

**COMPENDIUM  
OF  
STELLER SEA LION RELATED RESEARCH,  
2000-2005**

**Progress Report No. 1**

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## I. Introduction

On November 29, 2005, Chris Oliver, on behalf of the North Pacific Fishery Management Council, entered into a contract with Thomas R. Loughlin, TRL Wildlife Consulting, and Jack V. Tagart, Tagart Consulting, for the purpose of constructing a compendium of Steller sea lion (SSL) related research in the North Pacific. Under terms of the contract Drs Loughlin and Tagart are expected to: 1) identify all relevant SSL related research conducted from the year 2000 to 2005, including grey literature; 2) compile brief (one to two page) summaries of each research project and results; and 3) synthesize these various research findings into major (thematic) categories with attendant summary results.

## II. Progress to Date

The contractors met in Seattle on three occasions between November 30<sup>th</sup> and December 20<sup>th</sup>. We identified sources of bibliographic information, shared short lists of bibliographies currently in our possession, listed known sources of institutional funding for SSL research and set out preliminary tasks for ourselves. We gathered available published summaries of SSL research and began compiling a more comprehensive and integrated list of references.

Our current comprehensive list of references contains just over 500 citations. The list includes journal articles, progress and technical reports, contract reports, proceedings of conferences and symposia, books, thesis and other manuscripts including conference abstracts and posters. Roughly half of the citations originate from conference or symposia proceedings (including submitted papers, abstracts and posters); about a quarter of the citations are published articles in recognized journals; the remainder are from books, theses and technical reports. With the inclusion of abstracts, posters, and unpublished manuscripts there is substantial redundancy among the citations. Our preliminary working bibliography is attached as Appendix I.

Among the immediate areas of inquiry was identification and gathering of available published reports stemming from those projects funded by the Steller Sea Lion Research Initiative (SSLRI). This funding source released 15 million dollars in 2001 for projects with a 2-3 year duration. Much of the funding went to academic institutions, research foundations, and other non-governmental organizations. We made progress in contacting many of the Principle Investigators and a list of SSLRI affiliated reports is attached (see Appendix II). Notably, in so far as we can tell, there is as yet no published information from some of the funded projects.

We have adopted as major thematic categories the NMFS/AFSC list of Steller Sea Lion Research Themes and Sub-themes (<http://www.afsc.noaa.gov/Stellers/researchthemes.htm> also attached as Appendix III). We have made a preliminary cut at classifying the 500+ references into thematic categories (Figure 1). Currently, we anticipate synthesizing research findings within each of these thematic areas with adaptations as necessary following our review of the literature.

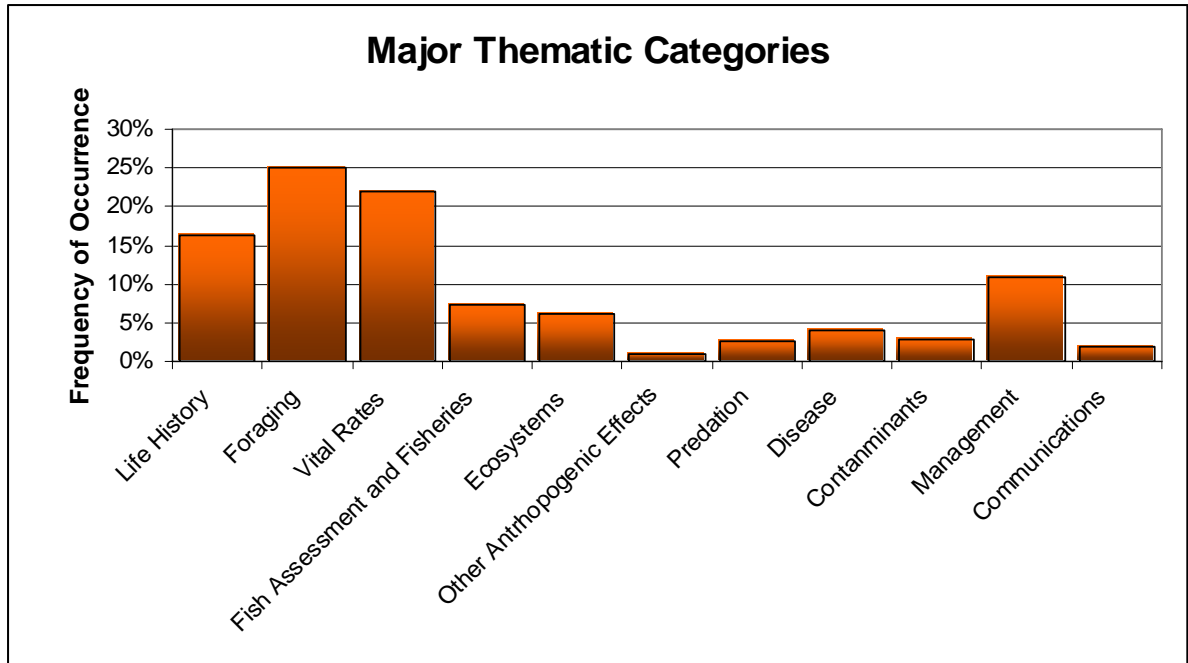


Figure 1. Preliminary distribution of current list of Steller sea lion related research citations by major thematic category.

Other areas of inquiry include contacting the PMEL Director to identify CIFAR projects funded with SSL related monies and identification of projects and published articles funded by Pollock Conservation Cooperative.

### III. Issues And Concerns

The second deliverable from our contract requests summaries of each article. In our preliminary discussions we talked of providing published abstracts for those papers with abstracts and generating abstracts for those without. Given the volume of papers identified, and the realization that many are themselves abstracts (currently available in referenced proceedings, e.g., abstracts from the Marine Science in Alaska Symposia (2003, 2004, 2005), the “Is it food, II” workshop and others), is it your desire to have those available abstracts incorporated into an annotated working bibliography, or is it sufficient to cite the compilations and address the content within the synthesis of research findings to be developed under the thematic categories?

It may be profitable to have a brief teleconference immediately following the New Year.

## Appendix I. Working Bibliography

28 December 2005

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Presented Papers.

Bodtker, K.M., E.S. Gregr, E. Carruthers, D.L. Musgrave, and A.W. Trites. 2005. Predicting the spatial distribution of Steller sea lion prey based on modeled physical oceanography.

Briggs, H.B., D.G. Calkins, R.W. Davis, and R. Thorne. 2005. Habitat associations and diving activity of subadult Steller sea lion (*Eumetopias jubatus*) during the winter and spring in north-central Gulf of Alaska.

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Farley, S.D., V.K. Stegall, L.D. Rea, A. Koenig, I. Ridley, and P.J. LaMotte. 2005. Trace element composition in vibrissae, milk, and serum of Alaska Steller sea lion (*Eumetopias jubatus*): Identification of weaning and dietary shifts.

Gregr, E.S., and A.W. Trites. 2005. Using overlap indices to assess the efficacy of regulations designed to reduce competition between fisheries and Steller sea lions.

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Atkinson, S., D. Calkins, M. Castellini, V. Burkanov, S. Ingles, and D. Hennen. 2005. Impact of changing diet regimes on Steller sea lion body condition.

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- Bau, S.S., and A.W. Trites. 2005. Terrestrial characteristics of Steller sea lion haulouts and rookeries.
- Beck, C.A., L.D. Rea, S.J. Iverson, J.M. Kennish, D. Tollit, and K.W. Pitcher. 2005. Estimating diet of young Steller sea lions using Quantitative Fatty Acid Signature Analysis (QFASA).
- Beckmen, K.B., K.A. Burek, T. Gelatt, F. Morado, S. Nadler, and E.T. Lyons. Hookworms in Steller sea lions (*Eumetopias jubatus*) in Alaska.
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**Abstracts and posters from the Sea Lions of the World Symposium, September 30-October 3, 2004, Anchorage, AK. Some of the titles may appear in a volume to be published in 2006 by Alaska Sea Grant.**

Presented Papers:

Beckmen, K.B., K. A. Burek, L. D. Rea, and T. S. Gelatt. 2004. A Health Assessment Approach to Steller Sea Lion Research in Alaska. Presented paper.

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- Call, K.A., B.S. Fadely, and A. Greig. 2004. Attendance Patterns of Juvenile Steller Sea Lions (*Eumetopias jubatus*) in the Gulf of Alaska and Aleutian Islands Derived from Satellite Dive Recorders (SDRs). Presented paper
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- Castellini, M. 2004. A Decade of Adult Steller Physiology in the Field: Where Are We Now? Presented paper.
- Fadely, B.S., T.S. Gelatt, L.D. Rea, J.C. King, and T.R. Loughlin. 2004. Regional Variation of Juvenile Steller Sea Lion (*Eumetopias jubatus*) Growth Rates in Alaska . Presented paper.
- Fritz, L., and S. Hinckley. 2004. A Critical Review of the Regime Shift--“Junk Food” Hypothesis for the Decline of the Western Stock of Steller Sea Lion. Presented paper.
- Hennen, D.R. 2004. Correlations between the Steller Sea Lion Decline and the Bering Sea/Gulf of Alaska Commercial Fishery. Presented paper.
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- Kucey, L., and A.W. Trites. 2004. Is Human Disturbance Affecting Steller Sea Lions? Presented paper.
- Lea, M.-L., B. Wilson, A. Trites, M. Sigler, and D. Csepp. 2004. Bridging the Gap—Linking Real-Time Foraging: Movements of Sea Lions to Prey Availability. Presented paper.
- Logerwell, E.A., and S. F. McDermott. 2004. Are Trawl Exclusion Zones Effective at Mitigating Competition between Commercial Fisheries and Steller Sea Lions? Presented paper.
- Mamaev, E.G., and V. N. Burkanov. 2004. How long do Steller sea lions drink milk? Presented paper
- Olesiuk, P.F. 2004. Population Biology and Status of Steller and California Sea Lions (*Eumetopias jubatus* and *Zalophus californianus*) in Canadian Waters. Presented paper.
- Pitcher, K.W., G. W. Pendleton, and T. S. Gelatt. 2004. Estimation of Weaning Status of Juvenile Steller Sea Lions Using Mark-Resight Models. Presented paper.
- Punt, A.E., and G. Fay. 2004. Can Experimental Manipulation Be Used to Determine the Cause of the Decline of the Western Stock of Steller Sea Lions (*Eumetopias jubatus*)? Presented paper.
- Rehberg, M.J., and J. M. Burns . 2004. Objective Classification of Trips-to-Sea Made by Juvenile Steller Sea Lions (*Eumetopias jubatus*) in Alaska. Presented paper.
- Rosen, D.A.S., D. J. Tollit, A.J. Winship, and A.W. Trites. 2004. Potential Effects of Short-Term Prey Changes on Sea Lion Physiology. Presented paper.

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Small, R.J., and D.P. DeMaster. 2004. Uncertain Management or Management of Uncertainty: Steller Sea Lion—A Case Study. Presented paper.

Sterling, J.T., B.S. Fadely, and T.R. Loughlin. 2004. Movement and Dive Behavior of Foraging Juvenile Steller Sea Lions (*Eumetopias jubatus*) Associated with Pelagic Eddies. Presented paper.

Trites, A.W., and K.H. Soto. 2004. A Global Comparative Analysis of Sea Lion Diets. Presented paper.

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Atkinson, S., T.M. Williams, K. Mashburn, D. Greig, and D. Christen. 2004. Physiology of Homeostasis in Sea Lions: The Link between Hormones and Metabolism. Poster

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- Davis, R.W., A.A. Brandon, D. Calkins, and T.R. Loughlin. 2004. Indices of Reproductive Effort and Nutritional Health in Lactating Steller Sea Lions and Pups in Areas of Declining and Stable Population . Poster.
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- Gregg, E.J., and A.W. Trites. 2004. Estimating Ecological Niche Overlap between Steller Sea Lions and Commercial Trawl Fisheries in Alaska. Poster.
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- Hu, C., L. Mazzaro, D. A. Rosen, A.W. Trites, and D. D. Kitts. 2004. Vitamin Supplementation Maintains Plasma 8-isoprostane Levels in Captive Steller Sea Lions. Poster

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- Richmond, J.P., J. M. Burns, and L. D. Rea. 2004. Examination of Blood and Muscle Development in the Steller Sea Lion (*Eumetopias jubatus*): Implications for Diving and Foraging Ability. Poster.
- Ruth, J., D.J. Tollit, J.L. Laake, and A. W. Trites. 2004. Using Feeding Trials and Computer Simulations to Reconstruct Sea Lion Diet from Scat. Poster.
- Schauflerer, L., E. Logerwell, and J. Vollenweider . 2004. Variation in the Quality of Steller Sea Lion Prey from the Aleutian Islands and Southeastern Alaska. Poster.
- Soboleff, N.J., and G. H. Kruse. 2004. Potential Interactions between State-Managed Fisheries and Steller Sea Lions (*Eumetopias jubatus*). Poster.
- Stegall, V.K., S.D. Farley, L. D. Rea, K. W. Pitcher, R. O. Rye, C. L. Kester, and C.R. Bern. 2004. Use of Carbon and Nitrogen Stable Isotope Ratios in Vibrissae to Detect Weaning in Alaska Steller Sea Lions (*Eumetopias jubatus*). Poster
- Thedinga, J.F., S. W. Johnson, and D.J. Csepp. 2004. Seasonal Availability of Nearshore Prey to Steller Sea Lions near Two Haul-outs in Southeastern Alaska. Poster.
- Thomas, G.L., and R. E. Thorne. 2004. Implications of the Prince William Sound Herring Population Crash: Did It Impact Steller Sea Lions? Poster.
- Thompson, D., J. Matthiopoulos, and I. L. Boyd . 2004. Effects of Water Temperature on Swimming Metabolic Rates and Foraging Efficiency in Sea Lions. Poster.
- Tollit, D., S. Heaslip, R. Joy, and A. W. Trites. 2004. Estimating Diet Composition in Sea Lions: What Technique to Choose? Poster.
- Waite, J.N., and V.N. Burkanov. 2004. Steller Sea Lion (*Eumetopias jubatus*) Feeding Habits in the Russian Far East. Poster.
- Wilson, B., M.-A. Lea, and A. W. Trites. 2004. Following in the Wake of Sea Lions: Fine-Scale Boat-Based Tracking of Juvenile Steller Sea Lions Reveals Distinct Habitat Preferences for Shorelines. Poster.
- Womble, J.N., and M. F. Sigler. 2004. Importance of Seasonally Available Prey for Steller Sea Lions (*Eumetopias jubatus*) at Benjamin Island, Southeastern Alaska. Poster.
- Wynne, K.M., R. J. Foy, B. Knoth, and C. L. Buck. Are Steller Sea Lions Prey-Limited? Ask Their Neighbors! Poster

## Appendix II. Steller Sea Lion Research Initiative Project Status

### STELLER SEA LION RESEARCH INITIATIVE RESEARCH PAPERS AND REPORTS

Compiled by Jack Tagart as of 12/19/2005

**Project: 01-SSL-001** - Implications of varying food distribution for fitness in Steller sea lions. Principle Investigator, Ian Body, University of St. Andrews, UK.

[ilb@st-andrews.ac.uk](mailto:ilb@st-andrews.ac.uk)

Final Contract Report:

Matthiopoulos, J., D. Thompson and I. Boyd. Implications of varying food distributions for fitness in Steller sea lions. Final Contract Report (Contract No. NA17FX1431), Sea Mammal Research Unit, Gatty Marine Laboratory, St Andrews University, St Andrews, Fife KY16 8LB, U.K. 92p.

**Project: 01-SSL-002** - Investigation of retinol (Vit. A) and tocopherol (Vit. E) status in Steller sea lion: contribution to the nutritional stress in declining populations. Principle Investigator, Liza Mazzaro, Mystic Aquarium, 55 coogan Blvd.Mystic, CT 06355

[LMazzaro@mysticaquarium.org](mailto:LMazzaro@mysticaquarium.org), [LMazzaro@aol.com](mailto:LMazzaro@aol.com)

Published Reports:

None at this time

**Project: 01-SSL-003** - Traditional knowledge of Steller sea lions and community-based monitoring of local seasonal haul-outs. Principle Investigator, Lianna Jack, The Alaska Sea Otter and Steller sea lion Commission. [ljack@seaotter-sealion.org](mailto:ljack@seaotter-sealion.org), [ljack@gci.net](mailto:ljack@gci.net)

Sent email 12/8/05

**Project: 01-SSL-006** - Identify Steller sea lion rookeries: gathering traditional ecological information on Steller sea lions from Perryville, Alaska. Principle Investigator, Helen Chythlook, Britol Bay Native Association. [hchythlook@bna.com](mailto:hchythlook@bna.com)

Final contract report:

Anonymous. 2004. Steller Sea Lion Research Initiative, Native Village of Perryville, Traditional ecological knowledge of subsistence uses of Steller sea lions and identifying Steller sea lion haulouts and rookeries in the Perryville, Alaska area. Final Contract Report. Bristol Bay Native Association P.O. Box 310 Dillingham, Alaska 99576. 68p.

**Project: 01-SSL-007** - 1. Bioenergetic studies of captive Steller sea lions  
2. Steller sea lion diet quantification studies; 3. Killer whale predation on Steller sea lions in western Alaska; 4. Remote passive acoustic monitoring of killer whales. Principle Investigator, Andrew Trites

Numerous publications via the Marine Mammal Consortium. I need to associate which ones are related to these projects.

**Project: 01-SSL-016** - Subsistence harvest monitoring of Steller sea lions on St. Paul Island, Alaska. Principle Investigator, Michael Williams ([michael.williams@noaa.gov](mailto:michael.williams@noaa.gov)) , Jesse Coltrane, The Aleut Community of St. Paul.

Contacted Mr. Williams (12/19/05), no email for Mr. Coltrane at present: As yet no response.

**Project: 01-SSL-018** – High resolution foraging behavior and movement patterns of Steller sea lion juveniles in regions of increase and decline. Principle Investigator, Jennifer Burns, University of Alaska, Anchorage. [jennifer.burns@uaa.alaska.edu](mailto:jennifer.burns@uaa.alaska.edu)

Published articles (related to above funded project):

Burns, J.M., T.M. Williams, S.M. Secor, N. Owen-Smith, N.A. Bargmann, M.A. Castellini (Accepted). New insights into the physiology of natural foraging. *Physiological and Biochemical Zoology*.

Burns, J.M., C. A. Clark, J.P Richmond. 2004. The impact of lactation strategy on physiological development of juvenile marine mammals: implications for the transition to independent foraging. *Comparative Physiology and Biochemistry, International Congress Series*. 1275: 341-350

Richmond, J.P., J.M. Burns, L.D. Rea, K. Mashburn. 2005. Postnatal ontogeny of erythropoietin and hematology in free-ranging Steller sea lions (*Eumetopias jubatus*). *General and Comparative Endocrinology*. 141:240-247

Theses:

Rehberg, M.J. 2005. Pattern matters: changes in the organization of swimming and diving behavior by Steller sea lion juveniles in coastal Alaska waters. M.S.. Thesis, University of Alaska, Anchorage, AK. 92p.



**Project: 01-SSL-021** - Seasonal forage patterns of Steller sea lions. Principle Investigator: Kate Wynne, University of Alaska, Fairbanks. [ffkmw@uaf.edu](mailto:ffkmw@uaf.edu)

Published Reports:

Wynne, K.M., R. Foy, and L. Buck. 2005. Gulf Apex Predator-prey Study (GAP) Final Report FY2001-2003. NOAA Grant NA16FX1270, University of Alaska Fairbanks, School of Fisheries and Ocean Sciences. 249p.  
[http://www.sfos.uaf.edu/gap/publications/annual\\_reports.htm](http://www.sfos.uaf.edu/gap/publications/annual_reports.htm)

**Project: 01-SSL-022** - Comparison of prey availability and ecology in Steller seal lion foraging regions: a coordinated aerial remote sensing study. Principle Investigator, Evelyn Brown. [ebrown@ims.uaf.edu](mailto:ebrown@ims.uaf.edu)

Published Reports:

None at this time, Final Report expected January, 2006.

**Project: 01-SSL-025** - Fish assemblages associated with Steller sea lion haul-outs. Principle Investigator, Brenda Konar. [bkonar@guru.uaf.edu](mailto:bkonar@guru.uaf.edu) ; MS Student, Cathy (Hegwer) Foy

Hegwer, C.L. 2003. Seasonal abundance and diversity of nearshore fishes around Steller sea lion haulouts of Kodiak Island. M.S. Thesis, University of Alaska, Fairbanks. 77p.  
<http://goldmine.uaf.edu/uhtbin/cgiirsi.exe/10UIY3TmI0/UAFRAS/30440361/5/0>

**Project: 01-SSL-031** – Investigation of Steller sea lion predation by killer whales in southeastern Alaska. Principle Investigator, Janice Straley, University of Alaska, Southeast. [Jan.Straley@uas.alaska.edu](mailto:Jan.Straley@uas.alaska.edu)

Published Reports:

Straley, J.M.. 2005. Investigations of Steller sea lion predation by killer whales in Southeastern Alaska. NOAA Contract report, Contract No. NA16FX1413 University of Alaska Southeast, Sitka, Alaska

Straley, J. M., D. R. Matkin, C. M. Gabriele, G. M. Ellis, and L. G. Barrett-Lennard. 2003. Transient killer whales in Southeastern Alaska: Who are they? What are they eating. Abstracts from the Symposium on Marine Science in the Northeast Pacific: Science for Resource Dependent Communities. January 13-17, Anchorage, AK. Available at: <http://www.afsc.noaa.gov/stellers/symposium2003.htm>

**Project: 01-SSL-041** - Nutritional significance of ephemeral high-quality foraging opportunities for Steller sea lions. Principle Investigator: Glenn VanBlaricom, University of Washington. [glennvb@u.washington.edu](mailto:glennvb@u.washington.edu)

Articles in press:

Hoberecht, L.K. D.J. Vos, and G. R. VanBlaricom. (in press) A remote biopsy system used to sample Steller sea lion (*Eumetopias jubatus*) blubber. *Marine Mammal Science*.

Published articles:

Shima, M., A.B. Hollowed, G.R. VanBlaricom. 2002. Changes over time in the spatial distribution of walleye pollock (*Theragra chalcogramma*) in the Gulf of Alaska, 1984-1996. *Fish. Bulletin* 100(2):307-323

Womble, J.N. M.F. Willson, M.F. Sigler, Brendan P. Kelly, G.R. VanBlaricom. 2005. Distribution of Steller sea lions *Eumetopias jubatus* in relation to spring-spawning fish in SE Alaska. *Marine Ecology Progress Series* 294:271-282

**Project: 01-SSL-042** - Assessment of fine-scaled interaction between Steller sea lion abundance and trends of local fisheries. Principle Investigator: John Skalski, University of Washington. [jrs@cbr.washington.edu](mailto:jrs@cbr.washington.edu)

Final contract report:

Dillingham, P. K. Ryding and J.R. Skalski. 2004. Assessment of fine-scaled interaction between Steller sea lion abundance and trends of local fisheries. Manuscript Rept., NOAA/NMFS/AFSC SSLRI Program, Juneau, Ak. 147 p.

Articles in press:

Dillingham, P. W., J. R. Skalski, and K. E. Ryding. 2005. Fine-scale geographic interactions between Steller sea lion trends and local fisheries. *Canadian Journal of Fisheries and Aquatic Sciences* (in press).

**Project 01-SSL-046** – Installation of a remote census and photogrammetry network: validation and assessment of seasonal and individual Steller sea lion body condition and population trends. Principle Investigator, Markus Horning, Texas A&M University. [horningm@tamug.edu](mailto:horningm@tamug.edu)

Sent email 12/19/05

**Project 01-SSL-047** – Satellite-linked mortality transmitters in Steller sea lions: assessing the effects of health status, foraging ability, and environmental variability on juvenile survival and population trends. Principle Investigator, Markus Horning, Texas A&M University. [horningm@tamug.edu](mailto:horningm@tamug.edu)

Sent email 12/19/05

**Project 01-SSL-049** – Linking animal-borne data records to autonomous remote imaging systems: implementing the RAT-link. Principle Investigator, Markus Horning, Texas A&M University. [horningm@tamug.edu](mailto:horningm@tamug.edu)

Sent email 12/19/05

**Project 01-SSL-049** – Foraging ecology and hunting behavior of adult and juvenile Steller sea lions. Principle Investigator, Randal Davis, Texas A&M University. [rawdavis@tamu.edu](mailto:rawdavis@tamu.edu)

Sent email 12/12/05

**Project: 01-SSL-052** - Acoustic characterization of Steller sea lion forage species. Principle Investigator, John Horne, University of Washington. [jhorne@u.washington.edu](mailto:jhorne@u.washington.edu)

Published Reports:

Gauthier, S. and J.K. Horne. 2004. Acoustic characteristics of forage fish species in the Gulf of Alaska and Bering Sea based on Kirchoff-approximation models. *Can. J. Fish. Aquat. Sci.* 61: 1839-1850.

Gauthier, S. and J.K. Horne. 2004. Potential acoustic discrimination within boreal fish assemblages. *ICES J. of Mar. Sci.* 61: 836-845.

**Project: 01-SSL-053** - Assessing population trends and dietary intake of Steller sea lion populations along the western Alaska peninsula and eastern Aleutians. Principle Investigator, Kate Wynne, University of Alaska, Fairbanks. [ffkmw@uaf.edu](mailto:ffkmw@uaf.edu) ; additional contacts: Beth Stewart, [beths@acsalaska.net](mailto:beths@acsalaska.net) and Cathy Foy, [cathyhegwer@ak.net](mailto:cathyhegwer@ak.net) , Aleutians East Borough. (note Cathy Foy was formerly Cathy Hegwer)

Published Reports:

None at this time

**Project: 01-SSL-055** - Metal toxicity in Steller sea lions (*Eumetopias jubatus*) tissues and cell lines. Principle Investigator, John P. Wise, Sr., University of Southern Maine. [john.wise@maine.edu](mailto:john.wise@maine.edu)

Final Contract Report:

Wise, J.P. 2005. Metal toxicity in Steller sea lion (*Eumetopias jubatus*) tissues and cell lines. Final Contract Report (Contract number NA16FX1412). University of Southern Maine. 24p.

Abstracts:

Holmes, A.L., Wise, S.S., Little, J.A., Xie, H., Bozza, M., Moreland, ST. Aubin, D.J., J.A., Dunn, J.L., Atkinson, S., Gulland, F., Bursian, S., and Wise, Sr. J.P. Hexavalent Chromium Cytotoxicity Is Organ and Species Specific for Steller Sea Lion and Mink Cells. Presented at the Marine Science in the Northeast, January 2003.

Wise, S.S., Little, J.E., Bozza, M., Atkinson, S., ST. Aubin, D.J., J.A., Dunn, J.L., Gulland, F., Wise, Sr. J.P. Metal Toxicity in Cultured Steller Sea Lion Fibroblasts. Presented at the International Association for Aquatic Animal Medicine (IAAAM) Annual Meeting, May 2003.

Wise, Sr. J.P., Wise, S.S., Goertz, C.E.C., Bozza, M., Atkinson, S., St Aubin, D.J., Dunn, J.L., Gulland, F. Toxicity of Heavy Metals in Cultured Steller Sea Lion Cells. Presented at the Society of Environmental Toxicology and Chemistry (SETAC) Annual Meeting, November 2003

Morin, A.T., Goertz, C.E.C., Wise, S.S., Dunn, J.L., Gulland, F., Jayasundara, N., Bozza, M., Atkinson, S., and Wise, Sr. J.P. Comparative Cytotoxicity of Hexavalent Chromium in Humans and Steller Sea Lions. Presented at the Northeast Society of Toxicology (NESOT) Annual Meeting, November 2003.

Goertz, C.E.C., Wise, S.S., Dunn, J.L., Gulland, F., Morin, A.T., Jayasundara, N., Bozza, M., Atkinson, S., Wise Sr. J.P. Sodium Chromate and Cadmium Chloride Toxicity in Steller Sea Lion Dermal, Renal, Bronchial, and Testicular Cells. Presented at the Northeast Society of Toxicology (NESOT) Annual Meeting, November 2003.

Wise, Sr., J.P., Wise, S.S., Goertz, C.E.C., Bozza, M., St. Aubin, D.K., Dunn, J.L., Atkinson, S., and Gulland, F.: Toxicity of Heavy Metals in Cultured Steller Sea Lion Cells. Presented at the Society of Environmental Toxicology and Chemistry, November, 2003.

Goertz, C.E.C., Wise, S.S., Jayasundara, N., Bozza, M., Atkinson, S., Dunn, J.L., Gulland, F., Wise, Sr. J.P. Metal Toxicity In Cultured Steller Sea Lion Fibroblasts. Presented at the Society for Marine Mammalogy (SMM) December 2003.

Morin, A.T., Goertz, C.E.C., Wise, S.S., Dunn, J.L., Gulland, F, Jayasundara, N., Bozza, M., Atkinson, S., and Wise, Sr. J.P.: Sodium Chromate Toxicity in Bronchus and Dermis of Steller Sea Lions and Humans. Toxicological Sciences 67(S): 757, 2004.

Goertz, C.E.C., Wise, S.S., Dunn, J.L., Gulland, F, Morin, A., Jayasundara, N., Bozza, M., Atkinson, S., and Wise, Sr. J.P.: Cytotoxicity of Two Heavy Metals in Steller Sea Lion Dermal, Renal, Bronchial, and Testicular Cells. Toxicological Sciences 67(S): 756, 2004.

Goertz, C.E.C., Wise, S.S., Dunn, J.L., Bozza, M., Atkinson, S., Gulland, F.M.D., Taylor, R.J., and Wise, Sr. J.P.: *In Vitro* Metal Toxicity in Steller Sea Lion (*Eumetopias jubatus*) Fibroblasts with an Emphasis on Hexavalent Chromium. Proceedings of the Annual Meeting of the International Association of Aquatic Animal Medicine, 35: 74-75 2004.

Goertz, C.E.C., Wise, S.S., Dunn, J.L., Gulland, F.M.D., Morin, A., Jayasundra, N., Bozza, M., Atkinson, S., and Wise, Sr. J.P. "Sodium Chromate Toxicity and Uptake in Steller Sea Lion Cells". Proceedings of the 22<sup>nd</sup> Wakefield Fisheries Symposium: "Sea Lions of the World Conservation and Research in the 21<sup>st</sup> Century" September, 2004.

Holmes, A.L., Wise, S.S., Morin, A.T., Goertz, C.E.C, Atkinson, S., Dunn, J.L., Gulland, F.M.D., and Wise, Sr., J.P.: Sodium Chromate Toxicity in Steller Sea Lion Cells. Proceedings of the Annual Meeting of the North Atlantic Chapter of the Society for Environmental Toxicology and Chemistry, June 2005.

Wise, S.S., Morin, A.T., Goertz, C.E.C., Dunn, J.L., Gulland, F.M.D., Bozza, M., Atkinson, S., and Wise, Sr. J.P.: Metal Toxicity of Sodium Chromate in Steller Sea Lion Bronchus and Dermis Compared To Humans. Presented at the Biennial meeting of PRIMO (Pollution Research in Marine Organisms), June 2005.

Kelly, R., Holmes, A.L., Wise, S.S., Morin, A.T., Goertz, C.E.C., Atkinson, S., Dunn, J.L., Gulland, F.M.D., and Wise Sr., J.P.: "Sodium Chromate Toxicity in Steller Sea Lion Cells." Proceedings of the Biennial Meeting of the Chromium and Human Health Workshop, August 2005.

**Project: 01-SSL-062** - Early and late pregnancy rates of Alaskan Steller sea lions and examination of the role of maternal condition. Principle Investigator, Bill Lasley, University of California. **No email address**

**Tom Loughlin is contacting, this is Patience Brown's thesis work.**

**Project 01-SSL-065** - Coastal bathymetry within the range of Steller sea lions in Alaska. Principle Investigator, Thomas Gellatt, ADFG (currently NOAA). [Tom.Gelatt@noaa.gov](mailto:Tom.Gelatt@noaa.gov)

Final Contract Report.

Gelatt, T.S. and M.J. Rehberg. Coastal Bathymetry within the Range of Steller Sea Lions in Alaska Steller Sea Lion Research Initiative Project 01-SSL-065. Alaska Department of Fish and Game, 525 West 67th Ave., Anchorage AK 99518 10p.

**Project 01-SSL-066** - The subsistence harvest of Steller sea lions and harbor seals by Alaska natives, harvest assessment program, 2001. Principle Investigator, James Fall, Alaska Department of Fish and Game. [jim\\_fall@fishgame.state.ak.us](mailto:jim_fall@fishgame.state.ak.us)

Published Reports:

Wolfe, R.J. 2001. The subsistence harvest of harbor seals and sea lions by Alaska natives. 2000. ADFG, Division of Subsistence, Technical Paper No. 266. 241 p.

Wolfe, R.J., J. Fall, and R.T. Stanek. 2002. The subsistence harvest of harbor seals and sea lions by Alaska natives. 2001. ADFG, Division of Subsistence, Technical Paper No. 273. 250 p.

Wolfe, R.J., J. Fall, and R.T. Stanek. 2003. The subsistence harvest of harbor seals and sea lions by Alaska natives. 2002. ADFG, Division of Subsistence, Technical Paper No. 277. 249p.

Wolfe, R.J., J. Fall, and R.T. Stanek. 2004. The subsistence harvest of harbor seals and sea lions by Alaska natives. 2003. ADFG, Division of Subsistence, Technical Paper No. 291. 253 p.

**Project 01-SSL-068** - Interaction of Steller sea lions and fisheries managed by the State of Alaska. Principle Investigator, Douglas Eggers, Alaska Department of Fish and Game; Project supervised by Gordon Kruse, University of Alaska, Fairbanks  
[Gordon.Kruse@uaf.edu](mailto:Gordon.Kruse@uaf.edu)

Final Contract Report:

Soboleff, N.J. (in preparation). Potential interactions between state-managed fisheries and Steller sea lions (*Eumetopias jubatus*). M.S. Thesis, University of Alaska, Juneau.  
[ftnjs@uaf.edu](mailto:ftnjs@uaf.edu)

**Project 01-SSL-071** - Estimates of changes in the foraging behavior of Steller sea lions in response to precipitous declines of the herring population in Prince William Sound. Principle Investigator, Richard Thorne, Prince William Sound Science Center.  
[thorne@pwssc.gen.ak.us](mailto:thorne@pwssc.gen.ak.us) .

Published Reports:

Thorne, R.E. 2005. Monitoring Pacific herring abundance with combined acoustic and optical technologies. Proc. Oceans05, Washington D.C. Sept 20-23, 2005

Thorne, R.E. 2005. Effectively addressing ecosystem understanding: solutions to the limitations of current fisheries and oceans policy. Proc. Oceans05, Washington D.C. Sept 20-23, 2005

Thorne, R.E. 2004. Acoustic Surveying of Pelagic Fish in Shallow Water. Proceedings IGARSS04 (Electronic), IEEE Publications, Escondido, CA., 4 p.

Thorne, R.E., G.L. Thomas and M. Foster 2003. Application of combined optical and acoustic technologies for fisheries and marine mammal research in Prince William Sound and Kodiak, Alaska. Proceedings Ocean 2003 MTS/IEEE (Electronic), Holland Publications, Escondido, CA.

Thomas, G.L. and R.E. Thorne 2003. Acoustical-optical assessment of Pacific herring and their predator assemblage in Prince William Sound, Alaska. Aquatic Living Resources **16**:247-253.

Thomas, G.L. and R.E. Thorne 2001. Night-time Predation by Steller Sea Lions. Nature 411:1013.

Final Contract Report:

Thorne, R.E. and G.L. Thomas 2002. Evaluation of Changes in the Foraging Behavior of Steller Sea Lions in Response to Precipitous Declines of the Herring Population in Prince William Sound. Final Report to NMFS, SSLRI Project # 31, 32p.

Thorne, R. E., G. L. Thomas and J, J. Goering. 2002. Interactions among Steller Sea Lions, Pollock and Herring and an Examination of Variability Associated with Acoustic Surveys of Pollock. Final Project Report to the Pollock Conservation Cooperative, University of Alaska, Fairbanks, Prince William Sound Science Center, Cordova, AK. 18 p.

**Project 01-SSL-073** - Improving access to ADF&Gs lower Cook Inlet Pacific herring stock assessment and commercial fishery database, including observation of Steller sea lions. Principle Investigator, Ed Otis, ADFG. [ted\\_otis@fishgame.state.ak.us](mailto:ted_otis@fishgame.state.ak.us)

Final Report:

Otis, E.O. and M. Spahn. 2003. Improving Access to ADF&G's Lower Cook Inlet Pacific Herring Stock Assessment and Commercial Fishery Databases, Including Observations of Steller Sea Lions (SSLRI Project 12). Final Report (Contract Number NA16FX1411), Alaska Department of Fish and Game, Division of Commercial Fisheries, 3298 Douglas Place, Homer, AK 99603. 7p.

### Appendix III. Steller Sea Lion Research Themes

1. **Life History** - Investigations of the life history of Steller sea lions, including all aspects of **ontogeny** (e.g., weaning process, molt, growth) and **reproduction**. Studies of **behavior** are included as a sub-theme since the age and sex of the studied individuals are central to their behavior.
2. **Foraging** - Studies of the foraging ecology of Steller sea lion juveniles and adults. This includes all aspects of foraging, including what is eaten (**food habits and diet**), the costs incurred in locating and obtaining prey (**bioenergetics**), and differences in habitat use by juveniles and adults (**habitat use**).
3. **Vital Rates** - All studies related to **population assessment** (both counting of animals and assessment of their condition), **reproductive rates**, and **survival/mortality rates** (e.g. branding studies). Modeling studies, such as the creation of a new life table, would also fall under this theme. Many of these studies supply baseline information necessary to address all of the hypotheses/questions.
4. **Fish Assessment and Fisheries** - Prey or fish surveys, along with any studies of the impacts of fisheries on either **large scales** (ecosystem-wide) or **small spatial/temporal scales**.
5. **Ecosystems** - Any study dealing with bottom-up processes in the ocean and how changes in them might affect the prey field for Steller sea lions. There are two sub-themes: **large scale** (ecosystem-wide) studies or those addressing ecosystem processes at **small spatial/temporal scales**.
6. **Other Anthropogenic Effects** - Any studies of the effects or quantification of **subsistence hunting, intentional shooting, incidental take**, or the **residual effect of harvests and bounties** on the Steller sea lion population. This theme, along with the following three, directly corresponds with one of factors causing or contributing to the decline.
7. **Predation** - **Killer whale** and **shark** predation are sub-themes under this general research theme. These would include all studies whose primary focus is addressing questions.
8. **Disease** - Studies of sea lion diseases (including parasites) are included in one of two sub-themes, which evaluate the impacts of disease on: 1) **individual sea lion health**, and 2) the population of sea lions as a whole (**population-level assessment**).
9. **Contaminants** - Similar to sea lion disease studies, contaminant studies were also placed into one of two sub-themes depending on the scale at which contaminant effects were analyzed: 1) assessment of the effects of contaminants on the health of individuals (**individual health assessment**), and 2) assessment of the effects of contaminants on sea lion habitats (**environmental-level effects**), and how this could reduce sea lion survival or births.
10. **Management** - Projects under this theme involve funding for meetings to **implement regulations** (e.g., NPFMC), for independent **reviews of actions**, and for **analysis of economic impacts** of actions. Reviews address the scientific and legal information available and required to answer some or all of the questions posed, while other projects inform decisions made by managers.



11. **Communications** - Communication of ideas and information both among researchers (**coordination**) and between researchers and the interested public (**outreach**) are the principal goals of projects under this theme. Forms of communication considered include symposia, publishing of scientific literature, and web-based content.