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Exxon Valdez Oil Spill Trustee Council
Procedures for the Preparation and Distribution of Reports

Updated January 16, 2009



***Exxon Valdez* Oil Spill Trustee Council**
Procedures for the Preparation and Distribution of Reports

Adopted: January 16, 2009

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Exxon Valdez Oil Spill Trustee Council

Procedures for the Preparation and Distribution of Reports

Adopted: January 16, 2009

INTRODUCTION

These *Procedures for the Preparation and Distribution of Reports* provide instructions regarding the preparation, peer review, printing and distribution of final and annual reports for projects funded by the Exxon Valdez Oil Spill Trustee Council. Quarterly reports address administrative reporting requirements. Principal investigators shall work with their agency liaisons to fulfill their quarterly reporting obligations as outlined in the *Invitation for Proposals* and the *General Operating Procedures of the Trustee Council*.

Unless otherwise specified by the Trustee Council Office, each project funded by the Trustee Council shall ultimately produce a final report that has been subjected to the Trustee Council's peer review process. In the case of multi-year projects, an annual report shall also be prepared each year until the project is completed, at which time a final report shall be prepared. Subject to the approval of the Trustee Council Office, on a project-by-project basis, journal articles or manuscripts may be used to fulfill requirements for the preparation of final reports (See page 7).

These *Procedures for the Preparation and Distribution of Reports* update and supersede earlier versions of this document and should be read together with the report writing guidelines published by the *Journal of Wildlife Management*:

Messmer, T. and M. Morrison. 2006. Unified manuscript guidelines for The Wildlife Society peer-reviewed publications, *Journal of Wildlife Management*, 70(1):304-320,

www.wildlife.org/publications/wild-70-01-guide_304%20320_ebook1.pdf

To the extent that there are any inconsistencies between these *Procedures for the Preparation and Distribution of Reports* and the guidance provided by Messmer, T. and M. Morrison (2006), the instructions provided in these *Procedures* shall be followed.

The primary changes in these *Procedures*, as compared to the previous version of this document (July 2002), clarify the peer review process and apply consistency to final report procedures for all projects funded by the Trustee Council.

The Trustee Council encourages principal investigators to publish the results of their work in peer-reviewed journals. All manuscripts shall include the Disclaimer Statement on page 8. Manuscripts or journal articles may be used to help satisfy final report requirements. (See *Use of Manuscripts for Final Report Writing*, page 7.)

FINAL REPORTS

Purpose: A final report for a project must be a comprehensive report addressing all the objectives identified over the course of the entire study. The final report shall address the original objectives of the study as identified in the approved proposal and account for any changes in the objectives. The principal investigator for a project is responsible for the submission and production of a final report. To ensure report obligations are met, future project funding is dependent upon completion of project deliverables.

Project Numbers: For purposes of identification each project is assigned a unique number. The project number that appears on the final report will be the number of the final year of funding. Over time the Trustee Council's project numbering system has evolved to meet the changing needs of the Restoration Program. Beginning in FY2010, project numbers will have eight digits, instead of six. The first two digits designate the current funding year, the second two digits represent the year the initial funding was authorized by the Trustee Council, and the last four digits are the project identity number.

For example, for project number 10071234:

10071234 indicates the project received funding in 2010

10071234 indicates the project was initially funded by the Council in 2007

10071234 can be cross-referenced with projects from other funding years such as 071234, 081234, etc.

Previous numbering conventions include:

- Natural Resource Damage Assessment (NRDA) projects are designated by alpha-numeric project numbers (e.g., MM6 for "Marine Mammal Study 6" or FS2 for "Fish/Shellfish Study 2").
- Restoration projects and Gulf Ecosystem Monitoring and Research Program (GEM) projects funded between FY 1993 and FY 2002 have five-digit project numbers (e.g., 95225). The first two digits identify the fiscal year in which the project was funded; the last three digits provide a specific project identifier.
- Projects funded between FY 2003 and FY2009 have six-digit project numbers. The first two digits identify the fiscal year in which the project was funded; the last four digits provide a specific project identifier.

I. Preparation: Final Reports

- A. Final Report Format – Authors shall follow the format set out below to prepare final reports. Reports shall meet normal scientific standards of completeness and detail that shall permit an independent scientific reader to evaluate the reliability and validity of the methods, data and analyses.
1. Report Cover – The report shall have a front and back cover of quality cover stock. To ensure consistent appearance, the color shall be goldenrod. An example of a final report cover is provided. (Attachment A) A final report cover shall:
- a. identify the report, using the appropriate series title, as a
 - (1.) Restoration Project final report – series title: *Exxon Valdez* Oil Spill Restoration Project Final Report, or
 - (2.) Gulf Ecosystem Monitoring and Research Project final report – series title: *Exxon Valdez* Oil Spill Gulf Ecosystem Monitoring and Research Project Final Report, or
 - (3.) other series that may be designated by the Trustee Council;
 - b. provide the report title;
 - c. include the project identification number;
 - d. identify the author(s) with appropriate affiliation(s);
 - e. include the date (month and year) of publication; and
 - f. include the following non-discrimination statement toward the bottom of the page on the inside front cover:

“The *Exxon Valdez* Oil Spill Trustee Council administers all programs and activities free from discrimination based on race, color, national origin, age, sex, religion, marital status, pregnancy, parenthood, or disability. The Council administers all programs and activities in compliance with Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title II of the Americans with Disabilities Act of 1990, the Age Discrimination Act of 1975, and Title IX of the Education Amendments of 1972. If you believe you have been discriminated against in any program, activity, or facility, or if you desire further information, please write to: EVOS Trustee Council, 441 West 5th Avenue, Suite 500, Anchorage, Alaska 99501-2340; or O.E.O. U.S. Department of the Interior, Washington D.C. 20240. “

2. **Title Page** – The Title Page of the report shall immediately follow the report cover page on white bond paper and be identical in terms of content and format to the front of the report cover page. (Attachment A)
3. **Study History, Abstract, Key Words, Project Data and Citation** – Following the Title Page, the report shall include, on not more than two pages: (1) a study history; (2) an abstract; (3) key words; (4) summary of data gathered during the project; and (5) a recommended citation for the final report. (Attachment A)
 - a. **Study History** – A brief study history shall include reference to any prior project numbers; changes in the title of the project or report over time; annual reports or other reports which contributed to the final report; and citation of publications that have preceded publication of the final report.
 - b. **Abstract** – An abstract, with a maximum length of 200 words (limit for processing through the National Technical Information Service), shall enable readers to quickly identify the basic content of the report, determine its relevance to their interests and thus decide whether to read the document in its entirety. If the final report consists of several chapters or manuscripts (See Use of Manuscripts for Report Writing, page 7), the abstract shall summarize the entire report. Do not use abbreviations or acronyms in the abstract.
 - c. **Key Words** – A short list of key words (up to 12 in alphabetical order) shall be provided. Include words from the title and others that identify: (1) common and scientific names of principal organisms, if any; (2) geographic area or region; (3) phenomena and entities studied (e.g., behavior, reproduction); (4) methods (only if the report describes a new or improved method); and (5) other words not covered above but useful for indexing.
 - d. **Project Data** – A summary of the data collected during the project shall be provided in order to preserve the opportunity for other researchers and the public to access this data in the future. The summary shall: (1) describe the data; (2) indicate the format of the available data collections; (3) identify the archive in which the data have been stored or the custodian of the data (including contact name, organization, address, phone/fax, e-mail, and web address where data may be acquired); and (4) indicate any access limitations placed on the data. Limiting access requires pre-approval by the Trustee Council Office.
 - e. **Citation** – A recommended citation for the final report shall be provided. See Attachment A for the correct citation format.
4. **Remainder of Report** – After the Study History, Abstract, Key Words, Project Data and Citation, the report shall continue as follows:

- a. **Table of Contents, including Lists of Tables, Figures and Appendices.**
- b. **Executive Summary – The executive summary shall:**
 - (1.) consolidate principal points of the report in one place and provide enough detail for the reader to digest the significance of the report without having to read it in full;
 - (2.) be written so that it can stand independently of the report (i.e., it must not refer to figures, tables or references contained elsewhere and all acronyms, uncommon symbols, and abbreviations must be spelled out);
 - (3.) not exceed four single-spaced pages;
 - (4.) concisely state the objectives, methods, results and conclusions of the report; and
 - (5.) be organized in the same manner as the report it summarizes.
- c. **Introduction – The introduction shall:**
 - (1.) present first, with all possible clarity, the nature and scope of the problem investigated, including the general area in which field activities were conducted; and
 - (2.) review pertinent literature, state the method(s) of investigation and briefly state principal results.
- d. **Objectives – The statement of objectives shall be the same as the objectives identified in the approved proposal. If the objectives have changed, describe what has changed and why.**
- e. **Methods – The discussion of methods shall include a clear description of the study area. To the extent the methodology differs from that described in the proposal; explain the reason for the deviation.**
- f. **Results – The presentation of results shall provide an objective and clear presentation of the data collected.**
- g. **Discussion – The discussion section shall:**
 - (1.) interpret the study results and explore the meaning and significance of the findings, including alternative interpretations of the results;
 - (2.) discuss whether the study hypotheses are upheld or disproven;

- (3.) note where there are unanswered questions; and
- (4.) where appropriate, cite relevant findings from other *Exxon Valdez* oil spill restoration studies, including GEM studies, and published literature.

- h. **Conclusions** – This shall be a brief, clear statement of the conclusions that are apparent from the discussion. Major unanswered questions shall be identified.
- i. **Acknowledgments**
- j. **Literature Cited**
- k. **Other References** – If there is a need to list references other than the literature cited (e.g., personal communications), these references shall be identified in this section.

B. Technical Format – The following guidelines shall help provide consistent formatting:

1. Word Processing Conventions

a. Standard Settings

Line

<i>Line spacing:</i>	single
<i>Hyphenation:</i>	off (i.e., do not hyphenate at right margin)
<i>Justification:</i>	left (i.e., do not right-justify margins)
<i>Margins:</i>	1 inch at top, bottom 1 inch left, right
<i>Tabs:</i>	every 0.5"
<i>Widow Protection:</i>	yes

Page

<i>Page numbering:</i>	bottom center
<i>Header:</i>	none

Font

<i>Times:</i>	12 point
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Note: If Times is not available, some other serif font shall be used (e.g., Palatino, Bookman or New Century Schoolbook).

- b. **Literature Citations** – In the Literature Cited section, start each citation with a hanging indent as shown below:

Byrd, G.V., D. Gibson, and D.L. Johnson. 1974. The birds of Adak Island, Alaska. *Condor* 76:288-300.

2. Other Conventions

- a. Use italics, rather than underlining, for Latin names and for *Exxon Valdez*.
- b. Use good quality white paper 8.5 x 11" (215 x 280mm) or metric size A4.
- c. Do not use dot matrix printers to print the report.
- d. When referring to the oil spill that occurred because the *Exxon Valdez* ran aground, use *Exxon Valdez* oil spill. After the first mention of the *Exxon Valdez* oil spill, refer to it simply as the spill.
- e. Clearly define any acronyms. Avoid the use of acronyms completely in the Abstract and Executive Summary.
- f. Use the terms "damages" and "injury" as defined by CERCLA regulations (See 43 CFR 11.14):
 - (1) "Damages" means the amount of money sought by the natural resource trustee as compensation for injury, destruction or loss of natural resources.
 - (2) "Injury" means a measurable adverse change, either long or short-term, in the chemical or physical quality or the viability of a natural resource resulting either directly or indirectly from exposure to a discharge of oil. Injury encompasses the phrases "destruction" and "loss."
 - (3) "Destruction" means the total and irreversible loss of a natural resource.
 - (4) "Loss" means a measurable adverse reduction of a chemical or physical quality or viability of a natural resource.

- C. Use of Manuscripts for Final Report Writing – The Trustee Council encourages principal investigators to publish the results of their work in peer-reviewed journals. *With the approval of the Science Director, on a project-by-project basis, manuscripts or journal articles may be used to help satisfy project final report writing requirements.* When a manuscript is used to fulfill report requirements, it is strongly preferred that the manuscript be in draft form before it has been submitted to a journal to allow duplication without violation of copyright or publication rights. (See the section on *Copyright and Publication Rights*, page 8.).

1. Authority to Use Manuscripts – Principal investigators shall contact the Science Director at the Trustee Council Office to request authority to use a manuscript(s) as the body of a final report.
2. Objectives – Because final reports are the primary and permanent record of how Trustee Council funds have been spent and what has been accomplished with those funds, it is necessary that these reports address all of the objectives for which the Trustee Council has provided funds.
 - a. If all of the project's objectives are completely described within one or more manuscripts being prepared for publication, a copy of the manuscript(s) may be submitted as the entire body of the report. (See Standard Format requirements in the next section.)
 - b. If a project's objectives are not all described completely within one or more manuscripts, the manuscript(s) may serve as a portion of the report. For example, if only two of five project objectives are addressed in a manuscript, the report shall include – in addition to the manuscript – information on the three objectives not covered in the manuscript. The two objectives covered by the manuscript shall be referenced in the report as appropriate (e.g., in the Methods and Results sections) and substantially integrated into the Discussion section, where there shall be an overall discussion of the project. In such cases, the combination of the manuscript and additional report material shall present an organized, integrated and complete account of project activities and results.
3. Standard Format – Every report, regardless of whether it is in the standard format or includes manuscripts, shall adhere to the formatting prescribed for the Report Cover, Title Page, Study History, Abstract, Key Words, Project Data and Citation (See Final Report Format, page 2).
4. Copyright and Publication Rights – When a manuscript is used to fulfill report writing requirements, it must be in a form that can be duplicated freely and posted on the Trustee Council website. This may require obtaining permission from the publisher. When appropriate:
 - a. The author shall provide the Trustee Council Office with a copy of the publisher's written permission to duplicate and post the article as part of the report.
 - b. The statement "This article is reprinted with permission from the publisher." shall precede the journal article(s) in the report.
5. Disclaimer Statement – Investigators seeking to publish the results of Trustee Council sponsored projects shall include the following statement with all manuscripts:

“The research described in this paper was supported by the *Exxon Valdez* Oil Spill Trustee Council. However, the findings and conclusions presented by the author(s) are their own and do not necessarily reflect the views or position of the Trustee Council.”

6. Reprints – Investigators who publish the results of Trustee Council sponsored projects shall provide the Trustee Council Office (attention: Science Director) 3 reprints of any published manuscript. The Trustee Council Office shall provide 1 of the reprints to the Alaska Resources Library and Information Services (ARLIS).

D. Due Date – Draft final reports shall be submitted for peer review by April 15 of the year following the fiscal year in which project work was completed unless a different date is specified in the approved proposal or contract. If this due date cannot be met, the principal investigator or liaison shall file an extension request with the Science Director at least 15 days prior to the due date. The request must be in writing and state a reason the report will be late. With approval of the Executive Director, an alternative final report due date may be identified. Draft final reports will undergo the peer review process outlined below. Principal investigators shall address peer review comments as appropriate for the final report. A final report shall be delivered to the Trustee Council office 30 days after receipt of reviewer's comments.

E. Portion of Project Funding Withheld Pending Final Deliverables - Ten Percent (10%) of the project funding will be withheld by project managers until the following criteria have been met:

1. the final report has gone through peer review and format review;
2. all print copies of the final report have been delivered to ARLIS;
3. an electronic copy of the final report has been delivered to the EVOSTC office; and
4. project data and metadata have been submitted to approved archives in accordance with the EVOSTC Data Policy.

For multi-year projects, the 10% withholding will apply to the final year of funding.

For projects in which agency personnel have the primary responsibility for producing the deliverables required above, the project managers will work within their respective agency's supervisory structure, fiscal procedures and other applicable policies to ensure project deliverables are provided in a timely manner.

The EVOSTC has the discretion to extend the due date on the deliverables required above, whether planned for or for other grounds the Executive Director determines are reasonable. Project funding will be withheld from Principal Investigators who have deliverables outstanding from other projects.

The EVOSTC has the discretion to waive this 10% holdback requirement for grounds the Executive Director determines are reasonable. Justifications for a waiver may include the nature of the project deliverables or significant delays that are beyond the control of the Principal Investigators.

II. Review Process

- A. Submission of Draft Final Reports for Peer Review – The principal investigator shall submit 1 paper copy and 1 electronic copy of the draft final report to the Science Director for peer review. The electronic copy shall be submitted as a word processing document (most recent version of Microsoft Word for Windows or WordPerfect) with any figures and tables imbedded.

Science Director
Trustee Council Office
441 W. 5th Ave., Suite 50
Anchorage, AK 99501

phone: (907) 278-8012
fax: (907) 276-7178
dfg.evoscience_director@alaska.gov

- B. Draft Final Report Peer Review and Acceptance Process – Draft final reports shall be scientifically or technically peer reviewed under the direction of the Science Director:

1. The Science Director shall secure the services of a minimum of two qualified reviewers who will provide comments, identify questions, and suggest revisions as appropriate for the report.
2. Reviewers will be selected based upon experience, expertise, availability, and objectivity.
3. Reviewers will be screened to avoid conflicts of interest and shall sign a conflict of interest disclosure form before being selected for a peer review.
4. Peer reviews will be confidential. Comments will be submitted in writing to the Science Director.
5. Peer reviewers will be anonymous to the authors of the report and the general public.

6. The Science Director shall consolidate the peer review comments and provide the consolidated comments and any recommendations in writing to the principal investigator(s).
 7. Final reports shall be revised by the principal investigator to address peer review comments within 30 days of receiving them. The final report shall be resubmitted for final acceptance, as above, by the Science Director. (1 paper copy and 1 electronic copy of the revised final report to the Science Director).
 8. Once the final report is accepted, the Science Director shall notify the principal investigator in writing and send a copy of the letter of acceptance to the project manager and ARLIS.
 9. Final reports will not be distributed from the Trustee Council Office until peer review is complete.
- C. Final Report Review of Format – Once the content of the report is accepted by the Science Director, the principal investigator shall prepare the final report for publication.
1. Format Review – Within 30 days of the date on which the Science Director accepts the final report, the principal investigator shall remove all references to “draft” from the report and submit the first several pages of the approved final report to ARLIS for format review (i.e., Cover, Title Page, Study History, Abstract, Key Words, Project Data and Citation). These pages can be mailed, faxed, or e-mailed to ARLIS (attention: Carrie Holba):

Carrie Holba
 ARLIS
 Suite 111, Library Bldg.
 3211 Providence Drive
 Anchorage AK 99508

phone (907) 786-7660
 fax (907) 786-7652
 carrie@arlis.org

2. Revisions – Within 15 days of receipt of the first several pages of the final report, ARLIS staff shall review it for compliance with the report format standards and notify the principal investigator in writing regarding any changes that need to be made.
3. Approval – To be certain that format revisions are made correctly, the principal investigator shall fax or e-mail a copy of the corrected version to ARLIS within 30 days of the format review. The principal investigator shall not reproduce the report until format approval is confirmed in writing by ARLIS.

III. Printing and Distribution Process

- A. Reproduction and Number of Copies – Within 60 days of the date of the written confirmation from ARLIS indicating approval of the final report format, the principal investigator shall produce final copies as follows:
1. Two-sided Pages – The body of the report shall be printed in two-sided format to reduce the space needed to store reports.
 2. Number of Copies – The principal investigator shall provide a total of 20 paper copies and 2 electronic copies, as follows:
 - a. 18 bound copies, 2 camera-ready copies and 1 electronic copy of the approved final report to ARLIS, which shall include a copy for the Science Director and a copy for the Trustee Council's official record. A camera-ready copy is an unbound copy of the report as it will appear in its final format, except that it is single-sided with blank pages inserted as appropriate. The electronic copy shall be submitted either as an Acrobat Portable Document Format (PDF) file or word processing document (using the most recent versions of Acrobat, Word, or Word Perfect) with all figures and tables imbedded. The preferred Acrobat file format is 'formatted text with graphics' format. Minimally, "PDF searchable image" format may be used if pre-approved by the Trustee Council Office. In either case, the PDF file shall not be secured or locked from future editing, or contain a digital signature from the principal investigator; and
 - b. 1 electronic copy to the Science Director. The electronic copy shall be submitted either as an Acrobat Portable Document Format (PDF) file or word processing document, according to the requirements listed in the previous section.
- B. Binding – Copies of final reports shall be bound using PERFECT binding. Smaller reports may be bound with black tape or comb binding. Very small reports may be bound with staples in three places along the spine, but only when other binding options are not available. Questions regarding binding shall be directed to ARLIS (attention: Carrie Holba; see address, page 10).
- C. Distribution of Final Reports – ARLIS shall distribute the bound and camera-ready copies of final reports to the appropriate individuals and libraries. (Attachment C) Final reports shall be posted on the Trustee Council website at www.evostc.state.ak.us.

ANNUAL REPORTS

Purpose: In the case of multi-year projects, an annual report shall be prepared each year until the project is completed, at which time a final report shall be prepared. All NRDA annual reports have been completed, and so are not addressed in this section of the

Procedures. The principal investigator for a project is responsible for the submission and production of an annual report.

I. Preparation of Annual Reports

A. Annual Report Format – Annual reports shall be brief documents (2-3 pages) that include the information listed below. An example of the annual report form, available for downloading from the Trustee Council’s web site (www.evostc.state.ak.us) or from the Trustee Council Office upon request, is provided. (Attachment B)

1. Project Number
2. Project Title
3. Principal Investigator’s Name(s)
4. Time Period Covered by the Report
5. Date of Report
6. Summary of Work Performed – This section shall include a brief summary of work performed during the reporting period, including any results available to date and their relationship to the original project objectives. Any deviation from the original project objectives, procedures or statistical methods, study area, or schedule shall be included. Any known problems or unusual developments, and any other significant information pertinent to the project, shall also be described.
7. Summary of Future Work to be Performed – This brief summary shall describe work to be performed during the upcoming year, if changed from the original proposal. A description of any proposed changes in objectives, procedural or statistical methods, study area, or schedule shall be included.
8. Coordination/Collaboration – This section shall describe efforts undertaken during the reporting period to achieve the coordination and collaboration provisions of the proposal, if applicable.
9. Community Involvement/TEK and Resource Management Applications – This section shall describe efforts undertaken during the reporting period to achieve the community involvement/TEK and resource management application provisions of the proposal, if applicable.
10. Information Transfer – This section shall list (1) publications produced during the reporting period, (2) conference and workshop presentations and attendance during the reporting period, and (3) data and/or information products developed during the reporting period.

11. **Budget** – This section shall explain any differences and/or problems between actual and budgeted expenditures, including any substantial changes in the allocation of funds among line items on the budget form. Any new information regarding matching funds or funds from non-Trustee Council sources for the project shall be included.

B. **Due Date** – Annual reports shall be *submitted by September 1 of each fiscal year for which a project receives funding*. The information in the annual reports shall be a key component in the Trustee Council's annual decision to continue funding a project. Failure to submit an annual report by September 1 of each year, or unsatisfactory review of an annual report, will result in withholding of additional project funds, and may result in cancellation of the project or denial of funding for future projects.

II. Review Process: Annual Reports

A. **Submission of Annual Report for Review** – The principal investigator shall electronically submit the annual report to the Science Director, care of dfg.evos.science_director@alaska.gov. The subject line of the e-mail transmitting the report must include the project number and the words "annual report" (e.g., "035620 Annual Report"). Electronic reports shall be submitted either as an Acrobat Portable Document Format (PDF) file or word processing document (using the most recent versions of Acrobat, Word, or Word Perfect) with all figures and tables imbedded. The preferred Acrobat file format is 'formatted text with graphics' format. Minimally, "PDF searchable image" format may be used if pre-approved by the Trustee Council Office. In either case, the PDF file shall not be secured or locked from future editing, or contain a digital signature from the principal investigator

B. **Annual Report Review Process** – Annual reports shall be reviewed by the Science Director. Under the guidance of the Science Director, annual reports may also be reviewed by qualified outside peer reviewers. The review process shall be used to determine whether continued funding of the project is warranted and to guide further work on the project. Any written comments on annual reports shall be provided to the principal investigator and kept on file at the Trustee Council Office, available upon request.

III. Distribution of Annual Reports

Annual reports shall be kept on file as public documents at the Trustee Council Office, available upon request. Annual reports shall also be posted on the Trustee Council's website at www.evostc.state.ak.us.

QUARTERLY REPORTS

Quarterly reports address administrative reporting requirements. Principal investigators shall work with their agency liaisons to fulfill their quarterly reporting obligations as outlined in the Invitation for Proposals and the General Operating Procedures of the Trustee Council.

ATTACHMENT A

Exxon Valdez Oil Spill
Restoration Project Final Report

Responses of River Otters to Oil Contamination:
A Controlled Study of Biological Markers

Restoration Project 99348
Final Report

**NOTE: The Report
Cover must be quality
cover stock, goldenrod
in color.**

Merav Ben-David
R. Terry Bowyer
Lawrence K. Duffy

Institute of Arctic Biology
311 Irving Building
University of Alaska Fairbanks
Fairbanks, Alaska 99775

for:

Alaska Department of Fish and Game
Habitat and Restoration Division
333 Raspberry Road
Anchorage, Alaska 99518

September 1999

NOTE: The statement below must be printed on the back of the goldenrod Report Cover.

The *Exxon Valdez* Oil Spill Trustee Council administers all programs and activities free from discrimination based on race, color, national origin, age, sex, religion, marital status, pregnancy, parenthood, or disability. The Council administers all programs and activities in compliance with Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title II of the Americans with Disabilities Act of 1990, the Age Discrimination Act of 1975, and Title IX of the Education Amendments of 1972. If you believe you have been discriminated against in any program, activity, or facility, or if you desire further information, please write to: EVOS Trustee Council, 441 West 5th Avenue, Suite 500, Anchorage, Alaska 99501-2340; or O.E.O. U.S. Department of the Interior, Washington, D.C. 20240.

Exxon Valdez Oil Spill
Restoration Project Final Report

Responses of River Otters to Oil Contamination:
A Controlled Study of Biological Markers

Restoration Project 99348
Final Report

**NOTE: The Title
Page must be on
white bond paper.**

Merav Ben-David
R. Terry Bowyer
Lawrence K. Duffy

Institute of Arctic Biology
311 Irving Building
University of Alaska Fairbanks
Fairbanks, Alaska 99775

for:

Alaska Department of Fish and Game
Habitat and Restoration Division
333 Raspberry Road
Anchorage, Alaska 99518

September 1999

Responses of River Otters to Oil Contamination:
A Controlled Study of Biological Stress Markers

Restoration Project 99348
Final Report

Study History: Project 99348 originated from the need to better understand the effects of contamination by crude oil on biomarkers in river otters (*Lontra canadensis*). Previous studies demonstrated elevated levels of biomarkers in river otters from oiled areas compared with those from non-oiled areas throughout Prince William Sound, Alaska, shortly following the *Exxon Valdez* oil spill (EVOS). Although the data collected to date strongly indicated a correlation between oil contamination and physiological stress in river otters, this evidence required verification through controlled experiments as identified by the EVOS Trustee Council review process (1997). This 2-year project was conducted at the Alaska SeaLife Center in Seward, Alaska, USA, between April 1998 and March 1999. Additional funding was provided by the Council for completion of 3 manuscripts in FY 2000 for publication in a peer-reviewed journal.

Abstract: In this study, we experimentally determined the effects of oil contamination on river otters. Fifteen wild-caught male river otters were exposed to 2 levels of weathered crude oil (i.e., control, 5 ppm/day/kg body mass, and 50 ppm/day/kg body mass) under controlled conditions in captivity at the Alaska SeaLife Center in Seward, Alaska. Responses of captive river otters to oil ingestion provided mixed results in relation to biomarkers. Although hemoglobin, white blood cells, alkaline phosphates, and possibly interleukin-6 immunoreactive responded in the expected manner, other parameters did not. Aspartate Aminotransferase Alanine Aminotransferase haptoglobin did not increase in response to oiling or decrease during rehabilitation. In addition, although expression of P450-1A increased in captive river otters during oiling, several inconsistencies in the data complicated data interpretation. Nonetheless, we were able to establish that reduction in hemoglobin led to increase in energetic costs of terrestrial locomotion, decrease in aerobic dive limit, and potential increase in foraging time due to a decrease in total length of submergence during each foraging bout. We offer a theoretical physiological model to describe interactions between the different biomarkers and advocate the exploration and development of other biomarkers that will be independent of the heme cycle.

Key Words: Aerobic dive limit, Alaska, captivity, CYP1A, crude oil, hemoglobin, immuno-histochemistry, liver enzymes, *Lontra canadensis*, lymphocytes, oxygen consumption, quantitative RT-PCR.

Project Data: *Description of data* – data was collected from live animals held in captivity at the Alaska SeaLife Center. Blood and other tissues were sampled and processed in different laboratories. Additional samples are archived at the Institute of Arctic Biology, UAF. *Format* – All data were entered as Excel spreadsheets. *Custodian* – contact Merav Ben-David, Institute of Arctic Biology, 311 Irving Building, University of Alaska Fairbanks, Fairbanks, Alaska 99775.

Citation:

Ben-David, M., R.T. Bowyer, and L.K. Duffy. 1999. Responses of river otters to oil contamination: A controlled study of biological stress markers, *Exxon Valdez* Oil Spill Restoration Project Final Report (Restoration Project 99348), Alaska Department of Fish and Game, Habitat and Restoration Division, Anchorage, Alaska.

EVOS ANNUAL PROJECT REPORT

All recipients of funds from the *Exxon Valdez* Oil Spill Trustee Council must submit an annual project report in the following format by September 1 of each fiscal year for which project funding is received, with the exception of the final funding year in which a final report must be submitted. Satisfactory review of the annual report is necessary for continuation of multi-year projects. Failure to submit an annual report by September 1 of each year, or unsatisfactory review of an annual report, will result in withholding of additional project funds and may result in cancellation of the project or denial of funding for future projects.

PLEASE NOTE: Significant changes in a project's objectives, methods, schedule, or budget require submittal of a new proposal that will be subject to the standard process of proposal submittal, technical review, and Trustee Council approval.

Project Number:

Project Title:

PI Name:

Time Period Covered by Report:

Date of Report:

1. **Work Performed:** Summarize work performed during the reporting period, including any results available to date and their relationship to the original project objectives. Describe and explain any deviation from the original project objectives, procedural or statistical methods, study area, or schedule. Also describe any known problems or unusual developments, and whether and how they have been or can be overcome. Include any other significant information pertinent to the project.
2. **Future Work:** Summarize work to be performed during the upcoming year, if changed from the original proposal. Describe any proposed changes in objectives, procedural or statistical methods, study area, or schedule. [PLEASE NOTE: Significant changes in a project's objectives, methods, schedule, or budget require submittal of a new proposal that will be subject to the standard process of proposal submittal, technical review, and Trustee Council approval.]
3. **Coordination/Collaboration:** Describe efforts undertaken during the reporting period to achieve the coordination and collaboration provisions of the proposal, if applicable.

4. **Community Involvement/TEK & Resource Management Applications:** Describe efforts undertaken during the reporting period to achieve the community involvement/TEK and resource management application provisions of the proposal, if applicable.
5. **Information Transfer:** List (a) publications produced during the reporting period, (b) conference and workshop presentations and attendance during the reporting period, and (c) data and/or information products developed during the reporting period. [PLEASE NOTE: Lack of compliance with the Trustee Council's data policy and/or the project's data management plan will result in withholding of additional project funds, cancellation of the project, or denial of funding for future projects.]
6. **Budget:** Explain any differences and/or problems between actual and budgeted expenditures, including any substantial changes in the allocation of funds among line items on the budget form. Also provide any new information regarding matching funds or funds from non-EVOS sources for the project. [PLEASE NOTE: Any request for an increased or supplemental budget must be submitted as a new proposal that will be subject to the standard process of proposal submittal, technical review, and Trustee Council approval.]

Signature of PI: _____

Project Web Site Address: _____

SUBMIT ANNUAL REPORTS ELECTRONICALLY TO dfg.evos.science_director@alaska.gov. THE REPORTS WILL BE POSTED ON THE TRUSTEE COUNCIL'S WEB SITE AND SHOULD ALSO BE POSTED ON THE PI'S WEB SITE. The subject line of the e-mail transmitting the report must include the project number and the words "annual report" (e.g., "035620 Annual Report"). Electronic reports must be submitted either as an Acrobat Portable Document Format (PDF) file or word processing document (using the most recent versions of Acrobat, Word, or Word Perfect) with all figures and tables imbedded. The preferred Acrobat file format is 'formatted text with graphics' format. Minimally, "PDF searchable image" format may be used if pre-approved by the Trustee Council Office. In either case, the PDF file shall not be secured or locked from future editing, or contain a digital signature from the principal investigator.

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- 1 to the Trustee Council's official record
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