13	Total

PROJECT PLAN

I. NEED FOR THE PROJECT

A. Statement of Problem

This study examines the utility of growth and energy allocation as tools for monitoring the performance of overwintering herring in Prince William Sound (PWS). In particular, we propose to test the hypothesis that growth in fall is the most consistent indicator of over winter survival because fall growth provides for the greatest provisions of stored energy. If fall growth predicts survival, then growth could used as a monitoring tool for the Integrated Herring Restoration Program.

While the size of fish in fall integrates growth between settlement and fall, we hypothesize that the important factor is growth in fall. Size can be an effective predictor of over winter survival in a given year but the few studies that encompass multiple years have shown winter mortality is frequently size independent (Hurst 2007). Moreover, Huss et al. (2008) reported a direct relationship between growth in fall and overwinter survival in Eurasian perch. They theorized that seasonal increases in the allometry between lipid and size (Hurst and Conover 2003) combine with good growing conditions in fall to provision even small individuals with sufficient energy stores to maintain condition over winter. This appears to be the case for rainbow trout described by Post and Parkinson (2001) who observed higher levels of storage energy in faster growing fish even after controlling for size.

Provisioning prior to fall is important because the survival of herring over winter is believed to relate directly to the difference in the amount of energy needed for metabolism and the amount available through foraging. Prey abundance declines in winter (Eslinger, Cooney et al. 2001) so herring must rely on energy stores to make up the difference (Paul and Paul 1998). Energy allocation strategies often change seasonally to favor storage over structure in fall (Hurst and Conover 2003; Huss, Bystrom et al. 2008). This implicates fall as the period with the greatest potential for provisioning energy stores. Improved foraging conditions could result from fall plankton blooms (Eslinger, Cooney et al. 2001) or by consumption of larger energy rich prey (Eslinger, Cooney et al. 2001). If herring encounter abundant food supplies in fall they may be able to sequester proportionately more energy to storage than similarly sized individuals foraging on less abundant prey.

One way of measuring provisioning success is to compare the energy density of herring at the end of the growing season with density the following spring. Energy density is appealing because there is a distinct threshold for energy content below which herring die. However, it is not clear what high values of energy density indicate. From the SEA program we learned that energy density varies among bays in the fall and varies within bays among years (Norcross, Brown et al. 2001). However, the amount of energy lost over winter usually correlates with the amount of reserve energy present in fall, but not with environmental parameters (Hurst and Conover 2003). In a laboratory study, (Heintz 2009) determined that coho salmon in poor nutritional condition lost less energy over winter than those in high condition. Thus, measuring energy loss may be misleading if large fluxes are assumed to correlate with winter severity.

An additional problem with monitoring energy density is that calorimetry does not reveal the relative amount of energy allocated to storage. While variation in energy density generally relates to variation in lipid content, fish can compensate for poor growing conditions by maximizing growth in structural mass over length (Heintz and Schaufler 2009). This results in small fish with energy densities equivalent to those of larger fish even though the two have very different body compositions. In such circumstances measures of energy density may lead to erroneous conclusions in the absence of information on growth or body composition. A loss of 20% of an organism's energy over winter has much less effect on fitness if that energy derives from lipid instead of muscle mass. Without data indicating how energy is partitioned it is difficult to place winter losses in the proper context.

We propose to complement efforts to monitor herring energy density and abundance among over wintering herring in PWS by providing measures of energy allocation and growth. Energy allocation will be measured by examining the lipid and protein content of young-of-the-year (YOY) herring from different bays in PWS. These measures will be correlated with measurements of isotopic composition and energy density collected under a separate proposal titled: *PWS Herring Survey*: Pacific Herring Energetic Recruitment Factors. Fish will be measured in fall and spring and changes in body composition will be related to changes in their energy content and abundance. In addition, we propose to monitor their growth at the same time by evaluating RNA/DNA ratios. Under study 090608 we developed a model that relates herring growth at different temperatures to RNA/DNA ratios. Observations of field specimens can be fit to this model to quantify growth in different bays. These data will be used to test the hypothesis that herring in bays that experience good growing conditions in fall have higher provisions of lipid and subsequently produce the most herring is spring.

B. Relevance to 1994 Restoration Plan Goals and Scientific Priorities

This project supports the Trustee's Integrated Herring Restoration Plan by providing detailed information on the relationship between growth, energy allocation and survival of YOY herring. Under the plan the Trustees require a core monitoring program. One approach to developing such a program is to begin monitoring by evaluating a large number of variables and after time identifying the essential variables. As a result of the SEA program we understand the need to monitor fish condition going into winter. Project Design

II. PROJECT DESIGN

A. Objectives

We propose testing the hypothesis that fall growth rates are the best predictor of overwinter survival because high growth in fall leads to increased storage energy. This requires that we measure growth and energy allocation among herring sampled in fall. In this study lipid is a proxy for storage energy and protein is the proxy for structure. We propose to use RNA/DNA ratios to estimate growth because it is not feasible to measure growth in wild populations. Similar measurements will be made in spring so we can better understand the performance of the fish over winter. The following objectives are intended to provide a basis for supporting or refuting our hypothesis.

1. Determine if growth rates of YOY herring vary among bays in fall and spring
2. Determine if fall growth rates correlate with stomach fullness and prey availability
3. Determine the relationship between fall growth rates and allocation of energy to storage in fall.
4. Determine the relationship between growth in fall and energy reserves the following spring.
5. Relate growth in fall to observations of survival in the bays sampled.

Objectives 2 and 5 require integration with other studies proposed under the PWS Herring Monitoring Program. Data collected here will be related to data sets developed under those projects. For Objective 2 we will collaborate with Dr. Campbell who is proposing a study titled: *PWS herring survey: Plankton and oceanic observations in PWS.* For objective 5 we will collaborate with Dr. Thorne who is proposing a study titled: *PWS herring survey: Assessment of Juvenile Herring Abundance and Habitat Utilization*. The remaining objectives will be addressed internally within this study.

B. Procedural and Scientific Methods

This study depends on data and samples collected under other proposed projects that make up the PWS Herring Survey. We will obtain field specimens from collections made under the proposed project titled: *PWS Herring Survey*: Pacific Herring Energetic Recruitment Factors (Kline 2009). Briefly, we will obtain 25 YOY herring from each of four bays studied under SEA (Zaikoff, Eaglek, Simpson and Whale Bays) and up to four others in November. Additional samples will be collected from these and other bays sampled during the spring “blitz” sampling effort. Sampling will be conducted over three years. Herring abundance estimates will be obtained from a proposed project titled: *PWS herring survey: Assessment of Juvenile Herring Abundance and Habitat Utilization*. Estimates of herring energy allocation strategies during summer will be obtained from a proposed project titled*: Monitoring growth condition and predation risk of age 0 herring in near shore structured settling habitats in PWS*.

Samples will be labeled, frozen and shipped to the Auke Bay Laboratories for analysis. Upon receipt of the samples we will record their lengths, wet masses and stomach fullness. The latter will be measured as the mass of all stomach contents as a percentage of the total mass. The contents will also be examined to identify prey to lowest practical taxon. A sample of dorsal muscle will be removed for RNA/DNA analysis and the remainder will be homogenized to determine the lipid, protein and water content.

In the lab, juvenile fish will be further processed to determine their dry mass, proximate composition, RNA and DNA content. The proximate composition of the fish will used to examine how energy is allocated between lipid and protein. Lipid will extracted using the Folch method (Folch, Lees et al. 1957) on a Dionex 200 Accelerated Solvent Extractor (ASE), followed by evaporation and volumetric dilution to a final volume of 1 ml. Total lipid content will be determined gravimetrically from the lipid fraction after solvent evaporation. For quality control, duplicate samples will be analyzed per group of 15-20 fish, and a standard reference sample analyzed with each group. The Dumas method will be used to determine protein content with a Leco Tru-Spec CHN analyzer, in which homogenate samples are dried and subject to combustion at 850 °C, followed by total nitrogen gas quantitation by thermal conductivity. Nitrogen content is converted to percent protein using 6.25 as the conversion factor (Craig, Kenley et al. 1978). Protein measurements will be performed in duplicate, and samples reanalyzed if the duplicates vary significantly. Moisture will be determined gravimetrically on a Leco TGA-601 themogravimetric analyzer. For all processes National Institute for Standards and Technology (NIST) standard reference materials will be used for quality-control purposes. Analysis of the RNA and DNA content of dorsal muscle samples will follow the fluorescence methods outlined (Caldarone, Wagner et al. 2001).

C. Data Analysis and Statistical Methods

Under previous Trustee studies we have developed a response surface that relates RNA/DNA ratios to growth and temperature under laboratory conditions. We will relate the observed temperatures and RNA/DNA of field caught specimens to this model to determine growth (Lankin, Peck et al. 2008). Growth will be compared among bays by ANOVA. The relation between fall growth and survival will be examined by regression analysis. After the three year program we anticipate have 12-20 observations of fall growth and overwinter survival. Fall growth will be related to the proportion of energy allocated to storage by regression analysis. After the three year program we anticipate having 12-20 observations of fall growth, survival and the proportion of energy allocated to storage. The proportion of energy allocated to storage (E_s) will be estimated by :

$$E_s = 36.43 \times L \times W \times E^{-1}$$

where 36.43 (kJ/g) is the calorific equivalent for lipid (Brett 1995), L is the percentage of lipid in the wet mass, W the wet mass and E the total energy content of the fish. Similar approaches will be employed to understand the relationship between fall growth and stomach fullness, energy use over winter and body composition at the end of winter.

D. Description of Study Area

The study area is Prince William Sound, particularly the bays studied under the SEA program. These include Whale, Eaglek, Simpson and Zaikoff Bays. These bays are located in the southwestern, northwestern, eastern and southern portions of PWS, respectively. YOY herring in each of these bays was studied intensively under the SEA program. However, other bays will also be sampled opportunistically. At this time we cannot identify them.

E. Coordination and Collaboration with Other Efforts

This program is integrated in the PWS Herring Survey and is intended as a complementary study. This program is described in a group of proposals submitted by various authors. The program will be overseen by Dr. Pegau of the Prince William Sound Science Center. Data collected here will be of direct use to many of the authors working in this program. In addition, the analyses performed here depend on data and sample collection by participants in the PWS Herring Survey including those studies proposed by Drs. Kline, Campbell and Thorne. In addition, the data collected here will provide for a natural progression from the study proposed by Cox and Heintz.

II. SCHEDULE

A. Project Milestones

Objective 1. Determine if growth rates of YOY herring vary among bays in fall and spring. *To be completed by February 2013*

Objective 2. Determine if fall growth rates correlate with stomach fullness and prey availability. *To be completed by February 2013*

Objective 3. Determine the relationship between fall growth rates and allocation of energy to storage in fall. *To be completed by February 2013*

Objective 4. Determine the relationship between growth in fall and energy reserves the following spring. *To be completed by February 2013*

Objective 5. Relate growth in fall to observations of survival in the bays sampled. *To be completed by February 2013*

B. Measurable Project Tasks

FY 2010	First Quarter	Acquire fall samples
	Second Quarter	Develop processing protocols, AMSS meeting
	Third Quarter	Acquire spring samples, process samples
	Fourth Quarter	Process samples, refine sampling plan for FY11
FY 2011	First Quarter	Acquire fall samples, process samples, prepare for AMSS meeting
	Second Quarter	Continue processing samples, attend AMSS meeting
	Third Quarter	Acquire spring samples, process samples
	Fourth Quarter	Continue processing, develop sampling plan for FY12
FY 2012	First Quarter	Acquire fall samples, prepare for AMSS meeting
	Second Quarter	Continue processing samples, attend AMSS meeting
	Third Quarter	Acquire spring samples, continue sample processing
	Fourth Quarter	Continue processing
FY 2013	First Quarter	Analyze data, prepare for AMSS meeting
	Second Quarter	Complete data analysis, attend AMSS
	Third Quarter	Archive data, submit draft final report
	Fourth Quarter	Submit final report

BUDGET JUSTIFICATION

Total FY 10-13 Budget Request: $331.8 K

Years 1 -3 (FY10, FY11, FY12)

These are monitoring years, costs include contract costs for sample analysis in the chemistry (proximate analysis, RNA/DNA) and analysis of stomach content in our biology labs. Travel reflects cost for the PI to attend AMSS meeting in January of each year. Commodities required to support these analyses and shipping costs are also included. Costs for Years 1 through 3 are identical. General Administration not shown.

Personnel		**$ 0**
Travel		**$ 1.8**
1 person to AMSS meeting	$1.8 K	
Contracts		**$75.0**
Contracts for proximate analysis	$25 K	
Contracts for RNA/DNA	$50 K	
Commodities		**$14.0**
Gases, solvents, glassware, standards Shipping other consumables	$14.0	
Equipment		**$0.0**
Total		**$90.8**

Year 4 (FY 13)

This is a close-out year. Costs reflect final report writing, data and document archiving and attendance at AMSS meeting in January. General Administration not shown.

Personnel		**$ 0**
Travel		**$1.8**
1 person to AMSS meeting	$1.8 K	
Contracts		**$3**
Contract for data archiving	$3 K	
Commodities		**$4.0**
Xeroxing, page charges, software	$4.0	
Equipment		**$0.0**
Total		**$8.8**

Data Management and QA/QC Statement

1. **Study design.** The study design is a stratified random sample. The sampling strata include bays and seasons. Sample sizes are based on the results of previous studies.

2. **Acceptable data.** Acceptable chemistry data will need to conform to standard QA criteria employed by our laboratory.

3. **Data characteristics.**

    a. Fish data include lengths, weights and ages and sex of herring.
    b. In addition, we will provide data on the stomach fullness, diet composition, lipid, protein, RNA and DNA content of individual fish.
    c.

4. **Algorithms to convert signals from sensors to observations.** Concentrations of nucleic acids will be determined from calibration curves derived from known standards. Separate calibration curves will be developed for RNA and DNA for each batch of 15 samples. Lipid and water content will be determined gravimetrically. Protein is determined using proprietary software for our Leco Tru-spec CHN analyzer.

5. **Sample handling and custody.** Biological information for each sample will be entered onto a custody sheet. The custody sheet has columns for sample identification number (SIN), fish length, weight, age, sex, date of processing, processor's sample identification number, the processor's name, and a column for any comments that might be important in interpretation. Examples of commentary would be any noticeable evidence of disease or parasites. The sample numbers will be assigned in the field and correlated with the processor's sample identification number. Sample identification numbers on custody sheets will be used to track the progress of samples through the analytical process and to correlate those results with the initially collected biological information. All QA and analytical results will reside in our database and can be tracked by the sample number. Electronic and hard copies of custody sheets are maintained at ABL.

6. **Calibration and performance evaluation of analytical instrumentation.** For gravimetric determination of lipid content, a duplicate sample will be analyzed per group of 15-20 fish along with a standard reference sample (SRM) and blank. A second set of samples will be re-analyzed if the coefficient of variation for the duplicates was greater than 25% or if the reference sample value not within 15% of the established value or if detectable lipid is found in the blank A whole herring homogenate is used as the SRM. The lipid content of the herring homogenate was initially determined in a group of samples that included the National Institute of Standards and Technology (NIST) SRM-1946, which has a certified value for lipid. The NIST SRM-1946 is processed monthly, along with the herring SRM to ensure consistency. We employ blanks (cane sugar) and reference materials (herring) to verify the protein results. Periodically a NIST standard is used to further test accuracy. RNA and DNA analyses include blanks and reference materials. There is no NIST standard for RNA and DNA so we use a pollock that has been repeatedly analyzed.

7. **Data reduction and reporting.** All data will be tabulated by bay and time. Bays will be compared using ANOVA and regression. See the proposal for details.

LITERATURE CITED

Brett, J. R. (1995). Chapter 1: Energetics. Physiological ecology of Pacific salmon. C. Groot, L. Margolis and W. C. Clarke. Vancouver, British Columbia, Canada, UBC Press.

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Norcross, B. L., E. D. Brown, et al. (2001). "A synthesis of the life history and ecology of juvenile Pacific herring in Prince William Sound, Alaska." Fisheries Oceanography **10**(Supplement 1): 42-57.

Paul, A. J. and J. M. Paul (1998). "Spring and summer whole-body energy content of Alaskan juvenile Pacific herring." Alaska Fishery Research Bulletin **5**(2): 131-136.

Post, J. R. and E. A. Parkinson (2001). "Energy allocation strategy in young fish: allometry and survival." Ecology **82**(4): 1040-1051.

Budget Category:	Proposed FY2010	Proposed FY2011						
Personnel	$0.0	$0.0						
Travel	$1.8	$1.8						
Contractual	$75.0	$75.0						
Commodities	$14.0	$14.0						
Equipment	$0.0	$0.0	LONG RANGE FUNDING REQUIREMENTS					
Subtotal	$90.8	$90.8						
General Administration	$8.2	$8.2	FY2010	FY2011	FY2012	FY2013		TOTAL
Project Total	$99.0	$99.0	$99.0	$99.0	$99.0	$9.6		$306.6
Full-time Equivalents (FTE)	0.0	0.0						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

FY10

Prepared:

Project Number:
Project Title: YOY herring growth
Agency: NOAA/TSMRI
PI: Heintz, R.

FORM 3A
TRUSTEE
AGENCY
SUMMARY

Personnel Costs:		GS/Range/	Months	Monthly		Proposed
Name	Position Description	Step	Budgeted	Costs	Overtime	FY 2008
			0.0	0.0		0.0
						0.0
			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	Proposed
Description		Price	Trips	Days	Per Diem	FY 2008
						0.0
						0.0
						0.0
						0.0
Travel to AMSS	1 person three days	0.6	1	4	0.3	1.8
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
					Travel Total	$1.8

FY10

Prepared:

Project Number:
Project Title: YOY Herring growth
Agency: NOAA/TSMRI

FORM 3B
Personnel
& Travel
DETAIL

Contractual Costs:	Proposed
Description	FY 2008
Contracts for proximate analysis, RNA/DNA	50.0
Contracts for stomach content analysis	25.0
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$75.0

Commodities Costs:	Proposed
Description	FY 2008
shipping, glassware, gases, reagents other consumables	14.0
Commodities Total	$14.0

FY10	Project Number: Project Title: YOY growth Agency: NOAA/TSMRI	FORM 3B Contractual & Commodities DETAIL

Prepared:

New Equipment Purchases:	Number of Units	Unit Price	Proposed FY 2008
Description			
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R		**New Equipment Total**	$0.0

Existing Equipment Usage:	Number of Units	Inventory Agency
Description		
Leco Protein Analyzer	1	NOAA
Accelerated Solvent Extractor	1	NOAA
Leco Thermogravimetric Analyzer	1	NOAA
Parr Semi-Micro Bomb Calorimeter	1	NOAA
Bio-Impedance Analyzers	2	NOAA

FY10

Prepared:

Project Number:
Project Title: YOY herring growth
Agency: NOAA/TSMRI

FORM 3B
Equipment
DETAIL

Budget Category:	Proposed FY2011	Proposed FY2012						
Personnel	$0.0	$0.0						
Travel	$1.8	$1.8						
Contractual	$75.0	$75.0						
Commodities	$14.0	$14.0						
Equipment	$0.0	$0.0	LONG RANGE FUNDING REQUIREMENTS					
Subtotal	$90.8	$90.8						
General Administration	$8.2	$8.2	FY2010	FY2011	FY2012	FY2013		TOTAL
Project Total	$99.0	$99.0	$99.0	$99.0	$99.0	$9.6		$306.6
Full-time Equivalents (FTE)	0.0	0.0						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

FY11

Prepared:

Project Number:
Project Title: YOY herring growth
Agency: NOAA/TSMRI

FORM 3A
TRUSTEE
AGENCY
SUMMARY

Personnel Costs:		GS/Range/	Months	Monthly		Proposed
Name	Position Description	Step	Budgeted	Costs	Overtime	FY 2008
			0.0	0.0		0.0
						0.0
			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	Proposed
Description		Price	Trips	Days	Per Diem	FY 2008
						0.0
						0.0
						0.0
						0.0
Travel to AMSS	1 person three days	0.6	1	4	0.3	1.8
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
					Travel Total	$1.8

FY11

Prepared:

Project Number:
Project Title: YOY Herring growth
Agency: NOAA/TSMRI

FORM 3B
Personnel
& Travel
DETAIL

Contractual Costs:	Proposed
Description	FY 2008
Contracts for proximate analysis, RNA/DNA	50.0
Contracts for stomach content analysis	25.0
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$75.0

Commodities Costs:	Proposed
Description	FY 2008
shipping, glassware, gases, reagents other consumables	14.0
Commodities Total	$14.0

FY11	**Project Number:** **Project Title:** YOY growth **Agency:** NOAA/TSMRI	FORM 3B Contractual & Commodities

Prepared:

New Equipment Purchases: Description		Number of Units	Unit Price	Proposed FY 2008
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.			**New Equipment Total**	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency
Leco Protein Analyzer	1	NOAA
Accelerated Solvent Extractor	1	NOAA
Leco Thermogravimetric Analyzer	1	NOAA
Parr Semi-Micro Bomb Calorimeter	1	NOAA
Bio-Impedance Analyzers	2	NOAA

FY11

Prepared:

Project Number:
Project Title: YOY herring growth
Agency: NOAA/TSMRI

FORM 3B
Equipment
DETAIL

Budget Category:	Proposed FY2012	Proposed FY2013						
Personnel	$0.0	$0.0						
Travel	$1.8	$1.8						
Contractual	$75.0	$0.0						
Commodities	$14.0	$7.0						
Equipment	$0.0	$0.0	LONG RANGE FUNDING REQUIREMENTS					
Subtotal	$90.8	$8.8						
General Administration	$8.2	$0.8	FY2010	FY2011	FY2012	FY2013		TOTAL
Project Total	$99.0	$9.6	$99.0	$99.0	$99.0	$9.6		$306.6
Full-time Equivalents (FTE)	0.0	0.0						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

FY12

Prepared:

Project Number:
Project Title: YOY herring growth
Agency: NOAA/TSMRI

FORM 3A
TRUSTEE
AGENCY
SUMMARY

Personnel Costs:		GS/Range/	Months	Monthly		Proposed
Name	Position Description	Step	Budgeted	Costs	Overtime	FY 2008
			0.0	0.0		0.0
						0.0
			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	Proposed
Description		Price	Trips	Days	Per Diem	FY 2008
						0.0
						0.0
						0.0
						0.0
Travel to AMSS	1 person three days	0.6	1	4	0.3	1.8
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
					Travel Total	$1.8

FY12

Prepared:

Project Number:
Project Title: YOY Herring growth
Agency: NOAA/TSMRI

FORM 3B
Personnel
& Travel
DETAIL

Contractual Costs:	Proposed
Description	FY 2008
Contracts for proximate analysis, RNA/DNA	50.0
Contracts for stomach content analysis	25.0
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$75.0

Commodities Costs:	Proposed
Description	FY 2008
shipping, glassware, gases, reagents other consumables	14.0
Commodities Total	$14.0

FY12

Prepared:

Project Number:
Project Title: YOY growth
Agency: NOAA/TSMRI

FORM 3B
Contractual
&
Commodities

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FY 2008
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		**New Equipment Total**	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency
Leco Protein Analyzer	1	NOAA
Accelerated Solvent Extractor	1	NOAA
Leco Thermogravimetric Analyzer	1	NOAA
Parr Semi-Micro Bomb Calorimeter	1	NOAA
Bio-Impedance Analyzers	2	NOAA

FY12

Prepared:

Project Number:
Project Title: YOY herring growth
Agency: NOAA/TSMRI

FORM 3B
Equipment
DETAIL

2008 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 2007 - September 30, 2008

Budget Category:	Proposed FY2013							
Personnel	$0.0							
Travel	$1.8							
Contractual	$3.0							
Commodities	$4.0							
Equipment	$0.0		LONG RANGE FUNDING REQUIREMENTS					
Subtotal	$8.8							
General Administration	$0.8		FY2010	FY2011	FY2012	FY2013		TOTAL
Project Total	$9.6		$99.0	$99.0	$99.0	$9.6		$306.6
Full-time Equivalents (FTE)	0.0							
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

FY13

Prepared:

Project Number:
Project Title: YOY herring growth
Agency: NOAA/TSMRI

FORM 3A
TRUSTEE
AGENCY
SUMMARY

2008 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 2007 - September 30, 2008

Personnel Costs:		GS/Range/	Months	Monthly		Proposed
Name	Position Description	Step	Budgeted	Costs	Overtime	FY 2008
			0.0	0.0		0.0
						0.0
			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	Proposed
Description		Price	Trips	Days	Per Diem	FY 2008
						0.0
						0.0
						0.0
						0.0
Travel to AMSS	1 person three days	0.6	1	4	0.3	1.8
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
					Travel Total	$1.8

FY13

Prepared:

Project Number:
Project Title: YOY Herring growth
Agency: NOAA/TSMRI

FORM 3B
Personnel
& Travel
DETAIL

2008 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 2007 - September 30, 2008

Contractual Costs:	Proposed
Description	FY 2008
data archiving	3.0
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$3.0

Commodities Costs:	Proposed
Description	FY 2008
paper, page charges, xeroxing, office supplies	4.0
Commodities Total	$4.0

FY13

Prepared:

Project Number:
Project Title: YOY growth
Agency: NOAA/TSMRI

FORM 3B
Contractual &
Commodities
DETAIL

2008 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 2007 - September 30, 2008

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FY 2008
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		**New Equipment Total**	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency
Leco Protein Analyzer	1	NOAA
Accelerated Solvent Extractor	1	NOAA
Leco Thermogravimetric Analyzer	1	NOAA
Parr Semi-Micro Bomb Calorimeter	1	NOAA
Bio-Impedance Analyzers	2	NOAA

FY13

Prepared:

Project Number:
Project Title: YOY herring growth
Agency: NOAA/TSMRI

FORM 3B
Equipment
DETAIL