Exxon Valdez Oil Spill Trustee Council
Restoration Office
645 "G" Street, Anchorage, AK 99501
Phone: (907) 278-8012 Fax: (907) 276-7178

MEMORANDUM

TO: Trustee Council

FROM: James R. Ayers
Executive Director

DATE: July 5, 1994

RE: Trustee Council Briefing Materials for July 11 Meeting

Thank you for your recent comments regarding issues before the Trustee Council. I have received oral comments from each of you and a June 14, 1994 memo from Commissioner Sandor. Attached is the July 11th meeting agenda (see attached #1). The issues on that agenda are addressed below. You should consider this memo and attachments as your briefing packet for the July 11 meeting. In addition, we have completed a review of the various other issues and timelines in light of your comments.

Meeting Schedules: We have revised the meeting dates to accommodate the Public Advisory Group and your respective schedules. That revised schedule was sent on June 20 (see attached #2). The best dates for the August meetings are August 8 and 29. A mid-August teleconference may be necessary for selection of the final alternative for the EIS. The actual dates for the September and October meetings will be established depending on completion of tasks and your schedules.

Science Review Board: The establishment of a small group of core scientists, what we have been calling the Science Review Board (SRB), to provide guidance on our science program has been supported by the Council as a means to develop and strengthen an Adaptive Mangement Process. This science review group, chaired by the Chief Scientist, would build on our foundation of the peer review process and improve continuity and consistency. The substantive questions in establishing the SRB remain the size of the group, the selection of its members, and its place in our organizational structure. In addition, we have recently been advised that creation of a group like a formal Science Review Board may fall under the Federal Advisory Committee Act, 41 CFR 101-6.10.

Therefore, based on your comments and the information above, I propose that we develop our core science review group through the Chief Scientist. As we discussed, the Chief Scientist will be selected by Request for Proposal (RFP) as we discussed and be responsible for identifying core reviewers for their independent perspectives. The core reviewers will be selected, as are other senior staff per the Memorandum of Understanding on the hiring of the Executive Director, by the Executive Director with the explicit concurrence of the Trustee Council.

The Chief Scientist will select the core reviewers with the express permission of the Executive Director and concurrence of the Trustee Council. A member of the core reviewers can be removed by the Chief Scientist with the express consent of the Executive Director in consultation with the Trustee Council (see attached #3).

Further, I recommend that we explore the process required under FACA to determine if the SRB should be recognized so as to avoid any challenges of their work.

Organization Diagrams: Changes to previous drafts have been made based on your comments and a new draft is attached (see attached #4).

FY95 Administration: Some Trustee Council members have commented that each agency has unique situations regarding the EVOS process. Specifically, some agencies have a large number of restoration projects while others are involved in the process but have fewer projects. Therefore, agencies may have different funding needs. We have requested Liaisons to develop budgets with a target of $150,000, with the understanding that some agencies may require additional funds. Justification must be submitted with the FY95 budget requests. This will ensure that everyone has opportunities for good, quick information transfer and participation. I remain hopeful we can attain our goal of 5% for FY95 and am confident we will for FY96.

FY95 Projects: We have received over $65 million in project proposals including the restoration reserve (see attached #5). It appears that an $18-25 million work plan, not including the reserve, is consistent with Trustee Council direction, and would address the necessary restoration. This would also provide for our long term balanced approach.

We plan to provide an overview of the projects during the meeting on July 11th, identifying those that have legal questions. Trustee Council guidance on the issue of a funding range for priorities would be appreciated. Immediately following, the scientists and the work force will perform a review and compile a restoration package of projects in the range of $18-25 million, or whatever the Council determines, for review and subsequent release to the public on August 8.

Restoration Plan and EIS: The Draft Restoration Plan and the EIS are moving along. The final plan and the final EIS with a preferred alternative will be a decision before you

in August. As discussed earlier and as reflected in the timeline, the Final EIS will be printed and released by September 28. The PAG and some Council members have also requested further discussion on the allocations described in the proposed alternative #5 in the draft EIS. A final Restoration Plan will also need to be drafted. As I've indicated before, I would like to see the Implementation Management Structure (see attachment #8), which was developed through a series of workshops earlier this year, incorporated into the final plan.

Finances: We are pursuing the establishment of the long term reserve account which will provide funding for future research, monitoring and associated restoration projects in the years following the last payment into the trust fund by Exxon in the year 2001. If $12 million per year (FY94 through FY2002), is deposited into the reserve with interest averaging 6%, the Trustee Council could have a reserve balance of approximately $120 to $150 million in 2002. Disbursement of the monies shall be made to the United States and the State of Alaska upon resolution of the Trustee Council. It is our assumption that the conditions of the Court decree would apply. Attached you will find a draft resolution that is being circulated to attorneys for their comments (see attachment #6).

As proposed, the reserve account would be established within the Court Registry and will be a part of the Court Registry Investment System. We have discussed the reserve with Mr. Michael Milby, the Clerk of Court of the United States District Court in Houston, and he informed us that the establishment of a reserve is possible. This type of account has been done before and could be handled in one of two ways, either unique or pooled with other funds. We will continue to work with Mr. Milby and have invited him to attend the August 29 Trustee Council meeting to provide you with a briefing and advice.

Institute of Marine Science Improvements: At the July 11 meeting you will also receive an update on this project. Attached for your review is a revised draft project description including purpose and need (see attachment #7).

Habitat Acquisition "Less than fee simple" policies: The PAG discussed the issue of "less than fee simple" acquisitions, including public access, and took public testimony about this issue. The PAG recommended we take the time to work with a PAG subcommittee to develop a draft policy that would reflect the various interests. We have asked the Alaska Department of Law (Alex Swiderski) and the U.S. Forest Service (Walt Sheridan) to work with the PAG to make an effort to develop recommendations for the Trustee Council's consideration. It is likely that this will come before the council during the August meeting, which is still timely and will not cause any delays in protection efforts.

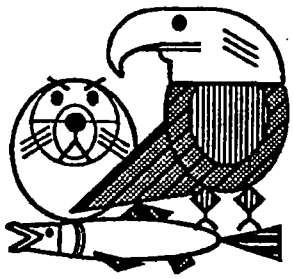
I hope this is helpful and look forward to seeing you on the 11th of July.

List of attachments:

#1. Agenda
#2. Proposed Meeting Schedule
#3. SRB
#4. Organizational Diagram
#5. List of Projects
#6. Draft Reserve Resolution
#7. Institute of Marine Science Project Description
#8. Implement Management Structure

Exxon Valdez Oil Spill Trustee Council

Restoration Office
645 "G" Street, Anchorage, AK 99501
Phone: (907) 278-8012 Fax: (907) 276-7178



AGENDA
EXXON VALDEZ OIL SPILL SETTLEMENT
TRUSTEE COUNCIL
CONTINUATION OF MAY 31, 1994 MEETING
ANCHORAGE
JULY 11, 1994 @ 1:00 p.m.

Trustee Council Members:

PHIL JANIK/Trustee Council
Regional Forester,
U.S. Department of Agriculture-Forest Service

BRUCE M. BOTELHO/CRAIG TILLERY
Attorney General/Trustee
State of Alaska/Representative

GEORGE T. FRAMPTON, JR./DEBORAH WILLIAMS
Assistant Secretary/Trustee Representative
U.S. Department of Interior

STEVEN PENNOYER
Director, Alaska Region
National Marine Fisheries Services

CARL L. ROSIER
Commissioner
Alaska Department of Fish & Game

JOHN A. SANDOR
Commissioner
Alaska Department of Environmental Conservation

Steven Pennoyer, Chair
Juneau - LIO 130 Seward Street -- Anchorage - 645 G Street First Floor

1. Call to Order 1:00 pm
   - Approval of Agenda
   - Order of the Day
   - Approval of May 31, 1994 Trustee Council Meeting Notes

2. Public Comment - 1:15 - 2:00 pm

3. Public Advisory Group Report (Brad Phillips) 2:00 pm

4. Executive Director's Report (Jim Ayers) 2:30 pm
   - Restoration Plan Update
   - Implementation
   - EIS Proposed Action
   - Science Review Board Policy Review
   - Overview of Proposals for Draft FY95 Work Plan

- Institute of Marine Science Improvements Update
- Habitat Protection & Acquisition Update
- Personnel
    - Chief Scientist Contract

5:00 pm Adjourn

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7/9/94

Outline FY95 Work Plan

Outline of Draft FY 95 Work Plan

Note: The following outline represents a draft proposal by staff in order to organize information about the Draft FY 95 Work Plan and provide an opportunity for meaningful public review and comment. The proposal to identify various project categories in no way reflects an action or decision on the part of the Trustee Council regarding any specific project or proposal to be funded in FY 95. Budgets for continuing administrative costs and closeout/report writing for FY 94 projects will require action by the Trustee Council in late August. It is intended that a Draft FY 95 Work Plan will be published for public review and comment in early September. Based on comment received as a result of the PAG and public review, the Executive Director will present a formal recommendation for consideration and action by the Trustee Council at a meeting in late October.

Summary: Draft FY 95 Work Plan

This document would consist of:

— an introduction and several tables that identify Priority 1 projects[1] (number, title, sponsor, lead agency, cost) organized according to category (General Restoration, Monitoring, Research, Habitat Protection and Administration)

— a narrative that puts the set of Priority 1 projects into the context of the overall restoration goals, objectives and strategies drawing on the guidance provided in the *Invitation to Submit Restoration Projects for FY 95* and the *Draft Restoration Plan*

— a listing of Priority 2 projects [2]

— a listing of Other Projects [3]

Note: this document would receive wide circulation to the Trustee Council mailing list.

Draft FY 95 Work Plan — Supplement Volume I

This document would consist of:

— Brief Project Descriptions for Priority 1 projects

— Brief Project Descriptions for Priority 2 projects

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— information on how to obtain BPDs for Other Projects

Note: this document would receive limited mail circulation, but be widely noticed as available upon request.

Draft FY 95 Work Plan — Supplement Volume II

This document would consist of:

— detailed budget forms for Priority 1 and Priority 2 projects

Note: this document would be provided to agencies for internal review and available at libraries for public review.

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(1) This set of projects will reflect a comprehensive, balanced set of preliminary FY 95 project priorities identified by the Executive Director in consultation with the Chief Scientist, Trustee Council agency liaisons, the PAG representatives and the Coordinating Committee on the basis of information available at this time. This set of projects will include General Restoration, Monitoring, Research, Habitat Protection and Administration projects that are responsive to the guidance (objectives and strategies) provided by the *Invitation to Submit Restoration Projects for FY 95* and cumulatively total approximately $18-25 million or that amount determined appropriate.

(2) This set of projects will include a number of projects identified as permissible under the terms of the civil settlement, but of a lower priority for FY 95.

(3) This set of projects will include all other General Restoration, Monitoring, Research, Habitat Protection and/or Administration projects that have been proposed to the Trustee Council that are identified as being incomplete, of little value to restoration, or having significant legal, technical or policy deficiencies. A specific rationale for why a particular project is proposed for this category will be provided for each project (e.g., not legally permissible under the civil settlement, the project proposal is incomplete, the proposal does not identify a significant relationship to an injured resource or service, the proposal lacks technical merit, etc.)

Exxon Valdez Oil Spill Trustee Council
Restoration Office
645 G Street, Suite 401, Anchorage, Alaska 99501-3451
Phone: (907) 278-8012 Fax: (907) 276-7178

Publication Policies

MEMORANDUM

TO: Trustee Council

FROM: James R. Ayers, Executive Director

DATE: July 9, 1994

SUBJ: Policies Regarding Publications and Reference to Trustee Council Funded Research

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The purpose of this memorandum is to recommend that the Trustee Council adopt a policy that addresses the need for a "disclaimer" when Trustee Council funded research is published in articles or other submissions for publication.

Additionally, as discussed below, a separate question has emerged regarding whether the Trustee Council should reserve the opportunity to participate in the peer review process of materials submitted for publication (in books, journals, etc.) that are supported with civil settlement funds.

Reference to Trustee Council Funded Research in Articles or Other Literature

Researchers who have worked on various damage assessment or restoration projects funded by the Trustee Council sometimes seek to have their work published as articles in scientific journals or other professional literature. While this is appropriate and even to be encouraged, it is also important to ensure that the views and positions of the Trustee Council are not inadvertently misconstrued as a result of these publication efforts. The conclusions of individual investigators using data or information from Trustee Council funded projects should be clearly identified as their own unless and until the Trustee Council takes specific action to endorse a particular interpretation or conclusion. It is my understanding from the Chief Scientist, that the Environmental Protection Agency (EPA) maintains a policy along these lines as indicated by the attached excerpt from an article

published in the *Marine Ecology Progress Series* by Dr. Spies, et. al. (see attachment, last page).

Recommendation: Investigators working on projects sponsored by the Trustee Council that are the subject of a journal article or other submission for publication should be directed to include a statement with all such submissions stating:

> "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."

Peer Review of Materials Included in Trustee Council Supported Publications

A related policy issue has also emerged regarding what opportunity, if any, the Trustee Council should have to participate in the peer review of materials published as a result of direct funding support from the civil settlement (e.g., a book of papers or journal articles for which civil settlement funds are used to pay page charges). This question was brought to light by the difference of scientific interpretation that has arisen regarding a paper to be included in the marine mammal book that will be published with funding support from the Trustee Council (*Effects of the* Exxon Valdez *on Marine Mammals*).

One possible means of addressing this issue would be for the Trustee Council to adopt a policy providing that if civil settlement funds are used to support the cost of printing a book or other publication, the Trustee Council would expressly reserve the opportunity to participate in the peer review process for the materials to be published as a result of that Trustee Council funding support.

At this point, there is a spectrum of opinion on the need for a policy that addresses this issue. Some agency liaisons are supportive of the concept while others object. There is no consensus of opinion and this is an issue that warrants further discussion. I do not have a recommendation at this time. I did, however, want to bring the issue to your attention.

attachment

Vol. 54: 157-170, 1989 | MARINE ECOLOGY PROGRESS SERIES Mar. Ecol. Prog. Ser. | Published June 8

Stable isotope ratios and contaminant concentrations in a sewage-distorted food web

Robert B. Spies[1], Harold Kruger[2], Robert Ireland[1], David W. Rice, Jr[1]

[1] Environmental Sciences Division, Lawrence Livermore National Laboratory, University of California, Box 5507, Livermore, California 94550, USA

[2] Kruger Laboratories, 24 Blackstone Street, Cambridge, Massachusetts 02139, USA

ABSTRACT: Concentrations of selected neutral organic contaminants and stable isotope ratios of carbon, nitrogen and deuterium/hydrogen in invertebrates and fish were compared from near a large, 60 m deep municipal waste outfall near Los Angeles, California, where waste has a measurable influence on the structure of the marine food web, and from a reference area off Santa Barbara, California. Objectives were to investigate (1) the degree of utilization of sewage organic matter in the food web, especially by 3 species of fish, (2) differences in contaminant accumulation between these benthophagous fish and (3) the behavior of organic contaminants relative to each other and to organic matter through several trophic levels. Isotopically lighter carbon and nitrogen and higher concentrations of most chlorinated hydrocarbons were found in tissues of organisms from near the outfall. On the basis of the $\delta^{13}C$ and $\delta^{15}N$ of the fishes, the estimated contribution of nitrogen and carbon from sewage was about 15 to 20% of their requirements for these elements. The $\delta^{13}C$ and $\delta^{15}N$ values increased in the fishes in the order of *Microstomus pacificus, Citharichthys sordidus* and *Zaniolepis latipinnis*. The Cs/K ratio of the latter species was also significantly higher than the former 2 species, also indicating its higher trophic position. *C. sordidus* had the highest wet-weight concentrations of chlorinated hydrocarbons and phthalic acid esters; intermediate concentrations of these compounds were found in *Z. latipinnis* and the lowest concentrations were found in *M. pacificus*. Concentrations of chlorinated hydrocarbons on a lipid-weight basis changed this order so that it more closely resembled the trophic structure revealed by the stable isotope ratio and Cs/K ratio data. Increases of both ΣDDT and Aroclor 1254, from deposit-feeding invertebrates through fish, were evident in foodwebs of the outfall and reference areas as positive correlations with $\delta^{13}C$. A large degree of correlation was evident between contaminants in *Z. latipinnis* but not in the other 2 fish species. These correlations were apparently not a function of liver lipid concentration, but the strengths of the correlations were dependent on the similarities of log K_{ow} values of the correlated compounds.

INTRODUCTION

Over 2×10^5 metric tons of sewage particulate matter are discharged into the Southern California Bight each year (Schafer 1984). Associated with these particles are a variety of xenobiotic contaminants, such as chlorinated hydrocarbons, aromatic hydrocarbons, phthalic acid esters, heterocycles and chlorophenols (Young & Gossett 1980, Eganhouse & Kaplan 1982, Gossett et al. 1982, Schafer 1984). The sewage particles are about 60% organic matter, compared to ca 2% in endogenous marine particulate matter (Sweeney & Kaplan 1980).

As a result of particulate matter settling, sediments have accumulated at the rate of 0.6 to 1.7 g cm^{-2} yr^{-1} (dry) during the 1970's near the Los Angeles County Joint Water Pollution Control Plant (JWPCP) outfall (Stull et al. 1986a). This deposition of particles with a high organic content has had a marked effect on the food web, changing microbial and invertebrate populations in accordance with effects expected from organic enrichment (Pearson & Rosenberg 1978, Stanley et al. 1978, Stull et al. 1986b). The general effect evident in the invertebrate populations was a stimulation of selected species of deposit-feeding infauna, especially polychaetes, while crustaceans, particularly amphipods, became less numerous (Smith & Green 1976, Word & Striplin 1980).

Changes in populations of benthophagous fish were also noted near the JWPCP outfall during the 1970's (Cross et al. 1985; see Spies 1984 for review). One species in particular, the Dover sole (American appella-

0171-8630/89/0054/0157/$ 03.00

ascribe size-related differences in $\delta^{15}N$ in *M. pacificus* mainly to changing diet with size rather than an isotope effect due to metabolism, the specimens analysed from Santa Barbara were much smaller (ca 8 g each) than those from the JWPCP outfall area (from 42 to 110 g each). Therefore, if there were really a relationship between size and $\delta^{15}N$ due to an isotope effect, the use of larger fish from the control area would have resulted in an even greater difference in $\delta^{15}N$ than observed.

The local movement of *Citharichthys sordidus* in and out of the outfall area is a behavior pattern consistent with the ecological data that indicate there is not a strong attraction of this species for the outfall area (Cross et al. 1985). This behavior pattern would be expected to result in both a greater accumulation of those contaminants that were elevated near the outfall and in isotope ratio shifts that were different in the outfall area in some individuals. Therefore, it might be expected that contaminant concentrations and shifts in stable isotope ratios might be correlated. Indeed, Aroclor 1254 and ΣDDT are elevated in these species relative to the SB reference site (Table 7) and their concentrations correlate with $\delta^{15}N$ (Fig. 4). An alternative explanation is that the switch from partly benthic to wholly pelagic prey in larger specimens (Allen 1982) would result in greater contaminant concentrations along with isotopic shifts toward lighter carbon and nitrogen. However, size did not correlate with either of these measures in this species.

It has now been well established that $\delta^{13}C$ increases slightly with each trophic transfer (DeNiro & Epstein 1978, Teeri & Schoeller 1979, Stephenson et al. 1986). This phenomenon has been utilized to interpret the structure of complex food webs where it is not entirely clear that the trophic level assignments should be for animals that feed on organisms from various trophic levels (Haines & Montague 1979, McConnaughey & McRoy 1979a, b, Rau et al. 1983). Data presented here indicate that a combination of $\delta^{13}C$ and $\delta^{15}N$ predicts trophic level better than Cs/K. However, we used about 20 of each species for the isotope ratio analyses and only 5 of each species for the Cs and K analyses. Perhaps with more Cs/K values clearer separations between species, such as those observed from the isotope ratio data, would be evident.

The data support the following conclusions: (1) the 3 species of fish collected in the outfall area obtained about 15 to 20% of their carbon and nitrogen from sewage and this varied little between species; (2) carbon and nitrogen became isotopically heavier and Cs/K increased in the 3 species in the order of: *Microstomus pacificus*, *Citharichthys sordidus* and *Zaniolepis latipinnis*, which suggests strongly that trophic levels increase in this order; (3) *M. pacificus*, a species that apparently occupies a lower trophic level than the other 2 species, accumulated the lowest concentrations of ΣDDT and PCBs; (4) Aroclor 1254 and ΣDDT bioaccumulate through the food web, from invertebrate detritus feeders to predatory fish, although for ΣDDT in fish this may related to lipid content; (5) contaminants tend to correlate positively between individuals of a fish species with increasing trophic level, and the reason for this remains unclear.

Acknowledgements. We are grateful to I. Haydock of the Los Angeles County Sanitation District for making the 'Sea-S-Dee' available for sampling and for the sample of sewage particulate matter. Willard Bascom, director of the Southern California Coastal Water Research Project (SCCWRP) at the time of this study, graciously made laboratory space available for processing field samples. Jeff Cross of SCCWRP was particularly helpful in our field work. Don Baumgartner, Bruce Boese and Henry Lee of EPA's Marine Laboratory, Newport, Oregon have given us support and many helpful suggestions. We thank D. Young, from the same laboratory, for invaluable discussions of the Cs and K data. This work was performed under the auspices of the U.S. Department of Energy by the Lawrence Livermore National Laboratory (LLNL) under Contract No. W-7405-ENG-48. Although the research described in this paper was funded by the U.S. Environmental Protection Agency through Interagency Agreement AD-89-E2A267 to LLNL, it has not been subjected to the Agency's required peer and policy review and therefore does not necessarily reflect the views of the Agency.

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RESERVE
RESOLUTION

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RESOLUTION OF THE EXXON VALDEZ TRUSTEE COUNCIL

We, the undersigned, duly authorized members of the Exxon Valdez Trustee Council, after extensive review and consideration of the views of the public, and in furtherance of our decision made at a public meeting of the Trustee Council on January 31, 1994, find as follows:

1. Scientists and other experts have identified a clear continuing need for research and monitoring (and, potentially, associated general restoration activities) after 2001, the year of the last annual payment by Exxon to the Joint Trust Fund. This need arises primarily from the present limitations on scientific understanding of the ecological systems and relationships that may affect the recovery of certain of the species injured by the Exxon Valdez oil spill. The research and monitoring programs adopted or under consideration by the Trustee Council will help fill those gaps in knowledge and may provide a basis for additional future actions to promote or assist recovery of injured species and ecological systems. Moreover, the relatively long life cycles of certain species make long-term programs to monitor recovery and assess any continuing injury essential. For example, sockeye salmon return in five-year cycles. In order to obtain meaningful information about the effects of the oil spill on those runs and its duration, several cycles may need to be examined. Actions to restore injured salmon runs and monitoring of their recovery could take yet additional cycles. Restoration of this species is thus likely to span several decades into the future. Similarly, many other resources such as murres, harlequin ducks, harbor seals, sea

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otters, and herring appear to be recovering slowly, if at all. Long term observation and, potentially, future restoration action are essential to assure the recovery of these species.

2. It is prudent to set aside trust funds in a reserve fund to provide funding for research, monitoring and associated general restoration programs after 2001.

3. Because all restoration needs through the year 2001 are not yet known, the Trustees must have the flexibility to invade the reserve to fund restoration projects that are clearly needed and cannot be funded by other trust funds.

WE THEREFORE resolve to create a reserve account with joint trust funds under the following terms and conditions:

(a) A long term investment sub-account ("Reserve Fund") shall be established in the EXXON VALDEZ Oil Spill Settlement Account in the Court Registry Investment System ("CHRIS") to receive, invest and disburse monies set aside as a reserve for future research, monitoring and general restoration projects. The term of investments shall be as determined yearly by the Trustee Council upon recommendation of the Executive Director. Interest received from investment of the Reserve Fund shall accrue to the Reserve Fund.

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(b) Disbursement of the monies in the Reserve Fund shall be to the Governments upon resolution of the Trustee Council as provided in the Order for Deposit of and Transfer of Settlement Proceeds entered by the United States District Court on December 6, 1991.

(c) The sum of $12,000,000 shall be placed in the Reserve Fund through the 1994 work plan. It is the intent of the Trustee Council that additional monies will be placed in the Reserve Fund from each remaining payment by Exxon. Such funding decisions will be made through the Trustee Council's annual Work Plan process and are subject to the final Restoration Plan. All requests for monies to be placed into the Reserve Account will be made through the United States District Court in the same manner as for other restoration projects.

(d) Expenditures from the Reserve Fund will be made only by the unanimous agreement of the Trustee Council, consistent with the terms of the Memorandum of Agreement and Consent Decree entered by the United States District Court on August 28, 1991. Expenditure of monies in the Reserve Fund for restoration projects shall be made in accordance with applicable law, including the National Environmental Policy Act.

(e) It is the intent of the Trustee Council that the Reserve Fund be available for research, monitoring and associated general restoration projects in the years following the last

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payment into the trust fund by Exxon in the year 2001. However, where there is a showing of need, the Trustee Council may, at any time, use either the principal or interest retained within the Reserve Fund to fund restoration projects permitted under the Memorandum of Agreement.

(f) The Department of Law and Department of Justice are requested to petition the United States District Court to provide any necessary authorization for the Reserve Fund and to seek a waiver of fees from the CHRIS.

Dated this _____ day of _____, 1994 at Anchorage, Alaska.

SIGNATURE BLOCKS

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ARDOR
SHAPING ALASKA'S FUTURE

Prince W[illiam] Sound
Economic Development Council

Regional Office:
P.O. Box 2353 • Valdez, Alaska 99686
Phone (907) 835-3775 • Fax (907) 835-5770

Satellite Office:
P.O. Box 99 • Cordova, Alaska 99574
Phone (907) 424-7261 • Fax (907) 424-7259

June 27, 1994

Exxon Valdez Oil Spill Trustee Council
645 G Street
Anchorage, AK 99501

Dear Trustee Council Members:

Prince William Sound Economic Development Council submits the attached proposal for consideration as a FY '95 Restoration Project. The Sound Waste Management Plan (SWMP), was developed by our regional Solid Waste Management Committee in cooperation with the Alaska Department of Environmental Conservation. Their efforts to combat the high cost of handling, removing oily and solid waste from and protecting the environment encompass the SWMP.

It is important to note that as a grassroots, regional project, local input and coordination is crucial to the long-term success of the SWMP project by creating local ownership. This proposal was developed and intended to be coordinated by PWSEDC's Solid Waste Management Committee in cooperation with ADEC.

We appreciate the efforts of the Trustee Council to restore and protect the environment from future encroachment and look forward to your questions and comments regarding this proposal.

Thank you for your time and consideration of this proposal.

Sincerely,

Paul Roetman

Paul A. Roetman
Executive Director

EXXON VALDEZ TRUSTEE COUNCIL
FY '95 GENERAL RESTORATION DESCRIPTION

A. TITLE PAGE

Project Title: Prince William Sound Restoration Strategy: Sound Waste Management Plan (SWMP)

Project Leader: Kelley Weaverling, Chair, PWSEDC Solid Waste Management Committee

Lead Agency: Alaska Department of Environmental Conservation

Cooperating agencies:
Prince William Sound Economic Development Council
City of Cordova
City of Valdez
City of Whittier
Alaska Department of Environmental Conservation
Alyeska Pipeline Service Company
Valdez Fisheries Development Association (VFDA)
Prince William Sound Aquaculture Corporation (PWSAC)
Prince William Sound Conservation Alliance (PWSCA)

Cost of Project: FY '95 - $275,900

Project Start-up / Completion Dates: FY '95 - November 1, 1994 - August 1, 1996

Duration: 1 - 2 years, starting with FY '95

Geographic Area: Prince William Sound

Contact Person:
Kelley Weaverling
Vice President
PWSEDC
Valdez, AK 99686
Tel: (907) 424-7261
Fax: (907) 424-7259

-or-

Paul A. Roetman
Executive Director
PWSEDC
Valdez, AK 99686
Tel: (907) 835-3775
Fax: (907) 835-5770

Prince William Sound Restoration Description:
Sound Waste Management Plan (SWMP)

B. INTRODUCTION

The Sound Waste Management Plan (SWMP) is a comprehensive plan to identify and remove existing oily and other solid waste from the waste stream, of the oil-impacted communities of Prince William Sound. The plan will improve upon current waste management and join past efforts into a unified regional effort. The SWMP, will put into action an oily and solid waste management system that will operate in all Prince William Sound communities to eliminate the potential for further encroachment or damage to the local ecology.

Problem:

Currently each community in Prince William Sound is out of compliance with federal regulations as it relates to permitting of waste sights. There are no regional goals for managing, reducing and handling of oily and solid waste. Because there is no plan, Prince William Sound is at a potential risk to further environmental harm. Prince William Sound Economic Development Council's regional Solid Waste Management Committee was formed, therefore as a task force of the area's largest contributors of waste. This included both cities, villages, industry, and hatchery representatives. They identified the following regional problems:

1. Costs to manage and handle oily and solid waste continue to rise and tap declining revenue resources.
2. Existing landfills have limited life spans.
3. There is no long term solution in sight.

Solution:

A three phase approach is needed to: 1. identify 2. reduce the cost of handling oily and solid waste, and 3. implement an oily and solid waste management plan.

Phase I will identify the options and most cost-effective means for handling and managing oily and solid waste in Prince William Sound. The PWSEDC regional committee will contract a firm to accomplish this phase;
Phase II will handle all required ADEC/EPA permitting to implement a regional management project, and
Phase III is the implementation of the SWMP that includes construction of the identified, chosen project i.e. regional landfill, regional incineration, etc.

*** It is important to note that as a regional project, local input and coordination is crucial to the long-term success of the SWAMP project by creating local ownership. This proposal was developed and intended to be coordinated by PWSEDC's Solid Waste Management Committee in cooperation with ADEC.**

The EVOS Trustee Council has funded a similar project, number 94417 entitled "waste oil disposal facilities." The SWMP broadens that project approach and greatly increases the effectiveness of enhancement and restoration efforts due to its regional coverage, local expertise and long term monitoring.

Funding for SWMP will allow an effective and necessary approach to enhancement, clean-up and collection of valuable data as it relates to oily and solid waste management in Prince William Sound in 1995. The SWMP will restore, enhance and promote long-term preservation of Prince William Sound from the effects of oily and solid waste. This document describes the plan of work to be undertaken during FY '95

C. NEED FOR THE PROJECT

To further enhance, improve the rate of natural recovery of, and reduce future events of marine pollution in Prince William Sound, the SWMP, is crucial. To ensure the protection and preservation of the Prince William Sound oil-impacted region, implementation of this plan is needed. Under EVOS Designated Wilderness Area objectives, "any restoration objective which aids recovery of injured resources, or prevents further injuries, will assist recovery of these areas." This is the SWMP focus.

The current primary waste stream for oily waste are local harbors. From boats, both domestic waste water (sewage) and oily waste are discharged directly into Prince William Sound. The secondary stream is smaller in direct amounts, but no less damaging to the oil-impacted environment. This includes leechates from community landfills that contribute to the total impact of waste to the local ecology. To add to this, all area landfills in Prince William Sound including both cities and villages are out of compliance with federal regulations. **The SWMP is the only regional effort identified to date that could provide a solution to oily and solid waste management in Prince William Sound.**

D. PROJECT DESIGN

1. Objectives:

The development of the Sound Waste Management Plan (SWMP) originated with Prince William Sound Economic Development Council's regional Solid Waste Management Committee. The primary objectives include the development and implementation of a regional strategy to limit the exposure of hazardous waste material in oil-impacted communities in Prince William Sound. The SWMP will provide a design and recommend an oily and solid waste collection and disposal alternative and provide a plan for future management of oily and solid waste in Prince William Sound. The following outlines the objectives to be accomplished in FY '95:

a) Gather background information on the composition and rate of oily and solid waste generation in Prince William Sound

b) Analyze waste management processing and disposal alternatives and select the most appropriate solution for Prince William Sound

c) Address regulatory requirements

d) Establish public participation program to understand and address community concerns and needs

e) Analyze oily and solid waste reduction and recycling options

f) Evaluate sites for a new regional landfill

g) Develop cost estimates for oily and solid waste management alternatives

h) Recommend financial planning to fund oily and solid waste services

2. Methods:
The SWMP will include a scoping of the current Prince William Sound situation by qualified firm. This scoping will determine both the options and costs related to each in implementing a regional oily and solid waste management system.

3. Schedule:
(FY 95 - Plan of Work)
Phase I

Nov 1	Distribute Request for Proposals (RFP's) for regional oily and solid waste management plan.
Dec 1	Coordinating meeting (Review of submitted proposals)
Jan 1995	Select consulting firm and draft contract
Feb 1	Coordinating meeting (contractor and committee)
Mar 1	Review of scoping firm's draft plan findings with PWSEDC Solid Waste Committee comments.
Apr 1	Public Review of findings (held in each PWS community)
Apr 2	Determination of most efficient and cost effective regional oily and solid waste system.

Phase II

Apr 1	Start process for implementation of regional oily and solid waste system.
Apr 15	Scope ADEC/EPA permitting for project implementation
Jun 1	Committee review and evaluation of FY 95 Work Plan.
July 15	Meeting to review draft ADEC/EPA permits
Aug 15	Submit ADEC/EPA permit
Oct 1	Meeting with ADEC/EPA about questions on permit
Nov 1	Submit revised permit

Jan 1996 Coordinating meeting

Phase III

May 1 Initiate construction of permitted facility

Aug 1 Facility complete and operational

4. Technical Support:
Prince William Sound Economic Development Council's Solid Waste Management Committee will play both an evaluative and advisory role to the scoping firm.

5. Location: Prince William Sound

E. PROJECT IMPLEMENTATION

To maintain the direct link from development and implementation of the SWMP, Prince William Sound Economic Development Council's regional Solid Waste Management Committee is the only appropriate entity to implement this regional project. Alaska Department of Environmental Conservation will additionally play an advisory, and coordinating role with the Committee's efforts.

F. COORDINATION OF INTEGRATED RESEARCH

The SWMP program is a coordinated effort of the Prince William Sound Economic Development Council in cooperation with: Department of Environmental Conservation, Alyeska Pipeline Service Company, Chugachmiut, Valdez Fisheries Development Association, Prince William Sound Aquaculture Corporation, Prince William Sound Conservation Alliance, the City of Valdez, the City of Whittier, the City of Cordova, and the Villages of Tatitlek and Chenega.

G. PUBLIC PROCESS

Public involvement has been of the highest priority to all PWSEDC Solid Waste Management Committee meetings. In order to provide a representative cross-section of all Prince William Sound, each community is represented, including both fishing and petroleum industry representatives. The process will continue with public review at local city council and tribal council meetings for comment of the SWMP. An integral part of the SWMP is community education on oily and solid waste issues.

H. PERSONNEL QUALIFICATIONS

Each member of PWSEDC's Solid Waste Management Committee through both experience and knowledge contributes to the overall effectiveness of the SWMP (see committee list appendix A). The expertise of the scoping firm will be procured through the bid process, requiring an evaluative application process.

I. BUDGET (FY '95)

1. Personnel

Phase I & II

PWSEDC will staff and coordinate project efforts	$ -0-

Phase III

To be determined

2. Travel

Phase I & II

10 trips for Solid Waste Committee Members	
14 members @ $200 for airfare	$ 28,000
Room & Board @ $120/day	$ 16,800
2 air trips to Anchorage for 5 principal investigators	$ 2,000
7 days time for 5 principal investigators @ 150/day	$ 5,250

Phase III

To be determined

3. Contractual Services

Phase I

Engineering Consulting Fees	$ 100,000
Accounting Services - project audit	$ 3,500
Teleconferencing fees 10 @ 150	$ 1,500
Copy costs- quarterly reporting @ 200	$ 800

Phase II

Permitting for project implementation	$ 100,000

Phase III

To be determined

4. Commodities

N/A

5. Equipment

N/A

6. Capital outlay

N/A

7. General administration (including environmental compliance)

Phase I & II

7% Administrative Support and Coordination	$ 18,050

Phase III

To be determined

Total Phase I & II	**$ 275,900**

Prince William Sound
Economic Development Council

P.O. Box 2353 • Valdez, Alaska 99686
Phone: 835-3775 • Fax: 835-5770
Representing the communities of Chenega Bay, Cordova, Tatitlek, Valdez and Whittier.

Solid Waste Management Committee

Jack Lamb, Committee Chair
Board of Directors, PWSEDC
Cordova
P: 424-7442 F: 424-6000

Kelley Weaverling
Board of Directors, PWSEDC
Cordova
P: 424-5305 F: 424-3430
H: 424-5565

Paul Jackson
Chugachmiut Corp.
Chenega Bay
P: 562-4155 F: 563-2891

Jeff Courier
Director, Public Works
City of Cordova
P: 424-6200 F: 424-6000

Gary Kompkoff
Board of Directors, PWSEDC
President, IRA Council
Tatitlek
P: 325-2311 F: 325-2298

Scott Walther
Board of Directors, PWSEDC
Vice Mayor
City of Whittier
P: 472-2311 F: 472-2399

Gary Williams
City Manager
City of Whittier
P: 472-2327 F: 472-2404

Dan Lawn, ex-officio
Environmental Engineer,
AK Dept. Environmental Conservation
Valdez
P: 835-4698 F: 835-2429
Cordova
P: 424-4385 F: 424-4386

Bill Wilcox
City Engineer
City of Valdez
P: 835-4313 F: 835-3420

Lee Schlitz
Director, Public Works
City of Valdez
P: 835-4473 F: 835-4900

Marnie Graham
PWS Conservation Alliance
Valdez
P: 835-2799 F: 835-5395

Dave Cobb
Board of Directors, PWSEDC
Valdez Fisheries Development Assoc.
P: 835-4874 F: 835-5951

Tony Zamora
Senior Environmental Specialist
Alyeska Pipleline Service Company
Environment/Operations Department
P: 835-6477 F: 835-6420

Rob Terrell
Maintenance Manager
Prince William Sound Aquaculture
P: 424-7511 F: 424-7514

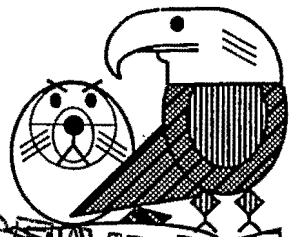
Appendix A

AGENDA

11.5.5 G

Exxon Valdez Oil Spill Trustee Council

Restoration Office
645 G Street, Suite 401, Anchorage, Alaska 99501-3451
Phone: (907) 278-8012 Fax: (907) 276-7178



AGENDA
EXXON VALDEZ OIL SPILL SETTLEMENT TRUSTEE COUNCIL
CONTINUATION OF MAY 31, 1994 MEETING
ANCHORAGE
JULY 11, 1994 @ 1:00 P.M.

7/11/94
11:36 am
DRAFT

Trustee Council Members:

PHIL JANIK
Regional Forester, Alaska Region
U.S. Department of Agriculture-Forest Service

BRUCE BOTELHO/CRAIG TILLERY
Attorney General/Trustee
State of Alaska/Representative

GEORGE T. FRAMPTON, JR./DEBORAH WILLIAMS
Assistant Secretary/Trustee Representative
U.S. Department of the Interior

STEVE PENNOYER/DON
Director/COLLINSWORTH
Alaska Region/Trustee Representative
National Marine Fisheries Service

CARL L. ROSIER
Commissioner
Alaska Department of Fish & Game

JOHN A. SANDOR
Commissioner
Alaska Department of Environmental Conservation

Steven Pennoyer, Chair
Juneau - LIO 130 Seward Street -- Anchorage - 645 G Street First Floor

1. Call to Order 1:00 p.m.
   - Approval of Agenda
   - Order of the Day
   - Approval of May 31, 1994 Trustee Council Meeting Notes

2. Public Comment - 1:15 - 2:00 p.m.

3. Public Advisory Group Report (Brad Phillips) 2:00 p.m.

4. Executive Director's Report (Jim Ayers) 2:30 p.m.
   - Restoration Plan Update
     - Implementation - Management Structure
     - Organizational Structure
   - EIS Proposed Action

- Science Review Board Policy Review
- Chief Scientist Contract
- Institute of Marine Science Improvements Update
- Habitat Protection & Acquisition Update
- Financial Report

5. Action Items
   - Publications Policy
   - Peterson Resolution
   - Outline of Draft FY95 Work Plan

6. Future Meeting Schedule

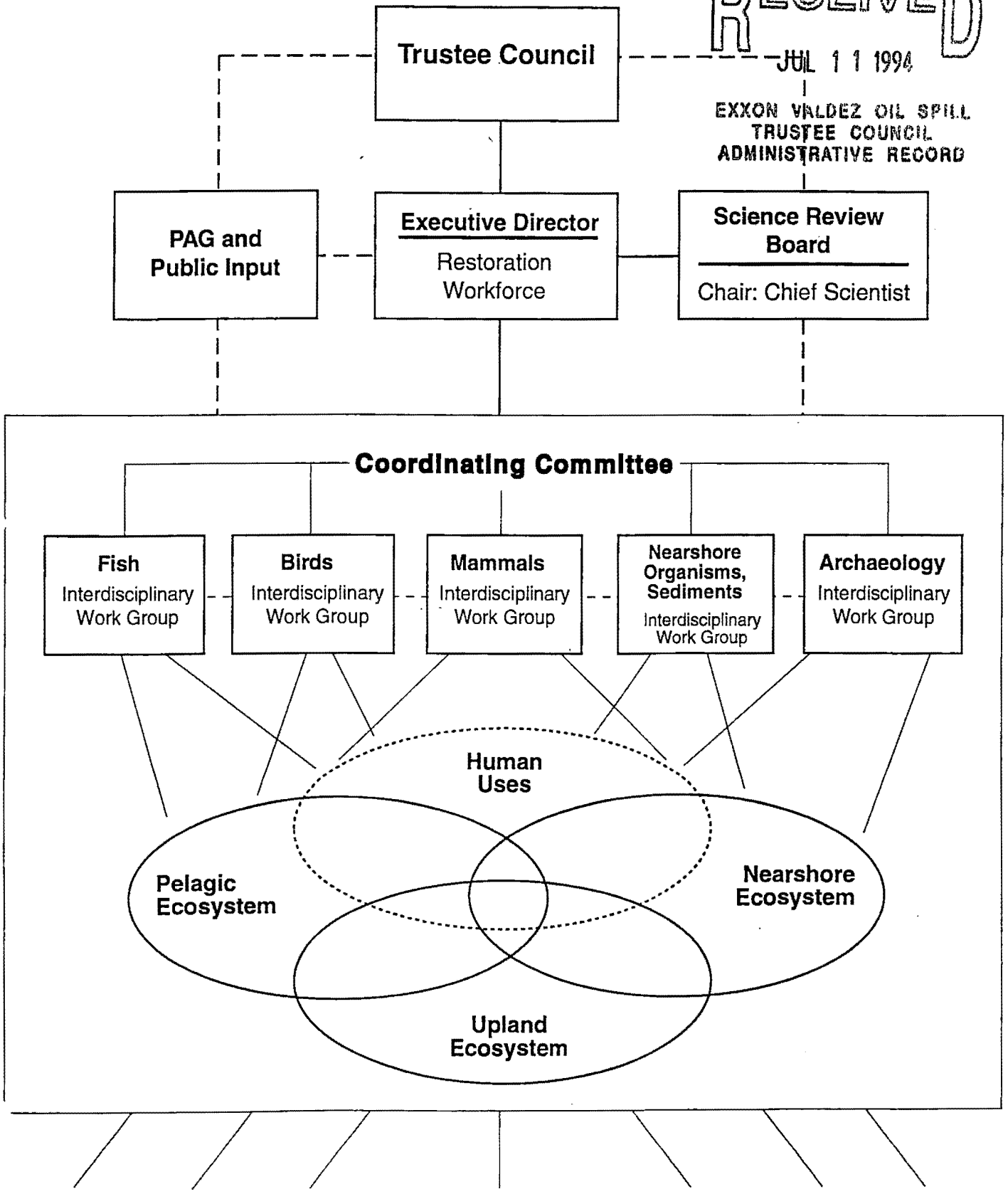
5:00 p.m. Adjourn

ORGANIZATIONAL
DIAGRAM

11.5.5 F

Draft 6/27/94

Management and Science Planning Organizational Diagram



Monitoring • Research • General Restoration

SCIENCE
REVIEW BOARD

11.5.5E

SCIENTIFIC REVIEW

In an effort to improve the efficiency of technical and scientific review and reduce the associated costs of such services, the Chief Scientist as he presently does, will contract with individuals for peer review services. However, the Chief Scientist will retain a core group of peer reviewers who will provide technical review and oversight for all projects and activities of the Trustee Council with a scientific or technical/scientific related component. Scientific knowledge and information from a broad range of experts will be applied to the restoration effort through an adaptive management process. This will serve to strengthen the Trustee Council's ability to implement a broad ecosystem based approach to restoration.

The establishment of a core group of reviewers will provide for long term consistency and the development and utilization of historical knowledge of the Exxon Valdez oil spill. While it may be impossible to find a core group of experts with expertise in all areas of scientific and social research associated with restoration projects, a core group of reviewers would have a broad range of expertise and a clear overall picture of the damage assessment and restoration phases of the Exxon Valdez oil spill. In the event that input is needed beyond the range of expertise covered by the core group of peer reviewers, the Chief Scientist will seek out expertise to be applied to these particular projects or tasks. These experts will provide individual input to the Chief Scientist and Executive Director. In this manner, the scientific and technical needs of the Trustee Council, Executive Director, Principle Investigators and restoration staff can most effectively be met.

Responsibilities of the Core Reviewers

Core Reviewers are charged with providing individual, independent, unbiased, scientific and/or technical review of restoration project proposals, actions, and programs at the request of the Trustee Council, Executive Director or Chief Scientist through the Chief Scientist. Core Reviewers will:

1. **Assist in the development of an adaptive management process:**
   - Review a synthesis of scientific information developed by the Chief Scientist, based on information gathered from Principle Investigators, and peer reviewers, in order to present a comprehensive overview of what has been learned, what concrete steps have been accomplished and what gaps may exist in the restoration program .

   - Explore various meritorious ideas and projects, or modifications to projects, that will address gaps and substantive problems in the health of the ecosystem..

   - Provide priority focus items to the Chief Scientist for transmittal to the Executive director, which will provide the basis for the direction of discussion at the annual restoration evaluation and synthesis workshop.

   - Provide input to the Chief Scientist and the Executive Director in order to facilitate the development of an annual overview of the general health of the spill area ecosystem and the status of injured resources and services.

- Identify focus areas for consideration in the development of an annual workplan and in the oversight of ongoing and proposed restoration work.

2. **Recommend scientific priorities based on technical merit:**
   - Review submitted project ideas and provide a recommended list of ideas and projects in light of specified funding constraints.

   - Participate in the resolution of conflicts between competing proposals.

   - Recommend logical combinations of proposals or a specific proposal which would best meet specified restoration objectives.

   - Participate in interdisciplinary work groups whose focus is to develop strategies, research approaches, and testable hypotheses for monitoring, research, and general restoration activities.

   - Participate in the development and review of the annual workplan in order to ensure that it is a comprehensive, integrated restoration program.

3. **Assist in the Peer Review Process for proposed, ongoing, and completed work:**
   - Review proposals
   - Review project design
   - Review project conclusions and reports

Responsibilities of the Chief Scientist

The Chief Scientist will be responsible for providing all independent, non-agency scientific support. In the case of the Core Peer Reviewers, the Chief Scientist will be responsible for:

- Chairing meetings

- Setting Agendas

- Conveying results, recommendations, and concerns of the Core Reviewers to the Executive Director and Trustee Council.

- Synthesizing information provided by Core Reviewers and any additional Peer Reviewers.

- Providing Core Reviewers as subcontractors within the scope of the Scientific Support Contract as well as any services required of any additional peer reviewers. These reviewers will have a contractual relationship with the Chief Scientist as part of the Chief Scientist's role in providing scientific support.

- Will secure services of additional peer reviewers as deemed necessary.

Requirements of Core Reviewers

- Core Reviewers must be recognized as leading experts with proven track records, must have a multidisciplinary approach to solving scientific problems and must have demonstrated a high level of professional integrity.

- Must meet minimum requirements established for any peer reviewer. Expertise is needed in the following areas: archaeology, birds, ecotoxicology, chemistry, fish, intertidal/subtidal, marine mammals, oceanography.

- As continuity and historical knowledge is important, prior knowledge of the Exxon Valdez oil spill is desirable.

- The Chief Scientist will recommend a minimum of five core peer reviewers to the Executive Director who will select core reviewers after the concurrence of the Trustee Council.

- Core reviewers, as any peer reviewer, may not be contractually involved in the implementation of projects. Even the appearance of a conflict of interest must be avoided.

- Core reviewers will be retained at the pleasure of the Trustee Council and may be removed by the Chief Scientist with the express permission of the Executive Director in consultation with the Trustee Council.

- It is expected that Core Reviewers will need to travel to Alaska for at least two meetings annually. The expenses incurred as a result of this travel will be reimbursed in accordance with the contractual obligations in place between the Chief Scientist and the Department of Natural Resources, in addition to any subcontracts in place between the Core Reviewers and the Chief Scientist.

- It is expected that scientists as well as core reviewers and other peer reviewers involved in Exxon Valdez oil spill projects will convene at least twice a year to:
    1. Disseminate the results of prior year's field work.
    2. Review project proposals as part of the development of the annual work plan.

- Additional meetings may be held as needed at the direction of the Chief Scientist.

General Assumptions

- The Core Reviewers and the Chief Scientist focus primarily on scientific and technical matters and the integration of these issues into the broad based ecosystem approach to restoration.

- The Trustee Council establishes policies and executes authorizations per the Consent Decree. Core Reviewers make independent recommendations to the Chief Scientist for transmittal to the Executive Director and Trustee Council.

- The Chief Scientist and Core Reviewers will be charged with providing to the Trustee Council, through the Chief Scientist, individual, independent technical review and recommendations of restoration proposals so that the Trustee Council can determine whether its objectives and policies will be effectively implemented.

- Core Reviewers and Peer Reviewers are subcontractors and are compensated appropriately for time and expenses at a negotiated fixed fee. Peer Reviewers may be paid or unpaid but all expenses associated with Peer Review will be managed through the Scientific Support contract.

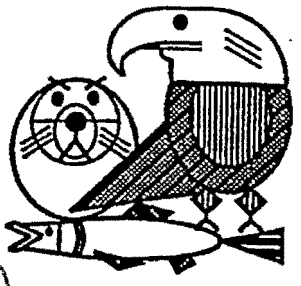
- Staff support will be provided by the Restoration Office for meetings of the Chief Scientist and Core Reviewers.

PROPOSED
MEETING
SCHEDULE

11.5.5D

Exxon Valdez Oil Spill Trustee Council

Restoration Office
645 "G" Street, Anchorage, AK 99501
Phone: (907) 278-8012 Fax: (907) 276-7178



MEMORANDUM

TO: Trustee Council

FROM: James R. Ayers
Executive Director

DATE: July 5, 1994

RE: Proposed Meeting Schedule

Trustee Council Meeting Schedule

July 11, 1994

* Policy review of Acquisitions "less than fee"
* Overview of proposals for FY95 Work Plan
* Science Review Board policy review
* Restoration Plan update

August 8th, 1994

* Review of FY95 draft Work Plan for release to the public
* Update on issues
* Restoration Plan EIS update and discussion of final alternative
* Fee Simple Acquisition progress
* Restoration Plan final structure

August 29, 1994

* EIS and Final Restoration Plan update
* Fee Simple Acquisition approval as appropriate
* Interim budget approval
* IMS EIS Update: public comment

Late September 1994

* Restoration Plan FEIS Update
* IMS FEIS Update
* Habitat Acquisition Approval as appropriate

October 31, 1994

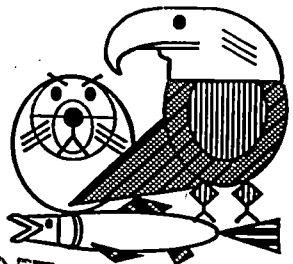
* Adoption of final Restoration Plan
* Final authorization of FY95 Work Plan
* Authorization for the Institute of Marine Science
* Authorization for Habitat Acquisition purchase agreements
* Update on Issues

FY 95 PROPOSALS

11.5.5C

Exxon Valdez Oil Spill Trustee Council

Restoration Office
645 G Street, Suite 401, Anchorage, Alaska 99501-3451
Phone: (907) 278-8012 Fax: (907) 276-7178



June 23, 1994

Dear Reviewer,

The attached *Preliminary Review Draft FY 95 Brief Project Descriptions* includes Brief Project Descriptions (BPDs) received in response to the *Invitation to Submit Restoration Projects for Fiscal Year 1995.* A summary of the projects submitted in this *Preliminary Review Draft* is provided in Tables 1 through 5 attached to this letter.

The BPDs are printed in order of their 5-digit Project Number. Each BPD is assigned a Project Number starting with "95" (for fiscal year 95) followed by three additional digits. If the proposed project is a project continued from FY 94, the 3-digit number from last year was retained. If a project has multiple related parts or sub-projects, those are identified by a letter at the end of the Project Number (e.g., 95007A, 95007B, ... etc.). If a project is a "closeout" from FY 94, "CLO" follows the Project Number. In addition to being given a project number, each project is assigned to a "lead agency" for purposes of follow-up and management. (Note: All projects, regardless of who proposed them, were assigned to a lead Trustee Council agency for purposes of administration.)

Additionally, projects were identified as "continuation" or "new" projects (one project was categorized as a "carry forward" of funds from FY 94), and placed into one of the following six categories:

- General Restoration
- Monitoring
- Research
- Habitat Protection
- Administration
- Restoration Reserve

In some cases, project proposals included multiple elements. The assignment of a project to a particular category (e.g., research vs. monitoring) was based on a brief review and is for initial organizational purposes only.

In addition to the BPDs, three additional documents are included at the end of the *Preliminary Review Draft* for your review.

Broad Agency Announcement (BAA) — A copy of the BAA, referenced in the *Invitation to Submit Restoration Projects for Fiscal Year 1995,* as issued by the National Oceanic and Atmospheric Administration is included for your review. This BAA describes the research area of interest (i.e., food limitation on recovery of injured resources) for which proposals are still being accepted until June 30, 1994. Proposals submitted in response to the BAA will be transmitted to the Interim Science Review Board as soon as possible after June 30.

Comments by LGL Alaska Research Associates, Inc. (LGL) — In addition to providing information concerning LGL's capabilities to undertake restoration projects, these comments provide several specific "restoration project concepts."

Comments by Cook Inlet Seiners Association — Comments from the Cook Inlet Seiners Association in response to the *Invitation to Submit Restoration Projects for Fiscal Year 1995* also include recommendations concerning several restoration project ideas.

SUMMARY

A total of 155 project proposals have been submitted as summarized below:

Project Category	# Projects	FY 95 Cost ($000s)
General Restoration	47	$ 22,757.3
Monitoring	28	$ 6,896.1
Research	68	$ 18,954.0
Habitat Protection	7	$ 2,399.9
Administration	4	$ 4,092.0
Restoration Reserve	1	$ 12,000.0
TOTAL	155	$ 67,099.3

GENERAL RESTORATION PROJECTS (Table 1)

Table 1 presents a summary of General Restoration project proposals submitted for FY 95. General Restoration is a term applied to all restoration activities other than Monitoring, Research and Habitat Protection. General Restoration Projects intended to help an injured *resource* recover will increase the rate of recovery, the degree of recovery or protection for an injured resource. General Restoration projects intended to help an injured *service* recover must have a sufficient relationship to an injured resource and benefit the same user group that was injured.

A total of 47 General Restoration projects were proposed for FY 95 with a total of approximately $22 million in costs (about half of which was attributable to proposed Project 95003 - Area E Commercial Salmon Permit Buyback Program). In FY 94, $5.4 million was allocated to General Restoration projects.

Twenty-seven of the proposed General Restoration projects are new this year. Table 1 lists General Restoration projects by the primary resource or service they would address.

MONITORING PROJECTS (Table 2)

Table 2 presents a summary of Monitoring project proposals submitted for FY 95. As with the other tables, Table 2 shows the location and project type (i.e., continued, new) and cost for FY 95 and FY 96 (if known). This table does not show total project cost because many of the monitoring programs have an undetermined end date. A total of 28 proposed monitoring projects were submitted for a total of $6.9 million in FY 95. In FY 94, a total of $12.1 million was allocated for Monitoring and Research projects combined.

Table 2 also shows the monitoring projects that were submitted compared to the preliminary monitoring recommendations that are included in the *Invitation to Submit Restoration Projects for Fiscal Year 1995*. (See Chapter 3 of the *Invitation*.) While monitoring recommendations contained in the *Invitation* are preliminary and will be subject to further peer review, legal analysis, and policy evaluation, they give an indication of what was anticipated in FY 95 submissions.

RESEARCH PROJECTS (Table 3)

Table 3 presents a summary of Research project proposals submitted for FY 95. Several different groups of projects were submitted as integrated research proposals, including:

— the continued PWS System Investigation (PWSSC/UAF/ADFG)(1);
— a study directed at Processes Structuring Recovery of Injured Nearshore Vertebrate Predators in PWS (NBS)(2);
— a Marine Mammal Ecosystem Study package(3);
— Nearshore Ecosystem Studies (UAF); and
— a collection of Pelagic Ecosystem Studies.

(1) an overview of this collection of projects is provided as Attachment A
(2) an overview of this collection of projects is provided as Attachment B
(3) an overview of this collection of projects is provided as Attachment C

Table 3 is organized to reflect these groupings of project proposals as well as other project proposals that address similar or related issues. It is recognized that many of the research proposals address varied topics and do not fit easily into any one category. The categories in Table 3 are for initial organization only and will undoubtedly be revised.

A total of 68 research projects have been proposed for FY 95, including 21 projects that are proposed to be continued from FY 94, 46 new project proposals, and 1 closeout project.

HABITAT PROTECTION (Table 4)

Table 4 presents a summary of Habitat Protection project proposals submitted for FY 95, including 7 proposed projects for a total of $2.4 million. (These projects do not provide funding for actual purchase or acquisition of parcels from private landowners.)

ADMINISTRATION (Table 5)

Table 5 presents a summary of Administration project proposals submitted for FY 95 including 4 projects for a total of $4.1 million.

RESTORATION RESERVE (Table 6)

Table 6 reflects the proposal to add another $12 million to the Restoration Reserve in FY 95 to add to the $12 million already set aside in FY 94.

* * * * *

Your review and comment on the *Preliminary Review Draft FY 95 Brief Project Descriptions* is greatly appreciated as the Trustee Council works toward the formulation of a work plan for FY 95. If you have questions, please let me know or contact Bob Loeffler or Eric Myers in the Anchorage Restoration Office.

Sincerely,

Molly McCammon

Molly McCammon, Director of Operations

attachments

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Total Cost: $67,099

Total Number of Projects: 155

Note 1: Brief Project Descriptions are not available for these projects.

Table 1 **GENERAL RESTORATION**

DRAFT

Proj.No.	Title	Lead Agency	Loc.	Proj Type	FY 94 Proj #	Cost FY 94	Cost FY 95	Cost FY 96	Total Cost	Yrs.
Archaeological Resources										
95007-CLO	Closeout: Site-specific Archaeological Restoration	ADNR	All	Closeout	94007	$599.5	$191.7	$0.0	$191.7	1
95007B	Archaeological Site Restoration (Site SEW-488)	USFS	PWS	Cont'd	94007	$599.5	$185.2	$0.0	$185.2	
95007C	Crafton Island Site Restoration	USFS	PWS	Cont'd	94007	$600.0	$27.7	$5.0	$32.7	
Birds - General										
95038	Symposium on Seabird Restoration	DOI	ALL	NEW			$77.0	$0.0	$77.0	2
95098	Identification of Seabird Feeding Areas from Remotely Sensed Data	DOI	ALL	NEW			$74.0	Unk	Unk	4
Birds - Murrelets										
95099	Murrelet Vocalization in Conjunction with Artificial Nests: A Possible Means of Attraction to Habitat	DOI	ALL	NEW			$77.0	Unk	Unk	4
Birds - Murres										
95096	Restoration of Murres by Way of Social Attraction and Predator Removal	DOI	ALL	NEW			$167.0	Unk	Unk	4
95097	Restoration of Murres by Way of Transplantation of Chicks: A Feasibility Study	DOI	ALL	NEW			$176.0	Unk	Unk	4
Birds - Predator Removal										
95041A-CLO	Closeout: Introduced Predator Removal from Islands	DOI	OUT	Closeout	94041	$84.0	$20.4	$0.0	$20.4	1
95041B-CLO	Introduced Predator Removal from Islands: Follow-up Surveys	DOI	OUT	Closeout	94041	$84.0	$50.9	$0.0	$50.9	2
95042	Five-year Plan to Remove Predators from Seabird Colonies	DOI	OUT	NEW			$75.0	$0.0	$75.0	2
Fish - Cutthroat/Dolly Varden										
95043B	Cutthroat and Dolly Varden Rehabilitation in Western PWS	USFS	PWS	Cont'd	94043		$137.4	Unk	Unk	

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Table 1 GENERAL RESTORATION

Proj No.	Title	Lead Agency	Loc.	Proj Type	FY 94 Proj #	Cost FY 94	Cost FY 95	Cost FY 96	Total Cost	Yrs
Fish - Herring										
95051	Large Scale Coded Wire Tagging of PWS Herring	ADFG	PWS	NEW			$190.6	$512.5	$846.2	4
95165	PWS Herring Stock Genetic Stock Identification	ADFG	PWS	Cont'd	94165	$62.0	$94.0	$97.0	Unk	3
Fish - Pink Salmon										
95024	Enhancement of Wild Pink Salmon Stocks	ADFG	PWS	NEW			$350.0	$685.5	Unk	
95079	Pink Salmon Restoration through Small-Scale Hatcheries	ADFG	PWS	NEW			$150.0	$75.0	$425.0	
95320C	Otolith Thermal Mass Marking of Hatchery Reared Pink Salmon in PWS	ADFG	PWS	Cont'd	94320C	$53.9	$649.0	$292.7	$1,436.2	
Fish - Rockfish										
95111	Sustainable Rockfish Yield	ADFG	PWS	NEW			$204.4	$318.0	$797.2	3
95112	Rockfish Restoration Objective	ADFG	PWS	NEW			$69.0	Unk	Unk	Unk
Fish - Salmon										
95137	Prince William Sound Salmon Stock Identification and Monitoring Studies	ADFG	PWS	Cont'd	94137	$261.6	$273.4	$0.0	$273.4	2
95139B	Spawning Channel-Port Dick Creek	ADFG	KEN	Cont'd			$127.5	Unk	Unk	5
95139C	Salmon Habitat and Stock Restoration-Pink Creek and Horse Marine Barrier Bypass Development	ADFG	KOD	Cont'd			$45.7	Unk	$203.7	5
Fish - Sockeye Salmon										
95255	Kenai River Sockeye Restoration	ADFG	KEN	Cont'd	94255	$406.1	TBD	TBD	TBD	
Multiple Resources										
95052	Community Involvement and Use of Traditional Knowledge	ADNR	ALL	NEW			$230.6	$300.0	Unk	5
95417	Carry-over of 1994 funds for Project 94417, Waste Oil Disposal Facilities	ADEC	All	Carry fwd	94417	$232.0	$0.0	$0.0	$0.0	
Persistence of Oil										
95047	Seal Contamination	ADNR	PWS	NEW			Unk	Unk	Unk	Unk
95266-CLO	Shoreline Assessment and Oil Removal	ADEC	ALL	Closeout	94266	$365.0	$93.8	$0.0	$93.8	

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Table 1 GENERAL RESTORATION

Proj No.	Title	Lead Agency	Loc.	Proj Type	FY 94 Proj #	Cost FY 94	Cost FY 95	Cost FY 96	Total Cost	Yrs
Services - Commercial Fishing										
95003	Area E Commercial Salmon Permit Buyback Program	ADFG	PWS	NEW			$11,735.0	$0.0	$11,735.0	Unk
95006	Paint River Pink Salmon Development	ADFG	KEN	NEW			$173.9	$215.0	$568.9	4
95088	Salmon Instream Restoration: Pink Creek and Horse Marine Bypass	ADFG	KOD	NEW			$52.7	Unk	$210.7	
95093	PWSAC: Restoration of Pink Salmon Resources and Services	ADFG	PWS	NEW	94320L		$2,219.1	$2,241.2	Unk	
95259	Restoration of Coghill Lake Sockeye	ADFG	PWS	Cont'd	94259	$354.1	$324.6	$324.6	$973.8	
95320B	PWS Pink Salmon Stock Identification and Monitoring (CWT)	ADFG	PWS	Cont'd	94320b	$244.4	$260.5	$248.6	Unk	Unk
Services - Recreation and Tourism										
95002	Leave No Trace Education Program	USFS	PWS	NEW		$0.0	$177.7	$166.8	$294.5	2
95016	A Tribute to Prince William Sound	USFS	PWS	NEW			$161.0	$0.0	$161.0	1
95053	Cordova's Mini Imaginarium	ADNR	PWS	NEW			$62.6	$62.6	$125.2	2
95067	Overescapement Information Brochure	USFS	KEN	NEW			$23.4	$0.0	$23.4	1
95080	Fleming Spit Recreation Area Enhancements	ADNR	PWS	NEW			$1,365.0	$0.0	$1,365.0	Unk
95082	"Mor-Pac Hill" Campground Improvements	ADNR	PWS	NEW			$360.0	$0.0	$360.0	
95084	Odiak Camper Park Expansion	ADNR	PWS	NEW			$266.0	$0.0	$266.0	Unk
95085	Cordova Historical Marine Park	ADNR	PWS	NEW			$196.5	$0.0	$196.5	
Services - Subsistence										
95017	Port Graham Coho Salmon Subsistence Fishery Restoration Project	ADFG	KEN	NEW			$587.9	$0.0	$587.9	1
95069	Restoration of Salmon Stocks of Special Importance to Native Cultures	ADFG	PWS KEN	NEW			$672.6	Unk	Unk	
95244	Seal and Sea Otter Coop Subsistence Harvest Assistance	ADFG	PWS KEN	Cont'd	94244	$55.0	$54.5	Unk	Unk	Unk
95272	Chenega Chinook Release Program	ADFG	PWS	Cont'd	94272	$57.4	$38.7	$39.1	$77.8	2
95279	Subsistence Food Safety Testing	ADFG	ALL	Cont'd	94279	$379.2	$207.3	$0.0	$207.3	
95428-CLO	Closeout: Subsistence Planning	ADFG	ALL	Closeout	94428		$81.0	$0.0	Unk	1
						TOTAL:	$22,757.3			
						Number of Projects:	47			

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Table 2 MONITORING

Proj No	Title	Proposer	Lead Agency	Loc.	Proj Type	FY 94 Proj #	Cost FY 94	Cost FY 95	Cost FY 96
Mammals									
Harbor Seals; (trend counts)									
	Part of research Project 95064: Monitoring Habitat Use, Trophic Interactions of Harbor Seals in Prince William Sound								
Killer Whales; (photo-id)									
95013	Killer Whale Monitoring in PWS		NOAA	PWS	NEW	94092		$105.0	Unk
95092	Recovery Monitoring of PWS Killer Whales	NOAA	NOAA	PWS	NEW	94092		$99.5	$29.0
Sea Otters (aerialsurveys, carcass collection)									
	Part of research project 9505B: Sea Otter Abundance and Distribution; See also Boat Surveys, Project 95159								
River Otters (latrine surveys)									
95062	River Otter Recovery Monitoring	ADFG	ADFG	PWS	NEW			TBD	TBD
Birds									
Bald Eagles (productivity survey; population survey)									
95029	Population Survey of Bald Eagles in PWS	DOI	DOI	PWS	NEW			$48.3	$0.0
95030	Productivity Survey of Bald Eagles in PWS	DOI	DOI	PWS	NEW			$81.9	$0.0
Black Oystercatchers (none in 1995)									
95159	Surveys to Determine Additional Oil Spill Effects and Recovery of Marine Bird and Sea Otter Populations in PWS	DOI	DOI	PWS	Cont'd	94159	$107.0	$391.0	$41.0
Common Murres (productivity survey; population survey)									
95039	Common Murre Productivity Monitoring	DOI	DOI	KEN	Cont'd	94039		$163.7	$138.5
Harlequin Ducks (productivity survey, population survey)									
95005	Harlequin Duck Abundance and Productivity in Western Cook Inlet	DOI	DOI	KEN	NEW			$40.2	Unk
95427	Harlequin Duck Recovery Monitoring	ADFG	ADFG	PWS	Cont'd	94427	$40.4	$221.8	Unk
Marbled Murrelets (none in 1995)									
	See Project 95159 (Black Oystercatchers)								
Pigeon Guillemots (none in 1995)									
	See Project 95159 (Black Oystercatchers)								
Fish and Shellfish									
Cuttrhoat and Dolly Varden (growth rates)									
	No project submitted								
Pacific Herring (health & spawning biomass counts)									
95166	Herring Natal Habitats	ADFG	ADFG	PWS	Cont'd	94166	$466.3	$493.3	$493.3

Description in parenthesis is the monitoring projects expected from the Invitation to Submit Restoration Projects. "Harbor Seals (trend counts)" shows that a project to monitor trend count was referenced in the Invitation for 1995.

Table 2 MONITORING

Proj. No.	Title	Proposer	Lead Agency	Loc.	Proj Type	FY 94 Proj #	Cost FY 94	Cost FY 95	Cost FY 96
Pink Salmon (egg mortality and returns per spawner)	Part of research project 95191B: Oil Related Egg and Alevin Mortality; and general restoration project 95320B Pink Salmon Stock ID and monitoring (Coded Wire Tag)								
Sockeye Salmon (smolt outmigration for Kenai, Red Lake, and Akalura systems; Fry abundance for Kenai)									
95048	Historical Analysis of Sockeye Salmon Growth		ADFG	ALL	NEW			$85.0	$11.0
95258	Sockeye Salmon Overescapement See also general restoration project 95255, Kenai River Restoration	ADFG	ADFG	KEN	Cont'd	94258	$854.9	$983.3	$0.0
Other Resources									
Archaelogy(index and crosscheck sites)									
95007A	Archaeological Site Restoration - Index Site Monitoring	ADNR	ADNR	ALL	Cont'd	94007	$599.5	$190.9	$190.0
Intertidal Organisms (PWS sites and Herring Bay)									
95094	Recovery of Intertidal Clams in PWS	ADFG	ADFG	PWS	NEW			$229.2	Unk
95045	Green Island Intertidal Restoration Monitoring		USFS	PWS	NEW			$113.4	$113.0
95086A	Coastal Habitat Intertidal Monitoring and		ADFG	PWS	Cont'd		$729.4	$829.4	Unk
95086C	Herring Bay Monitoring and Restoration Studies		ADFG	PWS	Cont'd	94086	$729.4	$549.1	Unk
95106	Subtidal Monitoring: Eelgrass Communities		ADFG	PWS	NEW			$399.9	$0.0
95107	Subtidal Site Verification		ADFG	PWS	NEW			$84.0	$0.0
Persistence of Oil (Kodiak & Ak Penin shoreline assessment; mussel beds; and subtidal bile)									
95027	Kodiak and Alaska Peninsula Comprehensive Shoreline Assessment: Monitoring Surface and Subsurface Oil	ADEC	ADEC	KOD AKP	NEW			$759.5	$113.6
95090	Mussel Bed Restoration and Monitoring in PWS and Gulf of Alaska	NOAA	NOAA	PWS KEN	Cont'd	94090	$676.1	$261.8	$270.0
95290	Hydrocarbon Data Analysis, Interpretation, and Database Maintenance for Restoration and NRDA Environmental Samples Associated with the Exxon Valdez Oil Spill	NOAA	NOAA	ALL	Cont'd	94290	$130.2	$72.2	Unk
95026	Hydrocarbon Monitoring: Integration of Microbial and Chemical Sediment Data		ADEC	All	NEW			$84.4	Unk

Description in parenthesis is the monitoring projects expected from the Invitation to Submit Restoration Projects. "Harbor Seals (trend counts)" shows that a project to monitor and count was referenced in the Invitation for 1995.

Table 2 MONITORING

Proj No.	Title	Proposer	Lead Agency	Loc.	Proj Type	FY 94 Proj #	Cost FY 94	Cost FY 95	Cost FY 96
Services									
Commercial fishing (none; see individual resources for monitoring)									
	No project submitted								
Desginated Wilderness areas (none; see persistence of oil)									
	No project submitted								
Passive use (none; see specific resources for monitoring)									
	No project submitted								
Recreation and Tourism (beach use and customer surveys)									
95056	Monitoring Visual Sensitivity in PWS	USFS	USFS	PWS	NEW			$264.7	$159.8
Closeout Monitoring Projects									
95039CLO	Closeout: Common Murre Population Monitoring	DOI	DOI	KEN	Closeout	94039	$227.2	$30.5	$0.0
95090CLO	Mussel Bed Restoration and Monitoring	ADEC	ADEC	PWS	Closeout	94090	$518.0	$154.4	$0.0
95173CLO	Closeout: Pigeon Guillemot Recovery Monitoring	DOI	DOI	PWS	Closeout	94173	$201.1	$55.0	$0.0
95285CLO	Closeout: Subtidal Sediment Recovery Monitoring	NOAA	NOAA	KEN	Closeout	95285	$629.2	$104.7	$0.0
							TOTAL	$6,896.1	
							No. of Projects =	28	

Description in parenthesis is the monitoring projects expected from the Invitation to Submit Restoration Projects. "Harbor Seals (trend counts)" shows that a project to monitor trend count was referenced in the Invitation for 1995.

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Table 3 **RESEARCH**

Proj No	Title	Lead Agency	Loc	Proj Type	FY 94 Proj #	Cost FY 94	Cost FY 95	Cost FY 96	Total Cost	Yrs
PWS System Investigation (PWSSC/UAF/ADFG)										
95320A	Salmon Growth and Mortality	ADFG	PWS	Cont'd	94320A	$263.4	$378.6	$378.6	$757.2	4
95320D	PWS Pink Salmon Genetics	ADFG	PWS	Cont'd	94320d	$171.2	$218.2	$130.0	$348.2	
95320E	Juvenile Salmon and Herring Integration	ADFG	PWS	Cont'd	94320e	$907.1	$1,492.0	$1,492.0	$4,476.0	
95320G	Phytoplankton and Nutrients	ADFG	PWS	Cont'd	94320g	$141.5	$297.3	$0.0	$297.3	
95320H	Role of Zooplankton in the PWS Ecosystem	ADFG	PWS	Cont'd	94320h	$300.1	$380.1	Unk	Unk	2
95320I(2)	Isotope Tracers-Food Webs of Fish	ADFG	PWS	Cont'd	94320I		$196.1	$160.0	Unk	2
95320I(3)	Purchase of Isotope Radio Mass Spectrometer	ADFG	PWS	NEW	94320I		$257.4	$0.0	$257.4	1
95320J	Information Systems and Model Development	ADFG	PWS	Cont'd	94320j	$756.5	$1,575.1	$1,430.9	Unk	Unk
95320K	PWSAC: Experimental Fry Release	ADFG	PWS	Cont'd	94320k	$46.6	$48.1	$48.6	Unk	Unk
95320M	Observational Physical Oceanography in PWS and the Gulf of Alaska	ADFG	PWS	Cont'd	94320m	$773.1	$824.4	$0.0	$824.4	1
95320N	Nearshore Fish	ADFG	PWS	Cont'd	94320N	$666.9	$1,192.4	$707.4	Unk	Unk
95320P	Planning and Communication	ADFG	PWS	Cont'd	94320P	$51.8	$176.5	$169.6	$346.1	2
95320Q	Avian Predation on Herring Spawn	ADFG	PWS	Cont'd	94320q	$84.8	$124.8	$427.1	Unk	
95320S	Place-holder for ADF&G Multi-step Sealed Proposal (Disease Impacts on PWS Herring Populations)	ADFG	PWS	Cont'd	94320S	$97.0			TBD	
95320T	Juvenile Herring Growth and Habitat Partitioning	ADFG	PWS	NEW			$456.8	$500.0	Unk	3
95320U	Somatic and Spawning Energetics of Herring and Pollock	ADFG	ALL	NEW			$97.2	$102.3	$324.6	
95320V	Herring Predation by Humpback Whales in PWS	ADFG	PWS	NEW			$181.6	$171.6	$363.2	2
95320Y	Variation in Local Predation Rates on Hatchery-Released Fry	ADFG	PWS	NEW			$118.9	$85.2	Unk	2+

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Table 3 **RESEARCH**

Proj No	Title	Lead Agency	Loc.	Proj Type	FY 94 Proj #	Cost FY 94	Cost FY 95	Cost FY 96	Total Cost	Yrs
Marine Mammal Ecosystem Research (ADFG/UAF/NOAA)										
95001	Condition and Health of Harbor Seals	ADFG	PWS	NEW			$153.8	$131.4	$375.8	
95064	Monitoring, Habitat Use, and Trophic Interactions of Harbor Seals in PWS	ADFG	PWS	Cont'd	94064	$272.2	$309.4	$302.0	$710.0	
95073	Impact of Killer Whale Predation on Harbor Seals in PWS	NOAA	PWS	NEW			$99.5	$229.5	$493.0	
95163	Abundance and Distribution of Forage Fish and their Influence on Recovery of Injured Species	NOAA	PWS KEN	Cont'd	94163		$1,203.7	$1,000.0	Unk	
95320I(1)	Istotope Tracers - Food Webs of Marine Mammals and Birds	ADFG	PWS	Cont'd	94320I	$60.5	$100.1	Unk	Unk	2-5
Other Marine Mammal Research										
95014	Predation by Killer Whales in PWS. Feeding Behavior and Distribution of Predators and Prey	NOAA	PWS	NEW			$156.9	$148.8	Unk	3
Nearshore Ecosystem/Community Structure Research (UAF)										
95009A	Trophics and Community Structure in the Intertidal and Shallow Subtidal	USFS	PWS	NEW			$455.4	Unk	Unk	2-5
95009B	Primary Productivity as a Factor in the Recovery of Injured Resources in Prince William Sound	USFS	PWS	NEW			$218.9	$291.3	$723.1	3
95009C	Trophic Dynamics and Energy Flow: Impacts of Herring Spawn and Sea Otter Predation on Nearshore Benthic Community Structure	USFS	PWS	NEW			$217.3	Unk	Unk	3-5
95009D	Survey and Experimental Enhancement of Octopuses in Intertidal Habitats	USFS	PWS	NEW			$159.5	$157.5	Unk	2-5
95009E	Community Structure of Mobile Foragers Using the Nearshore	USFS	PWS	NEW			$280.5	$227.0	Unk	2-5

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Table 3 **RESEARCH**

Proj No	Title	Lead Agency	Loc	Proj Type	FY 94 Proj #	Cost FY 94	Cost FY 95	Cost FY 96	Total Cost	Yrs
Recovery of Nearshore Predators (NBS)										
95025A	Factors Affecting Recovery of Sea Ducks and their Prey	DOI	PWS	NEW			$393.7	$298.0	$1,290.0	5
95025B	Sea Otter Abundance and Distribution, Food Habits and Population Assessment	DOI	PWS	NEW			$162.7	$82.8	$274.7	3
95025C	Pigeon Guillemots and River Otters	DOI	PWS	NEW			$179.6	$179.9	$539.6	4
95025D	Settlement Rates of Nearshore Invertebrates, Oceanic Processes and Population Recovery, Are They Linked?	DOI	PWS	NEW			$435.7	$405.0	$1,190.0	
95025E	Algal Competition Limiting Recovery in the Intertidal	DOI	PWS	NEW			$222.5	$222.5	$525.0	3
95025F	Availability and Utilization of Musculus spp. as Food for Sea Ducks and Sea Otters	DOI	PWS	NEW			$4.6	$4.6	$9.2	2
95025G	Recruitment Patterns of Nearshore Clam Populations in PWS	DOI	PWS	NEW			$121.3	$121.3	$522.7	5
95025H	Effects of Predatory Invertebrates on Nearshore Clam Populations in PWS	DOI	PWS	NEW			$118.4	$100.0	$256.7	3
95025J	Primary Productivity as a Factor in the Recovery of Injured Resources in PWS	DOI	PWS	NEW			$397.0	$310.0	$1,017.0	3

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Table 3 **RESEARCH**

Proj No	Title	Lead Agency	Loc.	Proj Type	FY 94 Proj #	Cost FY 94	Cost FY 95	Cost FY 96	Total Cost	Yrs
Other Nearshore/Intertidal Research										
95075	Population Structure of Blue Mussels in Relation to Levels of Oiling and Densities of Vertebrate Predators	NOAA	PWS	NEW			$197.5	$317.7	$314.1	3
95010	Inertidal Fauna and Flora Species Composition, Abundance and Variability Relative to Physical Habitat Controls	DOI	KEN	NEW			$73.5	Unk	Unk	2
95018	Partitioning of Primary Production Between Pelagic and Benthic Communities	ADFG	PWS	NEW			$197.1	$0.0	$197.1	
95086B	Population Dynamics of Eelgrass and Associated Fauna	ADFG	PWS	Cont'd	94086	$729.4	$64.8	$35.0	$99.8	2
95087	Sea Urchin Population Dynamics: Changes in Population Density and Availability as Prey of Sea Otters	ADFG	PWS	NEW			$65.4	$0.0	$65.4	
Pelagic Ecosystem Research (NBS)										
95019	Distribution of Forage Fish as Indicated by Puffin Diet Sampling	DOI	PWS KEN	NEW			$284.4	$204.2	$692.8	4
95021	Seasonal Movement and Pelagic Habitat Use by Common Murres from the Barren Islands	DOI	KEN	NEW			$251.1	$212.5	$463.6	3
95022	Foraging Efficiencies at Temporary Food Patches	DOI	PWS	NEW			$183.1	$147.2	$230.3	2
95023	Food Web Relationships of Pelagic Species Exhibiting Long-term Decline	DOI	PWS	NEW			$168.0	$170.0	$483.0	
Other Pelagic Research										
95033	Kittiwakes as Indicators of Forage Fish Availability	DOI	PWS KEN	NEW			$198.5	Unk	Unk	5
95173	Factors Affecting Recovery of PWS Pigeon Guillemot Populations	DOI	PWS	Cont'd	94173	$201.1	$353.7	Unk	Unk	5

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Table 3 RESEARCH

Proj No	Title	Lead Agency	Loc.	Proj Type	FY 94 Proj #	Cost FY 94	Cost FY 95	Cost FY 96	Total Cost	Yrs
Upland/Riparian Ecosystem Research										
95043A	Cordova Cutthroat Trout Habitat	USFS	PWS	Con't	94043		$22.7	$0.0	$22.7	1
95046	Long-term Record in Tree Rings of Climatic Features	NOAA	ALL	NEW			$153.6	$166.3	$494.5	3
95050	A Test of Sonar Accuracy in Estimating Escapement of Sockeye Salmon	ADFG	KEN, OUT	NEW			$79.3	$78.0	$235.4	4
95054	Montague Riparian Rehabilitation	USFS	PWS	NEW			$42.7	$0.0	$42.7	
95060	Spruce Bark Beetle Infestation Impacts on Injured Fish	ADFG	PWS KEN	NEW			TBD	TBD	TBD	
95105	Kenai River Ecosystem Restoration Pilot Enclosure Study	ADFG	KEN	NEW			$361.2	Unk	Unk	
Ecotoxicology Research										
95044	In Situ Formation and Ecotoxicity of Hydrocarbon Degradation Products Produced by Ultramicrobacteria	NOAA	PWS	NEW			$118.5	Unk	Unk	5
95071	Monitoring Nearshore Fish Species for Persistence of Oil Exposure and Ecotoxicological Effects	NOAA	PWS KEN AKP	NEW			$225.0	$185.0	Unk	
95074	Herring Reproductive Impairment	NOAA	PWS	NEW			$234.8	Unk	Unk	
95076	Effects of Oiled Incubation Substrate on Survival and Straying of Wild Pink Salmon	NOAA	ALL	NEW			$179.9	$310.9	$1,380.4	5
95191A	Investigating and Monitoring Oil Related Egg and Alevin Mortalities	ADFG	PWS	Cont'd	94191	$782.9	$681.5	Unk	Unk	5
95191B	Injury to Salmon Eggs and Pre-emergent Fry Incubated in Oiled Gravel (Laboratory Study)		ALL	Cont'd	94191	$784.0	$165.6	$324.0	$489.5	2

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Table 3 **RESEARCH**

Proj.No.	Title	Lead Agency	Loc	Proj Type	FY 94 Proj #	Cost FY 94	Cost FY 95	Cost FY 96	Total Cost	Yrs.
Other Research										
95031	Reproductive Success as a Factor Affecting Recovery of Murrelets in PWS	DOI	PWS	NEW			$398.0	Unk	Unk	2
95055	Prehistoric Ecological Baseline for PWS	USFS	PWS	NEW			$149.6	$91.7	$241.3	
95057	Movement of Larval and Juvenile Fishes within PWS	NOAA	PWS	NEW			$300.0	Unk	Unk	3
95065	PWSAC Pink Salmon Fry Mortality	ADFG	PWS	NEW			$52.5	$0.0	$52.5	1
95077	Recreation Impacts in PWS; Human Impacts as a Factor Constraining Long Term Ecosystem Recovery	ADNR	PWS	NEW			$117.0	$117.0	$376.9	
95078	Culture, History, and Ecosystems: An Assessment of Cultural/Historical Strategies to Building Long-term Understanding of Ecosystem Dynamics in the Exxon Valdez Oil Spill Area	DOI	ALL	NEW			$166.7	$0.0	$166.7	
95102-CLO	Closeout: Murrelet Prey and Foraging Habitat in Prince William Sound	DOI	PWS	Closeout	94102	$231.5	$62.3	$0.0	$62.3	1
						TOTAL:	$18,954.0			
						Number of Projects:	68			

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Table 4 **HABITAT PROTECTION**

Proj No	Title	Lead Agency	Loc	Proj Type	FY 94 Proj #	Cost FY 94	Cost FY 95	Cost FY 96	Total Cost	Yrs
95058	Restoration Assistance to Private Landowners	ADFG	ALL	NEW			$415.7	$0.0	$415.7	1
95095	Quantification of Stream Habitat for Harlequin Ducks and Anadromous Fish Species from Remote Sensed Data	ADNR	ALL	NEW			$88.0	Unk	Unk	4
95110-CLO	Closeout: Habitat Protection and Data Acquisition	ADNR	All	Closeout	95110	$678.7	$60.0	$0.0	$60.0	1
95126	Habitat Protection and Acquisition Support	ADNR	ALL	Cont'd	94120	$1,160.3	$1,403.3	$0.0	$1,403.3	
95200	Public Access	ADNR	PWS	NEW			$154.7	$247.5	$897.2	
95505A	Channel Type Habitat Relationships	USFS	PWS	Cont'd	94505	$406.1	$261.0	$69.3	$330.3	
95505B	Data Analysis for Stream Habitat	USFS	All	Cont'd	94505	$406.1	$17.2	$0.0	$17.2	
						TOTAL:	$2,399.9			
						Number of Projects:	7			

Table 5 ADMINISTRATION AND PUBLIC INFORMATION

Proj.No.	Title	Lead Agency	Loc.	Proj Type	FY 94 Proj #	Cost FY 94	Cost FY 95	Cost FY 96	Total Cost	Yrs.
95049	Independent Review of Restoration and Monitoring Projects	ADFG	ALL	NEW			$31.9	$0.0	$31.9	1
95089	Information Management System	All	ALL	Cont'd			$540.1	Unk	Unk	Unk
95100	Administration Budget	All	ALL	Cont'd			$3,500.0		$3,500.0	Unk
95422-CLO	Restoration Plan EIS/Record of Decision	USFS	ALL	Closeout	94422	$343.4	$20.0	$0.0	$20.0	
						TOTAL:	$4,092.0			
						Number of Projects:	4			

Table 6 RESTORATION RESERVE

Proj.No.	Title	Lead Agency	Loc.	Proj Type	FY 94 Proj #	Cost FY 94	Cost FY 95	Cost FY 96	Total Cost	Yrs.
95424	Restoration Reserve	All	All	Cont'd	94424	$12,000.0	$12,000.0	$12,000.0	Unk	Unk

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Attachment A: Overview of Prince William Sound Systems Investigation

Project number: 95320

Study type: Research/Monitoring

Name of study leader(s): Dr. Ted Cooney, University of Alaska Fairbanks

Lead agency: Alaska Department of Fish & Game (ADF&G)

Cooperating agencies: U.S. Forest Service (USFS)
National Biological Survey (NBS)
National Oceanic and Atmospheric Administration (NOAA)
University of Alaska Fairbanks (UAF)
Prince William Sound Science Center (PWSSC)
Prince William Sound Aquaculture Corporation (PWSAC)
North Gulf Oceanic Society (NGOS)

Start-up/Completion Dates: Ongoing; for FY95 October 1, 1994 - September 30, 1995

Duration: 5-10 years, beginning with FY1994

Geographic area of study: Prince William Sound, North Gulf of Alaska

Contact:

Dr. Ted Cooney
SEA Chief Scientist
IMS, UAF
Fairbanks, AK 99775
Tel: (907) 474-7407

- or -

Dr. David Scheel
SEA Scientific Management
PWS Science Center
Cordova, AK 99574
Tel: (907) 424-5800

B: INTRODUCTION

Sound Ecosystem Assessment (SEA) is a comprehensive and integrated study of natural and anthropogenic-induced variability in pink salmon and pacific herring production in Prince William Sound. SEA research focuses on understanding processes constraining the production of these species as the principal means to affect appropriate recovery strategies. SEA for FY95 is a continuation of research begun in FY94 (11 projects), expanded to include new core studies (6 projects), primarily of Pacific herring and herring predators. Most budgets reflect increases associated with the anticipated 12 month fiscal year.

Research sponsored by the *Exxon Valdez* Oil Spill (EVOS) Trustee Council since 1989 has documented that some species damaged by the spill are not recovering. The list of injured/not recovering species includes invertebrates, fish, birds, and mammals. When such species are economically important (as are pink salmon and herring), their status is highlighted by poor harvests and hardships in communities depending upon the resources. Unexpectedly low pink salmon returns in 1992-1993 and Pacific herring spawning returns in 1993-1994 have placed the future course of the fishing industry in Prince William Sound in grave doubt.

SEA has been developed as an integrated study from its inception, characterized by hierarchical structure, and attention to ecological boundaries and integrity. Emphasis is on data collection and monitoring, interagency cooperation, and a recognition of human needs and values in the ecosystem. Hierarchical structure means that SEA seeks connections between levels, not only in the ecosystem, but also in composition (federal, state and local representation) and logistics (research projects share platforms, equipment, and data management). Attention to ecological boundaries and integrity means that SEA follows a life-history pathway approach for pink salmon and herring to focus research efforts and to insure that connections to other species of prey, competitors, and predators are studied. SEA's emphasis on data collection, analysis, and monitoring acknowledges the need for more and better information, as well as for an integrated understanding placed in the context of past events. The recognition of human needs and values means that SEA has been developed with extensive public input, and will continue to take direction from the needs of human residents in the ecosystem.

The initial funding of SEA has allowed the program to begin field operations and collect valuable data about conditions in Prince William Sound during 1994. A preliminary analysis of the 1994 data is underway and initial results will be available for presentation at a Fall 1994 program review. The proposals presented here describe the work SEA intends to undertake during FY95, the first full year of funding.

C: NEED FOR THE PROGRAM

Pink salmon and herring are injured species, are not recovering, and are crucial to the economies of local communities and to the well-being and lifestyles of Prince William Sound residents. An historical data base and a set of experimental tools are provided for both species by commercial records, past research, and management/enhancement activities. Herring and pink salmon life histories have in common features allowing parallel conceptualization of research problems. For example, both species migrate inshore to spawn in locations subject to significant oceanographic and meteorological influences (wave action, floods) on survival. Their life histories are never-the-less distinct enough that studying each provides added insight to the ecosystem structure and function. For example, herring have a planktonic stage, pink salmon do not; herring spawn year after year, pink salmon die after spawning. Finally, both species are important and conspicuous elements of the marine ecosystem in Prince William Sound, serving as an energy source for a diverse assemblage of marine and terrestrial consumers. For this reason, SEA includes research focused on an array of associated species, especially where biological or conceptual links to pink salmon and herring are particularly strong.

D: PROJECT DESIGN

1.1 Multi-year objectives:

The SEA research program has been conceived as a 5-10 year effort in response to recommendations by a peer scientific review of the proposal in the December 1993 Cordova workshop. The primary goal of the core SEA study is to test a series of hypotheses concerning ecosystem function.

Cumulatively, the SEA hypotheses reflect our understanding of marine, freshwater, and climatological processes constraining populations in Prince William Sound. Revision of the hypotheses will likely occur as data accumulates, and SEA makes progress toward three goals. These are, first, to acquire an ecosystem-level understanding of processes constraining levels pink salmon and herring abundance and production in Prince William Sound; second, to use this new understanding to more accurately forecast pink salmon and herring responses to both natural and anthropogenic ecosystem disturbance, including their response to management, enhancement, and mandated restoration activities; and third, to establish a data base describing the status of the Prince William Sound ecosystem relative to pink salmon and herring as an information source for improving the effectiveness of management, enhancement, and mandated restoration activities for these key species.

These goals, and the hypothesis below provide continuity and focus for the duration of SEA. The hypotheses are initially based on previous studies of the oceanography and food-web dynamics of the area. Each of the hypotheses is examined in greater detail in individual project descriptions, but are presented here in summary:

1) Survival of pink salmon and herring embryos and alevins in natal habitats is largely established by density-independent physical factors.

2) Losses of larval and juvenile pink salmon and herring to predation are modulated by prey-switching. The diets of predators (fishes, birds and mammals) on 0-class fishes (including pink salmon and herring) are modulated by amounts of macrozooplankton present each year. When macrozooplankton is abundant, predators are strongly planktivorous. In contrast, when macrozooplankton populations are weak, predators are more piscivorous and predation on the smallest fish is substantial. Ocean temperature influences growth and feeding rates of both predators and prey.

3) Biomass of macrozooplankton (food for planktivores including birds, mammals and fishes) is established by physical transport processes that both seed the Sound from the adjacent Gulf of Alaska in the summer and flush surface populations from the region in the spring. The production of macrozooplankton is further modified by local levels of primary productivity.

4) Overwintering survival of Pacific herring to breeding age (at least two winters) is determined by the physiological condition of juveniles entering winter, and by food, temperature, and predators encountered from October through April.

These hypotheses are referred to here and in individual proposals as 1) natal habitats; 2) predator-prey relationships; 3) lake/river processes; and 4) herring overwintering.

1.2 Milestones for FY95

As conceived, SEA is designed as a multi-year investigation to exploit natural variation to create tests for each hypothesis. Sufficient variability is likely to occur over a five to ten year period. However, progress will be made in each year toward our long-term goals. Specific milestones for each project are given in each of the brief project descriptions. The following describes more general milestones that will likely be achieved by SEA in FY95.

1) Design and implementation of continuing joint oceanographic and acoustic/net sampling based on results of the 1994 field work, including appropriate location, scale and timing of sampling.

2) Continuation of data collection and data base growth. This information, and systems designed to store and provide access to it, will begin to form the basis to more accurately forecast animal production and to predict population responses to disturbance, including their response to management, enhancement, and restoration activities.

3) Description of physical processes within the Sound, and the resulting influence on distributions and production of plankton, fish, birds, and mammals influencing salmon and herring production. Initial model of physical transport to provide testable predictions.

4) Description of variation in diet of juvenile salmon and fish predators, and the distribution of these fishes, occurring along the salmon migratory pathway, including extent of evidence for prey-switching. Initiate a model of prey switching to provide testable predictions.

5) Initiate herring studies tracking larvae from spawning beaches to juvenile overwintering areas, including preliminary assessments of fish, bird, and mammal winter predation on these schools, and identify possible important factors in overwintering condition.

6) Continue ecotoxicological and disease studies of herring initiated in FY94.

2. Schedule (FY95 - SEA):

Nov. 1 Begin FY95 field season. Preliminary observations for herring overwintering program. Census of deep overwintering and surface zooplankton populations. Winter oceanographic observations. Order equipment and supplies.

Jan 1 Complete equipment and supplies acquisition. Bid vessels for FY95 spring/summer studies.

Feb 15 Select vessel charters. Begin staging for spring/summer field work in Cordova.

Mar 15 Begin spring oceanographic, phytoplankton, zooplankton, and predator studies.

May 1 All other field studies in place.

Aug 1 Majority of field work completed.

Oct 1 Formal review of FY95 season.

4. Technical support: See individual brief project descriptions.

5. Location: Prince William Sound

E. PROJECT IMPLEMENTATION

The SEA program is being implemented cooperatively by Alaska Department of Fish & Game, PWS Science Center, University of Alaska Fairbanks, PWS Aquaculture, as well as U.S. Forest Service, National Biological Survey, U.S. Fish & Wildlife Service, and National Oceanic and Atmospheric Administration. The interaction of scientists in these organizations to conduct the SEA program occurs within the PWS Fisheries Ecosystem Planning Group, an ad hoc organization with a mission to develop and advocate the best ecosystem science for the restoration and management of pink salmon and herring in Prince William Sound.

F: COORDINATION OF INTEGRATED RESEARCH EFFORT

1. Major programs:

SEA is organized under six major programs. Four correspond to the hypotheses named above and the fifth is responsible for the integrative data base and modeling efforts. A new program in ecotoxicology and disease is defined for FY95 as the result of core and related projects in the field. Each program coordinates research on one or a few related hypothesis and involves researchers from all projects contributing to the testing of those hypotheses (Table 1). The programs are themselves linked to shared logistics, data management and by the goal of developing predictive models of productivity.

The *Natal Habitat Program* studies factors determining survival in spawning redds and herring intertidal and subtidal spawning areas. The purpose of this program is to improve prediction of the number of fry and larval herring emerging from natal habitats and to understand the natural and anthropogenic factors influencing survival.

The *Predator-Prey Program* involves identifying factors determining predator diet, and hence prey-switching. This program will characterize major fish, bird, and mammal predators on herring larvae, salmon fry, and juveniles of both species. The goal of this program is to predict feeding intensity of predators as a function of predator abundance, alternative prey, and energetic constraints. Attention is given in this program to interactions of hatchery fry and pink salmon predators.

The *Lake/River Program* focuses on physical and biological factors constraining the production of zooplankton forage for fish, birds, and mammals in Prince William Sound. This program will

evaluate oceanographic patterns, the seeding of the Sound with zooplankton, the role of flushing in limiting zooplankton standing stock, and the availability of zooplankton as winter forage for herring.

The *Herring Overwintering Program* examines factors determining winter growth, survival, and condition of herring. The goal of this program is to determine factors regulating the survival of juvenile herring and the condition of adults as they enter the spring breeding season. This Program also examines causes and effects of disease in herring as viral hemorrhagic septicemia (VHS) apparently influences spawning condition.

The *Ecotoxicology and Disease Program* focus on oil and pathogenic causes of herring and salmon mortality in both early and late stages of life history.

The *Database & Modeling Program* provides the tools for building improved predictive capabilities. Information from all studies will be archived in Cordova and distributed as needed to investigators, the agencies, and the Trustee Council. SEA projects are adopting a centralized data bank, common to all projects and addressable for data synthesis and integration activities. Individual projects will contribute data and insight to the data base and modeling project, and each project will benefit from data services provided by this project. The modeling effort will draw on shared data and the expertise of project investigators to simulate important aspects of the system under study. Modeling will be one of the principal tools for testing the SEA hypotheses and providing improved predictive capabilities.

2. Field logistics:

To the greatest extent possible, projects share field platforms, transport, equipment, sampling schedules and personnel. SEA vessels will include a mid-water trawler, two seiners, an acoustic skiff, a fry skiff and support boat, a vessel for oceanography, and two support vessels (one for work in natal habitats, one in support of other nearshore sampling). The trawler and each seiner-skiff pair support sampling of oceanographic, phyto- and zooplankton, acoustic, and net data as well as some marine bird and mammal observations. Logistics for natal habitats are coordinated with ADF&G surveys of spawn sites.

Scientific crews aboard these boats coordinate sampling schedules and share responsibilities for data collection and ship-board processing. Resulting information is shared daily in the field, and changes are made to sampling protocols as necessary to maintain efficiency and cooperation, and to optimize the power of the investigation.

3. Planning and Communications:

Scientific planning and communications assist coordination between projects, and build community interaction with ongoing science. Planning activities allow the SEA program to keep abreast of other Trustee-funded research programs and to evaluate possible future directions as SEA evolves. Communications activities are designed to keep individual researchers aware of SEA activity outside their own projects, to facilitate coordination among SEA researchers and

between SEA and other Trustee research and to actively maintain community involvement in setting direction for SEA research in the future.

G: PUBLIC PROCESS

SEA was originally designed and implemented with extensive public involvement through the PWS Fisheries Ecosystem Planning Group (FERPG), and this group remains an important avenue for SEA scientists to interact with the public. SEA was reviewed at the December 1993 Cordova workshop. Additionally, the SEA project for Planning and Communication actively seeks public input and involvement in research from PWS communities.

Table 1. Project relationships to SEA programs for FY95 Prince William Sound System Investigations including SEA and cooperating studies.

		NH	P/P	L/R	HO	ETD	D&M
A.	**Continuing SEA core projects**						
320-A	Salmon growth and mortality		X	X			X
320-E	Juv. salmon and herring predators		X		X		X
320-G	Phytoplankton and nutrients			X	X		X
320-H	Role of zooplankton		X	X	X		X
320-J	Information systems and modeling	X	X	X	X	X	X
320-K	Experimental fry releases		X				X
320-M	Physical oceanography			X	X		X
320-N	Nearshore fish/Acoustics		X	X	X		X
320-P	Planning and communications	X	X	X	X	X	X
320-Q	Avian predation on herring spawn	X	X				X
320-W	Fish food webs/stable isotopes		X		X		X
B.	**New SEA core projects**						
320-0	Hatchery fry predators		X				X
320-R	Herring disease and ecotox.	X			X	X	X
320-S	Herring natal habitats	X					X
320-T	Juv. herring growth	X	X		X	X	X
320-U	Bio-energetics of herring & pollock		X		X	X	X
320-V	Whale predation on herring		X		X		X
320-X	UAF admin. charges						
C.	**Other PWS System Investigations cooperating studies**						
94320-B	CWT recovery of PWS pink salmon						X
94320-C	Otolith mass marking						X
94320-D	Pink salmon genetics	X					X
94320-F	Trophic interactions of harbor seals		X				X
94320-I	Mammal food webs/stable isotopes		X				X
	ADF&G Pink salmon alevin census	X					X
	Larval & juvenile herring in PWS	X		X	X		
94191	Oil related egg & alevin mortalities	X				X	X
	Bald eagle diet		X				X

NH = Natal habitats; P/P = Predator-prey; L/R = Lake/River; HO = Herring overwintering; ETD = Ecotoxicology & disease; D&M = Database & modeling.

Attchment B: Overview of Processes structuring recovery of injured nearshore vertebrate predators in Prince William Sound

Project Number: 95025

Project leader: Leslie Holland-Bartels

Lead agency: National Biological Survey

Cooperating agencies: University of Alaska, Fairbanks
University of Alaska, Juneau
Prince William Sound Science Center
Purdue University
U.S. Fish and Wildlife Service
University of Washington

Cost of project: 2,120.5K

Project start up date: October 1, 1994

Project Completion Date: September 30, 1999

Project duration: 5 YEARS (variable by project)

Geographic area: Prince William Sound

Contact person: Leslie Holland-Bartels
Branch Chief, Marine Mammals/Fisheries
National Biological Survey
Alaska Science Center
1011 East Tudor Road
Anchorage, Alaska 99503
(907) 786-3312, FAX 786-3636

B. INTRODUCTION

The nearshore marine ecosystem of Prince William Sound (PWS) may be functionally distinct from the pelagic ecosystem by spatial, energetic, and structural considerations. The nearshore ecosystem is constrained by bathymetry to relatively shallow water where space is limiting, receives a larger proportion of primary production from sessile macroalgae, and is composed largely of sessile benthic invertebrates that provide the predominate prey for a variety of vertebrate predators whose distributions are limited to the nearshore ecosystem. Because of shorelines and coastal physiography the nearshore ecosystem served as a repository for much of the oil spilled by the T/V Exxon Valdez. As a result most of the observed injured resources may be considered components of the nearshore system. EVOS injured wildlife resources include several warm blooded vertebrate predators that reside in the nearshore ecosystem.

Species include sea otters, harlequin ducks, bald eagles and black oystercatchers. Other recognized nearshore vertebrate predators include other shorebirds, river otter, mink and fish. Estimates of distribution and abundance of non-recovering, as well as other nearshore predators, suggest that densities vary among areas in western PWS. Recovery of injured resources is usually defined relative to pre-spill distribution and abundance, however, such data are lacking or incomplete. A large number of nearshore invertebrate populations were likely damaged as a result of the spill. It is also quite likely that changes in the species composition and abundance of both nearshore invertebrates and vertebrates because of the spill resulted in modifications in processes (ie., competition, predation, and recruitment) that are recognized as important in structuring nearshore marine invertebrate populations. In order to understand how injured resources are recovering, we must understand the processes that are responsible for structuring those communities.

We suggest potential mechanisms to answer the question of what is limiting recovery or why do vertebrate predator densities differ among areas in PWS, these include concerns in toxicology, physical processes, population dynamics and trophic interactions/prey abundance. These are based on a wide variety of coordinated meetings and will be assessed for the potential of limiting recovery of damaged resources.

The EVOS induced changes in populations of dominant competitors and resident predators in the nearshore region are limiting recovery of benthic communities.

Recovery of nearshore resources damaged by EVOS is limited by recruitment processes.

EVOS induced changes in populations of benthic prey species have influenced the recovery of benthic foraging predators.

EVOS induced changes in top predators have influenced the recovery of EVOS injured benthic prey populations.

Initial and/or residual oil in benthic habitats has a toxicological effect limiting the recovery of benthic communities.

Initial and/or residual oil in benthic habitats and in or on benthic prey organisms has had a limiting effect on the recovery of benthic foraging predators.

Physical processes limit the recovery of nearshore ecosystems.

C. NEED FOR THE PROJECT:

This project will potentially provide the data needed to identify what processes are limiting the recovery of not only injured vertebrate resources, but injured invertebrate resources as well. The project can potentially identify those mechanisms responsible for limiting recovery, which should provide rationale and justification for direct restoration decisions. Additionally, data

from this project may aid in defining the status of an injured resource relative to recovery and integrates both process oriented research and monitoring. Because baseline data on abundance are limiting other measures of the status of populations may be necessary to define a recovery endpoint.

D. PROJECT DESIGN:

Thirteen areas of study have been identified to address the issue of restoration of injured resources in the nearshore ecosystem. Through several meetings and close coordination, nine projects are submitted under this proposal. Two associated studies are being submitted by other lead agencies and two areas of needed research are identified, but no principal investigators have been identified. Each is an independent, yet integrated effort to evaluate each of the proposed mechanisms relative to recovery of injured resources. Each of the studies incorporate the spatial variability in predator densities relative to oil effects to evaluate each of the hypotheses in relation to restoration of a healthy and productive nearshore marine ecosystem in PWS. Each provides data to the core hypotheses related to restoration of vertebrate predators, and for the invertebrate subproposals, they concurrently address specific issues of restoration at those lower trophic levels.

NBS proposals: Following are brief descriptions of the purpose, objectives, methods and principal investigator(s) (where identified) of each project. We are aware of several other efforts that may relate to the nearshore ecosystem, but time constraints did not allow further discussion. After initial project review, however, further integration may be appropriate. These include efforts by Dr. Ray Highsmith, University of Alaska, Dr. David Scheel, Prince William Sound Science Center and Dr. Mary Anne Bishop, Copper River Delta Institute.

Subproject # 1: **Factors Affecting Recovery of Sea Ducks and their Prey**

Principal Investigators: **D. Essler (National Biological Survey) and K. Laing (U.S. Fish and Wildlife Service)**

Sea ducks are an important avian component of the nearshore ecosystem of Prince William Sound, particularly in winter. During March 1972 - 1991, sea ducks constituted 36% of birds observed by boat survey. Study of sea duck wintering ecology and ecosystem interactions serves to elucidate factors that limit populations and recovery of injured species and systems. This study is comprised of two related components: survival and movements, and foraging ecology of wintering sea ducks. Food habits and over winter survival of harlequin and goldeneye ducks will be estimated within the oil spill area. Stomach contents will estimate diet and radio telemetry will facilitate estimating survival in each species.

Subproject #2: **Sea otter abundance and distribution, food habits and population assessment project**

Principal Investigators: **B. Ballachey and J. Bodkin (National Biological Survey)**

Co-Investigator: **A. Rebar (Purdue University)**

This project will define seasonal patterns of sea otter habitat use relative to shoreline oiling and sea otter densities. Diets will be determined by visual observation at sites within density blocks. Reproduction will be estimated by pup to non-pup ratios and population assessment will be made through evaluation of physiological and morphological measures. Comparisons of prey distributions may provide a measure of the state of recovery in areas where mortality was known to be nearly complete. If prey populations are significantly different in abundance or size it may be concluded that predation forces are not equivocal among areas of different predator densities, possibly as a result of a persistent oil effect, suggesting a lack of recovery. Conversely, if prey populations are similar among areas which varied relative to oil exposure, it may be assumed that predation is similar among those areas and densities of vertebrate predators are limited by prey and recovery may be considered. In addition, blood measures will be examined as indicators of population recovery.

Subproject #3: **Pigeon guillemots and river otters as bioindicators of nearshore ecosystem health in Prince William Sound.**

Principal Investigator: **Daniel D. Roby (National Biological Survey: Alaska Cooperative Fish & Wildlife Research Unit, University of Alaska-Fairbanks)**

Co-Investigators: **Lawrence K. Duffy (Chair, Department of Chemistry University of Alaska-Fairbanks) and R. Terry Bowyer (Professor Institute of Arctic Biology, University of Alaska-Fairbanks**

This study is designed to develop a better understanding of how petroleum hydrocarbon pollution affects the nearshore marine environment. Results will allow us to test biostatistical models that predict ecosystem health and environmental deterioration. Our primary focus is the pigeon guillemot (*Cepphus columba*) as an indicator of environmental stress. The guillemot model will be used as an upper trophic level sentinel of bioavailable contaminants and as a surrogate to estimate the potential exposure and risk to other organisms that are components of the PWS nearshore ecosystem. River otters will also be examined since they inhabit marine environments, make extensive use of, and concentrate their activities in intertidal and subtidal zones. River otters are extremely sensitive to aquatic pollutants, yet continued to reside within the area of oil-contaminated shorelines in Prince William Sound following the *Exxon Valdez* oil spill. The study will identify guillemot nest sites and river otter latrine sites; more accurately assess the effects of oil exposure. It is our intent to collect blood from guillemots in several areas of PWS to establish control areas; use blood samples from the guillemot population to determine levels of acute phase blood proteins, indicative of exposure and tissue damage. We also will measure cytokines; supplement our molecular work by cellular studies such as red cell volume, hematocrits and immune functions; generate risk-assessments based on these biomarkers; and measure trophic level using stable isotope analysis of guillemot samples and plants and scats from river otter latrine sites.

Subproject #4: **Settlement Rates of Nearshore Invertebrates, Oceanographic Processes and Population Recovery: Are They Linked?**

Principal Investigator: **Gail V. Irvine (National Biological Survey) and David Salmon (Prince William Sound Science Center)**

This project addresses the hypothesis that offshore physical forcing functions (oceanographic) control settlement of planktonic larvae into nearshore environments, affecting the ability of the adult populations to recover. Settlement and recruitment rates of key intertidal organisms affected by the spill and important to the diets of other consumers, will be examined and related to larval abundance in the plankton and physical oceanography of the nearshore. Intensive site-specific manipulations, such as being performed at Herring Bay, provide data on locally operating mechanisms, but this study is designed to address variability in the contributions from the plankton on a broader scale. Thus, the project also examines whether the distribution and abundance of larvae can be used as indicators of mesoscale circulation of marine waters, linking transport phenomena with characteristics of which habitats may be more resilient to disturbance.

Subproject #5. **Algal Competition Limiting Recovery in the Intertidal**

Principal Investigators: **Michael S. Stekoll (University of Alaska, Juneau) and Gail V. Irvine (National Biological Survey)**

This effort proposes to investigate a documented shift in algal composition in the lower intertidal of sheltered rocky habitats in the Cook Inlet-Kenai Peninsula area (CIK) that has the

potential to be long-term and ecologically significant. Alaria, an annual kelp, normally dominates the lower intertidal during the summer season, but since the spill, Alaria has declined in abundance and the perennials, Fucus gardneri and members of the Gigartinaceae, have increased. If these perennials are able to successfully inhibit the recolonization and growth of Alaria, then this shift may become long lasting, and has implications for trophic and habitat relationships. This project will address the recovery of this community and investigate mechanisms responsible for the shift and that could affect recovery.

Subproject #6. **The availability and utilization of Musculus spp. as food for sea ducks and sea otters**

Principal Investigators: **Thomas A. Dean (Coastal Resources Associates, Inc.) and Stephen Jewett (University of Alaska, Fairbanks). Submitted through National Biological Survey**

This project will examine the utilization of *Musculus* by sea ducks and sea otters in Prince William Sound. Large numbers of *Musculus* recruit to selected eelgrass beds within the Sound each spring and the vast majority of the mussels disappear over the winter. *Musculus* provide an important potential food source for sea ducks and otters. Evidence for the utilization of *Musculus*, which are generally more abundant at oiled sites, may help rule out prey availability as a factor limiting otter or sea duck recovery. The objectives of the study are to determine if *Musculus* are utilized a food by either otters or sea ducks, and determine changes to *Musculus* densities that may result from predation by otters or ducks.

Subproject #7: **Recruitment patterns of nearshore clam populations in Prince William Sound**

Principal Investigator: **Glenn R. VanBlaricom (National Biological Survey, Washington Cooperative Fish and Wildlife Research Unit)**

This project will describe patterns of recruitment in nearshore clam populations known to be significant prey for sea otters in Prince William Sound (PWS). Nearshore clam populations were injured by the Exxon Valdez oil spill (EVOS), but their recovery patterns are unknown. Since clams are an important food resource for sea otters in PWS, it is possible that damage to clam populations has contributed to the failure of sea otter populations to recover from the EVOS. Age structure of clam populations will be used to determine the frequency and intensity of successful recruitment events in years recently past. Present rates of recruitment will be measured and correlated with environmental variables such as current pattern, water temperature, and primary production in the water column. The results will be used to evaluate the hypotheses that 1) low rates of clam recruitment are contributing to lack of recovery from EVOS damage in clam and sea otter populations in PWS, and 2) recent fluctuations in clam populations, and consequent effects on predators such as sea otters, are largely independent of EVOS damage.

Subproject #8: **Effects of predatory invertebrates on nearshore clam populations in Prince William Sound.**

Principal Investigator: **Glenn R. VanBlaricom (National Biological Survey, Washington Cooperative Fish and Wildlife Research Unit)**

Nearshore clam populations in Prince William Sound (PWS) are a biological resource injured by the *Exxon Valdez* oil spill (EVOS), but patterns of recovery are unknown. Clams are an important food resource for sea otters in PWS, also a biological resource also injured by the EVOS. Sea otters in PWS have not recovered from the oil spill. It is possible that damage to clam populations has contributed to the failure of sea otter populations to recover from the EVOS. Dynamics of clam populations often are influenced substantially by patterns of predation by invertebrates such as sea stars, crabs, and snails. This project will describe patterns of predation by such invertebrates on nearshore clam populations known to be significant prey for sea otters in PWS. Data on diet, activity, and density of predators will be used to estimate rates of clam mortality as a result of invertebrate predation. The results ill be used to examine the hypothesis that high rates of clam mortality are contributing to lack of recovery from EVOS damage in clam and sea otter populations in PWS. Objectives are to assemble, synthesize, and evaluate published literature on patterns of predation on bivalves by predatory invertebrate species known to occur with reasonable abundance in Prince William Sound. Incorporate relevant unpublished information available in the public domain and through contacts with other investigators of benthic ecosystems in PW; determine the diets of potentially important invertebrates in nearshore habitats of PWS; determine activity-time budgets of predatory invertebrates that forage on bivalves in PWS; determine patterns of

density for predatory invertebrates; and determine by experimental removal the effects of predation by invertebrates on mortality, population density, and size structure of clam populations.

Subproject #9: **Primary productivity as a factor in the recovery of injured resources in Prince William Sound**

Principal Investigator: **Dr. Michael S. Stekoll (University of Alaska)**

This project will investigate the production and flow of fixed carbon in the nearshore ecosystem of Prince William Sound and will determine the importance of benthic primary productivity in the recovery of injured intertidal and subtidal species. Results from this project would lay the foundation for understanding how fixed carbon is moved through the Prince William Sound nearshore system, and how this carbon flow is altered by seasonal events. The study will determine the relative importance of carbon input from phytoplankton, benthic production, terrestrial plants, and episodic transport (e.g., herring spawn). Understanding the flow of carbon will increase our understanding of factors that limit recovery of nearshore organisms.

Other Agency Proposals for Information Only: The following proposals are being submitted through other lead agencies, but have been closely coordinated and data will be integrated in the future. Their summaries are provided for information and proposals attached in the appendix.
identified:

Sea urchin population dynamics: changes in population density and availability as prey of sea otters. This effort is being submitted through ADF&G, but is closely coordinated with this proposed NBS package.

Principal Investigators: **Stephen Jewett (University of Alaska-Fairbanks) and Thomas A. Dean (Coastal Resources Associates, Inc). Submitted through ADF&G. Included for information only.**

This project will examine changes in the distribution and abundance of sea urchins, and will examine the availability of sea urchins as food for injured sea otter resources. Sea urchins, a favored food of otters, consume large amounts of algae (especially kelps) and can profoundly affect the structure of nearshore ecosystems. Prior to the spill there were few urchins in Prince William Sound, presumably because of predation by otters. It was predicted that a decrease in otter populations as a result of the *Exxon Valdez* oil spill, may lead to increases in urchin densities and subsequent decreases in kelps. However, urchin populations are increasing within the Sound. This project will address if urchin population densities are increasing in the Sound, if this increase is related to the lack of predation by otters, and if the increasing urchin population is a potential food source for recovering otter populations.

Population structure of blue mussels in relation to levels of oiling and densities of vertebrate

predators: This effort is being submitted through NOAA/NMFS, but is closely coordinated with this proposed NBS package.

Principal Investigator: **Charles E. O'Clair (NOAA/NMFS). Submitted through NMFS. Provided for information only.**

Contaminated mussels are suspected of being one of the factors limiting the recovery of vertebrate predators. Sea otters, harlequin ducks, and black oytercatchers are known to prey on mussels. Although black oystercatchers are considered to be recovering from EVOS, sea otters and harlequin ducks are not. This project is designed to support research of the vertebrate predator subgroup and will measure abundance, distribution and growth of *Mytilus* in oiled and unoiled locations and will measure hydrocarbon loads in mussel tissue. The project will also integrate the mussel bed cleaning project with the needs of the predator group.

Needed Research: The following subject areas are identified as research needs for which no Principal Investigator has been identified:

Black oystercatcher density, diet and reproductive success

Principal Investigators: to be determined, data need identified

This project will synthesize available black oystercatcher data, estimate dietary composition and reproductive success relative to oystercatcher density at three sites in western PWS. Densities will be estimated from available NRDA data. Dietary composition will be estimated from visual observations and collections of shell materials returned to nest sites. Reproductive success will be estimated from egg production and hatching and fledgling rates. Growth rates of chicks will be estimated from each density blocking.

Limpet/littorine study

Principal Investigators: to be determined, data need identified

The question of interest is whether effects on limpet and littorine populations by the EVOS are affecting the recovery of their vertebrate and invertebrate predators. Types of information needed include: comparisons of density, age and size structure of the populations in oiled and unoiled habitats, recruitment into those populations, and importance of the various limpet and littorine species to predators. Additionally, links need to be made with Herring Bay studies examining the effects of loss of Fucus on injury to and recovery of limpets and littorines.

D. PROJECT DESIGN

Elements of the project designs of the specific components of this study are included within each of the subproject proposals. Please refer to attachments. Project site selection will be coordinated to ensure a cohesive ecosystem approach, allow increased efficiency and cost effectiveness of data collection, and ensure that data can be properly shared to address the overall project hypotheses related to restoration of injured vertebrates. Data will be stored in a common format for easy exchange within the team and among other complimentary efforts. Individual subproject reports as well as a comprehensive analysis across subprojects will be conducted.

E. PROJECT IMPLEMENTATION

Many of the principal investigators included in this proposal have been conducting injury assessment studies in Prince William Sound since 1989. Others have an extensive research history in estuarine/marine waters of the Sound and elsewhere throughout Alaska. This array of scientists represents a highly experienced, well published group that can accomplished the objectives set forth in the proposal in an efficient and scientifically defendable manner. Please see the individual subproposals for individual credentials.

F. COORDINATION OF INTEGRATED RESEARCH EFFORTS

This effort is the product of numerous coordination efforts over the last six weeks. Each subproject proposal addresses specific coordination. However, the entire package is intended to ensure a synthesis of data across trophic levels. Each project depends on elements of the others. In addition, data from the SEA Project (physical and biological oceanography) and efforts by ADF&G, NOAA, and the Prince William Sound Science Center will continue to coordinated with and integral to this effort.

G. PUBLIC PROCESS

Investigators have taken part in public participation workshops sponsored by the Trustee Council. Scoping meetings conducted by the National Biological Survey were based on open invitation to a wide array of scientists throughout the federal, state, university, and private communities.

H. PERSONNEL QUALIFICATIONS

Each subproposal outlines the qualifications of the Principal Investigators. In addition, Dr. Leslie Holland-Bartels will act as project coordinator. Dr. Holland-Bartels is a senior scientist with the Alaska Science Center, National Biological Survey with 14 years experience in aquatic ecology. She has over 25 publications in national scientific journals on subjects ranging from contaminants, ecology of invertebrates, fisheries, water quality and aquatic ecology. She presently supervises the NBS Marine Mammal and Fisheries Branch of the Alaska Science Center.

F. BUDGET

Subproject	Title	Agency	FY 95 Cost
Project 1:	Factors Affecting Recovery of Sea Ducks and their Prey	NBS/USFWS	393.7K
Project 2:	Sea otter abundance and distribution, food habits and population assessment project	NBS	162.7K
Project 3	Pigeon guillemots and river otters as bioindicators of nearshore ecosystem health in Prince William Sound.	NBS, UAF	179.6K
Project 4	Settlement Rates of Nearshore Invertebrates, Oceanographic Processes and Population Recovery: Are They Linked?	NBS, PWSSC	435.7K
Project 5	Algal Competition Limiting Recovery in the Intertidal	UAF, NBS	222.5K
Project 6	The availability and utilization of Musculus spp. as food for sea ducks and sea otters	Private, UAF through NBS	4.6K
Project 7	Recruitment patterns of nearshore clam populations in Prince William Sound	NBS/U. Wash	121.3K
Project 8	Effects of predatory invertebrates on nearshore clam populations in Prince William Sound.	NBS/U. Wash	118.4K
Project 9	Primary productivity as a factor in the recovery of injured resources in Prince William Sound	UAF-Juneau	397.0K
	Project coordination/data synthesis/database management/FY 95 report	NBS	85.0K
		Σ	2120.5K

Attachment C

overview: Marine Mammal Studies

STATE OF ALASKA

WALTER J. HICKEL, GOVERNOR

DEPARTMENT OF FISH AND GAME

~~P.O. BOX 669~~ 1300 College Rd
~~CORDOVA, ALASKA 99574-0669~~ Fairbanks
PHONE: (907) ~~424-3212~~ 456-5156
FAX: (907) ~~424-3235~~ 452-6410

June 10, 1994

Molly McCammon, Director of Operations
Exxon Valdez Oil Spill Trustee Council
Restoration Office
645 G Street, Suite 401
Anchorage, AK 99501-3451

Dear Molly:

Enclosed is a group of proposed Exxon Valdez Oil Spill (EVOS) Restoration studies that are being submitted as part of an integrated MARINE MAMMAL ECOSYSTEM package. The package is designed to bring together a small group of naturally affiliated studies that will lend themselves well to a cooperative and integrated approach. The focus has been narrowed to a marine mammal ecosystem approach, rather than including all pelagic predators, because the investigators believed that would produce a better research product. Furthermore, communication and synthesis of results among this relatively small group of investigators can be realistically achieved without the need for a separate coordination component. The five investigators and their respective organizations (ADF&G, NOAA, and UAF) have been or are currently working together on other cooperative research efforts and are accustomed to sharing research platforms, ideas, and data. We are confident that the cooperation and communication required to synthesize this group of projects into a MARINE MAMMAL ECOSYSTEM study will be easily and efficiently accomplished.

By focusing on marine mammals, their predators, and their prey, we are not implying that marine mammals should be considered separately from the rest of the PWS ecosystem. All of the investigators proposing studies as part of this package are currently providing information to and cooperating with SEA plan and/or proposed seabird studies. Prey species for stable isotope and fatty acid analyses are being chosen in coordination with seabird researchers to make sure that species of broad trophic importance are selected. Meetings have already taken place to discuss coordination of sampling sites for bird, mammal, fish, and oceanographic studies. Incorporation of data from oceanographic and other SEA plan studies will be essential to meaningful synthesis of our research findings.

Each of the Brief Project Descriptions submitted as part of the MARINE MAMMAL ECOSYSTEM package have also been submitted separately by the investigators through their standard organizational

Attachment C

Overview: Marine Mammal Stud

channels. This was done to accommodate individual agency requirements and the fact that some projects are ongoing and others are being proposed for the first time. The electronic copies of each project description have been submitted through organizational channels.

Three of these brief project descriptions are for continuing projects. During FY94, harbor seal studies were conducted under 94064 (monitoring and habitat use) and 94320-F (a small trophics component that was included as part of SEA). Stable isotope studies were funded in FY94 as SEA project 94320-I and forage fish studies as project 94163.

If you have any questions or need additional information, please contact me or any of the individual investigators at the following phone or fax numbers:

Kathy Frost, ADF&G, Fairbanks - Phone 456-5156 Fax 452-6410
Mike Castellini, UAF, Fairbanks - Phone 474-6825 Fax 474-7204
Don Schell, UAF, Fairbanks - Phone 474-7115 Fax 474-5836
Marilyn Dahlheim, NMML/NOAA - Phone 206 526-4020 Fax 526-6615
Bruce Wright, NOAA - Phone 789-6600 Fax 789-6608

We found the package "Invitation to Submit Restoration Projects for FY 1995" to be very informative, and it provided useful guidelines for developing project descriptions. The emphasis on an ecosystem approach to research, and on interdisciplinary and multi-agency projects, should result in a research effort that will answer some of the significant, long-term questions about the health of Prince William Sound.

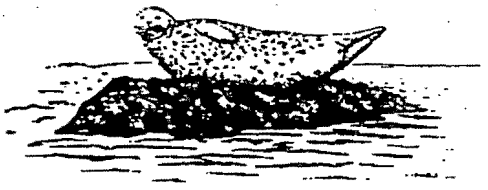
Sincerely,

Kathy Frost

Kathryn J. Frost
Marine Mammals Biologist

Attachment C

Overview: Marine Mammal Studie



FY95 MARINE MAMMAL ECOSYSTEM Studies

The MARINE MAMMAL ECOSYSTEM package for FY95 contains five major projects that provide an ecosystem approach to studying marine mammals and their environment in Prince William Sound (PWS). The primary focus is on harbor seals and killer whales, species that were injured by the Exxon Valdez oil spill (EVOS). A central goal of the studies is to understand why harbor seals in PWS have declined almost 60% since 1984, and why they are not recovering from impacts of the EVOS. This package incorporates projects that directly address harbor seals, as well as studies of their predators and prey. The status of harbor seals affects subsistence users who depend on harbor seals for food, commercial fishermen who may be affected by regulations necessary to protect marine mammals, and recreational users and tourists who view and photograph marine mammals.

The studies in this package directly address the question **"What is causing the long-term decline in some marine mammals and sea birds"**, which was identified as one of five high priority ecosystem issues to be addressed by restoration research. The studies do so by addressing a suite of broad questions, including:

Is it food, competition, or predation?
Is it human impact?
Is it disease?
Is it habitat?

The EVOS Damage Assessment and Restoration Science Programs have previously funded studies of harbor seals and killer whales in PWS. Those studies have documented injury, monitored for recovery, and gathered some information on biology and ecological relationships. The FY95 MARINE MAMMAL ECOSYSTEM package will continue some parts of the harbor seal and killer whale studies, while reorienting them toward a more integrated and ecosystem-based approach. The addition of new studies dealing with harbor seal physiology, stable isotopes in food webs, and forage fish biology will result in an integrated program of research with a strong ecosystem emphasis. The overall package includes investigations of diet and trophic interactions of harbor seals; movements, feeding areas, and haulout use; diving and feeding behavior; health and disease; availability of prey species; impact of killer whale predation; and effects of human-caused mortality. These are all identified as important issues under the recovery monitoring strategy for harbor seals.

In addition, studies in this package will obtain information that addresses a second high priority ecosystem question **"What is causing the failure of PWS herring and pink salmon runs?"**. Investigators will provide data to SEA Plan projects regarding seal and killer whale predation on herring and pink salmon; the significance of salmon and herring in seal and whale diets; and the locations of marine mammal concentration and feeding areas.

Attachment C

Overview: Marine mammal st

Components of the MARINE MAMMAL ECOSYSTEM Project

Harbor Seal Monitoring, Habitat Use, and Trophic Interactions

Project Leader: Kathryn J. Frost, ADF&G

This project will gather data on the distribution, abundance, behavior, food habits, and genetic relationships of harbor seals in PWS. Monitoring will be done at trend count sites during pupping and molting to determine whether there is recovery following the EVOS, or whether the ongoing decline is continuing. Seals will be instrumented with satellite tags to investigate habitat use, movements, and diving and haulout behavior. Fatty acids in blood and blubber of harbor seals and in prey species will be analyzed to provide information on diet and food web relationships in PWS. These data will be integrated with results from stable isotope analyses to provide better resolution of trophic status. The effects of killer whale predation, subsistence harvest, and other mortality on the harbor seal population in PWS will be modeled to evaluate how those factors may be influencing recovery. Blood samples will be analyzed for phocine distemper, herpes virus, and other diseases that could cause health problems in the seal population. Skin samples will be analyzed to determine the genetic relationships of harbor seals within PWS, and of PWS harbor seals to seals in other areas. This study will address hypotheses that food limitation, killer whale predation, disease, or human impacts may be limiting recovery and/or causing seal numbers to decline.

Harbor Seal Condition and Health Status

Project Leader: Michael Castellini, UAF

This project will analyze body morphometrics to assess the condition of harbor seals, and will analyze blood to examine their disease and health status. Ratios of length to girth and estimates of body fat and density will be compared for harbor seals collected before and after the EVOS, and within and outside of PWS. This will allow an assessment of whether PWS seals are underweight (malnourished) or "normal". Blood will be analyzed for indicators of health, including anemia, dehydration, organ function, tissue damage, oxygen carrying capacity, hormonal balance, and stress-induced protein levels. If harbor seals in PWS are malnourished or unhealthy, that would support hypotheses that food or disease have caused the decline and are limiting recovery. If seals are healthy, other causes must be sought for the ongoing decline. Samples for this project will be obtained from seals caught during satellite tagging operations and from archived collections of serum. Historical data on seal morphometrics will be made available from ADF&G.

Attachment C

Interview: Marine Mammal St

Effects of Killer Whale Predation on Recovery Rates of Injured Resources

Project Leader: Marilyn Dahlheim, NMML/NMFS

This project will investigate the potential impact of killer whale predation on PWS harbor seals, and also on other injured resources such as herring and pink salmon. Skin and blubber biopsy samples will be examined through stable isotope and fatty acid analyses to determine the importance of marine mammals versus fish in the diet of the PWS killer whales. The combination of stable isotope and fatty acid analyses provides a complementary approach that will increase the resolution in prey determination and evaluation of trophic interactions. These data will be integrated with information on killer whale distribution and abundance, foraging strategies, and population energetics, and will be used in a collaborative effort with ADF&G to model the impact of killer whale predation on PWS harbor seals.

Confirming Food Web Dependencies in the PWS Ecosystem using Stable Isotope Tracers

Project Leader: Donald M. Schell, UAF

The objective of this project is to use the predictable shifts in stable isotope ratios of carbon and nitrogen that occur with increasing trophic level to describe trophic status and food web dependencies of harbor seals in PWS. Stable isotope ratio analyses will be performed on samples from harbor seals and their key prey species. Predators acquire stable isotopes in proportion to the amount of food derived from each source, and thus tissues such as claws or whiskers can provide a temporal record of foods consumed. Such information is especially useful where it is difficult to determine diets from direct observations of feeding or stomach contents. It is possible to trace energy supply between trophic levels (phytoplankton and zooplankton to fishes to top consumers) using carbon isotopes, and to construct food webs and assign trophic status using nitrogen isotopes which are enriched at each trophic step. Through the temporal record provided by seal whiskers, it should be possible to identify major shifts in prey base and trophic status over the life of individual seals. These techniques have been successfully used in studies of Steller sea lions, bowhead whales, and other species. Samples will be obtained in conjunction with harbor seal and forage fish studies.

Abundance and Distribution of Forage Fish and their Influence on Recovery of Injured Species

Project Leader: Bruce Wright, NOAA

The objectives of this project are to determine temporal and spatial distribution, abundance, and availability of important prey

Attachment C

overview: marine mammalist

species (forage fishes, squid, and macrozooplankton), and to determine what biotic and abiotic factors affect short-term and long-term distribution and abundance. These data will be integrated with information about predator distribution, abundance, and foraging behavior to evaluate the hypothesis that food limitation is responsible for ongoing declines and the failure of injured species (harbor seals, sea birds, salmon) to recover following the EVOS. Data about forage species are essential for understanding food web relationships and for evaluating whether food may be limiting. However, this is not an easy topic to address. Multiple years of integrated studies which combine traditional and new technology will be required to gather data sufficient to answer this question.

11.5.5B

DRAFT June 29, 1994

Purpose, Need and Budget for the Institute of Marine Science Improvements

The purpose of the Institute of Marine Science (IMS) improvements at Seward is to provide the required infrastructure for conducting the long-term research and monitoring program needed to restore and enhance resources and services injured by the Exxon Valdez oil spill (EVOS). The institute would conduct research and monitoring studies on marine resources and the ecosystem in concert with other existing institutes, including the Prince William Sound Science Center, Copper River Delta Institute, Fisheries Industrial and Technology Center and Auke Bay Laboratories and would provide specialized capabilities for studies on marine mammals, marine birds and fish genetics that cannot be currently conducted at other existing facilities in Alaska. The research and rehabilitation programs to be carried out at the proposed facility would, among other things, endeavor to restore, to their pre-spill condition, those injured, but not recovering resources including: Common murre, Harbor seal, Harlequin duck, Marbled murrelet, Pigeon Guillemot, Sea otter, and Pink salmon. Studies conducted at the institute would support the primary restoration strategies for these species as outlined in the *Draft Restoration Plan*:

- Conduct research to find out why these resources are not recovering
- Initiate, sustain, or accelerate recovery
- Monitor recovery

Additionally, research made possible by the IMS improvements would complement and enhance the long term ecosystem-based research and monitoring program being implemented for the EVOS area. This would be accomplished through support of field studies using specialized laboratory and animal research capabilities that would otherwise not be possible or as successful because of the lack of adequate facilities in Alaska.

The need for the IMS improvements to augment EVOS restoration efforts is illustrated by the following excerpts from the Research Strategies in the May 16, 1994 Invitation to Submit Restoration Projects for Fiscal Year 1995:

- *Five years after the oil spill, some resources are not recovering, while others are recovering only slowly. For these resources, restoration requires an understanding of the factors constraining recovery: Why aren't these resources recovering? If they are recovering only slowly, why? Without answers to these questions, restoration efforts may be ineffective.*

- *The ecosystem approach will require multi-disciplinary, long-term research on ecosystem processes that may be limiting recovery, in addition to resource-specific research projects.*

- *Because ecosystem processes are complex and may involve multiple resources, restoration projects to address these questions involve an integrated, collaborative, multi-disciplinary approach.*

To date, research and monitoring efforts in the EVOS area have been largely field based. The reasons for this are numerous and include the following factors to various degrees: 1) the paucity of research laboratory facilities in the EVOS area has restricted the use of laboratory-based approaches for many restoration studies, 2) damage assessment studies and subsequent "restoration studies" were primarily designed as field experiments to measure *in situ* effects of the oil spill, 3) the research and management budgets of resource (Trustee) agencies in Alaska have historically focused on field techniques to derive estimates of fish and wildlife populations, and 4) Alaska's fish and wildlife resources are monitored and managed by multiple Federal and state agencies (USFWS, NBS, NMFS, NPS, USFS, ADF&G) which has fragmented the available funding for research facilities. Additionally, the University of Alaska Fairbanks' (UAF) marine science program in the School of Fisheries and Ocean Science (SFOS) and the Institute of Marine Science (IMS) is centered in Fairbanks. Although the University maintains research laboratories in the EVOS area, including the Seward Marine Center, the Kasitsna Bay Laboratory (near Homer), and the Fishery Industrial Technology Center (Kodiak), these facilities are not adequate to meet current and anticipated EVOS research needs. Moreover, none of these university laboratories have the capability, without substantial improvements, to carry out needed research programs on marine mammals and seabirds.

Despite the efforts of many capable marine scientists and the expenditure of nearly a hundred million dollars on studies in the EVOS region, scientists and managers are currently unable to understand significant changes occurring in the northern Gulf of Alaska and Prince William Sound ecosystem as manifested by long term declines of pinnipeds (i.e., Steller sea lion, harbor seal) and pelagic seabirds (e.g., marbled murrelet, pigeon guillemot, black-legged kittiwake) and recent catastrophic declines in pink salmon and herring stocks in Prince William Sound. The proposed IMS improvements would provide a focus for several key areas of marine research, notably marine mammals and seabirds. Additionally, the facility would enhance the efforts of other research disciplines including fish genetics, invertebrate biology, oceanography, and marine ecology that would provide additional opportunities for restoration of injured resources.

Research Functions

Scientific Work Group

The IMS Scientific Work Group (SWG) was formed in March, 1994 to define the research and rehabilitation functions of the proposed facility and to guide the design program for the project architects. The SWG (member list attached) is comprised of representatives of the University of Alaska Fairbanks, National Biological Survey, National Marine Fisheries Service, and Alaska Department of Fish and Game and has included the assistance of Dr. Joseph R. Geraci, a consulting marine mammal specialist and Mr. W. Scott Drieschman, a consulting seabird specialist, as well as the Trustee Council Chief Scientist and agency liaisons. The SWG in conjunction with a corollary group, the Education Work Group has produced the draft Design Program Workbook. This document has been used by the project team to derive the design and cost assumptions for the proposed facility. The Design Program Workbook is a "living document"; new information is incorporated as the SWG and the project team continue to review assumptions and bring the project forward.

Need

The proposed IMS improvements would provide needed laboratory facilities to focus the research and monitoring needs for marine mammals (primarily pinnipeds and sea otters) and marine birds (primarily pelagic seabirds) in the EVOS area. Additionally, wet and dry laboratories would be furnished for fish genetics research associated with EVOS-induced heritable genetic damage in salmonids and potentially herring; and for live studies of bioenergetics, reproduction, neurobiology and disease associated with non-commercial fish and invertebrates in the EVOS region. There are no existing facilities in Alaska that can presently address these needs. Additionally, research on oceanography and ecological modeling are anticipated at the facility. The facility would also house a specialized library with a repository of literature and other information relating to research in the northern Gulf of Alaska and EVOS region. This library would become part of the integrated information management system for EVOS restoration efforts. Research would be carried out at the facility by the University of Alaska Fairbanks (UAF), SFOS and IMS; the Alaska Department of Fish and Game (ADF&G), Commercial Fisheries Management and Development Division, and Wildlife Conservation Division; other Trustee Agencies including the Department of Interior, National Biological Survey (NBS) and the Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), and other visiting scientists affiliated with academic and private institutes.

The following is a description of anticipated research activities and programs that would be carried out at the proposed facility as envisioned by the SWG. Based on information gathered to

date, in consultation with UAF and agency researchers and the Chief Scientist, we know that the following long term research needs exist:

Marine Mammals

Harbor seal: The EVOS caused population declines and sublethal injuries to harbor seals in Prince William Sound. While some dead seals were recovered from the Kenai Peninsula, the extent of injury outside of Prince William Sound is unknown. Because harbor seal populations in northern Gulf of Alaska have declined precipitously since 1984, and the underlying causes of this decline are unknown, it is difficult to predict recovery from the oil spill. A better understanding of the causes of the decline will be required to determine the actions needed for recovery.

Steller sea lion: Results from sea lion studies have been inconclusive concerning the effects of the EVOS. Steller sea lion populations have experienced a severe decline (up to 93%) over the last 30 years in the northern Gulf of Alaska. They are currently listed as Threatened under the Endangered Species Act. No estimate of recovery time is available. As with harbor seals, a better understanding of the causes of the decline will be required to determine the actions needed for recovery.

Sea otter: The EVOS caused declines in populations of sea otters in Prince William Sound and possibly the Gulf of Alaska. Sea otters were the most abundant marine animal in the path of the oil and were particularly vulnerable to its effects. While little or no evidence of recovery has been detected thus far, sea otters are expected to eventually recover to their prespill population, perhaps in several decades. However, future rates of population increase are difficult to estimate.

Research program overview: The marine mammal program would be extremely diverse and probably the largest user of the facility in terms of space and personnel. Projects would include: captive feeding/energetics, hydrodynamics, development and testing of telemetry equipment, testing of immobilizing drugs, health status and disease studies, reproduction biology, physiology, behavior, and ecosystem modeling and data management. This program would interact with the veterinarian and rehabilitation projects at the facility as well as operate a field program, in coordination with other field studies in the EVOS region. Anticipated full-time research personnel include two to three dedicated UAF faculty, three to four dedicated students, two to three technicians/research faculty, and one to three visiting researchers (ADF&G, other agencies, academic, private). The projects require, among other things, specialized research tanks, animal holding and quarantine areas, research habitat with underwater viewing, wet labs with running sea water, dry labs, animal food preparation area, surgery and pharmacy, necropsy room, freezers, offices, library, vessel, and computer services. The following is a brief description of specific projects that are anticipated to be undertaken at the institute:

Health/Disease Status: Harbor Seals, Steller sea lions, and sea otters would be tested for a wide variety of specific blood indices of health and how these factors change over time with various handling regimes. This would provide opportunities to identify problems which may be preventing recovery. Veterinary panels of blood chemistry and research level analyses of stress proteins and hormone status would be used to assess health. Animals from captive situations would be compared to wild animals and historic samples would be taken from inside and outside of the EVOS region. This work involves routine blood sampling of captive and wild animals.

There is a great amount of information on health and disease that can be gathered from the live and dead animals that would be handled at the institute. To assist in the recovery of injured resources, ADF&G seal and sea lion projects would be able to obtain sample data from all available animals to compare with and help interpret results of field research being done on wild animals. This information would be used to produce a database on the clinical characteristics of sick and healthy Alaska pinnipeds. In the future, it will be possible to conduct experiments on exposures to disease and testing of vaccines for purposes of providing for the recovery of injured species.

Body Condition: Morphometric examinations of animals over time and development are used to model body condition (length, girth, mass relationships). These data are used to understand how an animal's mass and size can be used to determine health condition relative to fatness or malnutrition. These data also apply to studies on energetics through hydrodynamic relationships. Animals in captive conditions are used to compare and model data obtained from wild animals. This would provide opportunities to determine how recovery of injured species is linked to diet.

Energy assimilation: Feeding studies would be undertaken to look at the relationships between types and quantities of food and whole body energy demands of animals. Carefully controlled studies of metabolic rates, digestion efficiency, body temperature fluctuations, and feeding rates would be conducted. These data would be used, in conjunction with field studies, to test *Limitation of Food* hypotheses on recovery of injured species.

Hydrodynamics and diving theory: Studies on the energetic costs to marine mammals while they are at sea are obtained by modeling hydrodynamic constraints on animals in controlled situations. Estimates of how much energy an animal utilizes at sea requires estimates of the cost of swimming, transport, and diving. These studies would be carried out in research tanks utilizing a suite of physical measurements, a swimmill, and computer modeling. This would provide opportunities to determine how energetic costs affect recovery of injured species.

Diving physiology: While at sea, marine mammals spend a great deal of time underwater. Studies on the control of body function, metabolic rate, thermoregulation, and breath-holding on these parameters would be conducted. These studies would be linked with those on energy assimilation and hydrodynamics to help determine factors that are limiting recovery of injured species

Development and testing of telemetry equipment: Satellite linked transmitters are being used to gather data on the distribution and behavior of injured resources including harbor seals and sea lions both on land and at sea. A variety of sensors are available to take various physiological (dive duration, speed, internal temperature, heart rate) and environmental (depth, water temperature, video, light and sound levels) measurements. Different attachment techniques are used for various instrument packages. The best way to test the sensors and attachment techniques is on captive animals of the appropriate species and sizes. This would be done in the large naturalistic habitat tanks where test animals have access to haulouts, diving areas, and other animals. The behavior of test animals and the instrument package would be monitored to determine effects. These studies would lead to more informative and reliable telemetry studies which are used to monitor recovery and determine factors limiting recovery of injured species.

Testing of immobilizing drugs: The use of immobilizing drugs is essential to carrying out research and monitoring studies of injured marine mammals. There are some problems with the drugs currently available for immobilizing Steller sea lions. Testing of new drugs and development of immobilization protocols can best be done with captive animals. Immobilization studies would be done on animals in small research tanks under the supervision of a veterinarian with a full suite of physiological monitoring equipment. These studies would likely lead to improved capabilities for field scientists to collect blood and tissue samples and attach instrument packages to animals while reducing side effects and mortality to wild animals.

Stable isotope fractionation: A series of studies are anticipated that would investigate the effects of diet type and physiology on the fractionation of stable isotopes in marine mammals. Diets of known composition would be fed to captive harbor seals and other pinnipeds to follow the incorporation of stable isotopes in keratinous tissues such as whiskers and claws. A determination of the fidelity of isotope ratio transfers would provide essential data for understanding food web interactions in wild populations. By adding trace amounts of labeled substrates to diets, the quality and assimilation efficiencies of food sources can be estimated. Hydrolysis and isolation of individual amino acids in whiskers and blood would enable the identification of essential amino acids in pinnipeds and the extent of transamination effects in altering nitrogen isotope ratios. This information would also assist in assessing the dietary quality of prey species in the trophic energetics of marine mammals.

Marine Birds

Murres: The oil spill caused population declines and sublethal injuries at murre colonies in the Gulf of Alaska. In general it is estimated that between 35% to 70% of the breeding adults at the Chiswell Islands, Barren Islands, Puale Bay, and the Triplets were killed by the EVOS. The degree of recovery necessarily varies among the affected colonies. There are preliminary indications of recovery at the Barren Islands but it is not yet known when the timing of reproduction will return to normal. Agency scientists estimate it could take many decades and perhaps a century before the injured murre populations return to their prespill levels. Variables affecting recovery time include the amount of disturbance near colonies and the rate of migration from healthy colonies.

Marbled murrelet: The EVOS caused an estimated 5-10% decline in the marbled murrelet population in the spill area. Marbled murrelets were thought to be declining Prince William Sound and the Gulf of Alaska prior to the oil spill. Although there is uncertainty associated with the decline, scientists expect it to continue. There are several factors that could account for this decline including a diminished food supply, increased predation, reduced nesting habitat, or fishery interactions, but there are no conclusive data indicating if any or all of these factors are affecting the population.

Pigeon guillemot: The EVOS caused up to an estimated 15% decline in the population of pigeon guillemots in the Gulf of Alaska. Pigeon guillemots were thought to be declining in Prince William Sound prior to the spill. The reasons for the long-term decline are unknown which makes predictions about future population trends and the prospects for recovery extremely difficult.

Harlequin duck: The EVOS caused population declines and appears to have caused sublethal injuries to harlequin ducks. An estimated 1,000 harlequin ducks were killed by the spill. Residual oil in the environment and in their preferred prey, is thought to affecting their reproduction and subsequent recovery. However, there is little known about how oil may affect reproduction and what physiological changes can be induced by feeding on oiled prey. Scientists disagree on the time it will take harlequin ducks to recover to their pre-spill levels, but estimates suggest that recovery may not occur for several decades.

Other marine birds: Numerous other birds were affected by the EVOS. Some of the other species found dead include ducks, gulls, terns, auklets, puffins, loons, grebes, shearwaters, petrels, cormorants, kittiwakes, and geese. There is a great deal of uncertainty about the recovery of populations of individual species because many were not studied.

Research program overview: Although not as large as the marine mammal program in terms of space, equipment, and personnel, the marine bird program would conduct a wide range of projects including captive feeding/energetics, health status and disease studies, reproduction biology, physiology, behavior, development and testing of telemetry equipment, and ecosystem modeling.

This program would interact with the veterinarian and rehabilitation projects as well as operate a field program, in coordination with other field studies in the EVOS region. Anticipated full-time research personnel include one to two dedicated UAF faculty, one to two dedicated students, one to three technicians/research faculty, and one to three visiting researchers (agencies, academic, private). The projects require, among other things, use of specialized research tanks and pens, animal holding and quarantine areas, wet labs, dry labs, and the research habitat. The marine bird program would share the following facilities with the marine mammal program: animal food preparation areas, surgery and pharmacy, necropsy room, freezers, offices, library, vessel, and computer services. The following is a brief description of specific projects that are anticipated to be undertaken at the institute:

Health/Disease Status: NBS collects bird and mammal carcasses and conducts necropsies to obtain biological information. Presently these are frozen and returned to Anchorage for evaluation by the NBS veterinarian. There are minimal abilities to examine seriously ill specimens prior to mortality because of distance limitations. This results in higher mortality and some loss of data which could be used to determine the health/disease status of individual birds. The proposed institute would facilitate examination and tissue removal on sick or dead birds instead of transporting them to Anchorage. Examination of sick birds would also be useful for obtaining the physiological data needed to interpret disease processes. This would provide opportunities to identify problems which may be preventing recovery of injured resources.

Bird behavior: Behavioral studies would be undertaken in the research habitat and tanks to examine diving and food selection/handling characteristics. This information would improve our understanding of prey selection and food web interactions in wild populations which is needed to understand factors affecting recovery of injured species.

Bird physiology: Animals of known age, health condition, and dietary input kept at the facility would be examined to compare to physiological and biological data routinely collected in the field. This would provide a reference for interpreting information obtained from wild bird populations and would provide opportunities for determining how recovery is related to diet and overall fitness.

Development and testing of telemetry equipment: NBS and others employ telemetry techniques routinely to examine movements of birds and fish. The tanks and research habitat at the facility would be used to develop and test units prior to implant. Additionally, studies would examine the impact of new instruments on the natural behavior of target species. Such testing would improve the design of units to collect data that more reflects natural behavior before they are used in field studies on wild animals. These studies would lead to more informative and reliable telemetry studies which are used to monitor recovery and determine factors limiting recovery of injured species.

Stable isotope fractionation by seabirds: The incorporation of distinctive isotope ratios by feeding seabirds depends upon the isotope ratios in the prey being consumed and the rate of turnover of body

tissues. It is well known that seabirds undergo pronounced seasonal variation in energy storage and mobilization in response to migrational and breeding activities. These activities may cause major shifts in energy resources and concomitant changes in isotope ratios due to physiological processes such as lipid synthesis/catabolism or transamination during protein synthesis associated with molting. Through the use of diets of known isotopic composition and the sampling of feathers during regrowth, it is expected that one could determine the efficiency of food assimilation and the extent of carbon and nitrogen isotope fractionation during tissue synthesis. As various species of seabirds become available, work would be extended to interspecific comparisons. Intraspecific variation of isotopic fractionation will also be tested when multiple individuals of a species are fed known diets under controlled conditions.

Fish/Invertebrates

Pink salmon: The EVOS caused sublethal injuries to wild populations of pink salmon, but there is some uncertainty about the extent of effects on population levels. Extremely low returns of hatchery-produced and wild fish to Prince William Sound in 1993 have focused attention on this issue. There is evidence that exposure to oil caused genetic damage in pink salmon and potentially herring. The genetic damage may be causing reduced size or reproductive success. This is a very critical area of research for pink salmon.

Intertidal and subtidal communities: The EVOS caused population declines and sublethal injuries to the community of plants and animals living in the intertidal and subtidal zones. Direct oiling and beach cleaning killed many organisms. Cleaning removed much of the oil from the intertidal zone but subsurface oil persisted in many heavily oiled beaches, and in mussel beds, which were avoided during cleanup. Moreover, cleaning transported oil contaminated sediments to the subtidal zone The lower and middle intertidal zones have recovered to a large extent; full recovery of the intertidal community, especially the upper intertidal zone may take more than a decade. Recovery of subtidal organisms is expected in most cases in several years.

Research program overview: The proposed improvements would expand the existing IMS fish and invertebrate program at the Seward Marine Center (SMC) to allow for EVOS restoration and monitoring studies. Non-EVOS studies are currently occupying all available laboratory space at the SMC. Additionally, a fish genetics program to examine heritable genetic damage to pink salmon, sockeye salmon, and potentially herring would be conducted by ADF&G. Currently, facilities for conducting fish genetics research on spill related injuries are very scarce and current projects are being hampered by water problems, logistical difficulties, and the closing of the Big Lake Fish Hatchery. The proposed facility would provide the critical capability to raise individual fish from eggs to maturity (freshwater through saltwater life stages), thereby allowing the analysis of gonads and gametes, along with progeny from oil exposed adults, for evidence of heritable genetic damage. Projects would include: laboratory exposure of salmonid eggs, embryos and larvae to varying concentrations of crude oil and its water soluble components to determine genetic effects; analysis

of tissues from oil exposed fish for evidence of genetic damage; analysis of gonads, gametes and progeny of oil exposed adult fish for genetic damage; and laboratory and *in situ* studies of oil pollution effects on fish and invertebrate populations, food web interactions, and health. Field studies of residual oil pollution effects would be supplemented with live studies of bioenergetics, reproduction, neurobiology, and disease.

Additional spill related genetics projects that would likely utilize the facility include inheritance studies using all salmon species to confirm the genetic origins of allozyme polymorphisms; population genetics of pink salmon in Prince William Sound, and genetic marking of hatchery pink salmon in Prince William Sound. The IMS program would emphasize non-commercial fish and invertebrate taxa while the ADF&G research program would emphasize commercially important fish taxa.

These projects require, among other things, wet laboratories with high quality running seawater and freshwater, tanks and incubators, dry labs, freezers, offices, library, computer services, and potentially vessel and submersible support. Anticipated full time research personnel include: six to eight fishery biologists, four to six technicians/research faculty, and one to three visiting research scientists.

Oceanography

Recovery of injured resources is related to physical conditions in the environment and associated lower trophic levels including primary and secondary productivity. It is essential that a coordinated oceanographic and ecological monitoring program be accomplished for restoration. The proposed improvements would expand the existing SMC oceanographic program to allow for long term, year round evaluations of oceanographic features of the EVOS region including basic features such as temperature, salinity, and nutrients. This program would improve the understanding of food web relationships and species interactions within the physical environment of the EVOS area. Monitoring would include phytoplankton and zooplankton, and intertidal and subtidal community profiles. As envisioned, the oceanographic baseline from Seward to Middleton Island would be expanded to include a series of stations from Prince William Sound to the Barren Islands. The program would make use of the existing dock and storage facilities at the SMC but would require the additional use of a dedicated research vessel and submersible; office space; library; and computer services at the proposed facility.

Ecological Modeling

The ecological modelling program would support many of the database and computer service needs of the marine mammal, marine bird, fish/invertebrate and oceanographic programs. This program would compliment and work in concert with other ecological modelling efforts in the EVOS area. The proposed improvements would provide computer and office space for one to two full-time UAF

research faculty and one to two students involved in this program. The primary purpose of ecological modelling is to organize ecological information about species interactions so that changes can be forecast in their abundance and appropriate management actions can be implemented before a crisis occurs. Additionally, ecological modelling is used to identify data gaps and to establish data collection protocols when designing and carrying out field studies.

Budget

The attached Project Capital Cost Estimate reflects the current budget projection for this project. This is based on the conceptual design of the facility needed to carry out the research functions described in this report. The total facility cost of $35.4 million includes the $12.5 million previously appropriated by the Alaska Legislature for this project. Additionally, a cost of $ 3 million is shown for acquiring a research vessel and submersible based on estimates by the UAF SFOS Marine Superintendent. The total costs incorporate the costs associated with the design, project management, planning and permitting (including EIS), and contingency costs associated at this stage of project development. A specific detailed budget and design that reflect the associated cost of each component of the project will be presented at the August 8, 1994 Trustee Council meeting.

Project Capital Cost Estimate

BUILDING COMPONENTS	RESEARCH SF	TOTAL
1. MAIN BUILDING	38,237 SF	$11,808,000
Research Labs/Offices:		
Marine Mammals		
Marine Bird		
Fish/Invertebrates		
Library		
Veterinary		
Service Areas		
2. HABITAT TANKS	34,691 SF	$9,758,000
Sea Otters		
Seals		
Sealions		
Marine Birds		
3. PENS AND POOLS	6 Pens, 3 Pools	$302,000
Sea Otters		
Seals		
Sealions		
4. LIFE SUPPORT	5,800 SF	$6,698,000
5. SITE CIVIL	110,000 SF	$2,255,000
Paving and Landscape		
Excavation/Grading		
Wave Barrier		
Site Utility		
Site prep		
SUBTOTAL		$30,821,000
6. *EQUIPMENT	15% Allowance	$4,623,000
**TOTAL FACILITY		$35,444,000
7. RESEARCH VESSEL		$2,400,000
8. SUBMERSIBLE		$600,000
TOTAL VESSELS		$3,000,000

NOTE: Cost estimate based on concept design and Design Program Workbook.

* 15% of total construction cost for an equipment budget is a standard assumption for a research laboratory.

** $12,500,000. of the total facility cost has been previously appropriated by the Alaska Legislature.

IMS Scientific Work Group

Dr. A.J. Paul
UAF / Institute of Marine Science
PO Box 730
Seward, Alaska 99664
Phone: 224-5261
Fax: 224-3392

Dr. Michael Castellini
UAF / Institute of Marine Science
PO Box 4746825
Fairbanks, Alaska 99775-7220
Phone: 474-6825
Fax: 474-7204

Dr. Byron Morris
NOAA / National Marine Fisheries Service
Office of Spill Damage, Assessment, and Restoration
PO Box 210029
Auke Bay, Alaska 99821
Phone: 789-6600
Fax: 789-6608

Ms. Linda Shaw
NOAA / National Marine Fisheries Service
Protected Resources Management Division
PO Box 21668
Juneau, Alaska 99802
Phone: 586-7235
Fax: 586-7131

Mr. Joseph Greenough
NOAA / National Marine Fisheries Service
Auke Bay Lab
Juneau, Alaska 99802

Dr. Leslie Holland-Bartels
Alaska Fish and Wildlife Research Center
National Biological Survey
1011 Tudor Road
Anchorage, Alaska 99503
Phone: 786-3312
Fax: 786-3636

Dr. Scott Hatch (Dr. John Piatt)
Alaska Fish and Wildlife Research Center
National Biological Survey
1011 Tudor Road
Anchorage, Alaska 99503
Phone: 786-3549
Fax: 786-3636

Dr. Daniel Mulcahy
BioVet Services
P.O. Box 242512
Anchorage, AK 99524-1512
Phone: 333-0421

Dr. Jim Seeb (Mr. Gary Miller)
Alaska Department of Fish and Game
CFMD / Genetics Laboratory
333 Raspberry Road
Anchorage, Alaska 99518-1599
Phone: 267-2385 (267-2255)
Fax: 344-9238

Mr. Lloyd Lowry
Alaska Department of Fish and Game
Wildlife Conservation Division
1300 College Road
Fairbanks, Alaska 99701-1599
Phone: 456-5156
Fax: 452-6412

Mr. Kim Sundberg
Alaska Department of Fish and Game
Habitat and Restoration Division
333 Raspberry Road
Anchorage, Alaska 99518-1599
Phone: 267-2334
Fax: 349-1723

Dr. Joseph Geraci
Ontario Veterinary College
Dept. of Pathology
Guelph, Ontario, CANADA N1G 2W1
Phone: (519)823-8800 x4635
Fax: (512) 824-5930

Dr. Scott Drieschman
Wildlife Concepts International
P.O. Box 65
Palomar Mountain, CA 92062
Phone: (619)742-1228
Fax: 742-1716

Comprehensive, Balanced Approach to Implementation of the Restoration Plan

(Implementation Management Structure)

	Attachment
• **Mission Statement**	A
• **Guiding Principles**	B
• **Ecosystem Goals**	C
• **Objectives & Strategies** (by Resource and Service)	D
• **Management and Science Planning** (organizational chart)	E
• **Adaptive Management Process** (graphic)	F
• **Ecosystem Description** (draft)	G

Exxon Valdez Oil Spill Truste(
Restoration Office
645 G Street, Suite 402, Anchorage, Alaska 99501
Phone: (907) 278-8012 Fax: (907) 276-7178

Mission Statement of the Exxon Valdez Oil Spill Trustee Council

The mission of the Trustee Council and all participants in council efforts is to efficiently restore the environment injured by the Exxon Valdez oil spill to a healthy, productive, world renowned ecosystem, while taking into account the importance of quality of life and the need for viable opportunities to establish and sustain a reasonable standard of living.

The restoration will be accomplished through the development and implementation of a comprehensive interdisciplinary recovery and rehabilitation program that includes:

- Natural Recovery
- Monitoring and Research
- Resource and Service Restoration
- Habitat Acquisition and Protection
- Resource and Service Enhancement
- Replacement
- Meaningful Public Participation
- Project Evaluation
- Fiscal Accountability
- Efficient Administration

Adopted by the Trustee Council at their November 30, 1993 meeting.

Draft Guiding Principles

In mid-January, in mid-March, and then again in mid-April 1994, a working group of state and federal resource specialists, peer review scientists, representatives of the Trustee Council's Public Advisory Group, representatives of user groups impacted by the spill and residents of the spill-affected communities met in a series of work sessions to discuss methods to implement an ecosystem approach to restoration activities.

The working group developed the Draft Guiding Principles identified below which reflect and elaborate upon the Policies identified in Chapter 2 of the *Draft Restoration Plan.* Further guidance regarding the categories of restoration action — General Restoration, Habitat Protection and Acquisition, Monitoring and Research, and Public Information and Administration — is provided in Chapter 3 of the *Draft Restoration Plan.*

General Principles

1. Restoration should contribute to a healthy, productive and biologically diverse ecosystem within the spill area that supports the services necessary for the people who live in the area.

2. Restoration will take an ecosystem approach to better understand what factors control the populations of injured resources.

Principles that Focus or Direct Restoration Activities

3. Restoration will focus upon injured resources and services and will emphasize resources and services that have not recovered. Resources and services will be enhanced, as appropriate, to promote restoration. Restoration actions may address resources for which there was no documented injury if these activities will benefit an injured resource or service.

4. Resources and services not previously identified as injured may be considered for restoration if reasonable scientific or local knowledge obtained since the spill indicates a spill-related injury.

5. Projects designed to restore or enhance an injured service:
   - must have a sufficient relationship to an injured resource,
   - must benefit the same user group that was injured, and
   - should be compatible with the character and public uses of the area.

6. Restoration activities will occur primarily within the spill area. Limited restoration activities outside the spill area, but within Alaska, may be considered under the following conditions:
   - when the most effective restoration actions for an injured population are in a part of its range outside the spill area, or
   - when the information acquired from research and monitoring activities outside the spill area will be significant for restoration or understanding injuries within the spill area.

Principles Concerning Integration of Restoration Activities

7. Restoration will include a synthesis of findings and results, and will also provide an indication of important remaining issues or gaps in knowledge.

8. Restoration shall take advantage of cost-sharing opportunities where effective.

9. Restoration should be guided and reevaluated as information is obtained from damage assessment studies and restoration actions.

Public Participation Principles

10. Restoration must include a meaningful public participation process at all levels: planning, project design, implementation, and review.

11. Restoration must reflect public ownership of the process by timely release and reasonable access to information and data.

Principles Concerning the Design of Restoration Projects

12. Proposed restoration strategies should state a clear, measurable and achievable endpoint.

13. Restoration must be conducted as efficiently as possible, reflecting a reasonable balance between costs and benefits.

Principles to Help Establish Priorities for Restoration Activities

14. Priority will be given to restoring injured resources and services which have economic, cultural and subsistence value to people living in the oil spill area, as long as this is consistent with other principles.

15. Possible negative effects on resources or services must be assessed in considering restoration projects.

16. Priority shall be given to strategies that involve multi-disciplinary, interagency or collaborative partnerships.

17. Restoration projects will be subject to open, independent scientific review before Trustee Council approval.

18. Past performance of the project team should be taken into consideration when making funding decisions on future restoration projects.

19. Competitive proposals for restoration projects will be encouraged.

20. Government agencies will be funded only for restoration projects that they would not have conducted had the spill not occurred.

GOALS

- **Pelagic (Off-shore) Ecosystem:** A healthy, productive, pelagic (off-shore) ecosystem that supports resources and services injured by the oil spill, and that maintains naturally occuring biodiversity.

- **Near-shore Ecosystem:** A healthy, productive, near-shore ecosystem that supports resources and services injured by the oil spill, and that maintains naturally occuring biodiversity.

- **Upland Ecosystem:** A healthy, productive, upland ecosystem that supports resources and services injured by the oil spill, and that maintains naturally occuring biodiversity.

Ecosystem Definitions: The three ecosystem types described below are intended to describe areas that generally contain similar biological and physical features that influence the relationships of the resources that exist in the spill area and the services they support.

Pelagic Ecosystem. The deeper, open water region offshroe that is not directly affected by wave action, terrestrial runoff, or other nearshore processes. Examples are the center of Prince William Sound and a few hundred yards beyond the steep cliffs and fiord mouths of the outer Kenai coast.

Nearshore Ecosystem. Terrrestrial and aquatic areas dominated by nearshore processes such as tidal movement, salt spray, intertidal and shoreline vegetation, wave action, and terrestrial runoff. nearshore areas include the intertidal zone, salt marshes, and beach areas where salt and shoreline processes dominate, as well as shallower offshore waters that are greatly influenced by nearshore processes. It also includes narrow fjords and channels that occur in the spill area.

Upland Ecosystem. The area of land and water uphill of the nearshore ecosystem.

Appendix A

DRAFT RESTORATION OBJECTIVES AND STRATEGIES BY RESOURCE AND SERVICE

Table of Contents

Introduction

For each resource or service injured by the oil spill, the *Draft Restoration Plan* identifies strategies to accomplish recovery. The appendix begins by summarizing those strategies. The *Draft Restoration Plan* will be distributed for public review June 18 through August 1, 1994. Thus, the Final Restoration Plan may change some of the strategies summarized in this appendix.

In the remainder of the appendix, resources and services injured by the oil spill are listed alphabetically. For each resource and service, the appendix first lists the recovery status -- a brief description of the current condition of the resource or service. That is followed by the objective — the definition of recovery for that resource or service. It is a measurable definition of what condition the restoration program should accomplish. Any restoration project should help the restoration program reach those objectives (i.e., to accomplish recovery for one or more injured resources or services).

Finally, the appendix lists monitoring, research, and general restoration strategies identified by the workshop. The strategies in this appendix are preliminary and have not been subject to further scientific, legal, or policy review. However, they provide the best current indication of 1995 restoration needs. Also, there is considerable duplication in this appendix, because many resources have similar monitoring, research, or general restoration strategies.

Strategies for Achieving Restoration

The *Draft Restoration Plan* (November 30, 1993) outlines strategies to accomplish recovery. This section of the appendix summarizes those strategies. For more information, see the *Draft Restoration Plan,* especially Chapter 4.

Restoration Strategies from the *Draft Restoration Plan*
Part A. Biological Resources

Biological Resources	Primary Restoration Strategy (from *Draft Restoration Plan*)
Recovering Resources Bald eagle Black oystercatcher Killer whale Sockeye salmon at Red Lk*	***Primary Restoration Strategy*** • Rely on natural recovery • Monitor recovery • Protect injured resources and their habitats
Resources Not Recovering Common murre Harbor seal Harlequin duck Intertidal organisms Marbled murrelet Pacific herring* Pigeon guillemot Pink salmon* Sea otter Sockeye Salmon (Kenai & Akalura Systems)* Subtidal Organisms	***Primary Restoration Strategy*** • Conduct research to find out why these resources are not recovering • Initiate, sustain, or accelerate recovery • Monitor recovery • Protect injured resources and their habitats
Recovery Unknown Clams* Cutthroat trout Dolly Varden trout River otter Rockfish	***Primary Restoration Strategy*** • Rely on natural recovery • Monitor recovery • Protect injured resources and their habitats

* These resources are also important for subsistence or commercial fishing. For these resources, waiting for natural recovery may significantly harm a community or industry, and the strategies for subsistence or commercial fishing also apply (see Part C of the table).

Part B. Other Resources

Other Resources	Primary Restoration Strategy (from *Draft Restoration Plan*)
Archaeology	***Primary Restoration Strategy*** • Repair spill-related injury to archaeological sites and artifacts • Protect sites and artifacts from further injury and store them in appropriate facilities • Protect injured resources and their habitats
Designated Wilderness Areas	***Primary Restoration Strategy*** Any restoration strategy which aides recovery of injured resources, or prevents further injuries will assist recovery of designated wilderness areas. No strategies have been identified which benefit only designated wilderness areas without also addressing injured resources.

Part C. Services

Services	Primary Restoration Strategy (from *Draft Restoration Plan*)
Commercial Fishing	*Primary Restoration Strategy* • Promote recovery of commercial fishing as soon as possible • Protect commercial fish resources as soon as possible • Monitor recovery
Recreation and Tourism	*Primary Restoration Strategy* • Preserve or improve the recreational and tourism values of the spill area • Remove or reduce residual oil if it is cost effective and less harmful than leaving it in place • Monitor recovery
Passive Uses	*Primary Restoration Strategy* Any restoration strategy which aids recovery of injured resources, or prevents further injuries, will assist recovery of passive-use values. No strategy has been identified that benefits only passive uses, without also addressing injured resources.
Subsistence	*Primary Restoration Strategy* • Promote recovery of subsistence as soon as possible • Remove or reduce residual oil if it is cost effective and less harmful than leaving it in place • Protect subsistence resources from further degradation • Monitor recovery

Objectives and Strategies by Resource and Service

Archaeological Resources

Recovery Status: Injury to archaeological resources stems from increased looting and vandalism of sites and artifacts, and erosion within and around the sites resulting from cleanup activities. In addition, archaeological artifacts may have been oiled. Injuries attributed to looting and vandalism still occur. These injuries diminish the availability or quality of scientific data and opportunities to learn about the cultural heritage of people in the spill area.

Recovery Objective: Archaeological resources will be considered recovered when spill-related injury ends, and looting and vandalism are at or below pre-spill levels. Restoration cannot regenerate what has been destroyed, but it can prevent further degradation of sites as well as the scientific information that would otherwise be lost.

RECOVERY MONITORING STRATEGY: Background: The current evidence suggests that a majority of the archaeological site vandalism that can be either directly or indirectly linked to the *Exxon Valdez* oil spill event occurred in 1989 before adequate constraints were put into place over the activities of oil spill cleanup personnel. Most of this vandalism took the form of prospecting for sites with high artifact yields. Numerous small holes, from 0.5 to 2.0 meters in size, were dug by vandals in 17 known sites (projections based on existing data suggest that about 100 additional sites were similarly vandalized).

Evidence of vandalism dropped dramatically after 1989, probably reflecting the more effective archaeological constraint system that had been put into place by the participating agencies, with the cooperation of Exxon Corp., by the late summer of 1989. This apparent drop in vandalism was unexpected and at first suggested that continued vandalism related to the *Exxon Valdez* spill event might not be a significant future concern. However, based on what we know about the behavior patterns of archaeological looters, the activity focus of vandals may have shifted (or will shift) from general prospecting to a more focused pattern of looting at a select number of high-yield archaeological sites that were identified by looters during the initial "prospecting" phase, or simply observed by more discrete potential looters engaged in cleanup operations in the post-1989 era. Artifact hunters are most likely to act on the opportunities presented by this knowledge in the next 15 years while their memories remain fresh; thereafter, the threat should gradually drop as the information loses "immediacy" and specificity.

A second oil-spill factor may greatly increase the likelihood that looter knowledge gained in the oil-cleanup period might be activated at any time at high-yield sites. The injury to commercial and subsistence species (e.g., harbor seals and herring) may create conditions of economic depression in several Gulf of Alaska communities that will increase the temptation to turn to commercial archaeological looting as an alternative source of income to make up

for the income loss in other sectors. (Note: Loss of subsistence species forces users to use limited cash to purchase food and other products.) Studies of the economics of archaeological looting in Utah and elsewhere, such as St. Lawrence Island, have shown that commercial digging increases in communities that are experiencing economic downturns.

Another compelling reason to be concerned is that demand for Alaskan archaeological materials is at an all-time high by art dealers, jewelers, and knife makers. The prices of single slate ulus now approach $500 at certain galleries; rare pieces of ivory and bone may be sold for over $100,000.

Strategy: Archaeological monitoring of archaeological sites injured by the spill or spill-related activities will target a small number of sites which are determined to represent those that are most vulnerable to serious, commercial looting. There will be two categories of sites scheduled for continued monitoring. The first group, or index group, will consist of 4 known sites that will be monitored on a yearly basis for signs of vandalism. The selection of these sites will be based on their potential vulnerability to pot hunting and will be independent of jurisdiction. That is, no attempt will be made to distribute index sites equally by political jurisdiction or agency jurisdiction. One or two of these sites will also be selected for continued hydrocarbon monitoring so the behavior and effect of oiling can be observed over the long term in archaeological deposits. A second group of 4 sites will be selected for monitoring, but on a biannual basis. This second group of sites may vary over time in order to maintain flexible response to new information such as fresh reports of vandalism or new findings on patterns of looting. The second group of sites provides a cross-check to monitoring data collected at the index sites. By focusing annual monitoring on 4 index sites and using a 2-year monitoring schedule on the additional 4 "cross-check" sites, expenditures would be kept to a minimum, but at a level that would still provide adequate tracking of vandalism trends over the years.

Because baseline data have already been collected on the sites that would be monitored, local people and communities will be included in the monitoring effort whenever possible. Agency archeologists will serve as managers of the monitoring effort and conduct any specialized or difficult monitoring actions. This local involvement will also serve as a social mechanism for discouraging certain individuals from engaging in looting by encouraging the growth of cultural pride and heritage knowledge in the communities. Guidance for obtaining local participation will be sought in the results of the initial phase of the already funded "Community Archaeological Site Protection Plans Project." The first phase of this project, which will outline an effective approach for the involvement of local communities in archaeological protection, will be completed by the Office of History and Archaeology, State of Alaska, by September/October 1994. In order to avoid duplication of effort, every effort will be made to coordinate and integrate the archaeological monitoring program with the community archaeological protection activities.

Monitoring Schedule: Monitoring of index sites will occur on a yearly basis. This schedule is necessary to interdict vandalism before the damage has become severe and to insure that all signs of vandalism would be visible (e.g., unvegetated ground). The second group of sites will be monitored on a biannual basis which should be sufficient to identify at least the majority of vandalism indicators before they are hidden by vegetation. If monitoring indicates a strong recovery trend by the year 2000, the monitoring interval for index sites can shift to every two years and the interval for cross-check sites to every four years.

Estimated Recovery Time: Recovery will have been achieved when all vandalism that was stimulated by the *Exxon Valdez* oil spill has ceased and any required data recovery actions (e.g., professional excavation of looted site areas) or other mitigative actions (e.g., stabilization of vandalized site areas) designed to address documented injury have been completed. The best professional judgement estimates the achievement of recovery by the year 2020. This period of time should see the present generation of archaeological looters disappear, hopefully discouraged by local community education programs, site protection programs, and the social pressures created by a citizenry having a sense of "ownership" and pride in their archaeological heritage. In addition, a thirty-year span should result in the dissipation of any remaining oil contamination in archaeological deposits.

RESEARCH STRATEGIES: Archaeological sites are a promising source of long-term ecological data. The archaeological record, though often coarse-grained in terms of precise dates, may offer answers to some of the questions posed by contemporary ecosystem scientists who are trying to discriminate between changes that have links to the oil spill and those that represent fluctuations in natural systems over time.

Another source of long-term data may be found through ethnographic and historical research. Native Alaskans over the past millennia have accumulated a rich storehouse of information about the local environment, and though much of this knowledge has been lost of late, much still survives. The survival of coastal Native peoples has always depended on accurate, empirical observations about the world and its fickle environment. Historical archives and the memories of non-Native Alaskans also may offer valued information on the operation of the environment in the past.

Two hypotheses have been identified for using archaeological resources to study cultural dynamics and ecological history. The hypothesis for cultural dynamics is that ecosystem shifts have caused major cultural shifts in the spill area. The hypothesis for ecological history is that archaeological, ethnographic and historic data can produce an informed comparative baseline for EVOS ecosystem studies. Existing archaeological collections may contain faunal/floral samples which will provide critical insights into specific ecosystem problems. Once assessed, the existing data should be supplemented by specific site excavation designed to fill in data gaps.

GENERAL RESTORATION STRATEGIES: In the FY 94 work plan, the Trustee Council approved Project 94007. Through this project, "Community Archeological Site

Protection Plans" are being prepared by the Office of History and Archaeology, State of Alaska. These plans will address such topics as stabilizing eroding sites, removing and restoring artifacts, the reduction of looting and vandalism, the removal of artifacts from sites and storage in an appropriate facility, and affording the opportunity to view or learn about the cultural heritage of people in the spill area. Implementation of these protection plans should be a top priority for general restoration projects for archaeological resources. Although the plans will not be in final, peer-reviewed form until May 1995, a draft of the plans will be ready by October 1994 and should serve as the basis of preparatory projects.

Bald Eagles

Recovery Status: Two hundred to 300 bald eagles may have been killed in the spill. However, population estimates made in 1989, 1990, and 1991 indicate that there may have been an increase in the PWS bald eagle population since the previous survey conducted in 1984. Productivity decreased in 1989, but appeared to have recovered by 1990.

Recovery Objective: Because population and productivity appear to have returned to pre-spill levels, bald eagles may have already recovered from the effects of the spill.

RECOVERY MONITORING STRATEGY: Aerial surveys of Prince William Sound using fixed wing aircraft were used before and after the spill to estimate bald eagle population size. Based on modelling, the Prince William Sound eagle population was expected to increase to its prespill level by 1994. Aerial surveys will be conducted in 1995 to verify this prediction. Productivity of Prince William sound bald eagles will be measured using helicopter surveys in 1995 to verify that it is normal given the dramatic declines of its major prey species, pink salmon. If population and productivity of Prince William Sound bald eagles is normal in 1995, monitoring will be conducted at five year intervals. If the 1995 surveys indicate declines in population or productivity, more frequent surveys will be conducted. There is not enough pre-spill data on eagle populations in other parts of the spill area to warrant surveys outside Prince William Sound.

Monitoring Schedule: A PWS population and productivity survey should be conducted every 5 years starting in 1995.

Estimated Recovery Time: 5 years

RESEARCH AND GENERAL RESTORATION STRATEGIES: Bald eagles are recovering and may have recovered from the spill. No research or general restoration strategies are expected for the 1995 work plan.

Black Oystercatcher

Recovery Status: Black Oystercatchers are recovering, although oystercatchers may still be exposed to hydrocarbons when feeding in intertidal areas.

Recovery Objective: Black oystercatchers will have recovered when Prince William Sound populations attain prespill levels and when reproductive success of nests and growth rates of chicks raised in oiled areas are comparable to those in unoiled areas.

RECOVERY MONITORING STRATEGY: Population abundance and distribution in Prince William Sound will be monitored during boat surveys for marine birds and mammals. Growth rates of chicks will be monitored every two years.

Monitoring Schedule: Boat surveys of Prince William Sound bird populations should be conducted in the summer every three years starting in 1996. Chick growth rates will be monitored every two years for a six-year period starting in 1995.

Estimated Recovery Time: Unknown

RESEARCH AND GENERAL RESTORATION STRATEGIES: No research or general restoration strategies have yet been identified for the 1995 work plan.

Clams

Recovery Status: Littleneck clams and butter clams on sheltered beaches were killed by oiling and clean-up activities. In addition, growth appeared to be reduced by oil, but determination of sublethal or chronic effects is awaiting final analyses.

Recovery Objective: Clams will have recovered when populations and productivity have returned to levels that would have prevailed in the absence of the oil spill (prespill data or non-oiled control sites).

RECOVERY MONITORING STRATEGY: Paired oiled and non-oiled (control) clam beds will be sampled. Measures should be density and size-frequency distribution. Random sampling design within sites. Number and location of study sites to be determined from agency data and local subsistence usage. Consider sites throughout spill impact area.

Monitoring Schedule: Conduct one comprehensive study and then evaluate need for further monitoring.

Estimated Recovery Time: Unknown

RESEARCH AND GENERAL RESTORATION STRATEGIES: No research or general restoration strategies have yet been identified for the 1995 work plan.

Commercial Fishing

Recovery Status: Commercial fishing was injured through injury to commercial fish species and also through fishing closures. Continuing injuries to commercial fishing may cause hardships for fishermen and related businesses. Each year that commercial fishing remains below prespill levels compounds the injury to the fishermen and, in many instances, the communities in which they live and work.

The Trustee Council recognizes the impact to communities and people of the Prince William Sound region resulting from the sharp decline in pink salmon and herring fisheries in past years. In the 1994 work program, the Trustee Council has committed to the expenditure of five million dollars to help address these issues through the development of an ecosystem based study for PWS. Some of the pink salmon and herring problems may be unrelated to the spill. However, the Council will continue to address these important problems as they relate to the oil spill.

Recovery Objective: Commercial fishing will have recovered when the population levels and distribution of injured or replacement fish used by the commercial fishing industry match conditions that would have existed had the spill not occurred. Because of the difficulty of separating spill related effects from other changes in fish runs, the Trustee Council may use pre-spill conditions as a substitute measure for conditions that would have existed had the spill not occurred.

RECOVERY MONITORING STRATEGY: The strategy we have taken thus far is to assess the fishery resources used by the commercial fishing industry to determine whether they were damaged and, if so, whether they are recovering. For example, we are trying to assess the health of the Prince William Sound pink salmon and Pacific herring populations as well as the status of Kenai River sockeye salmon by improving abundance estimation techniques. This is not an easy task since we have to deal with stock identification problems (wild and hatchery stocks in the case of Prince William Sound pink salmon) in order to sort out abundance/survival trends in stocks which seem to have been damaged by the oil spill. In some cases this has entailed marking studies (e.g. Prince William Sound pink salmon and Kenai River sockeye salmon smolts), genetic studies (e.g. Kenai adult sockeye salmon), hydroacoustic surveys (e.g. Kenai sockeye salmon adults and juveniles), and SCUBA surveys (e.g. Prince William Sound herring). Other stocks were studied for a short time (e.g. clams, shrimp, rockfish). So, it may be wise to collect some additional information in the future. In any case, an ecosystem approach, such as is proposed in the SEA study, might lead to a better understanding of injuries as well as better estimates of recovery time.

Monitoring Schedule: At this time, it is difficult to recommend doing monitoring on anything other than an annual basis for pink salmon, herring or sockeye salmon. For example, pink salmon populations on odd and even years are essentially genetically isolated while herring and sockeye salmon are composed of multi-aged cohorts of siblings. So, it would appear that critical information could be lost if monitoring was done, for example, only on alternate years. For clams, shrimp, rockfish, etc., it might be advisable to monitor these on some longer interval (e.g. every two or three years).

Estimated Recovery Time: It is difficult to estimate this for the fishery resources being studied at this time. For example, the next two years are critical for judging recovery of Kenai River sockeye salmon. If good runs occur this year and next year, the population has probably recovered. This year is critical for Prince William sound herring, which apparently were not very abundant (and were diseased) last year. Some Prince William Sound pink salmon populations may have been reproductively damaged, and it is difficult to determine when they might recover (either with or without restoration efforts).

RESEARCH AND GENERAL RESTORATION STRATEGIES: Research and general restoration strategies intended to restore commercial fishing are discussed under the individual commercial fishing resources including pink salmon, sockeye salmon, herring, and rockfish. No research or general restoration strategies have yet been identified for the 1995 work plan that restore commercial fishing directly without restoring a commercial fish resource.

Common Murres

Recovery Status: Productivity of common murres show signs of recovery at some injured colonies (Barren Islands, Paule Bay) but post-spill population counts are still lower than pre-spill estimates and show no sign of recovery.

Recovery Objective: Common murres will have recovered when population trends are increasing significantly at index colonies in the spill area and when reproductive timing and success are within normal bounds. (Normal bounds will be determined by comparing productivity data with information from other murre colonies in the Gulf of Alaska and elsewhere.)

RECOVERY MONITORING STRATEGY: Populations at the Chiswell Islands, Barren Islands, Triplets, Ugaiushak Island and Puale Bay, the designated index colonies within the spill area, will be surveyed once every three years to determine if populations have recovered. Productivity will be monitored annually for four years at the Barren Islands to insure it is within normal bounds.

Monitoring Schedule: A complete population survey of injured colonies will be conducted every three years starting in 1996. Reproductive studies will be continued annually for four years, starting in 1995, then terminated if productivity is normal.

Estimated Recovery Time: 15-70 years.

RESEARCH: *Multiple-resource Research.* The high priority research issues for common murre are ecosystem processes: climate/oceanographic features, prey limitation and predation. Since the 1970s, murres along with other pelagic-feeding resources such as marbled murrelets, harbor seals, and other marine mammals and seabirds have been declining in the northern Gulf of Alaska and Prince William Sound. See Chapter 3: Pelagic Ecosystem, and the discussion of individual factors — climatic/oceanographic features, prey limitation, and predation.

Research Specific to Murres. Avian predation is considered a high priority issue for common murres. See Chapter 3: "Has predation increased?" Also a concern, but a lesser priority, is the question of whether behavioral changes in common murres have decreased breeding productivity at some colonies. See Chapter 3: "Behavior Change."

GENERAL RESTORATION: No general restoration strategies have been identified for the 1995 work plan. Restoration techniques to initiate recovery are unlikely until scientists have determined why common murres are not recovering.

Cutthroat Trout

Recovery Status: Cutthroat trout have grown more slowly in oiled areas than in unoiled areas. Insufficient data are available to determine whether they are recovering.

Recovery Objective: Cutthroat trout will have recovered when growth rates within oiled areas are comparable to those for unoiled areas.

RECOVERY MONITORING STRATEGY: Monitor growth rates in injured populations to determine when the recovery objective has been met. Analysis of scale or otolith growth patterns may be a cost-effective approach to comparing current and past growth histories.

Monitoring Schedule: Every three years, continued at least one interval after the recovery objective has been met.

Estimated Recovery Time: Unknown

RESEARCH: No specific research issues were developed for the injured fish resources whose recovery status is unknown. Rather, the focus for cutthroat trout should be on determining if natural recovery is occurring.

GENERAL RESTORATION: Stock-separation information to help management protection is a useful but not high priority general restoration technique for cutthroat trout.

Conservative limits on sport-fish harvest of cutthroat trout have been adopted in Prince William Sound. These management measures are likely to continue until the fish recover from the spill. While recovery status is unknown, the impact of the protective measures could be minimized by management information that allows the Alaska Department of Fish and Game to vary harvest regulations by time or location to minimize incidental catch of the injured runs of cutthroat. This task typically involves some type of marking so that fisheries managers can determine the portion of the catch (at different locations and times) that originates from the different runs. This information is beyond that historically gathered by the department and would allow it to manage fishing to protect the injured runs — to minimize interference with natural recovery.

Designated Wilderness Areas

Recovery Status: The oil spill delivered oil in varying quantities to the waters adjoining the seven areas within the spill area designated as wilderness (including wilderness study areas). Oil was also deposited above the mean high tide line in these areas. During the intense clean-up seasons of 1989 to 1990, hundreds of workers and thousands of pieces of equipment were at work in the spill area. This activity was an unprecedented imposition of people, noise, and activity on the area's undeveloped and normally sparsely occupied landscape.

Recovery Objective: Designated Wilderness Areas will have recovered when oil is no longer encountered in these areas and the public perceives them to be recovered from the spill.

RECOVERY MONITORING, RESEARCH, AND GENERAL RESTORATION STRATEGIES: Any restoration objective which aids recovery of injured resources, or prevents further injuries, will assist recovery of designated wilderness areas. No strategy has been identified that benefits designated wilderness areas without also addressing injured resources. For that reason, no monitoring specific to designated wilderness areas is proposed.

Monitoring Schedule: No monitoring specific to designated wilderness areas is proposed. However, monitoring the fate of the oil will continue to identify the existence and concentrations of *Exxon Valdez* oil in designated wilderness areas (For information about monitoring the presence of oil, see "Fate and Persistence of Oil" in this appendix.)

Dolly Varden

Recovery Status: Dolly Varden have grown more slowly in oiled areas than in unoiled areas. Insufficient data are available to determine whether they are recovering.

Recovery Objective: Dolly Varden will have recovered when growth rates within oiled areas are comparable to those for unoiled areas.

RECOVERY MONITORING STRATEGY: Monitor growth rates in injured populations to determine when the recovery objective has been met. Analysis of otolith growth patterns may be a cost-effective approach to comparing current and past growth histories.

Monitoring Schedule: Every three years, continued at least one interval after the recovery objective has been met.

Estimated Recovery Time: Unknown

RESEARCH: No specific research issues were developed for the injured fish resources whose recovery status is unknown. Rather, the focus for Dolly Varden should be on determining if natural recovery is occurring.

GENERAL RESTORATION: Stock-separation information to help management protection is a useful but not high priority general restoration technique for Dolly Varden.

Conservative limits on sport-fish harvest of Dolly Varden trout have been adopted in Prince William Sound. These management measures are likely to continue until the fish recover from the spill. While recovery status is unknown, the impact of the protective measures could be minimized by management information that allows the Alaska Department of Fish and Game to vary harvest regulations by time or location to minimize incidental catch of the injured runs of Dolly Varden. This task typically involves some type of marking so that fisheries managers can determine the portion of the catch (at different locations and times) that originates from the different runs. This information is beyond that historically gathered by the department and would allow it to manage fishing to protect the injured runs — to minimize interference with natural recovery.

Harbor Seals

Recovery Status: Harbor seal numbers were declining in Prince William Sound (PWS) before the spill. Following the spill, seals in the oiled area had declined 43%, compared to 11% in the unoiled area. Counts made during the molt at trend count sites in Prince William Sound during 1990-1993 indicate that numbers may have stabilized. However, counts during pupping have continued to decline. It is not known which counts are the best indicator of

population status. If the conditions that were causing the population to decline before the spill have improved, normal growth may replace the animals that were lost. However, if conditions continue to be unfavorable, the affected population may continue to decline. Harbor seals are a key subsistence resource in PWS and subsistence hunting is both affected by and may be affecting harbor seal status.

Recovery Objective: Recovery will have occurred when harbor seal populations trends are stable or increasing.

RECOVERY MONITORING STRATEGY: Aerial surveys of 25 trend count sites in PWS will be conducted during pupping and molting for comparison with previous years' data.

Monitoring Schedule: Aerial surveys will be conducted annually for the next 2 years. Periodicity of monitoring will be reevaluated after 1996, in light of population trend and indications of recovery. To date, it is not clear whether the population has stabilized in PWS or is continuing to decline. This species has declined more than 50% throughout the northern Gulf of Alaska and PWS in the last decade. It is currently being considered for listing as depleted under the Marine Mammal Protection Act. Data on current population status are necessary to avoid unnecessary regulation of fisheries in PWS and to provide information to subsistence hunters that will allow them to make informed decisions about levels of harvest. This monitoring program is very inexpensive to conduct.

Estimated Recovery Time: Unknown. If the ongoing decline is caused by food limitation or other unidentified factors that continue to be limiting, the population (including that segment that was damaged by the oil spill) may not recover.

RESEARCH: *Multiple-resource Research.* Harbor seal populations in PWS and the northern Gulf of Alaska have been declining for over a decade. The EVOS caused additional mortality in the spill area. In the four years since the EVOS, seal numbers have not shown any indication of recovery. In contrast, seals in southeast Alaska and Canada appear healthy and increasing. The reasons for the decline in the northern Gulf and PWS are unknown, but limited (or changing) availability of prey, particularly forage fishes, has been suggested as a cause for the decline. It is not possible, however, to eliminate other causes such as disease, predation by killer whales, harvest, or take by fisheries, or several of these factors in combination.

Of these factors, hypotheses relating to prey limitation, predations, and resource exploitation are high priority research areas for explaining the harbor seal decline. Specific research hypotheses include: (1) The decline in harbor seals in PWS (and the Gulf of Alaska) has occurred primarily because of changes in the availability of prey, particularly forage fishes; and (2) Predation by killer whales has caused or exacerbated the harbor seal decline, and/or prevented recovery. General issues considered important, but not as likely to explain the decline, include research on the definition of habitat effects and oceanographic processes on recruitment, growth, condition, and survival; and impacts of disease on harbor seals in

Prince William Sound. See Chapter 3: Pelagic Ecosystem, and discussion of individual factors — food limitation, and predation.

Research specific to Harbor Seals. Resource exploitation is a high priority issue for harbor seals. Harbor seal numbers are greatly reduced because of the area-wide decline, which was exacerbated by additional spill-related mortality. At this reduced level, the population may be impacted by any additional mortality, such as that caused by subsistence harvest or take associated with fisheries. See Chapter 2 discussion of "Resource Exploitation."

GENERAL RESTORATION: It would help restoration to determine if Prince William Sound animals are genetically distinct or different populations from those in the Gulf of Alaska or Southeast Alaska. This information about whether the populations are distinct or intermingle would be helpful in allowing subsistence hunters to assess the effects of their harvest. It would also be useful in understanding how the region-wide decline in harbor seals affects the population in the spill area.

Harlequin Ducks

Recovery Status: There are indications of reduced densities of birds in the breeding season; a declining trend in the summer, post-breeding population; and very poor production of young in western Prince William Sound.

Recovery Objective: Harlequin ducks will have recovered when breeding and post-breeding season densities and production of young return to estimated prespill levels, or when there are no differences in these parameters between oiled and unoiled areas.

RECOVERY MONITORING STRATEGY: A survey that will provide an estimate of breeding-age adults to assess reproductive capability in the population and establish numerical recovery objectives will be conducted in 1995. After 1995, a May-June boat survey every three years should provide indications of change in the potential breeding population. Annual production of young is currently very low in the spill area and is normally highly variable in harlequin ducks. Annual monitoring is recommended for the next five years to confidently detect any signs of improvement amid expected fluctuations. Monitoring would be accomplished with a shoreline boat survey during late August and September, providing data on numbers of young, brood distribution, and abundance of post-breeding harlequins.

Monitoring Schedule: Conduct May-June breeding population survey every three years beginning in 1995. Conduct a production/post-breeding survey annually 1995-1999.

Estimated Recovery Time: Unknown. Intrinsic annual growth rates for harlequin duck populations may be 10% or less. Slow maturation and annually varying breeding propensity further inhibit population increase.

RESEARCH: The breeding population of harlequin ducks in Western Prince William Sound has suffered consistent reproductive failure. The reasons for this chronic recruitment failure since the spill is unknown, but the leading hypothesis is that ingestion of oil-contaminated prey from foraging in oiled mussel beds has affected the reproductive success of the resident birds. This is a high priority issue for harlequin ducks. See discussion of individual factors in Chapter 3: "Direct Toxicity" and "Recruitment Processes."

GENERAL RESTORATION: In 1994, the Trustee Council funded the cleaning of contaminated mussel beds, primarily in Prince William Sound. If these mussel beds are the cause of the continued oil contamination and reproductive failure, the continued cleaning of any remaining contaminated mussel beds will be a continued high priority. The continuation of the 1994 project is dependent on the results of this summer's project.

Intertidal Organisms

Recovery Status: The lower intertidal zone and, to some extent, the middle intertidal zone are recovering. However, injuries persist in the upper intertidal zone, especially on rocky sheltered shores. Recovery of this zone appears to depend, in part, on the return of adult Fucus in large numbers.

Recovery Objective: Each intertidal elevation (lower, middle, or upper) will have recovered when community composition, population abundance of component species, age class distribution and ecosystem functions and services in each injured intertidal habitat have returned to levels that would have prevailed in the absence of the oil spill.

RECOVERY MONITORING STRATEGY: Monitor selected matched oiled and non-oiled (control) sites throughout the spill area, incorporating a variety of habitats in each region. To validate the inference of recovery for the matched-pair design, matched non-oiled sites should be monitored also.

Monitoring Schedule: Monitor Prince William Sound paired sites in 1995 and 1997. Monitor Cook Inlet/Kenai Peninsula and Kodiak/Alaska Peninsula in 1996 and 1998. Further monitoring cycles should be dependent upon results of initial four years.

Approximately one-half of the site pairs would be within Prince William Sound and the other one-half in the other two regions combined. Because of the matched-pair design and the need to make comparisons within regions (which were shown to differ), a two-year monitoring cycle is necessary. This monitoring strategy provides continuity and level effort between years.

In addition, monitoring of Herring Bay intertidal sites will occur annually.

Estimated Recovery Time: Unknown

RESEARCH: The high priority research issues for the nearshore ecosystem including intertidal and subtidal organisms are ecosystem process questions. See Chapter 3: Nearshore Ecosystem, and Community Structure. See also discussion of other factors — predation, competition, and physical/oceanographic factors.

GENERAL RESTORATION: No general restoration strategies have yet been identified for the 1995 Work Plan.

Killer Whales

Recovery Status: Thirteen whales disappeared from one pod in Prince William Sound between 1988 and 1990. The injured pod is growing again.

Recovery Objective: Killer whales will have recovered when the injured pod grows to at least 36 individuals (1988 level).

RECOVERY MONITORING STRATEGY: Photographs of individual killer whales occurring in AB pod will be collected to document natural recovery. Because AB pod whales frequently associate with other Prince William sound resident killer whale pods (approximately 80% of all encounters), it is necessary to photograph all killer whale pods/individuals encountered during field research in Prince William Sound.

Monitoring Schedule: Field research every two years will allow us to keep track of new births by year and record regrowth of the pod. Natality and mortality rates will be conservative biennial estimates, and missing whales will not be confirmed as dead until two years after they are first missing.

Estimated Recovery Time: Recovery of AB pod to pre-spill levels (36 whales) could take ten to fifteen years given the current age and sex structure of the population.

RESEARCH AND GENERAL RESTORATION STRATEGIES: No research or general restoration strategies have been identified for the 1995 Work Plan.

Marbled Murrelet

Recovery Status: Marbled murrelet populations in Prince William Sound were in decline before the spill. The causes of the pre-spill decline are unknown.

Recovery Objective: Marbled murrelets will have recovered when population trends are increasing.

RECOVERY MONITORING STRATEGY: Estimate the Prince William Sound marbled murrelet population in July using standard U.S. Fish and Wildlife Service boat surveys.

Monitoring Schedule: Boat surveys of Prince William Sound bird populations should be conducted in the summer every three years starting in 1996.

Estimated Recovery Time: Unknown

RESEARCH: *Multiple-resource Research.* Research concerning ecosystem processes are high priority research issues for marbled murrelets: climatic/oceanographic features, prey limitation and predation. Since the 1970s, marbled murrelets along with other pelagic-feeding resources such as murres, harbor seals, and other marine mammals and seabirds have been declining in the northern Gulf of Alaska and Prince William Sound. See Chapter 3: Pelagic Ecosystem, and the discussion of individual factors — climatic/oceanographic features, prey limitation, and predation.

Research Specific to Marbled Murrelets. Avian and mammalian predation is considered a high priority issue for marbled murrelet. See Chapter 3: "Has predation increased?" Also a concern, but a lesser priority, is further research on the effects of resource exploitation (incidental gillnet catch) and upland development. However, protection of habitat remains an important strategy for protecting recovery. See Chapter 3: "Predation", and "Resource Exploitation."

GENERAL RESTORATION: No general restoration strategies have been identified for the 1995 work plan. Restoration techniques to initiate recovery are unlikely until scientists have determine why marbled murrelets are not recovering.

Pacific Herring

Recovery Status: Pacific herring studies have demonstrated egg mortality and larval deformities. Populations may have declined, but there is uncertainty as to the full extent and mechanism of injury. However, the stocks and dependent fisheries in Prince William Sound are not healthy, as indicated by the low spawning biomass in 1993 and 1994 and the resultant elimination of the fisheries in those years.

Recovery Objective: Pacific herring will have recovered when populations are healthy and productive and exist at prespill abundances.

RECOVERY MONITORING STRATEGY: Monitor fish health and spawning biomass. Annual monitoring for fish health status will begin in 1994. Estimation of spawning biomass will require support of annual spawn deposition survey to supplement normal ADF&G data collection.

Monitoring Schedule: Annual monitoring until recovery objectives have been met, that is when a healthy, strong year-class has recruited into the spawning population. Continued annual monitoring for four additional years (one recruitment cycle) beyond meeting the recovery objectives to ensure recovery has been achieved.

Estimated Recovery Time: Unknown; no sooner than 1996 (1992 year-class), which will require annual monitoring until at least 2000.

RESEARCH: *Multiple-resource Research.* Research on ecosystem processes including climatic/oceanographic features, prey limitation, and predation, is a high priority for understanding why herring and pink salmon are not recovering in Prince William Sound. A basic hypothesis for an ecosystem approach to determining how processes in the pelagic ecosystem may control fluctuations in these fisheries resources has been identified. This hypothesis is that mortality and growth of pink salmon and herring in Prince William Sound are controlled by the standing biomass of zooplankton, as influenced by atmospheric and oceanic processes. The average residence time of the Sound's waters and the strength of advective transport of deeper waters from the Gulf of Alaska into the Sound, control the standing biomass of zooplankton. When zooplankton are abundant, predation pressure on juvenile salmon and herring is relatively low, and survival of the juveniles is higher. If zooplankton abundance is low, predatory fish and birds switch from a zooplankton diet to juvenile salmon and herring, thus reducing survival of the juveniles.

Other ecosystem processes that are high priority for herring research include the advective transport of herring larvae from rearing areas in the Sound, and the quality of winter conditions on the survival and reproductive success of the herring population. See Chapter 3: Pelagic Ecosystem, and discussion of individual factors — physical/oceanographic features, prey limitations, and predation.

Research Specific to Herring. The continued investigation of the effects of previous exposure to oil is a high priority research area for herring. This exposure may have caused lethal and sublethal effects, and genetic damage to herring which may be inherited to succeeding generations. In addition, the effects of causes of viral hemorrhagic septicemia (VHS) is also a high priority research area. See Chapter 3: "Direct Toxicity," "Heritable Genetic Damage," and "Is it Disease?"

GENERAL RESTORATION: Stock separation information to help management protection is a high priority general restoration strategy for herring.

The failure of the herring run in Prince William Sound in 1993 and 1994 prompted the Alaska Department of Fish and Game to close the fishery. Until the Sound-wide herring run is strong enough to support a commercial fishery, this closure will likely continue. During recovery, the impact of fishery management could be minimized by management information that allows the Alaska Department of Fish and Game to vary harvest regulations by time or location to minimize incidental catch of the injured runs of herring. This task typically involves stock separation so that fisheries managers can determine the portion of the catch (at different locations and times) that originates from the different runs. Marking programs and genetic stock identification are examples of management tools for stock separation. This information is beyond that historically gathered by the department and would allow it to manage fishing to protect the injured runs — to minimize interference with natural recovery. It allows this protection in a way that may allow earlier opening of the herring fishery in some parts of Prince William Sound. Unfortunately, stock separation techniques for herring are less well established than they are for salmon. There is some question about the technical feasibility of these techniques for herring.

Passive Use

Recovery Status: Passive use of resources includes the appreciation of the aesthetic and intrinsic values of undisturbed areas, the value derived from simply knowing that a resource exists, and other nonuse values. Injuries to passive uses are tied to public perceptions of injured resources.

Recovery Objective: Passive uses will have recovered when people perceive that aesthetic and intrinsic values associated with the spill area are no longer diminished by the oil spill.

RESEARCH, MONITORING, AND GENERAL RESTORATION STRATEGY: Any restoration activity that aids recovery of injured resources, or prevents further injuries, will assist recovery of passive-use values. No strategies have been identified which benefit only passive uses without also addressing injured resources. Since recovery of passive uses requires that people know when recovery has occurred, the availability to the public of the latest scientific information will continue to play an important role in the restoration of passive uses. At some point, the Trustee Council may wish to survey perceptions about recovery, but no specific passive use monitoring is proposed at this time.

Monitoring Schedule: At this time, no monitoring specific to passive use values is proposed.

Estimated Recovery Time: Unknown

Persistence of Oil (Intertidal Sediments, Mussels)

Oil itself is not an injured resource or service. It is the cause of the injuries. Monitoring the fate and persistence of oil in the environment including location, concentration, and toxicity provides foundation monitoring for remaining oil contamination in the ecosystem. It also provides specific recovery monitoring for continued contamination in sediments and mussels.

Recovery Status:

- *Prince William Sound.* Limited shoreline surveys and limited clean-up work occurred in 1991, 1992, and 1993. The surveys indicated that subsurface oil remained at many sites that were heavily oiled in 1989.

  In 1993, shoreline assessment surveys were conducted at over 75 sites in Prince William Sound. They found that oil residue was present at most sites and sheening occurred at some. They also found that surface oiling has become very stable. There was no measurable reduction in surface asphalt and surface oil residue from 1992 to 1993. Subsurface oiling, on the other hand, has decreased substantially since 1991. Overall, the amount of subsurface oil found at the study sites in 1993 is about 45% of the amount found in the same areas in 1991.

- *Kodiak.* No sites have been surveyed on Kodiak Island since 1990.

- *Alaska Peninsula.* No general assessment work has been done since 1990. Five study sites were established in 1992 to examine the persistence and degradation of oil along national park coast lines. Those sites will be revisited in 1994. The 1992 observations indicate a continuing presence of oil at those sites.

- *Cook Inlet and Outer Kenai Coast.* Only limited assessment work has been done since 1990. A study site was established in 1992 to examine the persistence and chemical degradation of oil along national park coast lines. That site will be revisited in 1994. The 1992 observation indicates a continuing presence of oil at that site.

Recovery Objective: With respect to residual oil contamination, recovery has been achieved when remaining oil concentrations are reduced to a level comparable to pre-spill levels.

RECOVERY MONITORING STRATEGY: To assess the persistence of oil, monitoring needs to record the location, concentration, and characterization of oil that remains from the *Exxon Valdez* oil spill. Monitoring the location means periodically determining the areal extent until it reaches "recovery" levels in most areas, and focusing more frequent monitoring on "hot spots" where significant concentrations remain.

Monitoring Schedule:

- *Kodiak and Alaska Peninsula.* Comprehensive surveys have not been conducted since 1990. A survey should be conducted in 1995 to determine the areal extent and location of significant concentrations of remaining oil. The monitoring should be designed to give a comprehensive look at the distribution of oil in order to satisfy scientific and public information needs. Needs for future monitoring, if any, on Kodiak and the Alaska Peninsula will be determined based on the results from 1995.

- *Prince William Sound.* Specific areas in Prince William Sound were monitored in 1993. Monitoring is not needed in 1995. It should be conducted in 1996 to determine the location of significant concentrations of remaining oil. Like that for Kodiak and the Alaska Peninsula, the monitoring should be designed to give a comprehensive look at the distribution of oil in order to satisfy scientific and public information needs. It should not focus on known "hot spots" monitored in 1993, but be a broader effort to give a comprehensive picture. Future monitoring of specific remaining areas of high oil concentration will be determined based on the results from 1996.

- *Cook Inlet and Outer Kenai Coast.* Monitoring needs for Cook Inlet and outer Kenai Coast need not drive the monitoring schedule; rather, they should be incorporated into the projects for Kodiak and Prince William Sound as logistics opportunities are available.

Estimated Recovery Time: Unknown

RESEARCH: No research strategies have been identified for the 1995 Work Plan.

GENERAL RESTORATION: The 1994 Work Plan includes a project to accelerate the degradation of surface oil on beaches of important value to subsistence and recreation where the visual recognition of oil is diminishing these services. No strategies have been identified for the 1995 work plan.

Persistence of Oil (Mussel Beds)

Recovery Status: Mussels themselves are an injured resource, both from the recreational and subsistence view plus possibly as the vehicle for transferring petroleum hydrocarbons to higher consumers. High concentrations of petroleum hydrocarbons remain evident in some mussel beds within Prince William Sound, and preliminary results indicate contaminated beds outside Prince William Sound also.

Recovery Objective: Recovery will be complete when sediment petroleum hydrocarbons concentrations have declined to pre-spill concentrations.

RECOVERY MONITORING STRATEGY: Beds identified as contaminated should be monitored no more than once every three years. In order to maintain a level effort of work, one-third of these beds could be monitored each year.

Monitoring Schedule: Perform one cycle of monitoring, then re-evaluate.

Estimated Recovery Time: Unknown

RESEARCH: No research strategies have been identified for the 1995 Work Plan.

GENERAL RESTORATION: In 1994, the Trustee Council funded the cleaning of contaminated mussel beds, primarily in Prince William Sound. If these mussel beds are the cause of the continued oil contamination to harlequin ducks and other intertidal feeders, and reproductive failure to harlequin ducks, the continued cleaning of any remaining contaminated mussel beds will be a continued high priority. The continuation of the 1994 project is dependent on the results of this summer's project.

Persistence of Oil (Subtidal Sediments)

Recovery Status: Subtidal organisms living in or on sediments and demersal fish that forage in subtidal sediment habitats may be exposed to the petroleum hydrocarbons that may be contaminating the sediments. In 1991, shallow subtidal PAH composition patterns consistent with that of weathered *EXXON VALDEZ* oil were found mainly at Northwest Bay in the depth range 3 - 20 m. Reduced concentrations of the oil were found at some shallow water stations in Bay of Isles, Herring Bay, and Snug Harbor. Data in 1992 and 1993 on the fish exposed showed evidence of continued contamination.

Recovery Objectives: Subtidal sediments will have recovered when concentrations of petroleum hydrocarbons in shallow (0 - 20 m) sediments approximate the petrogenic background concentration that prevailed prior to the *EXXON VALDEZ* oil spill and petroleum exposure indices in biota from oiled sites are similar to indices in biota from non-oiled sites.

RECOVERY MONITORING STRATEGY: Concentrations of hydrocarbons in shallow (0 - 20 m) subtidal sediments, and indices of petroleum exposure in flatfish will be monitored.

Monitoring Schedule: Sediments and biota should be monitored in 1995, and future monitoring should be dependent on 1995 results.

Estimated Recovery Time: Concentrations of petroleum hydrocarbons in shallow subtidal sediments are expected to recover to pre-oil spill levels in four to six years. Recovery time for biota exposure are not known

RESEARCH AND GENERAL RESTORATION STRATEGIES: No research or general restoration strategies have been identified for the 1995 work plan.

Pigeon Guillemot

Recovery Status: The pigeon guillemot population in Prince William Sound was in decline before the spill. The causes of the prespill decline are unknown.

Recovery Objective: Pigeon guillemots will have recovered when populations are stable or increasing.

RECOVERY MONITORING STRATEGY: Estimate the Prince William Sound pigeon guillemot population in winter and summer using standard US Fish and Wildlife Service boat surveys.

Continue June counts of pigeon guillemots attending colonies on Naked, Peak, Storey, Smith and Little Smith islands. The Naked Island area supports greater than 25% of Prince William Sound guillemots, and pre-spill and post-spill counts of the Naked Island area population provide excellent data for determining population trend. These data will provide an independent source of information to confirm trends found in the boat surveys.

Monitoring Schedule: Boat surveys of Prince William Sound bird populations should be conducted in winter and summer every three years starting in 1996. June counts of guillemots in the Naked Island area should be conducted every three years.

Estimated Recovery Time: Unknown

RESEARCH: *Multiple-resource Research.* Research concerning ecosystem processes are high priority research issues for pigeon guillemot: climatic/oceanographic features, prey limitation and predation. Since the 1970s, pigeon guillemot along with other pelagic-feeding resources such as marbled murrelets, harbor seals, and other marine mammals and seabirds have been declining in the northern Gulf of Alaska and Prince William Sound. See Chapter 3: Pelagic Ecosystem, and the discussion of individual factors — climatic/oceanographic features, prey limitation, and predation.

Research Specific to Pigeon Guillemots. Predation of eggs and nestlings is an alternative but lower priority hypothesis for the lack of pigeon guillemot recovery. Mammalian predation is considered an only moderately important research issue for pigeon guillemots.

In the initial years of the spill, oil was found on eggs. Investigating the lingering effects of this oiling is considered only a moderate priority research hypothesis in explaining the lack of recovery. In addition, resource exploitation (e.g., incidental gillnet catch) is unlikely to

explain the continued area-wide decline, and may have a potentially significant impact on recovery. See Chapter 3: "Direct Toxicity," "Is it Predation?" and "Resource Exploitation."

GENERAL RESTORATION: No general restoration strategies have been identified for the 1995 Work Plan.

Pink Salmon

Recovery Status: Pink salmon studies have demonstrated egg mortality, fry deformities, and reduced growth in juveniles. Populations may have declined, but there is uncertainty as to the full extent and mechanism of injury. However, there is evidence of continued damage in some stocks from exposure to oil, and there has been a precipitous decline to both wild and hatchery stocks of pink salmon in Prince William Sound since 1991.

Recovery Objective: Pink salmon will have recovered when populations are healthy and productive and exist at prespill abundance (an indication of recovery is when egg mortalities in oiled areas match prespill level or levels in unoiled areas.)

RECOVERY MONITORING STRATEGY: (1) Annual monitoring of egg mortality in a standardized set of oiled and non-oiled streams. (2) Monitoring of escapements and return per spawner productivity. ADFG routinely monitors escapements throughout PWS as part of its management program; an additional increment of stock separation in the commercial fishery is necessary to accurately determine hatchery/wild stock fishery contributions, in order to estimate returns per spawner. This additional increment may be provided by higher-resolution management activities required as general restoration activity to ensure adequate escapement of impacted populations of pink salmon.

Monitoring Schedule: Annual monitoring until recovery objectives have been met, and for the subsequent generation (two years) after recovery objectives have been met to ensure recovery has been achieved.

Estimated Recovery Time: Unknown; at least two generations, depending on the mechanism of damage to reproductive success.

RESEARCH: *Multiple-resource Research.* Research on ecosystem processes including climatic/oceanographic features, prey limitation, and predation, is a high priority for understanding why herring and pink salmon are not recovering in Prince William Sound. A basic hypothesis for an ecosystem approach to determining how processes in the pelagic ecosystem may control fluctuations in these fisheries resources has been identified. This hypothesis is that mortality and growth of pink salmon and herring in Prince William Sound are controlled by the standing biomass of zooplankton, as influenced by atmospheric and oceanic processes. The average residence time of the Sound's waters and the strength of

advective transport of deeper waters from the Gulf of Alaska into the Sound control the standing biomass of zooplankton. When zooplankton are abundant, predation pressure on juvenile salmon and herring is relatively low, and survival of the juveniles is higher. If zooplankton abundance is low, predatory fish and birds switch from a zooplankton diet to juvenile salmon and herring, thus reducing survival of the juveniles.

Research on the impacts of large-scale enhancement of pink salmon in Prince William Sound on the recovery and productivity of wild populations of pink salmon is also a high priority. See Chapter 3: Pelagic Ecosystem, and discussion of individual factors — climatic/oceanographic features, prey limitations, predation, and impact of hatcheries.

Research Specific to Pink Salmon. The continued investigation of the effects of previous exposure to oil a high priority research area for pink salmon. This exposure may have caused lethal and sublethal effects, and genetic damage to pink salmon which may be inherited to succeeding generations. See Chapter 3: "Direct Toxicity,"and "Heritable Genetic Damage."

GENERAL RESTORATION: Stock-separation information to help management protection is a high priority general restoration technique for pink salmon.

The poor returns of the pink salmon runs in Prince William Sound in 1992 and 1993 have prompted the Alaska Department of Fish and Game to restrict the fishery. Fishermen harvest both injured and healthy pink salmon runs. There is a need for more information to allow the Alaska Department of Fish and Game to vary harvest regulations by time or location to minimize incidental catch of the injured runs of pink salmon. This task typically involves some type of marking so that fisheries managers can determine the portion of the catch (at different locations and times) that originates from the different runs. This information is beyond that historically gathered by the department and would allow it to manage fishing to protect the injured runs — to minimize interference with natural recovery.

Recreation and Tourism

Recovery Status: The spill disrupted use of the spill area for recreation and tourism. Resources important for wildlife viewing include killer whale, sea otter, harbor seal, bald eagle, and various seabirds. Residual oil exists on some beaches with high value for recreation. It may decrease the quality of recreational experiences and discourage recreational use of these beaches.

Closures on sport hunting and fishing also affected use of the spill area for recreation and tourism. Sport fishing resources include salmon, rockfish, Dolly Varden, and cutthroat trout. Harlequin duck are hunted in the spill area.

Recreation was also affected by changes in human use in response to the spill. For example, displacement of use from oiled areas to unoiled areas increased management problems and facility use in unoiled areas. Some facilities like the Green Island cabin and the Fleming Spit camp area were injured by clean-up workers.

Recovery Objective: Recreation and tourism will have recovered, in large part, when the fish and wildlife resources on which they depend have recovered, recreation use of oiled beaches is no longer impaired, and facilities and management capabilities can accommodate changes in human use.

RECOVERY MONITORING STRATEGY: Stay advised of the recovery status of the resources upon which recreation activities depend. Interaction with the recreation user groups will be maintained by requiring oil spill funded resource projects to monitor recreation use in the project area. Identify oiled beaches which have or have had high attraction for recreation use where evidence persists as surface or subsurface oil. The 1991 Forest Service Customer Survey will be redone periodically to establish recovery trends.

Monitoring Schedule: Resource monitoring activities that relate to recreational use of the oil spill area will be scheduled as the scientists determine, and the data will be used by the agencies to monitor resource use-based recreation. Beaches with persistent oil will be monitored annually in mid-summer. The Customer Survey will be repeated in 1995, and three and six years hence, in an attempt to establish recovery and trend information.

Estimated Recovery Time: Use statistics are currently higher than for pre-spill years, but people express that oiled areas are not the same as they were pre-spill is prevalent. Continue beach monitoring as long as residual oil persists. When perception of oiling will be insignificant among recreationists is unknown.

RESEARCH AND GENERAL RESTORATION STRATEGIES: No research and general restoration strategies have been identified for the 1995 Work Plan.

River Otters

Recovery Status: River otters have suffered sublethal effects from the spill and continuing exposure to hydrocarbons.

Recovery Objectives: Indications of recovery are when habitat use, food habitats, and physiological indices have returned to prespill conditions.

RECOVERING MONITORING STRATEGY: Monitor latrine sites for use by otters and reestablish use of abandoned sites to indicate populations recovery. Monitor species composition in feces to document return to prespill composition.

Monitoring Schedule: Two field trips yearly early summer and late summer.

Estimated Recovery Time: River otters are long-lived species; best case scenario - 15 years.

RESEARCH AND GENERAL RESTORATION STRATEGIES: No research and general restoration strategies have been identified for the 1995 work plan.

Rockfish

Recovery Status: Dead adult rockfish were recovered following the oil spill. Other rockfish were exposed to hydrocarbons and showed sublethal effects. Furthermore, closures to salmon fisheries increased fishing pressures on rockfish which may be affecting their population. However, the extent and mechanism of injury to this species are unknown.

Recovery Objective: Without further study, recovery cannot be defined.

RECOVERY MONITORING STRATEGY: No monitoring strategy can be determined without definition of a recovery objective. Synthesis of NRDA studies and other data on PWS rockfish is needed, with recommendations for recovery objective and monitoring approach a requirement of the synthesis project.

Monitoring Schedule: None

Estimated Recovery Time: Unknown

RESEARCH AND GENERAL RESTORATION STRATEGIES: The only research or general restoration task that has been identified for rockfish is synthesis of the available information in order to determine if restoration is needed.

Sea Otters

Recovery Status: Sea otters do not appear to be recovering, but are expected to eventually recover to their prespill population. Exactly what population increases would constitute recovery is very uncertain, as there is no population data from 1986 to 1989, and the population may have been increasing in Eastern Prince William Sound during that time. In addition, only large changes in the population can be reliably detected with current measuring techniques. However, there are recent indications that the patterns of juvenile and mid-aged mortalities are returning to prespill conditions.

Recovery Objective: Sea otters will be considered recovered when population abundance and distribution are comparable to prespill abundance and distribution, and when all ages appear healthy.

RECOVERY MONITORING STRATEGY: The recovery monitoring program will track abundance and mortality of sea otters in oiled areas.

Abundance. Aerial surveys of sea otter abundance in areas of Prince William Sound most heavily impacted by the oil spill (areas around northern Knight Island and Naked Island) and in non-oiled areas of western PWS will be conducted in 1995 and 1997 and thereafter only if the number of sea otters in oiled areas remains lower than anticipated. Data on sea otter abundance collected as part of the seabird boat surveys will continue to be collected in the process of monitoring seabirds (at no extra cost to either the seabird or sea otter projects), and will be used to augment the aerial survey data on sea otter abundance in oiled areas. However, the aerial surveys have been developed specifically to provide accurate counts of sea otters whereas the boat surveys have been shown to be biased in their estimates. Thus data collected in the boat surveys will be relied upon only as supplementary information.

Mortality. Sea otter carcasses will be collected in oiled areas of Prince William Sound (the Green Island area) in the spring of 1995 and 1996. Ages of the otters at the time of death can be determined from the skulls. Pre-spill data on carcasses from this area indicated the proportion of prime-age otters in the carcass sample is normally low. However, mortality of prime-age otters was high post-spill, through 1991. Since then, mortality patterns appear to be returning to normal. Two more seasons of carcass collection will allow us to confirm that mortality patterns in the population are similar to prespill. An advantage of assessing mortality through collection of carcasses is that the work can be completed in a short time at a relatively low cost.

Monitoring Schedule:

1995	Aerial surveys, Carcass collection
1996	Carcass collection
1997	Aerial surveys
1998	Only if data collected in 1996 suggests recovery is not occurring
1999	Aerial surveys, if needed
2001	Aerial surveys, if needed

Monitoring Schedule Justification: Unusually low densities of sea otters have been observed in heavily oiled areas of PWS and no increases have been detected since the spill. Maximum annual growth rates in sea otter populations are 0.21. Based on an estimated annual increase of 0.10 and α and $\beta = 0.20$, a significant difference between two bi-annual surveys could be detected. If the annual change is 0.05, three surveys (1995, 1997, 1999) would be required to detect statistical significance.

Estimated Recovery Time: Unknown. No increase in population size has been observed since the spill.

RESEARCH: For sea otters, high priority is given to questions focused on the continued impacts of oiling, both by direct toxicity and altered community structure, and on prey limitation on recovery. Specific research hypotheses relative to these factors are: (1) direct exposure to hydrocarbons and ingestion of contaminated prey has impacted current or future survival and reproductive success of sea otters in Prince William Sound; and (2) the oil spill induced changes in population of benthic prey species that have limited re-occupation of sea otter habitat and the recovery of sea otters in oiled areas. See Chapter 3: Nearshore Ecosystem, and discussion of individual factors — community structure, direct toxicity and prey limitations.

GENERAL RESTORATION STRATEGIES: No general restoration strategies have been identified for the 1995 work plan.

Sockeye Salmon

Recovery Status: Sockeye salmon in Red Lake, Akalura Lake, and lakes in the Kenai River system declined in population because of adult overescapement in 1989. The Red Lake system may be recovering because the plankton has recovered, and fry survival improved in 1993. However, Akalura Lake and Kenai River Lakes have not recovered: smolt production has continued to decline from these lakes. In the Kenai River lakes, for example, smolt production has declined from 30 million in 1989 to 6 million in 1990, and to less than 1 million in 1992 and 1993.

Recovery Objective: Sockeye salmon in the impacted lakes will have recovered when populations are able to support overwinter survival rates and smolt outmigrations comparable to prespill levels.

RECOVERY MONITORING STRATEGY: In Red Lake and Akalura Lake, monitoring of smolt outmigrations. In Kenai River lakes, monitoring of fall fry abundance and smolt abundance to estimate overwinter survival and smolt production.

Monitoring Schedule: Annually until recovery objectives have been met, and for two subsequent years after smolt productivity has returned to normal. Thus two more years of monitoring at Red Lake are required to confirm recovery, while at least seven years of monitoring will be necessary at Kenai and Akalura Lake to monitor productivity through returns of year-classes damaged by spill-induced overescapements.

Estimated Recovery Time: For Akulara Lake and Kenai River lakes, recovery time is unknown, but is believed to be a minimum of seven years. Red Lake may be considered fully recovered in two years.

RESEARCH: High priority research concerning sockeye salmon entirely concern ecosystem processes. See Chapter 3: Upland Ecosystem, and discussion of individual factors — community structure, prey limitation, predation, and competition.

GENERAL RESTORATION: Stock-separation information to help management protect injuried sockeye salmon is a high priority general restoration technique.

The diminished sockeye salmon smolt production in the Kenai and Kodiak area lakes is likely to prompt the Alaska Department of Fish and Game to restrict the fishery. Fishermen harvest both injured and healthy sockeye salmon runs. There is a need for more information to allow the Alaska Department of Fish and Game to vary harvest regulations by time or location to minimize incidental catch of the injured runs. This task typically involves some type of marking so that fisheries managers can determine the portion of the catch (at different locations and times) that originates from the different runs. This information is beyond that historically gathered by the department and would allow it to manage fishing to protect the injured runs — to minimize interference with natural recovery.

Subsistence

Recovery Status: Subsistence users say that maintaining their subsistence culture depends on uninterrupted use of subsistence resources. The more time users spend away from subsistence activities, the less likely they will return to the activities. Continuing injury to natural resources used for subsistence may affect the way of life of entire communities.

Recovery Objective: Subsistence will have recovered when injured subsistence resources are healthy and productive and exist at prespill levels and people are confident that the resources are safe to eat. One indication that recovery has occurred is when the cultural values provided by gathering, preparing, and sharing food are reintegrated into community life.

RECOVERY MONITORING STRATEGY: Other than completion of laboratory sample analysis and result reporting to Native Villages, no new samples will be collected through FY95. Harlequin duck and harbor seal monitoring studies (see each resource above) are important for promoting confidence of subsistence users in wild foods.

Monitoring Schedule: See above

Estimated Recovery Time: To be determined

RESEARCH AND GENERAL RESTORATION STRATEGIES: Some research and general restoration strategies intended to restore subsistence are included under the individual commercial fishing resources including pink salmon, sockeye salmon, herring, and harbor seals.

Other Research Priorities for FY 95 include clam recruitment projects. Subsistence users are reporting smaller and fewer clams at some sites previously used for subsistence gathering.

General Restoration Priorities for FY 95 include completion of 94279, Subsistence Food Safety Testing, including laboratory analysis of 1994 samples. Result reporting through newsletters and community followup meetings will be needed to accomplish the goals of this project. The newsletter will include all that was reported in other Trustee Council sponsored projects that have information which applies to subsistence communities.

Project 94272, Chenega Chinook Salmon Release, will continue for another 4 years. Project 94244, Harbor Seal and Sea Otter Cooperative Subsistence Harvest Assistance, will need to continue in order to meet project goals.

Subtidal Organisms

Recovery Status: Certain subtidal organisms, like eelgrass and some species of algae, appeared to be recovering. Other subtidal organisms, like leather stars and helmet crabs, showed little signs of recovery.

Recovery Objective: Subtidal communities will have recovered when the community composition, age class distribution population abundance of component species, and ecosystem functions and services in each injured subtidal habitat have returned to levels that would have prevailed in the absence of the oil spill.

RECOVERY MONITORING STRATEGY: Focus on the eelgrass community in Prince William Sound. A matched-pair design is recommended.

Monitoring Schedule: Eelgrass sites should be monitored in 1995. Further monitoring should be dependent upon the results of this 1995 effort.

Estimated Recovery Time: Unknown

RESEARCH: The high priority research issues for the nearshore ecosystem, including intertidal and subtidal organisms, are entirely ecosystem process questions. See Chapter 3: Nearshore Ecosystem, and Community Structure. See also discussion of other factors — predation, competition, and climatic/oceanographic factors.

GENERAL RESTORATION: No general restoration strategies have yet been identified for the 1995 Work Plan.

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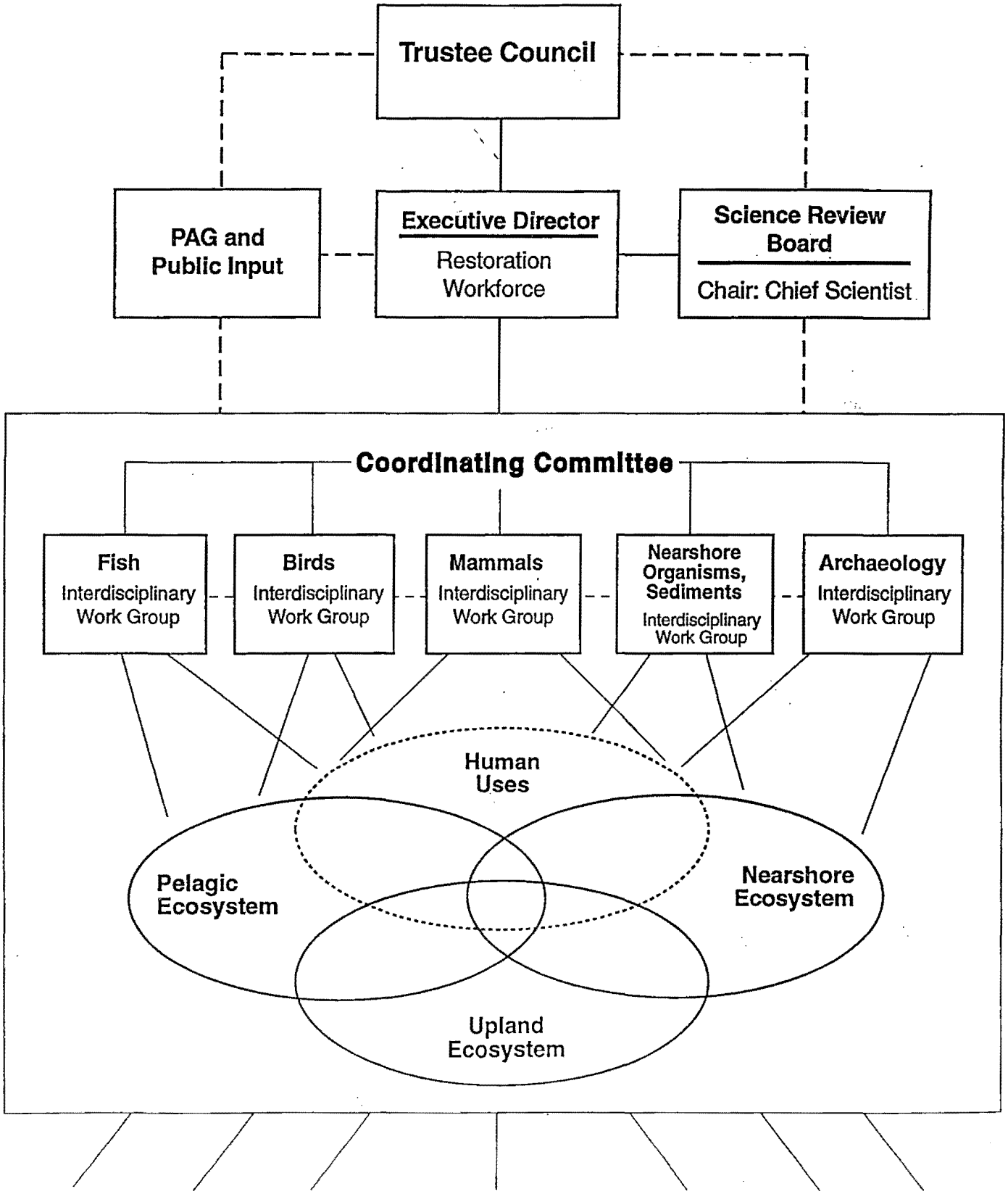
Management and Science Planning Organizational Diagram



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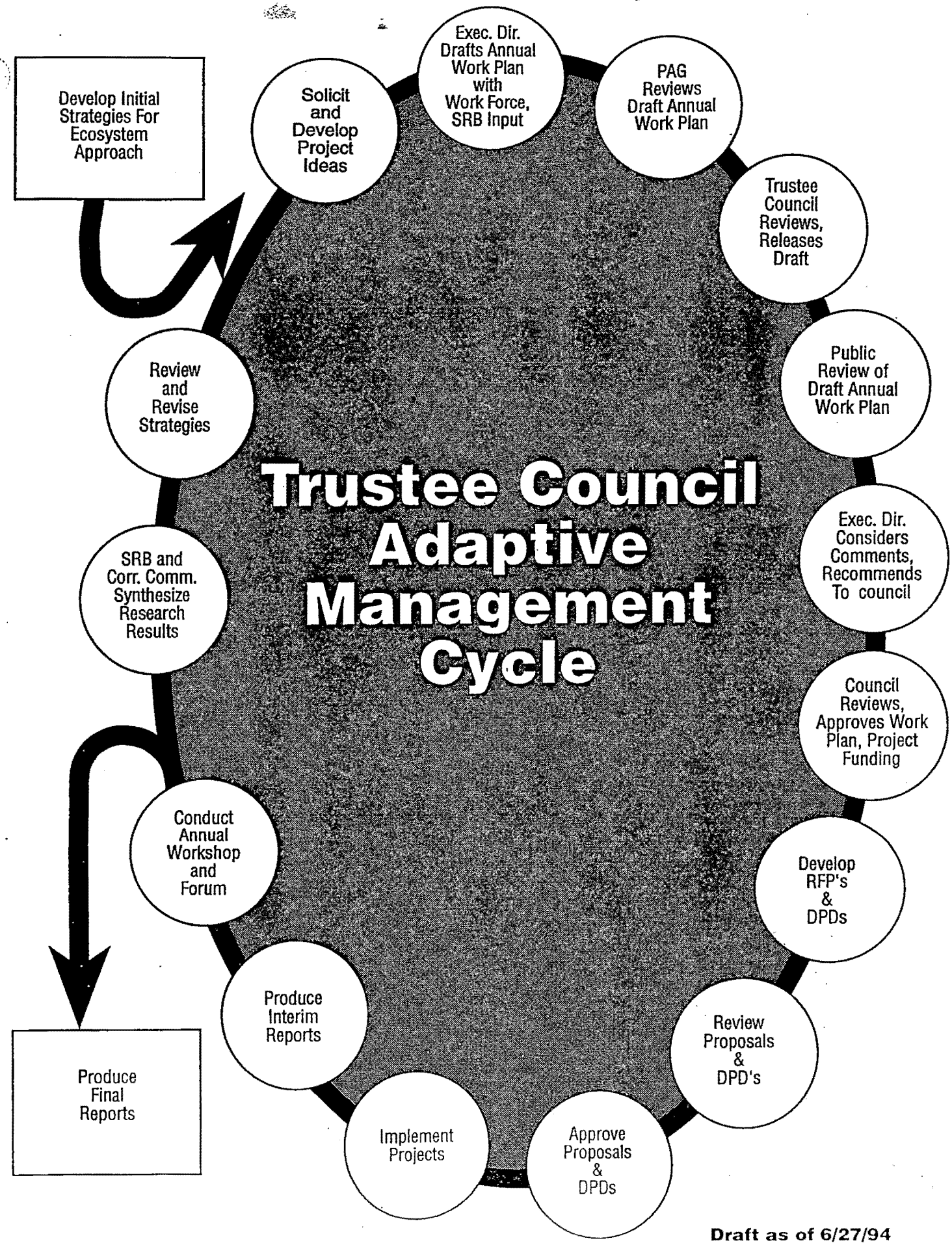

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Ecosystems and the Spill Affected Area
A narrative for the *Exxon Valdez* Oil Spill Trustee Council

Glenn Patrick Juday, Associate Professor of Forest Ecology, Forest Sciences Department, University of Alaska Fairbanks, Fairbanks, Alaska 99775-0080, (907) 474-6717 Work, 474-7439 FAX; (907) 479-3765 Home
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1. The nature of ecosystems and restoration management.

When different objects interact and produce roughly predictable outcomes we call it a system. We all experience systems every day, such as weather systems, systems of flowing water, and ecosystems. All life on the planet earth, especially human life, is sustained by ecosystems. Ecosystems are made up of two components - 1) living plants, animals, and microbes and 2) the non-living physical word that sustains or limits them. Any observer can see that life is not distributed randomly or unpredictably across the earth or even local parts of it, but instead life seems to occur and survive over time according to certain rules. An ecosystem is simply the interacting forms of life and their physical environment in a given defined area. In this sense the ecosystem concept can be applied to something as small as a single stream or to the entire North Pacific Ocean. In fact, different species have become specialized in making their living at both of those extremes in scale.

Natural resource management consists of making and implement decisions to harvest, protect, or restore ecosystems to meet human needs or values. Resource management cannot successfully be carried out by considering only a single resource in a limited area over a short period of time. For example the number of salmon that can be taken from a coastal Alaska stream in a given year depends on how productive the ocean and stream have been over a number of years, the number and needs of human users, the number and legal status of wildlife predators, the weather and many other factors. As a result, in order to both measure the effect of the *Exxon Valdez* oil spill and to design a program to restore the area affected by it, a good understanding of its ecosystems is vital. The notion of restoring an ecosystem depends critically on knowing what ecosystems are and some idea of what the restored ecosystem condition is.

2. Natural setting of the spill-affected area.

The spill-affected area is one of the most intact, productive, and dynamic interactive land-air-sea systems of high productivity in the world. The geologic forces that continue to shape the land, often within a human lifetime, include earthquakes, glaciers, storm battering of the land, and volcanoes. Some of the strongest expressions of these forces to be found on earth are on display in the spill area. One of the earth's great storm breeding areas is located west of the spill area, producing weather characterized by impressive waves, wind, snow, or rain. Some of the steepest coastal mountains in the world rim the spill-affected area and define its watershed. The mountainous watershed of the spill area and contiguous territory to the east is the largest area of permanent snow and ice in the world outside the Antarctic and Greenland ice sheets. The primary productivity of the marine ecosystem of southcentral Alaska ranks high in worldwide terms. Humans have been part of this ecosystem for thousands of years and developed ways of life based on use of the resources of the land and sea. Residents of the spill area today have continued many aspects of these ways of life and adapted them to new opportunities and circumstances. The abundant food resources and the largely intact and uninhabited upland, shoreline, and nearshore habitats provide for a notable number and diversity of large marine animals.

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The freshwater streams of the spill-affected area experience extremely low levels of industrial pollution. Watersheds in the area have been disturbed only lightly or not at all by human activities to date. As a result aquatic habitat quality is excellent and contributes to one of the most productive fisheries in the world. Many of the birds and mammals in the ecosystem of the spill-affected area seek out small, predator-free islands or rocky headlands for resting, breeding, or other special needs. The spill-affected area contains some of the most significant marine mammal habitat in the world. The spill-affected area is one of the most northerly migratory bird overwintering areas in North America. Many birds use the spill-affected area for breeding or as a seasonally important staging habitat during migration. The spill-affected still contains healthy populations of large predators such as the brown bear that have been eliminated across large areas elsewhere as humans have claimed the resources and habitats they need. As crowding of the human population into the world's coastal zones and degredation of the natural systems of coastal areas around the world continues, the relative value and rarity of the of the North Gulf of Alaska coastal and marine ecosystem increases.

Geology

Geological features of the spill-affected area directly control several important natural systems functions. The mountain and shoreline configuration guide and interact with wind and water currents. The geochemistry of bedrock types controls the type of soils and plant communities that develop. Surface movements such as land uplift, beach erosion, or landslides disturb or renew soils and communities of plants and animals. The North Gulf of Alaska coast is a young but geologically complex region defined by an arc of southern Alaska mountains. The Pacific Plate is moving northwest at about 6 cm per year, causing a collision with southern Alaska (figure 1.) The stress of the collision has attached the terranes that make up southern Alaska, thrown up high mountains, and forced the Pacific Plate to dive under (subduct) Alaska (figure 2.) The Aleutian Trench marks the line where the Pacific Plate is diving beneath the North American continent.

The region is characterized by intense tectonic activity including numerous earthquakes, active regional uplift, numerous thrust faults, crustal shortening, and occasional crustal subsidence. Figure 3 shows a cross section of these forces in action in the spill area. Strain that gradually accumulates on this system is released suddenly through earthquakes about every 750 to 1,200 years. The Great Alaska Earthquake in late March of 1964 was the largest ever recorded in North America and caused the more extensive land surface adjustment known in the 20th century. The tectonic adjustment associated with the 1964 earthquake moved coastal southcentral Alaska about 33 feet (10 m) seaward and uplifted parts of Montague Island over 20 feet (7 m), while areas in the northwest Sound subsided about 6 feet (2 m). Intertidal communities on shorelines raised above sea level were wiped out, and on those sites the *Exxon Valdez* oil damaged communities developed largely since 1964. A distinctive ring of new beaches and rock shelves marks the uplifted shores, indicating that storms, currents, and erosion rapidly are building gravel beaches. A significant amount of oil was deposited on these beaches and has been buried by continuing gravel accumulation.

High mountains intercept abundant loads of precipitation, which falls primarily as snow in the higher elevations. Because more snow falls than can be melted in the summer, the snow accumulates into a thick pack that compacts lower layers into ice. The ice begins to flow as glaciers down the mountain slopes and can reach tidewater. The spill-affected area is one of the great tidewater glacier regions of the world. The mountain glaciers of Prince William Sound and the southern Kenai Peninsula are one of only a handful of places in the world where glaciers and forests are in currently contact over an extensive area. One of the last major deglaciation events that will happen for some time to come is at Columbia Glacier, which has retreated about 4 miles (6.5 km) since 1985. The

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waters of inner Prince William Sound and the southern Kenai Peninsula are significantly chilled, diluted by freshwater, and made turbid by both meltwater and icebergs of the mainland glaciers.

Intertidal and subtidal rocky headlands support highly productive kelp forest ecosystems. The adjacent Copper River Delta contains fine sediments protected behind a sandy barrier island rim, the result of rapid sorting of a very large glacial sediment load. Active shoreline erosion and the subsidence of former mountain peaks along with sea level rise has created isolated small islands in the Sound and Gulf that offer freedom from land predators in the midst of a rich area of marine productivity; as a result small islands in the region are among the most outstanding marine mammal and seabird habitats in North America.

Climate and Ocean Conditions

Figure 4 shows the average position of atmospheric high pressure (descending air) and low pressure (rising air) over the North Pacific. The circulation of air about these pressure systems brings cold and warm air into contact in the southern Gulf of Alaska causing clouds, winds, and a storm front. The tracking of this storm front along the intermediate lines of atmospheric pressure strength takes the mean path into southeast Alaska and then up along the North Gulf coast into the spill area from the southeast. The extreme uplift at latitude 60° north has created a steep arc-shaped mountain backstop catchment area . Numerous Gulf of Alaska low pressure weather systems following the Aleutian storm track stall and dissipate against the mountain barrier. Figure 5 shows the how the interaction of solar energy with the complex land and sea surfaces of the spill-affected area produces different types of weather.

The resulting forced orographic uplift causes abundant precipitation occurring as rain at lower elevations and snow in higher elevations. Figure 6 shows that the steady succession of storm fronts and air movement over the surface of North Pacific is associated with a major ocean current system of the same name. The northeast Pacific current systems form a major loop, called the Alaskan Gyre, which is a major factor in the life cycle of anadromous fish and marine life originating in Alaska.

Hinchinbrook Entrance, defined by the gap between Hinchinbrook and Montague Islands, receives a loop of the Alaska Coastal Current which introduces relatively unmodified oceanic water from the open Gulf of Alaska into outer Prince William Sound. The marine biota of the outer Sound are markedly different that in the inner Sound, and regional-scale climatic differences caused by the contrasting waters are noticeable also. Figure 7 shows the mean current pattern near Bligh Reef in Prince William Sound, the site of the spill, in March 1989. Strong inflow through Hinchinbrook Entrance was happening, and return flow carried relatively fresh unweathered oil with a high toxic component onto the shores of Naked, Peak Story, Knight, and Green Islands among others.

Because of the endless succession of strong storms and the steep coastal mountains, Prince William Sound and North Gulf shorelines are largely wave-battered rocky headland and alternating high energy gravel beach. Fine sediments in the intertidal zone are not as common along the North Gulf of Alaska as many other coastlines. Fine sediments (mud) tend to trap oil, sealing it from exposure to light and oxygen that break down the toxic fractions in the oil. Trapped oil can seep out in small amounts over many years. Local shorelines of fine sediment in sheltered waters of the spill area that received a heavy load of oil from the *Exxon Valdez* spill will probably leak relatively unweathered oil for some time to come. The oil that coated wave-battered gravel beaches has been attacked and broken down relatively efficiently.

South coastal Alaska experiences a semidiurnal tidal cycle; two unequal high and two unequal

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low tides occur approximately daily. The difference in elevation between the high and low tides in the spill-affected area is among the greatest of the world's coastlines. This great tidal magnitude influences a variety of forms of life and makes an extensive intertidal zone with its unique forms of life throughout the spill area. Because the oil was delivered to beaches (where some is still buried) by the tides, a careful understanding of tidal processes is a useful to key to monitoring and restoring spill-affected ecosystems.

Mean annual air temperatures in the spill-affected area are largely controlled by ocean temperatures, which vary from about 4° C in the winter to about 14° C in the summer, and by ocean currents. Valdez at the extreme northern limit of deep tidewater shoreline, even with its heavy snowfalls, experiences a relative mild mean annual temperature (fig. 8). The long-term record hints at a regular trend of high and low temperatures. Most of the shore based weather stations around the Gulf of Alaska have experienced a temperature cycle of a little over 18 years between peaks (fig. 9). This major shift in the physical environment probably has major effects of many of the injured resources, although the question is only now being investigated carefully.

3. General rules of ecosystems.

A. Energy drives ecosystems. All of life is based on capturing energy and harnessing it to the purposes of life such as growth, reproduction, and movement. All ecosystem food energy in the spill affected area comes from the harvest of sunlight by photosynthetic plants and small plant-like marine organisms. Ecosystems store food energy in carbon compounds, and carbon gain serves as a measure of energy capture or **primary production.** An adequate understanding of the spill affected ecosystem will include a reasonable accounting of primary production. For example, how much primary production is available to spill-injured species? What other species compete for it?

B. The amount of sunlight energy captured by plants and marine organisms is the base for all animals and their numbers cannot exceed this food supply except for brief periods of time when they live off stored food. Most of the energy arriving in an ecosystem from the sun simply warms the earth's surface or moves water; only about 0.1% of the sun's energy is captured by green plants and photosynthetic marine organisms. This first building block of primary producers of food on the pyramid of life is called the **first trophic level.** Annual primary production at the first trophic level sets an upper limit on the entire system. Anything that enhances or interferes with the annual harvest of the sun's energy will affect the entire ecosystem. Several questions about energy flow are important to know for spill restoration purposes. For example, what factors in the environment control or limit the primary production that reaches spill-affected species? How did the spill and cleanup measures affect primary production? Does primary production in spill-affected areas change over time according to any pattern? What are the long-term effects from the spill on the basic pattern of primary production in the spill area?

C. High quality sun energy flows in one direction through ecosystems, is gradually degraded in a stepwise fashion, and ultimately is dissipated as diffuse heat. Energy is constantly introduced into the ecosystems of the spill-affected area from sunlight, warm currents of water heated elsewhere, wind and ocean currents, and the stored

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energy of clouds and atmospheric moisture. Once it is brought into the system, the different forms of energy perform different ecosystem support functions. When the energy of clouds is released and falls on the land as precipitation it is turned into the energy of moving water (fig. 5). Major ocean currents transport drifting organisms and spread their reproductive structures just as they transported and spread the oil spill (figs. 6 and 7). Because of the high latitude location of the spill-affected area, imported energy in the form of ocean currents is particularly important for many components of the ecosystem. The ultimate fate of all this energy is to dissipate as low quality energy or warmth. Energy does not cycle, it moves in one direction and is lost. Because food energy is constantly being used and degraded to lower quality forms of energy (low grade heat) in an ecosystem, the annual cycle of primary production is the most important event in the whole ecosystem. The spill affected and is continuing to affect the annual cycle of primary production in many both direct and indirect ways.

D. Energy is not passed along efficiently when one organism eats another. Each time one organism eats another it captures no more than about 10% of the energy content present in what it is eating. Each step of consumption in an ecosystem is called a trophic level. Primary producers are at the first trophic level. Animals that eat primary producers live at the second trophic level and are called **primary consumers**. Animals that eat primary consumers live at the third trophic level and so on. Figure 10 shows these trophic relationships. The total number of trophic levels from a primary producer to the final consumer is called a food chain. However, at virtually every trophic level animals face a variety of organisms that they could eat and that might eat them, so a better term for trophic level relationships in real ecosystems is a **food web**. Much remains to be learned of food webs in the spill area and in some of its marine ecosystems predator and prey reverse roles at different stages of their life cycles. Because the energy transfer from trophic level is so low and food energy flows only out of ecosystems after primary production, the numbers and biomass of animals higher and higher up in trophic levels must decrease. The term for the profile of numbers or biomass upward through the trophic levels of a food web is **trophic pyramid** (fig. 10). The highest trophic level animals will always be the most limited in numbers or biomass (rarest) in an ecosystem. A very high proportion of the identified damaged resources are higher trophic level animals. Other organisms lower in trophic level were certainly injured, but the summary effect of an ecosystem injury in one simple sense can be measured in the population status of the higher trophic level animals.

E. Nutrients and other elements cycle in ecosystems. Most living tissues are made up primarily of carbon, hydrogen, and oxygen which are generally readily available in any ecosystem. But **nitrogen, phosphorus**, and in some marine systems, **silicon** are needed in such quantities that their availability can become limiting, including spill-affected ecosystems. Restoration and management of the spill-affected ecosystem requires some knowledge of the pathways of major nutrients or other elements. In terrestrial ecosystems nutrients are taken up in plant and animal tissues and then fall to the ground where they become food for decomposers who release the elements back into the soil. In marine and aquatic systems dead organisms sink and take the elements in their tissues to the bottom. If the water is

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deeper than light can penetrate then the elements that decomposers release from them are unavailable to photosynthetic organisms. Processes that return bottom water back to the illuminated surface waters are crucial in aquatic and marine systems. Because water is most dense at 4° C cooling water to this temperature is one of the most efficient promoters of productivity in deep water systems. Wind driven currents can also bring bottom water to the surface. Figure 11 shows in an idealized way how the limitation of nutrients interacting with solar energy controls the production of plants and animals in a high latitude marine ecosystem such as the spill area.

Oil and oil breakdown products are complex, and often biologically active, carbon compounds that can be passed from the environment to organisms or from organism to organism. Toxic materials that are biologically active (readily incorporated into living tissues) usually occur in greater and greater concentrations as they pass through trophic levels in food webs. As a result of this biological magnification effect, higher trophic level animals can be at risk from even relatively dilute quantities of toxic materials released into the environment. On this basis monitoring and testing of some injured resources may need to continue for many years into the recovery process.

F. Ecosystems are dynamic and constantly change through time. Natural disturbances are common in the dynamic environment of the spill-affected area. On the land or in intertidal and subtidal habitats these disturbances are usually patchy in size and happen on different time scales, resulting in a more diverse environment overall. The *Exxon Valdez* oil spill imposed a massive disturbance resulting in the simultaneous death of many plants and animals. For many of the injured resources, most members of their populations are now concentrated in similar size and age classes.

It is very tempting to regard any change noticed since the spill as being caused by it, especially an unwanted change. But the ecosystem of the spill affected area changes naturally and as a result of other human activities now and in the past. Our model of a restored ecosystem in the spill-affected area will have to accommodate these natural changes, sometimes very large and significant changes. Truly, the problem of determining the "natural background" condition of a large ecosystem such as the spill area is a case of a "moving goal post" by which we measure it. This is why it is vital to determine *how* the ecosystem works, because that insight is actually a indispensable key to understanding the continuing impact of the spill and judging the suitability of policies and actions to restore injured resources.

G. Diversity in forms of life is an important way ecosystems cope with a diverse and changing environment. This concept, known as biodiversity, includes variety in numbers and abundance of species, genetic variety within a species, and variety in the pattern and arrangement of ecosystem types on a landscape. Most people are familiar with the fact that in terrestrial ecosystems the number of species decreases from the equator to the polar regions. In the sea, however, the gradient of change is not as great or rapid. The marine systems of spill-affected area are rich in species, but work remains to be done in identifying the number of species. The spill reduced the number of species in local areas, but its continuing effect on the

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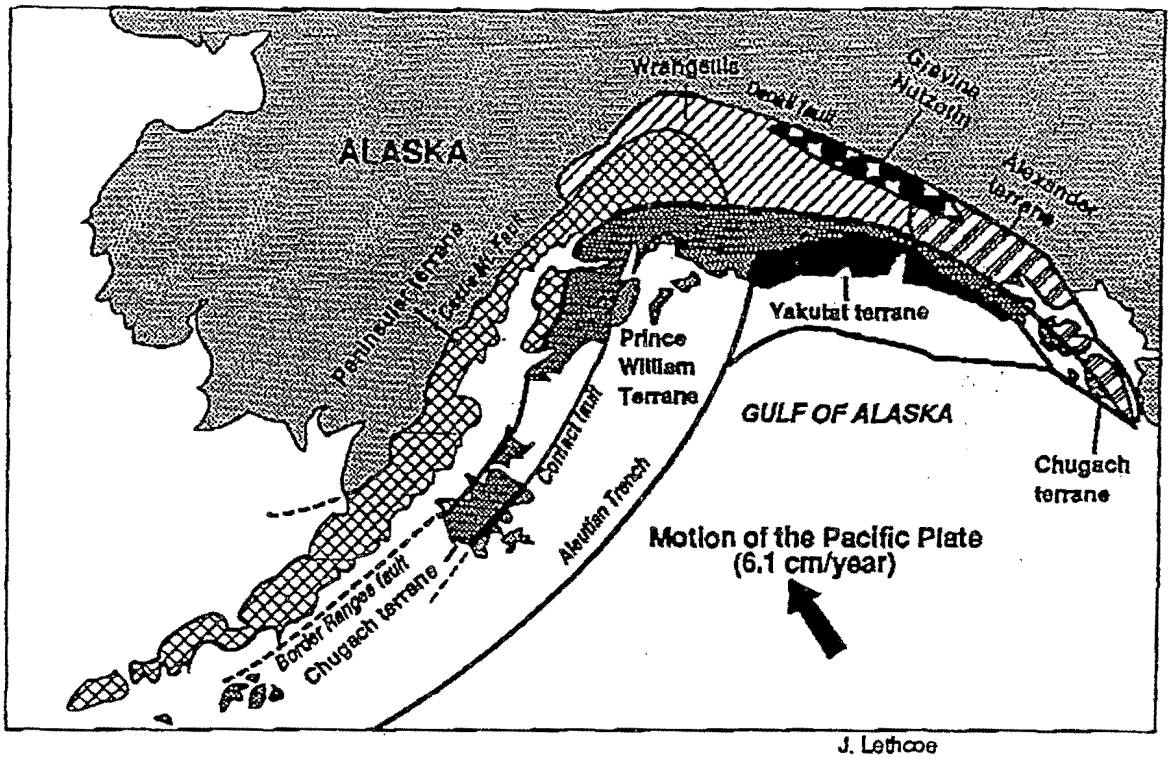
diversity of species and their natural relative abundance is not clear. A region supports species diversity not only as overall numbers of species, but some regions such as the spill-affected area serve as the centers of distribution for certain species or species groups. The variety and population density of marine mammals and seabirds makes the spill-affected area an especially important part of their overall prospects for survival.

The survival advantages of genetic diversity are great; the offspring of most higher plants and animals that result from the mating of closely related individuals survive and perform poorly. As a result, the reduction in numbers or isolation of higher trophic-level animals, limited already because of energetics, can be a matter for concern in an environmental restoration program. Many populations made up of similar or uniform genotypes offer reduced resistance to diseases and a limited ability to respond to extremes of habitat conditions. Some populations of fish in the spill-affected area are genetically discrete on a geographic. In those cases heavy mortality or a reduced population don't subtract small numbers of a random sample of all genes, they can effectively eliminate particular gene types from the species population.

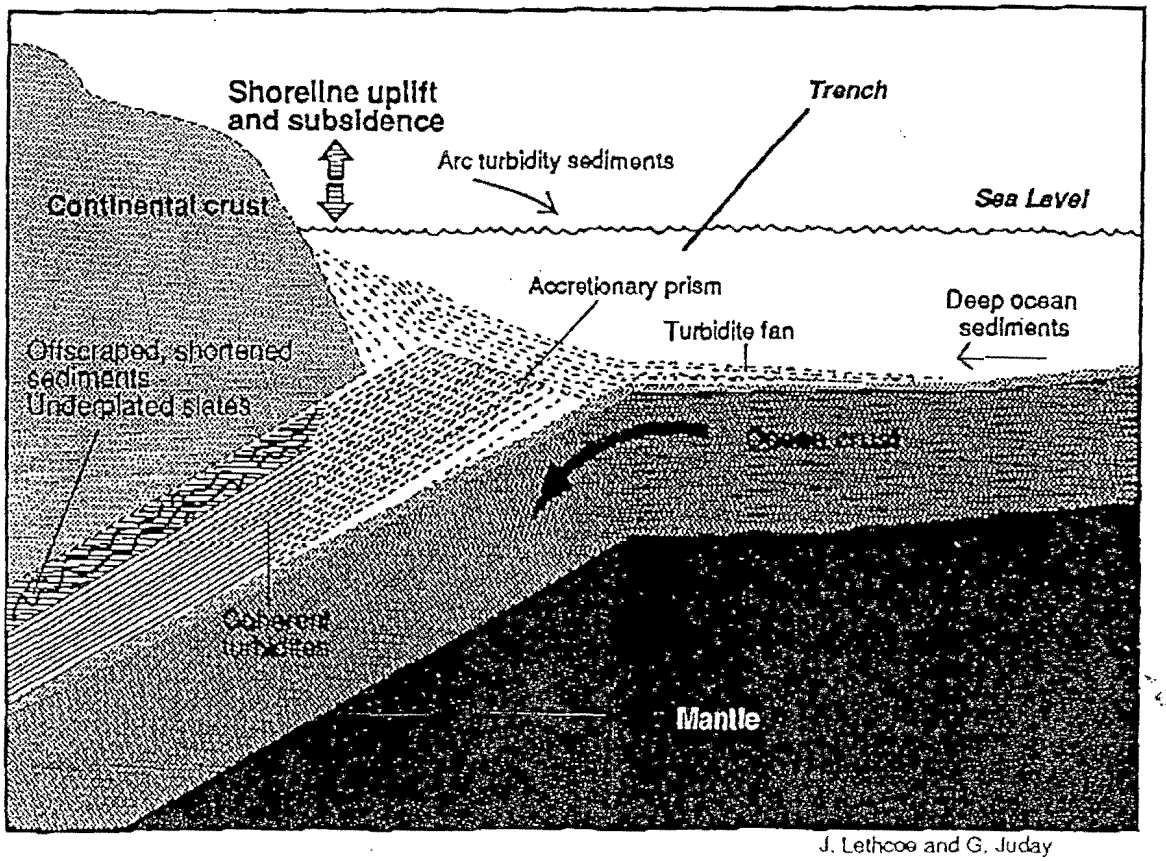
Diversity of habitat or ecosystems found within a landscape can offer survival opportunities for plants and animals that would otherwise not be available. For example, marbled murrelets spend much of the breeding season commuting between nests in large old trees and coastal waters where they feed. Harbor seals and Steller sea lion can be locally limited by the availability of haulout sites within a suitable distance of marine feeding areas. A diverse landscape can truly become more than the sum of its parts.

Figure 1.Geologic setting of the spill-affected area



J. Lethcoe

Figure 2. Features associated with a subducting coastal margin



J. Lethcoe and G. Juday

Figure 3. Cross section of subduction of the Pacific plate in the spill-affected area

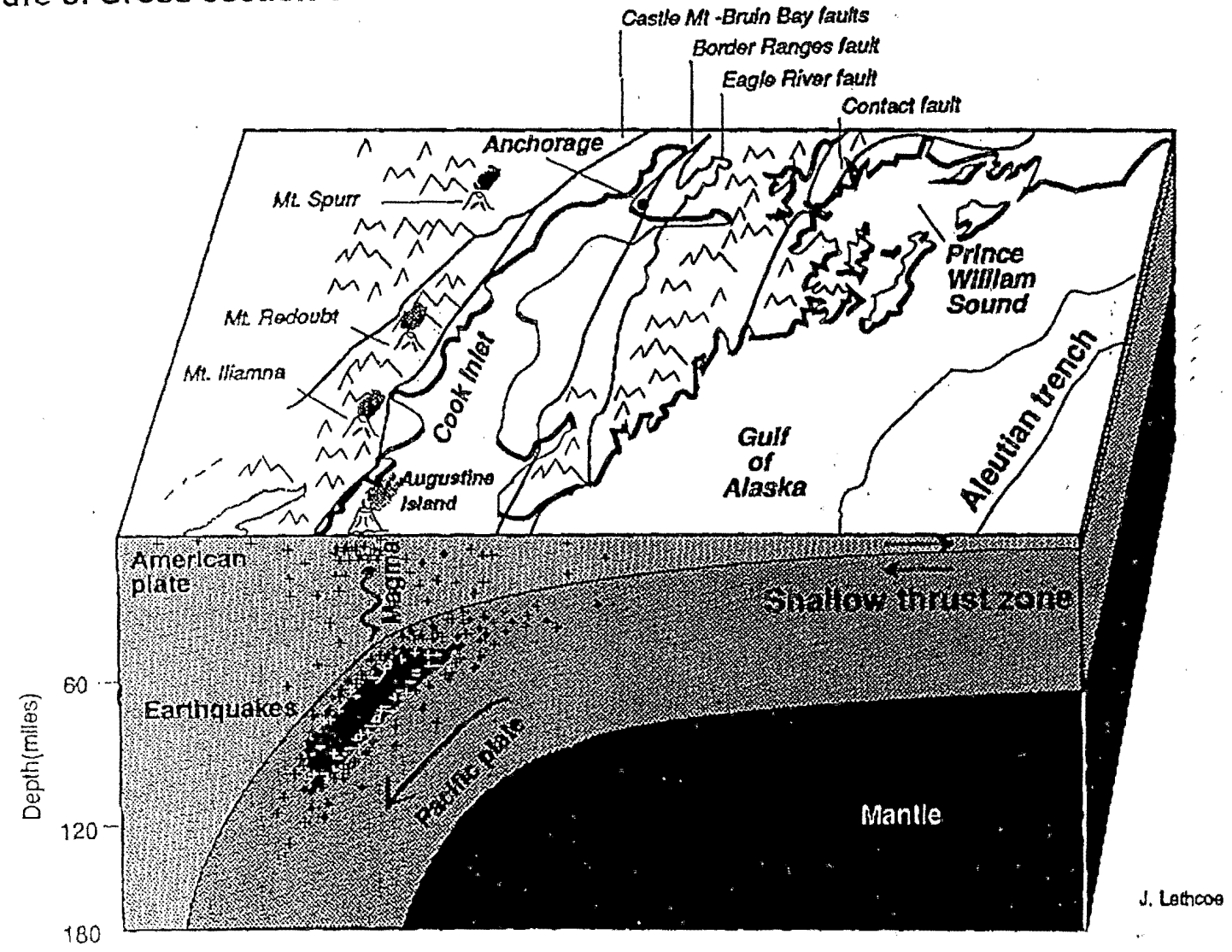
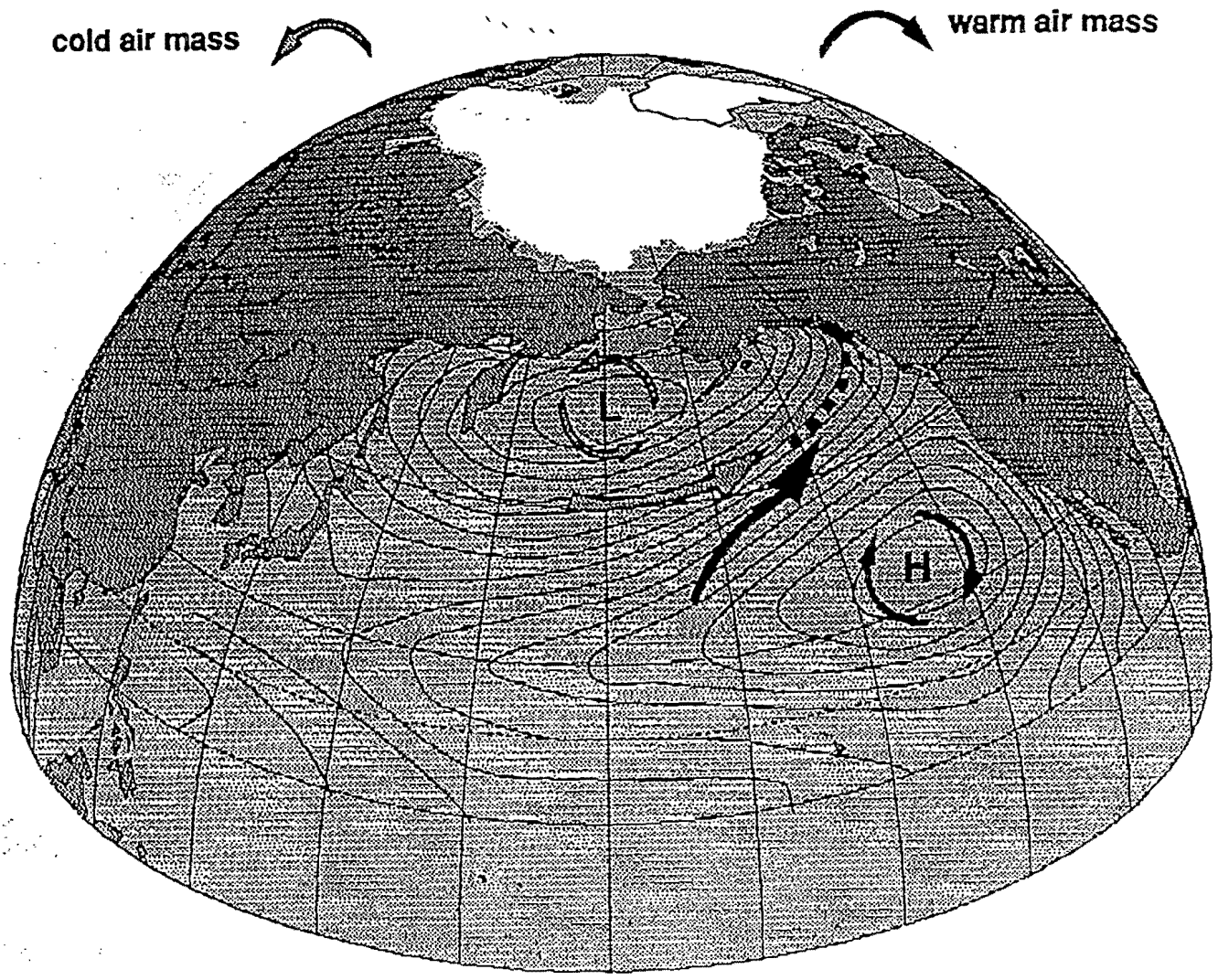
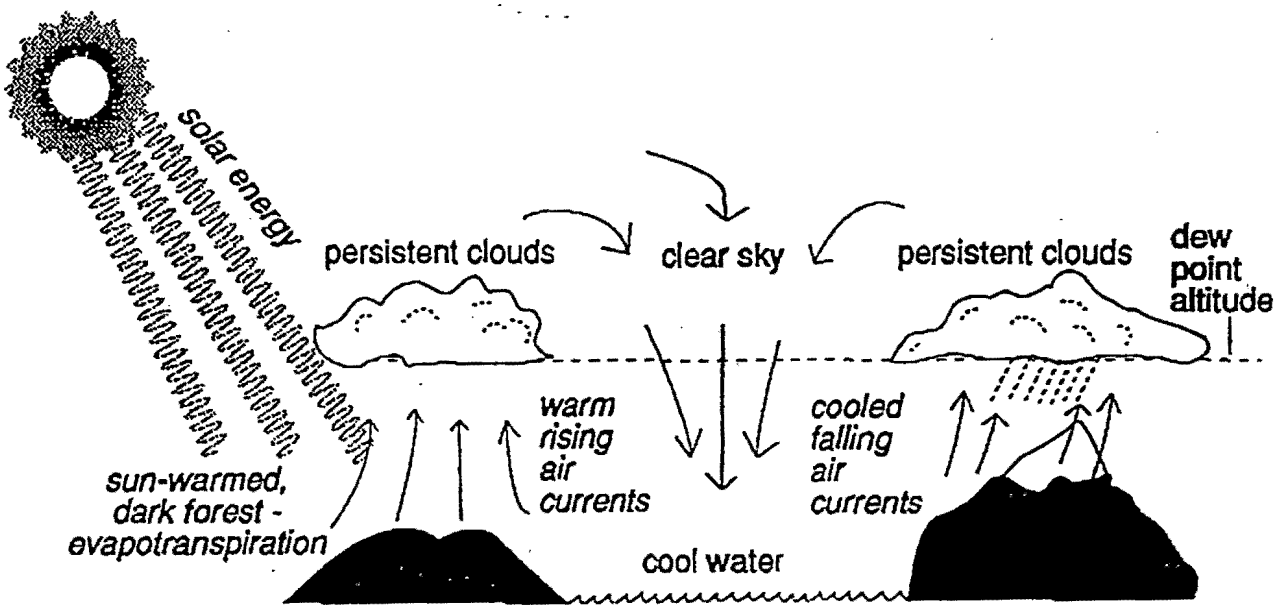


Figure 4. Mean sea level pressure and atmospheric circulation in the North Pacific Region 1946-1988



G. Juday adapted from: Salmon (1992)

Figure 5. Different response of land and sea surfaces to solar energy in the hydrological cycle



G. Juday adapted from J. Lethcoe

Figure 6. North Pacific region current systems, and location of Alaskan Gyre and area of storm formation

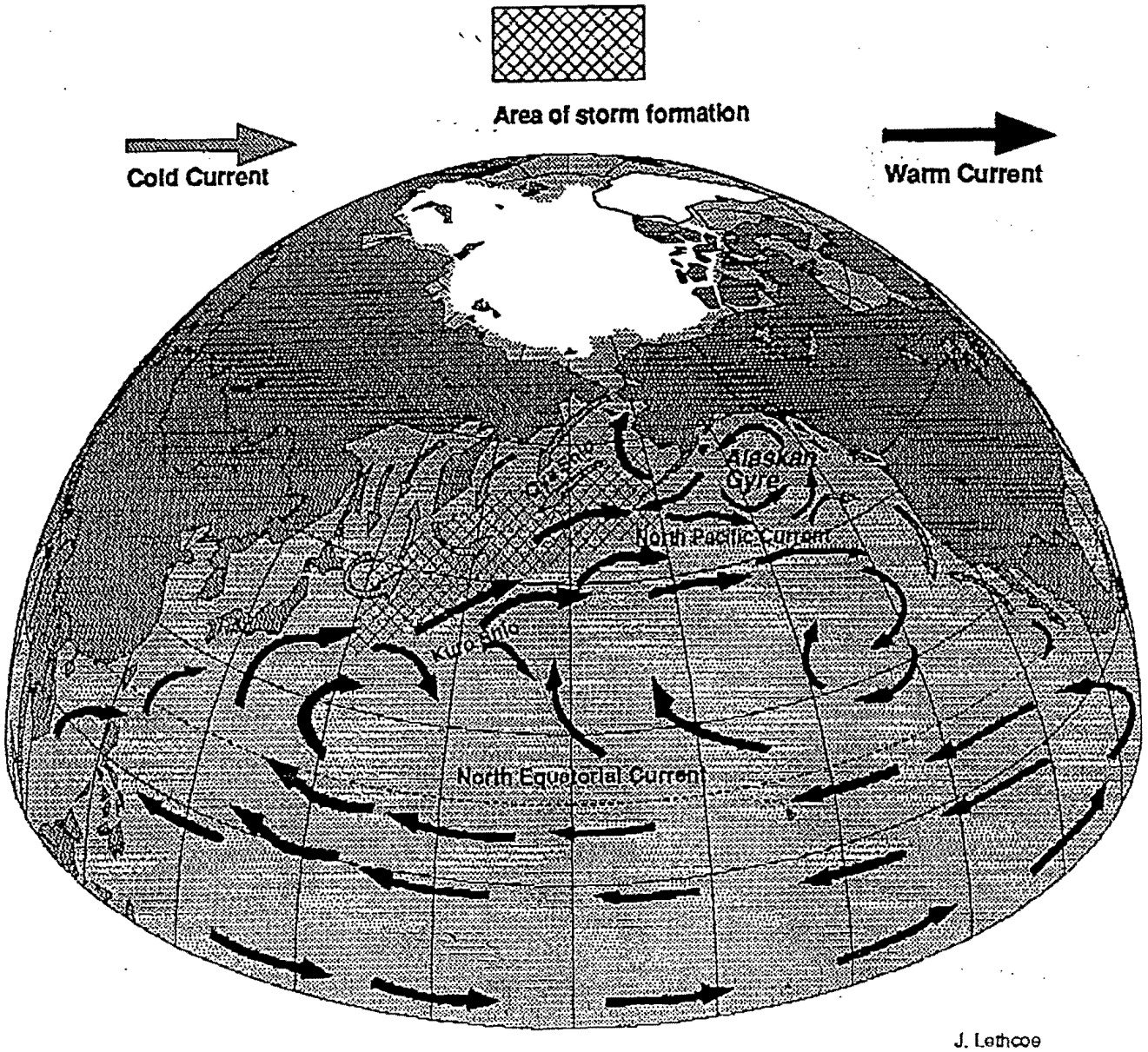
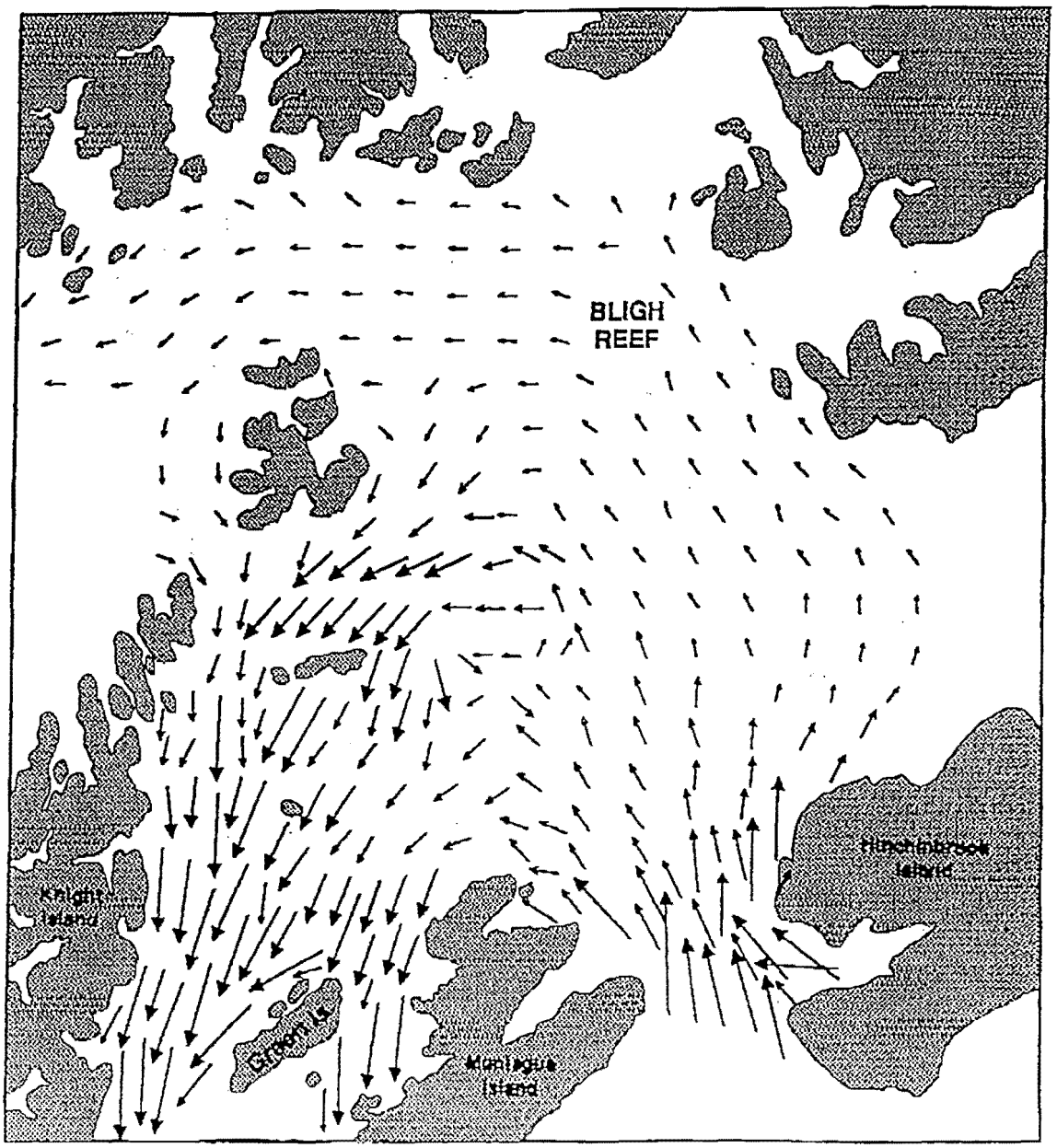
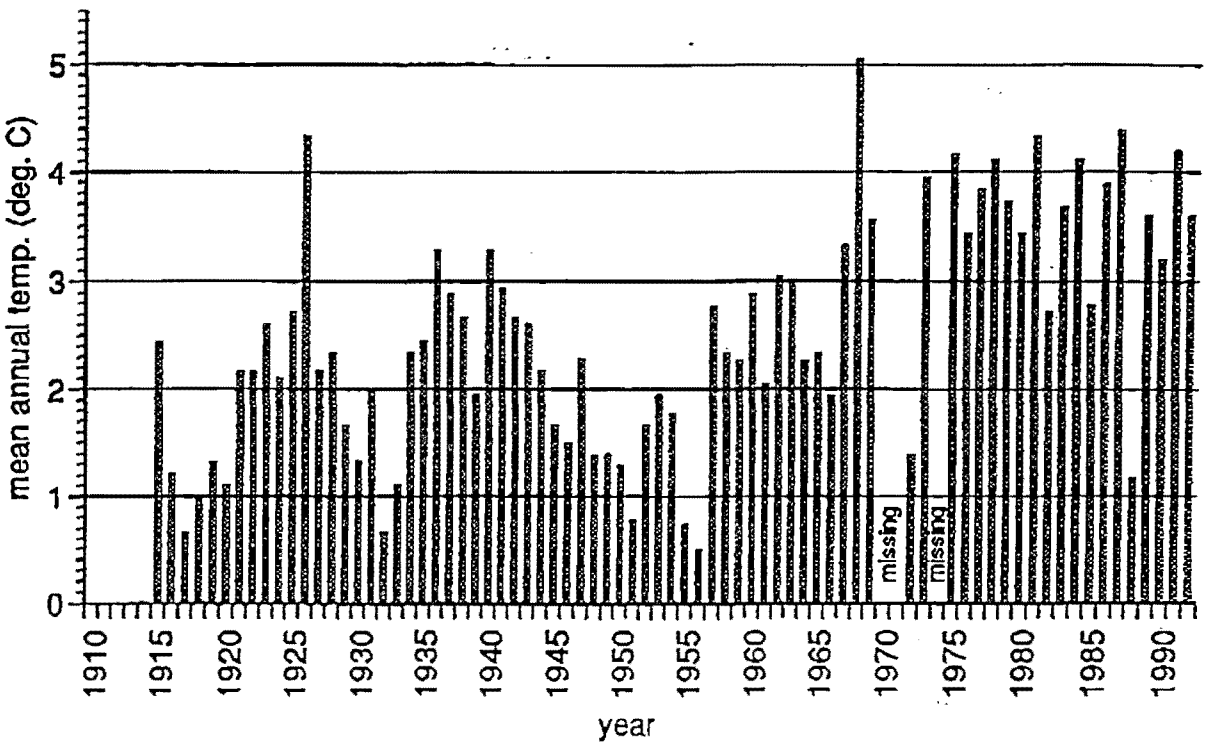


Figure 7. Mean current pattern immediately following *Exxon Valdez* oil spill, March 1989



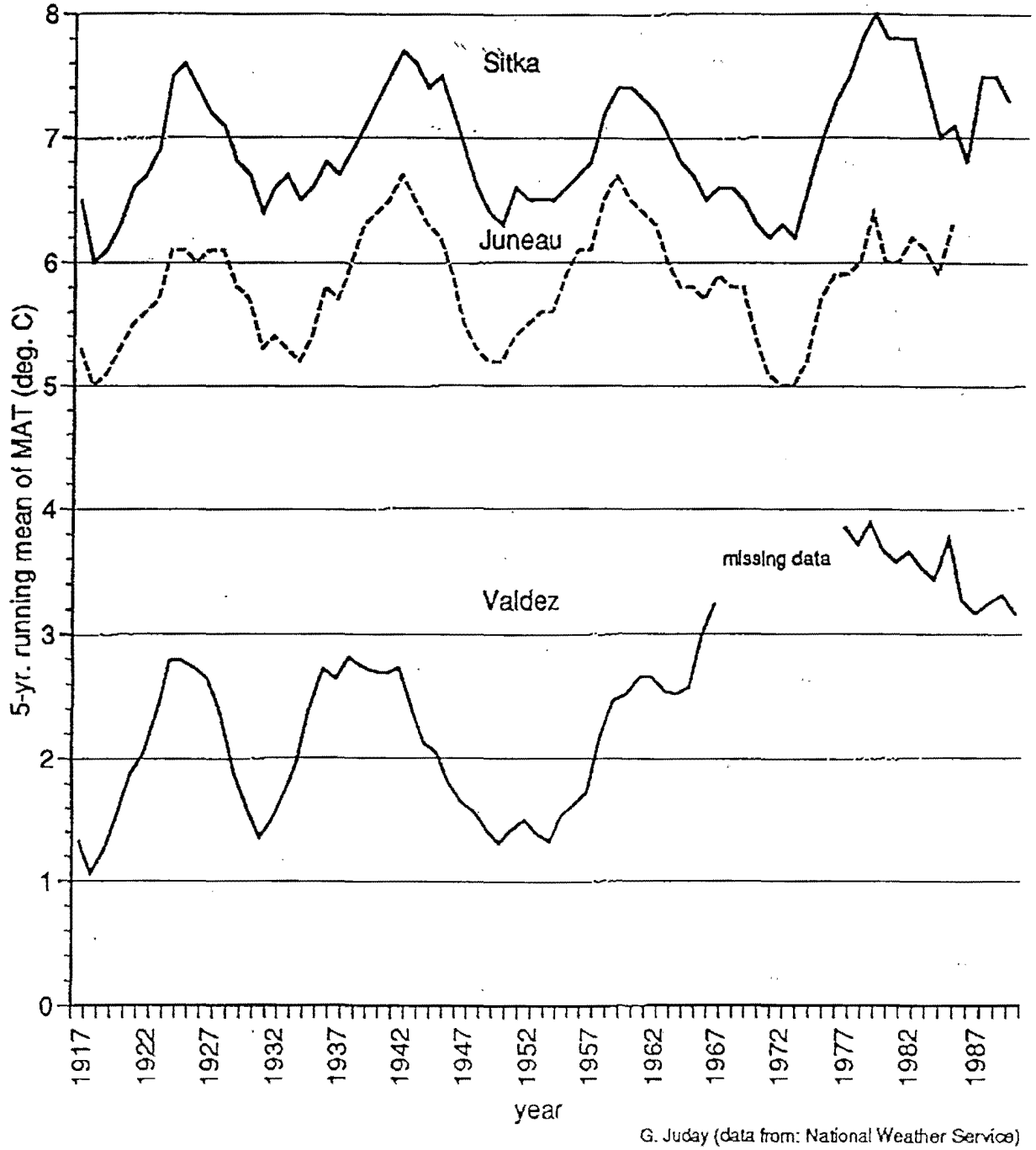
Source: Galt and Payton (1990)

Figure 8. Valdez Mean Annual Temperature



G. Juday (data from: National Weather Service)

Figure 9. Smoothed MAT at Valdez, Sitka and Juneau Downtown



G. Juday (data from: National Weather Service)

Figure 10. Trophic pyramid in ecosystems

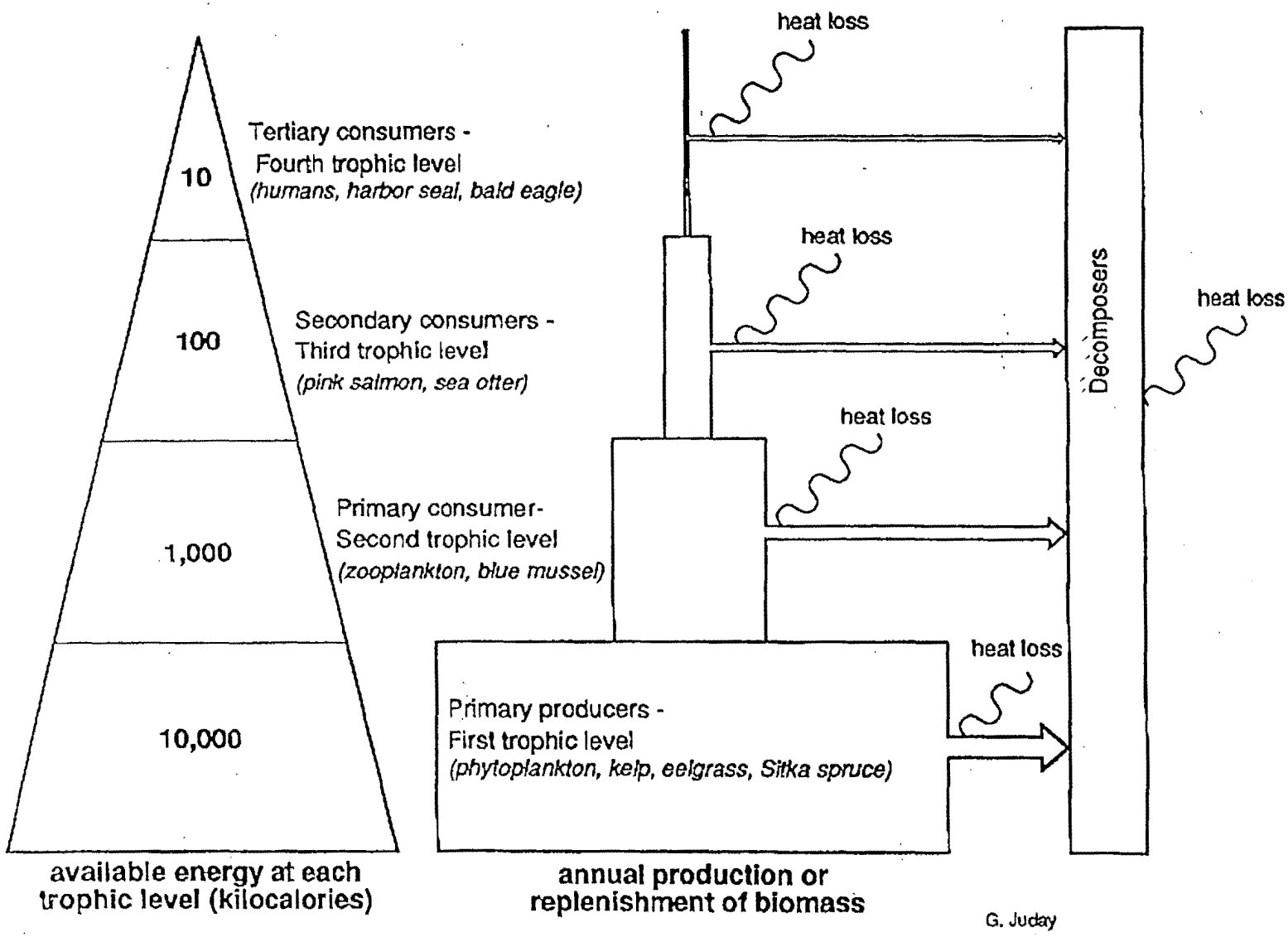
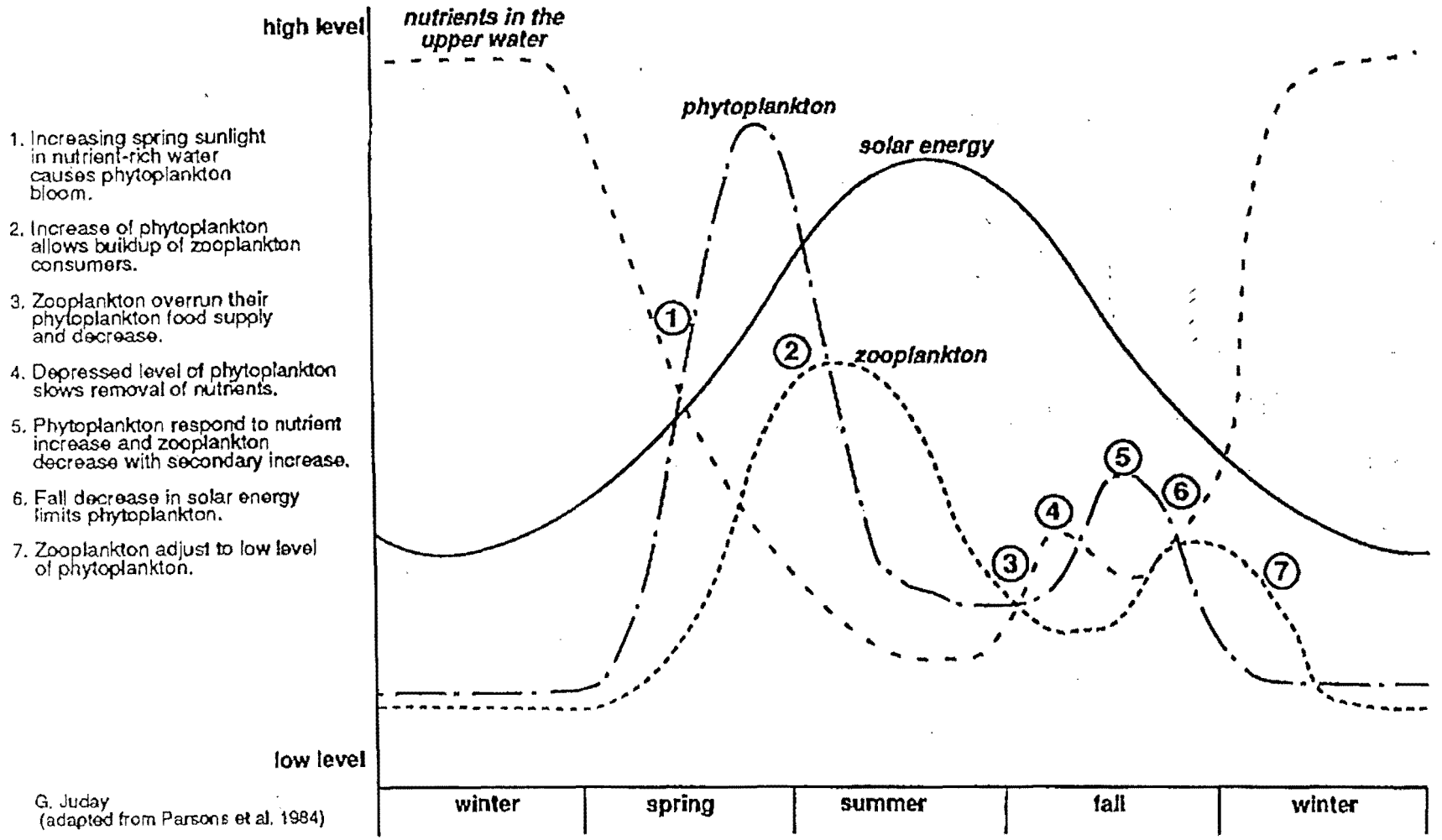


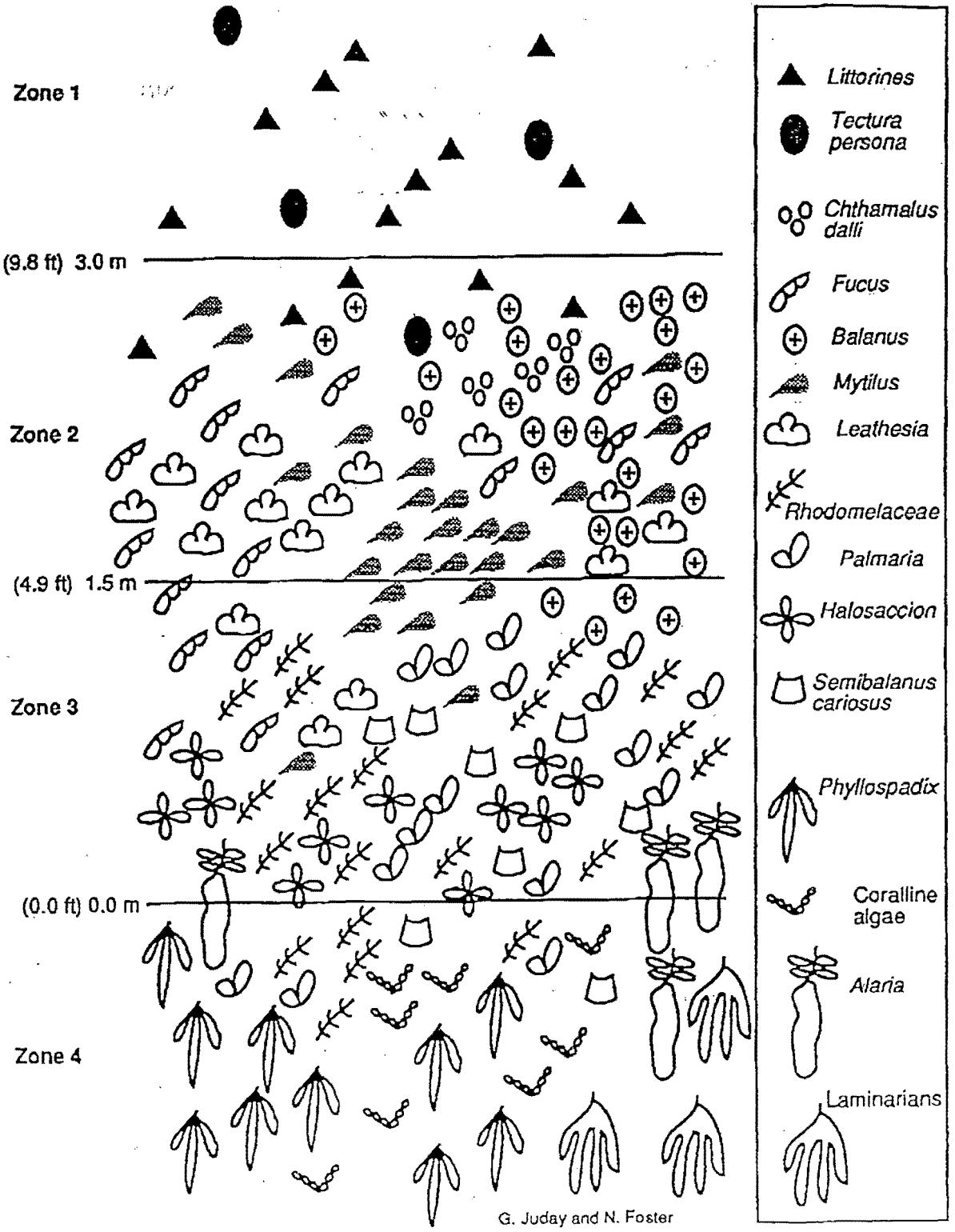
Figure 11. Theoretical annual cycle of events in high latitude marine ecosystems



1. Increasing spring sunlight in nutrient-rich water causes phytoplankton bloom.
2. Increase of phytoplankton allows buildup of zooplankton consumers.
3. Zooplankton overrun their phytoplankton food supply and decrease.
4. Depressed level of phytoplankton slows removal of nutrients.
5. Phytoplankton respond to nutrient increase and zooplankton decrease with secondary increase.
6. Fall decrease in solar energy limits phytoplankton.
7. Zooplankton adjust to low level of phytoplankton.

G. Juday
(adapted from Parsons et al. 1984)

Figure 12. Scematic zonation of intertidal organisms In Prince William Sound



Please bring your attention to the one dollar note on the back of same is the Great Seal.

Now please read the front page of this book I found 6, 5, 94, The work comparing the cornerstone and its membership of the Illuminati, an elite group favoring themself's through exaltation be it laws, money, justice and being electable to a public office.

If your not of this group there interpretation is your brazen. (on page #6 it says No one except the all seeing eye is capable of determining its true membership) thats from here own book! In the name of Jesus Charles E. McKee 6/7/94

To: Anchorage Municipal Assembly

THE WAY TO CHRISTHOOD

A WORK GIVING THE LAWS WHICH LEAD TO SUCCESS AND SOUL ILLUMINATION, AND WILL GIVE THE PEOPLE THE RELIGION THEY HAVE BEEN LONG LOOKING FOR

Second and completely rewritten edition of the book formerly entitled
"CHRISTHOOD AND ADEPTSHIP"

TEMPLE OF ILLUMINATI

Vicki Cantrell
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@ 8:30

By R. SWINBURNE CLYMER

Published by
THE PHILOSOPHICAL PUBLISHING CO.
ALLENTOWN, PA.

PREFACE TO SECOND EDITION

The present work is only a primer, a book that points the way. It is by no means an exhaustive treatment of the subject, but is intended for beginners, and will help the seeker to make a start in the right direction. The child must learn to stand before he can walk. He must learn to walk before he can run. The process of learning is often slow.

In preparing the book, it has been the desire of the author to accomplish two things. One purpose is to give instructions which point the way to success and contentment. In this, the book may be much along the lines advocated by other systems of advanced thought; yet the fundamental principles differ from those generally promulgated. Another purpose is to suggest a religion which the seeker can both accept and apply to the needs of life, a religion which he is not only to believe but to live. In the book is suggested what type of thought and what type of action will enable one to be a success on the material plane, or the earth plane of action. In it is also pointed out the way to success on the soul plane. True success is two-sided, it seeks equilibrium. It mean satisfaction on both the material and the soul plane.

It is too often considered that success has to do only with things of the material; that success means prosperity in business, in a chosen profession, or along certain lines of endeavor. The author admits that prosperity in business and success in a chosen profession are desirable; but he firmly believes that true, full, and complete success does not stop with this.

True, full, and complete success includes happiness, peace, and contentment, as well as health of body, mind, and soul. To

attain prosperity in business at the expense of physical health or peace of mind, is a limited success. It is a fact that many who have become successful in their chosen field of service are unhappy, and possibly sufferers from some condition of ill health which makes life for them one long day of misery. This is not true success. It is success along one line, it is artificial success. True success means satisfaction in all things that have to do with the science and the art of living.

To be truly successful, a life must have religion for its foundation. The religious life is the true life. Let it not be understood, however, that religious life refers to loud prayer or mere church going. The truly religious life is indeed a life of prayer—the prayer of action, the prayer of being and of doing. The acts of the truly religious life are in themselves a prayer. This—the thought and the deed of kindly service—is the only true and practical prayer. The farmer in the field who tills the soil and sows the seed, with love in his heart for labor and for contact with nature, and with the desire to produce, represents the prayer life. His service is beneficial to himself and to mankind. That which is necessary to others, if done in love and in kindness, is a practical prayer. The spirit of the deed gives it its classification. The true life, the prayer life, is a religious life, not because of formal phrases and singing of psalms, but because of many good acts, acts prompted by love and contentment.

The greatest success is that which pertains to welfare of soul. Success of soul is worth more than success in material interests. Success of soul is possible only through development of soul, through awakening of soul. It is possible only through the finding of the Christ. To find the Christ; to become conscious of Sonship with God, the Father; to attain Christhood—this is at once the end and the aim of life. Consequently, to realize this is to realize true success. To find the Christ, or to attain Christhood, is to come into glory. The glory of today is the glory of tomorrow; for, even though we pass beyond the Veil of this life,

the glory attained today goes with us into the Beyond, and is our heritage of the Great Tomorrow.

People are demanding a new religion. A new religion, accurately speaking, is impossible; for there can be nothing absolutely new. There may be, however, an evolution of the old into the seemingly new. There may be a new manifestation of the old, a new birth, a new interpretation. It is this—a new interpretation—for which the multitudes hunger. The multitudes are not satisfied with a beautiful doctrine, a beautiful creed, or merely with a beautiful service, even though it may be beyond criticism in regard to exactness and uniformity. What they want and demand is something that will satisfy the longings and the needs of the heart. The heart's need and longing can be satisfied only by the heart itself, not by anything that is without. Within man is all that he needs, all that can truly bring him peace.

The author does not denounce or underestimate the calls, the obligations, the appetites, of the material; but he claims that man must satisfy the requirements of the material *with things that benefit, not with things that harm either the self or others.* Both the knowledge and the inspiration that enable one to follow this rule of action are to be gained through a religion that is at once philosophical and scientific. It must be a religion that can be applied, or put into practice. It must be a religion that satisfies the reasoning of thoughtful minds and supplements comfort of heart with logical statements. The New Interpretation particularly aims at this—stating logical principles that can be applied, applied in all works with which man has to do. A satisfying religion becomes the base of all that one does, the actuating principle of one's every undertaking.

This is the type of religion that is being taught by the Temple of Illumination, a church of fundamental doctrines. Nothing can be erected without a foundation, or basic principles. These the church is able to give; yet it is by no means a creed-bound church. It recognizes that no two men are alike, that no

two can apply truth in exactly the same manner. It is called the Temple of Illumination because each individual who belongs to it or supports it must either himself have found Illumination of Soul or must be in the process of finding it. He is seeking unity within himself. He is in search of Christhood. Thus the individual is a manifestation, or a representation, of the Church Universal. The church recognizes Illumination of Soul, or Christhood, as a possible experience or attainment in the life of each individual. In this sense, each individual is a church, a temple, of the living God. Primarily, others are not to be the judge as to whether an individual has attained Illumination of Soul. Neither is an individual to make public or private confession of having attained. Ideally, the Temple of Illumination is the Church Invisible. No one except the All Seeing Eye is capable of determining its true membership.

It has been generally regarded that the religious life and the demands of a business career are incompatible. This error is due to the fact that the religion prevalent among men has been more a matter of belief and church going and holding to some creed than a religion of *thinking and acting and doing*. This type of religion, however, now belongs to the past. Man is beginning to see that neither creed nor dogma nor church can save; that the only saving power is in right thinking, right living, and right dealing with others. But right thinking, right living, right dealing with others must be actuated by a higher motive than the desire to save one's soul. Man must think right and do right because it is best to do so, because it is to his own highest interest to do so, and because thinking right and doing right is the only true life and the only true religion. Man is beginning to realize that true religion begins in the heart, but ends in action. "As a man thinketh in his heart so is he." Equally true is it, "As a man thinketh in his heart, so does he." This interpretation of the religious life makes it thoroughly compatible with the demands of a business career. Nay, more

than this, it even makes the truly religious life necessary to successful business.

To be a true success on the earth plane and to reach Christhood on the soul plane are by no means inconsistent. In fact, each is necessary to the other. Full and complete success includes success on both planes. This truth is clearly taught by the Master Jesus. "Seek ye first the kingdom of heaven and all these things will be added unto you." This indicates the pathway to success.

To be free from suffering and responsibility is not the ideal sought by the truly religious life. It is admitted that when the old life is discarded and the new life is taken up, before Illumination is attained, suffering will probably result. But we must remember that birth is ever painful no matter on what plane it may be. Suffering, we must remmeber, is always the working out of a just law; and the sooner we go through with it, the better it will be for us.

The coming religion recognizes the Law of Karma—that is, the Law of Justice as taught by the Master Jesus, "As a man soweth so shall he reap." The new religion upholds the doctrine of the forgiveness of sins, but denies that the deed itself is forgiven in the sense of being severed from its natural consequences. For whatever wrong we do, we must pay the penalty in some way, at some time. If we are made to suffer unjustly, we will be compensated for it, in some way, by some one, at some time; while he who causes us to suffer unjustly will in some way and at some time be made to pay for it.

To reach Christhood is simply to evolve to a higher state of consciousness. This can be accomplished only through what we name "Soul Development," which means living in conscious harmony with the Divine Law, living a life that will help us to reach the state called Illumination.

Says a teacher: "There are two sides to the universe. Between these two sides exists an Opacity called the "Veil,"

Both sides of the Veil occupy the same space; both sides of the universe and all aspects, therefore, of all things occupy the same space. However, it takes the soul-developed senses to see and to sense soul things. It takes Spiritual (Soul) Perception, or Intuition, to perceive spiritual things. It takes one who is soul-developed and of a spiritual mind to understand anything in the world of soul on the other side of the Veil, although he may be living right here in the midst of objects of materiality."

This we believe; for we know that two men may be together, of whom one is well versed in chemistry, while the other knows nothing about it. One lives in the world of chemistry, while to the other that world is unknown. It is the same with things of the Soul. Here is one who, through living the true life, through recognition of the laws underlying development of Intuition, or Soul Knowledge, has penetrated the Veil and knows the things of the Soul. He may be living with another who is thoroughly taken up with things of the world. They live side by side; but one is in the heavens while the other is of the earth earthly.

The fact that spiritual and material occupy the same space makes it imperative that the true religion shall recognize both body and soul. It must recognize the needs of the body and supply them; but it must also recognize the requirement of the soul and must point out the way to the attainment of soul growth.

As to the accomplishment of desired states, Eliphas Levi, the great French Master and Kabbalist, said:

"To accomplish anything we must believe in our ability to accomplish, and this faith must be at once translated into action. Faith has no tentative effort. It begins in the certainty of finishing, and works calmly as though it had omnipotence at its disposal and eternity before it. Dare to formulate desire, whatever it may be, then set to work immediately, and cease not to act in the same manner and for the same end. What you wish will take place, and has already begun for you."

This is the *one* great Law that will lead to success both on the material plane and on the soul plane. It is not enough to have faith in the accomplishment of a special thing. We must *dare,* we must *work* in harmony with our faith, then we will and must succeed.

Sixtus V was a poor, ignorant boy, herding sheep; but he became pope. Napoleon was low in birth and breeding, but he ascended the throne of France. Benjamin Franklin walked the streets of Philadelphia with a roll of bread tucked under his arm, and people laughed at him. They finished by allowing him to do their thinking. Cyrus W. Field was called an "imaginary fool;" but, through persistence, he was able to lay the trans-Atlantic cable. Lincoln was a rail-splitter. He failed in business as a store-keeper. But he became President of the United States, and it is doubtful whether there has ever been a more honest and a more honored man.

These are men who desired to do things, who had faith in themselves, and who were willing to be laughed at, willing to be ridiculed, willing to suffer, in order that they might prove the truth of the things they advocated.

The opportunities of today are remarkable both in number and in variety. It is simply a question as to whether you desire to do; whether you dare to do, and to stand by your convictions, in the face of sneers, ridicule, and suffering; whether you are willing to work according to your faith. If you are, then success is assured.

Sincerely yours,

R. SWINBURNE CLYMER.

CHAPTER ONE

THE CHRIST

When Jesus asked his disciples, "Whom say ye that I am?" Peter answered and said: "Thou art the Christ, the Son of the living God."

And Jesus answered: "Blessed art thou, for flesh and blood hath not revealed it unto thee, but my Father which is in heaven."

Flesh and blood cannot reveal the Christ unto man. Only the Awakened Soul within his own being can reveal the Christ. This idea the Master clearly gave to all those who were capable of understanding. To know the Christ, to demonstrate the Christ, is given to man only when he becomes conscious of, and truly in unity with, his own soulual Selfhood.

For hundreds of years, the true idea of the Christ has been lost sight of, due largely to the materialistic tendencies and the erroneous conceptions of religious teachers. Intellectual knowledge and scholastic learning do not always give man the deeper understanding that his soul craves.

The Christ, as the potential son of God, dwells in every individual. The Christ is not a being, or a deified form of being. The Christ is the true conception of being, the true conception of what God is. The Christ is not a name limited to one person. It is the realization of God in human life. Nor does it represent an experience of Godhood in the life of Jesus alone. The Christ represents a state of consciousness possible to all men and women who will meet the conditions necessary to its attainment. The Christ is the spark of divinity in humanity brought to a state of Individualized Consciousness. In its

incipient stages, to be sure, it is unconscious and non-individualized, but is capable of being evolved into a state of consciousness as an individualized Entity. In its primitive state, it is an involution of divinity as the acorn is an involution of the possibilities of an oak. In its developed state, it is the manifest evolution, or evolvement, of divinity, as the oak is a manifest evolvement of the acorn from which it sprang.

Jesus' works alone were not the cause of his fame and notoriety. The idea he taught and demonstrated, was the secret of his power among men. The prophets before him had done mighty works, healing diseases and even raising the dead. In every generation, great works had been accomplished; but no one prior to Jesus had openly preached the divinity within each human being. No one prior to Jesus had demonstrated that each life is responsible unto itself for its own misdeeds and its own sinning. Such truths as these could not be revealed or manifested by flesh and blood, but only by divine revelation to the inner consciousness.

In order to know the Christ and its power, man must become conscious of his own Inner, Divine Selfhood. Jesus himself came into Supreme Consciousness of Being only in his last incarnation. We are told that he was "like as we are, but without sin." He met the same temptations, and was subject to the same laws, both natural, ethical and moral, and soulual laws. Through his life and his teachings, he gave us the hope that every man may overcome much Karma; that he may step out into the aura of unity with his own divinity; that he need not be defeated in his progress toward Christhood by the demands of the flesh, which are continually endeavoring to hold him back.

The Christ, being identified with developed and illumined Soul, is one part of the fourfold nature of perfect man. Consequently, it is logical to consider the Christ, or the Soul, in close connection with other departments of man's nature.

The spark of divinity latent in each life, when developed and brought into a state of Individualized Consciousness, is called Soul. Thus developed, it is the Christ. Therefore, the attainment of Soul Consciousness, or Individualization of Soul, is the same thing as the attainment of Christhood. In other words, the soul as a germ in its undeveloped state, is that spark of divinity which is evolved through material conception, and which is capable of being nurtured and fanned into the flame of full Christhood, or Soul Consciousness. The soul, this small speck of creation, is drawn into the aura of those whose minds are in harmony with its own. At conception, as a tiny speck, or minute essence, of the Great Creator, it begins to build a body in which to dwell.

Mind is that part of man's nature which is responsible for nurturing and fanning the primitive spark of soul into a Flame of Christ Consciousness. Mind is the architect and the builder of Soul. To the mind is delegated the mission of developing the latent germ of divinity in man's nature into manifest Christhood.

The body is the material or physical temple in which the operations of mind, spirit, and soul are performed. It is a sacred sanctuary; made sacred by the wonderful chemical processes through which the threefold nature of man—body, mind, and soul—become unified and harmonized into the perfect Unity of Christhood. The body is the foundation and the basis of all soulual operations. It furnishes the ingredients and fuel for Soul Development. Consequently, the body is not to be thought of as an incident, but as an essential, in the development of the Christ.

Spirit is a part of the universal life. It is the life principle of man's being. It is that which holds mind, soul, and body together.

This, in brief, outlines the function and the mission of the four departments of man's being—body, mind, spirit, and soul.

Mind, being the architect of soul, and being both the creative and the executive power in Soul Development, must be given prominent place in this little volume on "Christhood."

Mind creates for man his every thought and his every desire. Every thought he draws to him or gives out is a created reality—a current, or a vibration. We can feel these currents, but we cannot see them, although we can see their manifestations. If a man loves he manifests loves in his movements, his words, his voice, his eyes. The opposite of love, every phase and gradation of ill-will and hatred, is also a vibratory fact, and is capable of forceful manifestation. As an aura of vibration, one's thoughts and feelings emanate from the body, and have power to build up or to tear down, to construct or to destroy. All the varied shades and gradations of love, good-will, and forgiveness are constructive and upbuilding; all the varied shades and gradations of ill-will and unkindness are destructive in their effects on the soul.

This was the message of Jesus—the mighty power of love, unity, and good fellowship. He taught man that, only from good motives and good works, could he reap a good harvest. His idea of divinity, his daily ministrations, gave evidence that his own was a heart of love, understanding of truth, and purity. The soul is the source of true love. We cannot play false to, or deceive, our own soul. The vibratory current of every thought and deed is its own record-maker and its own record-bearer, whether good or evil. Godlikeness, love of truth, beneficence, opens the door to the unfoldment of the Christ within. Every vibration accumulated and concentrated, bears fruit of its own kind.

In large measure, man is the creator of his own destiny; and, to a certain extent, he shares in shaping the destiny of others. All that we live in and draw to us is in large degree the result of our own creation. We create hope, happiness, pleasure, goodness, and truth; or we create their opposite. The soul

reveals itself only in proportion to its own development. When the soul is evil, dwarfed, crippled by envy, jealousy, hate, and malice, its manifestation is very slight. The dwarfed, misshapen soul is more to be deplored than a misshapen body. It is better for man to enter heaven halt and blind physically than to enter darkness physically perfect.

As the Christ develops and attains an appreciable degree of consciousness, the soul has access to the great storehouse of the universe. It draws upon the vibrations of love, goodness, truth, and wisdom—qualities available to all who are capable of connecting themselves with them.

"Know ye not that ye are the temples of the living God?"

Know ye not that within your being is a divine spark of the Creator, God? Know ye not that the body has been builded by a tiny spark of divinity which is evolving into a greater body and a greater soul? Know ye not that the divine spark of divinity is the Christ within, awaiting the touches of unfoldment and growth? Knew ye not that, by worthy effort and by pure thoughts and desires of love and good-will toward all creatures, the Christ will unite and harmonize all things in its development?

Know ye not that all men are your brothers? That man by your side—he may seem to be indifferent to all refinement and all honor; but he and you sprang from the same source. He is your brother. He bears your likeness, as you bear the likeness of your Creator. Hence, God is no respector of person. God creates perfection; but perfection is a process, and nothing is to be regarded as a finished product of creation. God, the Christ, is in constant creation of good, truth, and love.

As man takes steps toward the development of the Christ, he finds many Judas Iscariots to tear down all good works. These are more of his own creation in the marvelous inner world of his thought than of external form. Vibrations of goodness are crossed by material and fleshly demands. Therefore, it is

better in every way for the aspirant to be guarded by one who knows one who understands how to guide him over the pitfalls and dangerous places. The Master Jesus protected his own with power of Himself. Even in the moments of his greatest struggles, even in the laying down of his own life, how carefully he protected his disciples and his loved ones!

We know not what manner of spirit we are until the Christ metes out judgment. Within, a faithful watchman over his own, even though the tiny spark is lost to view, the Christ continues to abide even unto the end—whatever end the individual creates for himself. Vain words and pretenses can never develop the divine spark into the Christ. Nothing but love and true devotion of heart and good works can evolve the divine nature of man into Christhood.

Love unto all stumbling, striving, struggling creatures is a beacon light that fills the dark valley with its rays, and draws unto itself greater light, greater peace, greater power, making sons of God and creators of worlds uncreated. The Christ is the true, the perfect, supreme man of God.

CHAPTER TWO

THE DIVINE IN MAN

Every man brought to earth and made flesh has at least a spark of the divine within himself.

There is scarcely a human being that is devoid of love, and love is the brightest flame of the Divine. The great love nature of many is their weakness; but, through proper development, this very weakness can be made a power for good.

When Jesus stood at the well at Sychar and asked a drink of the Samaritan woman, he recognized that the power that led her into sin could be made the power of righteousness. From the gospel narrative, we learn how she accepted his teachings and transferred her powerful vibrations of love into doing good and what she thereby accomplished. The flame of divinity, which had been abused and misdirected, after being turned in the right direction, accomplished more than the combined efforts of the disciples. The people of Samaria knew what manner of woman she had been; and the great change wrought in her through the divine power of the Christ in Jesus led them to believe in him.

Even in its undeveloped state, the soul of man is divine. It is drawn from the Creator; and, eventually, after many stages of evolution, it finds its way to a higher estate within man. In its partially awakened and partially conscious state, the soul throws off its earth likeness, and takes on the divine likeness. The desires of the flesh, the fascinations of material beauty, wear away; and, beneath the meshes of the transitory, man sees and knows the Soul Beautiful.

Through development, the soul is enabled to manifest its

divine nature. Little by little, all pretense, all subterfuge, all petty and bold hypocrisy, are thrown off. More and more, as development continues, the image of its divine origin becomes manifest; and, in time, the divine reality—Soul Consciousness—can no longer be doubted by the individual in whom the process of transfiguration has been taking place.

What the world needs is Souls—divine, loving, understanding Souls. Souls are created by the Giver of all life.

"God breathed the breath of life into man, and be became a living soul."

"The breath of life" is the spirit in man. A distinction is to be made between the Soul and the spirit in man or the life principle. Both emanate from God, the Creator. The spirit, however, does not attain consciousness and development as an entity. Whereas, the soul is capable of evolvement, or growth, into a conscious entity. Again, they differ in another respect. The spirit in man does not possess the property of eternal life in an individual sense; it is eternal only as an element of universal life, which knows no destruction. The spirit in man is eternal in that, at the transition called death, it returns to the source whence it came, and, losing its identity, blends with, and becomes a part of, the great ocean of universal life. The soul of man, on the other hand, possesses the possibility of becoming eternal as an individualized center of divine-human consciousness. The soul is an essence of the Divine Being, capable of growth, development, culture, and individualization. It is capable of developing into the image of the Creator whose divine nature it represents. Yet, equally true, it is possible for the soul to retrograte or to be covered up by the grosser elements of the flesh.

All life, all growth, all manifestation is an evidence of vibration. Vibration comes from heat or fire. Even the gross elements of matter contain a certain type of heat, or electrical and magnetic vibrations, or currents. Although the divine element in man is small (if indeed it is in any way permissible to use expressions of size regarding it), nevertheless, it may become a mighty potency, capable of purifying the grosser elements of flesh. Mental activity determines the trend of the divine element in man's nature. Mind is the responsible agent in cultivating it. Thoughts and desires of purity, truth, and love, firmly established in the mind and serving as the actuating motive of life, feed and fan the divine spark of a soul and enable it to consume and destroy the coarse, heavy vibrations of the fleshly self.

Thus, it is necessary for the divine nature in man to be encouraged and developed. It must grow and expand and unfold as the acorn grows and expands and unfolds into the mature oak. Man, in his intellectual center and his conscious mental activities, is responsible for growth of the soulual element of his being. Through development and unfoldment, the soul may become a potent center of vibration, capable of chasing away and dispelling the slow, heavy currents of materiality. The divine in man may be concentrated and intensified to a high degree of power, and, thus, gradually, may gain the ascendency over fleshly tendencies. The divine may consume the earthly nature and transmute it into its own likeness; but the earthly nature is incapable of consuming the divine, although it is possible for the earthly nature to so cover up the divine element that it appears to be non-existent in that body. Yet, it must not be concluded that the divine spark is destroyed. It is merely covered up in an unmanifested, or unindividualized state, and returns to God at the end of that particular pilgrimage, to be taken up by some other body, which, in its turn, has the opportunity of bringing it to Individualization and to Christ Consciousness.

As an essence, or a spark, of the Infinite, the divine in man is indestructible. Distinction must be made, however, between the indestructible nature of soul as an individualization,

and the indestructible nature of the primitive essence, as such. Growth of the divine nature in man, as a potential soulual essence, means development of soul into an individual entity, or into an individual center of divine human consciousness. Thus, if growth does not properly take place, the manifestation of soul as an individual center of consciousness is interfered with. If the grosser elements of man's nature overwhelm the divine and bury it beneath the rubbish of materiality so that its potential divine qualities are not unfolded, it is like a seed that has not met the proper conditions of germination.

If the carnal nature is decidedly in the ascendency, the essence of divinity in man is little more than a nucleus about which an accumulation of carnality collects. At the transition known as death, these are rent asunder, the evil is thrown into the great "melting pot" of nature; while the divine essences that remain, in an ungerminated condition or in a very slightly developed state, are gathered back to the Creator, and are compelled to go through another evolutionary journey. This is "the second death," "but he that overcometh shall not be hurt of the second death."

In proportion as man develops his divine nature, does he live in harmony with the laws of the Divine Being. Not in words merely, but in thoughts and in deeds, must he represent the divine principle. The devil can quote scripture and can use subtle and fair words; but subtle argument and fair speech do not prove him to be a representative of divine life and power.

"He that saith, I know Him, and keepeth not His commandments, is a liar, and the truth is not in him." "He that saith he abideth in Him ought himself also so to walk even as He walked."

Love, tenderness, goodness, and truth are four essentials for development of the divine in man. Right thinking, right living, and concentrated effort are vibrations of power, unity, and truth. To love is to manifest love in every possible way.

We never tire of serving those whom we love. As the soul awakens from its Adam dream—the dream of earthly illusions and delusions—it loves goodness more than hypocrisy and pretense. Furthermore, it manifests its love by doing everything possible to further the interests of truth and righteousness in the earth.

It does not yet appear what we shall be; but we know that, when he shall appear, we shall be like him."

The Christ is the divine nature in man brought to an appreciable degree of development. When the Christ appears, we shall be like him; for we shall see him as a pure white Flame of Fire within the Soul. In order that the Christ may appear to us, we must walk as the Master Jesus walked, and must obey the law of love and forgiveness as he obeyed.

"God is spirit, and they that worship Him must worship in spirit and in truth."

True worship is true development of soul. Only through processes of growth and development of soul, and through the thoughts and the deeds that true development of soul prompts, can we acceptably worship the Father.

True worship, or growth of soul, demands a fair and just estimate of one's self. It is possible for us to understand ourselves—not with ultimate and unerring knowledge at any given moment, but with sufficient accuracy to insure progressive and satisfactory growth. In development, we are enabled to see ourselves as we are: that is, we are able to classify motives and desires, and to determine wherein is our greatest need at a given stage of advancement. If something in our nature desires "an eye for an eye or a tooth for a tooth," we have evidence that a deeper work of grace and of truth is needed in the heart. Thus we are led, step at a time, to direct the Christ potencies into the channels of sorest need and deepest hunger.

Hunger for a forgiving spirit; for a heart of humility and sincerity; for a clear vision of truth adapted to our particular

need in a particular crisis; for guidance and inspiration in daily tasks—such hunger is two-fold in its evidence; first, it is in itself evidence that the soul is active and alive; second, it gives evidence of the channels into which we should direct the Christ potencies through heart prayer, or clearly defined desire. Nay, it is evidence of much more than activity and life of soul. It indicates that the divine element has at least passed the stage of helpless infancy. The infant may cry for want of food, not knowing for what it cries. The child of more advanced stage may cry for bread and know that bread is exactly the thing it wants. Thus, a decided and well-defined hunger of soul is evidence of growth and healthful activity. Again, a well-defined hunger of soul gives evidence of the possibility of being satisfied. The divine element is not planted in man's nature merely to taunt and to tantalize him with its yearnings and its cravings. True yearning of heart is a divine prophesy that awaits fulfillment. True, we may hunger again; but daily bread and daily appetite are conditions of healthful growth of soul, as daily bread and daily appetite are evidence of physical well-being.

The divine in man makes of him a miniature world, capable of evolving realms of magnificent estate. To evolve the ideal of character and the ideal of divine-human power, which one has seen as "the heavenly vision," is one's right by inheritance. Man attains what he truly wills to attain. Swedenborg says:

"The will makes the man, and thought only so far as it proceeds from the will; and deeds or works proceed from both."

Hence, it follows that the will guided by love and wisdom is the highest expression of man's being. "To proceed" is to be produced and presented in suitable form so as to be perceived. In proportion as man cultivates the divine element in his nature, in proportion as he advances toward Christhood, is the tiny spark of divinity "produced" and "brought forth" so as to be seen of men. This is what is meant by "being made manifest,"

or "man manifesting the Christ," as Jesus manifested the Father to all.

Man attains his highest ideal and develops the resources of his divine nature by coming into harmony with the vibrations of love, truth, and goodness. There are myriads of vibrations floating in the AEthic sphere of human mind. These are constantly drawing and storing up energy of the same elements of which they are composed; also, they are constantly transferring energy of their own type to such minds as are receptive to them. To desire virtues; to develop and to encourage graces of heart; to persist in training the will to obey the Divine Law—this attitude of mind attracts from nature's great ocean of vibrations, forces and currents in harmony with one's desires and one's needs. The secret of developing the divine element in man's being is found in the ability to draw, according to need, on the inexhaustible supply of vitality in the AEthic spheres.

It is well to take one's self in hand; to place one's self under discipline; to follow the instructions of the Masters. Guidance and Illumination will come in accordance with one's need, and in proportion to one's faithfulness in calling on the AEthic forces for help and guidance. Obedience to one's divine nature leads to Christhood.

CHAPTER THREE

DEVELOPMENT

True development means the harmonious development of body, mind, and soul. True development leads to what the Ancients called Initiation, what Jesus called Christhood, or becoming the Son of God. In order to attain Christhood, or Sonship with the Father, one must become proportionate and symmetrical in his manifold nature, one must bring about equilibrium of body, mind, and soul. Power to gain an entrance into the vast realms of truth comes only through perfecting one's self by right living, right thinking, right acting; and, through this three-fold righteousness, will be brought about the awakening of the soul.

Among certain classes, an erroneous idea is prevalent concerning development. Some entertain the idea that development it attained by becoming negative, and coming under the control of a disembodied spirit. This is a serious mistake. Control from exterior sources is not development. Development is inner growth—growth and expansion of faculties of soul, growth into the fulness of life, light, and love. Development means growth into the consciousness of one-ness with God, the attainment of at-one-ment with the Infinite One. Growth is the opposite of becoming dwarfed and twisted and misshapen. Development is the attainment of that which is above. Development is possible to all who will obey the various requirements of the Divine Law.

In the beginning, the Creator produced the laws of life and righteousness. These laws obtain through all time. As general principles of growth, they always have been, and always will be.

One needs only to conform with these laws in order to attain perfection and development of soul.

From the time that the Word became flesh, the laws of evolution and development have remained unchanged and invincible—invincible because they are just and right. To obey them brings peace of mind. To disobey them results in pain and They are the laws that develop nature to perfection and beauty. anguish, sure and severe punishment. To obey brings all that heart can desire and all that soul may attain.

A distinction is to be made between evolution and development. Evolution refers to nature's tendency toward advancement and progress; to nature's principles and laws of upward march; to normal growth, without the help of man's co-operation. Evolutionary laws apply to the individual and to the species, indeed, to every form of expression or manifestation that is capable of change. True development is in perfect harmony with the processes of evolution. Development, however, is an intensification of nature's evolutionary process through conscious application of evolutionary principles on the part of man. Although the principles and the laws of development must accord with evolutionary laws and principles, yet development brings about results in a shorter time. Wonderful changes and improvements in plant life brought about by the scientist's intensification of normal conditions of growth are to be classed as the results of development. Similarly, development of soul refers to an intensification of the processes of normal growth. Thus, by conscious, intelligent, and systematic application of the laws of truth and righteousness, growth of soul-power is greatly promoted; and, if the individual is prudent, moderate, and reasonable in his application of the normal laws of growth and culture, the results are permanent and satisfactory.

To encourage conscious, intelligent, systematic methods of soul development, is not to advocate "mushroom" processes and results. Best results are obtained from moderate application

of sure and safe methods, which lead to slow, but steady, progress.

"Man shall not live by bread alone, but by every word that proceedeth out of the mouth of the living God."

To live by every word that proceedeth out of the mouth of the living God, means development of soul. It demands certain requirements. The first requirement is sincere desire. The desire for development of soul is the first step toward its attainment. The leading desire of every man's heart should be for the best. Material, mortal man, though groping and stumbling in the dark, blindly snatching at opportunities for advancement on his own plane of the physical, desires to live. Even in his present environments, he would live on and on if he could lengthen out the days into years. This desire, even for material existence, is the cry of the hungry soul, yet scarcely conscious that its cry is a striving for recognition and development.

To respond to the cry of hunger is a step toward development. To become thoroughly conscious of a decided and a well-defined hunger of soul for deeper and better things, is a most wholesome indication. Even in the first stages of unfoldment, the soul seeks to rid itself of all pretense and effectation, and to rise above the frivolities of a physical existence. As it frees itself more and more of the entanglements of its own weaving on the material plane, it becomes more and more natural; and its real being becomes more and more apparent. Thus, it gradually merges into unity and uniformity. Its desires and motives and purposes become more and more purified, centralized, and concentrated. Its leading desire is to realize and to execute the Divine Plan of life and being. As it draws nearer to the realization of its purpose, it can distinguish more clearly the false from the true. The mystery of reality becomes even a greater mystery; but it is enabled to disentangle and to unravel a part of the net that covers the deeper meaning of reality and purity.

Little by little, entanglements of thought and desire disappear; conflicts of motive vanish; hindering attachments on the personal plane lose their power over it. Thus, gradually, it may be by almost imperceptible degrees, the soul develops from a crude, formative condition into a well-defined state of consciousness.

As the soul advances, and develops into the likeness of its Creator, it draws to itself the assistance of all that is in harmony with its purpose. It becomes conscious of a meaning, a tenderness even, in the air it breathes; in the sunlight that falls in golden rays across its path; in the lightning's flash, which, for an instant, thrusts aside a veil of darkness and allows a glimpse of something too deep for ordinary man to discern. When his organism has been purified, when his inner vision has been opened, and he has become *one who knows*—then he is capable of spelling the words of the lightning's flash.

It is well to know that there are dangers in the path of development. No one should attempt anything like a systematic application of the laws of development without being under the care and the guidance of one who understands. The devotee of righteousness and soul growth needs advice. He needs the protection that comes from the thoughts and the vibrations of those who have themselves in great measure overcome the dangers and the pitfalls of the path. Without such protection and guidance, he is apt to meet discouragement and sore perplexity, or even to fail in the attainment of his purpose.

As we strive to walk the narrow path of development, there maye be those who would hold us back. Even Peter, the right-hand disciple, was not always a source of strength to the Master. And did not Jesus say to him: "Satan hath desired thee, Simon Barjona."

In addition to the hampering effect of others and of external conditions, the demands of the physical body may retard the soul's progress. The physical being finds it difficult to harmonize with the expansion, and the beautifying of the soul. For this reason during development, the body needs special attention. It needs conditions of refinement in keeping with development of soul. The physical desires need to be directed into proper channels, and to be transmuted into power and vitality.

Again, for another reason, the aspirant for soul development needs the guidance of those who have travelled the path before him. So prevalent are erroneous teachings regarding development that the aspirant is liable to be influenced by them, and thus be led astray. Only the experienced, only those who understand the deeper mysteries in their purity, can point out to him the error of these teachings. He must clearly understand that development is not a process of becoming passive and negative, and then of opening the nature in a receptive attitude to whatever vibrations come along, whether good or not-good.

The Master bids us to subdue all things, and not to be subdued by them. We are to master thought-conditions and not to be mastered by them. We are to control and not to be controlled. By positive, constructive thought and will, by righteous purposes and motives, by right living, we learn to subject all things beneath our feet. Thus, we grow into the higher. By continued positive thought; by holding a well-defined ideal; by concentrating the attention systematically on a clearly outlined purpose; by not allowing the attention to waver or to become dull and listless—by means of such exercises as these, intelligently and systematically practiced, we learn to determine what type of influences shall gain entrance into our lives. Thus, we avoid coming under the control of others or of external conditions.

True development is a process of issuing and establishing such decrees as we wish to see carried out in our own thought kingdom; a process of issuing and establishing the decree that love and forgiveness shall be the actuating principle of our own

thought activities; the decree that our own will-power shall become strong and masterful, reliable and steady, ever obedient to the Christ Ideal; the decree that our every thought shall be so pure and kind and loving that their radiations to others may be a healing influence. This is a positive and a constructive process.

Let no one gather the impression from this, however, that man is to be constantly thinking of soul growth, to be constantly conscious of methods of growth, or to be giving his attention constantly to religious subjects. This is an error to be carefully guarded against. Just as exercises for physical culture are to be indulged in at certain times and places, so exercises for soul culture have their time and place. Just as exercises for physical culture should be taken with a degree of regularity, and should be adapted to individual need, so exercises for soul culture should be taken intelligently, and with a reasonable degree of system. As relaxation is a necessary feature of physical culture, so relaxation and change of thought are necessary in soul growth. It is just as important to concentrate the attention at times on the duties of a wholesome occupation as it is to direct the mind to exercises calculated to promote soul growth.

When we attain a certain stage of growth, all that this particular stage can give is ours to have—ours by right of conquest; ours as a reward for faithful and earnest effort; ours as the natural result of faithful and earnest endeavor. After having utilized all that one stage has for us, we must pass on; for knowledge is limitless; and a higher plane awaits us with its storehouse of knowledge and experience, with its forces and vibrations of greater power and greater mastery. There is no limit to growth and development. That which we have already attained urges us on, while other stages and planes continually press us with invitations to come up higher.

It is the duty of the Temple to protect, to assist, and to guide all students into safe paths of development. The Masters

they are bound by most sacred obligations to assist and to strengthen him through his initiation.

Man—body, mind, spirit, and soul—is the temple of the the spiritual states and spaces. Some of these are active, some are latent. It is necessary to understand the laws of vibration, of concentration, of accumulation, and of transference, in order to attain intercourse with the forces that dwell in certain spaces. From time immemorial such successive school of thought representing the AEth Priesthood has understood these laws; and it has always been their mission to guard and protect the students that come under their care.

In many instances, when the student comes to understand certain laws, he begins to abuse them. This he may do unknowingly. A meager knowledge of the higher laws often leads to the inclination to produce phenomena, and to make a display of power. These tendencies are harmful rather than beneficial. In true development, the teacher guards against unprofitable and injurious tendencies. No good comes of the practice of producing phenomena; and much harm may come of it. The ability or the inclination to produce phenomena and to make a display of power is a sign of which all should take warning.

The student should be instructed and trained with extreme care. The house, the physical temple, must be purified; the mind must be cleansed of its unkind and evil thoughts. The mind must be taught to send out pure, unselfish, generous vibrations. These healthful vibrations of thought will lift the soul to higher regions and to purer air. The mind, which is the electrical center of the soul, sends out the very substance that either nourishes or poisons both body and soul. Hence, the mind, with its thoughts, feelings, and desires, is the place to begin, the first floor to cleanse of all its rubbish.

Each student is surrounded by the clean, strong, wholesome vibrations of the AEth Brotherhood. Thus, he is assisted

over the tides of darkness and temptation, and is enabled to gain what he could not attain alone and unguarded.

Conscious efforts, repeatedly concentrated into real, actual desire, accumulate strength rapidly as the soul wings its way upward.

CHAPTER FOUR

FORMOLOGY

Formology means the building of an ideal, a process in which the mind and the will are focussed and concentrated upon an idea or a thought, or are directed into channels that lead to an ultimate result.

Every individual has an ideal or standard which he wishes to attain. It may be that his ideal does not lift him upward to any great extent; but it does at least lift him above himself. One never sees the false side of one's ideal. Only the beautiful, the desirable, features of a picture are formed and held in contemplation. No one knowingly bows to an idol of clay. The beautiful aspect of one's idol is presented, and this calls forth admiration, love, and devotion.

Whatever the mind concentrates upon, that it creates. The one thought accumulates and gathers to itself kindred thoughts; and, thus, it forms a larger and more realistic picture. Formology is the art of forming and holding in mind a distinct and clearly defined idea, thought, or picture. It is the art of focussing the attention upon one fixed aim; of concentrating the purpose into a definite channel; of condensing the power of thought and will into a highly dynamic center of attraction. Through the potent vibrations of a well-disciplined mind, it is possible to attain such superior excellence in the practice of concentration that the attention does not waver, and the thought vibrations are not interrupted by cross currents or by irrevelant influences.

Long training and self-discipline, however, are necessary to the attainment of excellence; and no one should become unduly discouraged if his concentration-exercises are somewhat interrupted by vibrations that are foreign to the purpose in

hand. If other thoughts creep in and distract the attention, no harm is done more than to scatter the forces and to delay and temporarily to interrupt the process of building. Thoughts and fancies that flit around and press themselves upon one uninvited, do not enter into the processes of concentration, and do not find place in the ideal structure unless desire and purpose of heart invite them. The process may be compared to the building of a house. The structure advances in proportion as the carpenter moves forward in his work without interruption. If strangers attract his attention and claim his interest, delay results; but this need not lower the standard of work, nor interfere with the quality of material used in the structure.

The ideal of concentration forms, holds, molds, and gives birth to a something that steadily draws one on. The soul is the magnetic center, the womb, of all created ideals. Within itself, it holds the unseen forces of power and formation, which give life, strength, and vitality to every dream. The dreamer, filled with visions of power, beauty, greatness, draws upon these forces and builds his ideal stronger. Every hope is centered in the ideal. Physical labor even is a means of carrying him on to the realization of his dream.

As force creates force, as perfection creates perfection, so does mind create mind and soul as well as matter. All that the mind definitely wills and purposes, takes definite form, evolving into stronger and more compact shape. Then the ideal fits into the material and becomes whatever the mind wills, on the physical plane, on the mental, or on the plane of Christhood. The building of thoughts leads to Mastership. When man realizes the power and the force of mind, when he uses these forces to bring forth into manifestation, he places himself in line with Creators and Christs. Eventually, he may attain that for which his soul has yearned. The ability to gather forces, to accumulate energy, is something that all men seek.

Within every aspiring mind dwells an ideal, a picture of

some desire. The ideal may be like a trifling seed; but the bare fact of its presence proves its possibilities and its tendencies to growth. Within nature's great storehouse is a vast amount of energy, life, force, power and strength, ready for man to utilize and to accumulate in the attainment of his ideals. When he fails to live up to the ideal, he mars its likeness, and interferes with the chances of attainment. It is possible for man to attain his ideal. It is possible for him to become what he will.

Concentration unlocks the doors of opportunity, and makes us masters of our dreams. To will a thing consciously and understandingly, sets into motion certain laws, which become our servants, and meekly do our bidding. Concentration leads to Mastership; but Mastership comes only through long and arduous training. The determination to attain a desire is the thing that makes happy. As the potter molds the clay, so may the Master mold his will, and be able to calm the storm-tossed seas, and to demonstrate true Magic.

The magician spends hours, days, weeks, months, and years in training, in order to attain his ideal—his Adeptship. If he accomplishes nothing, it is because he attempts nothing; because he does not hold on, does not persist and persevere; because he does not work, accumulate, and wisely transfer his energy and force.

Napoleon is an example of one who gathered his forces together. He never allowed a moment to be idly wasted. He molded and builded according to his plan. His ideal was to gain empires. Herein was his power: he knew how to direct and to use his forces so as to gain results. He went not through life without purpose, like driftwood washing the shores of strange seas.

The ideal mind is active. Sluggishly standing still accomplishes nothing. There is more power in action than in idleness. The active mind is constantly accumulating, planning, building an ideal or a dream. The inactive mind is stagnant. It is like

the slimy pool of water that breeds a host of evils and diseases. The active mind keeps accumulating power for greater activity, and is able thus to progress on toward Mastership and true power.

The standard of the Temple of Illuminati is work and activity. In order to build up for perfection, every atom of thought-force and energy must be utilized; strength of mind, and mental vigor must be conserved; thought currents must not be allowed to dissipate in aimless wanderings. The great power of a master lies in constant accumulation of thought-force, in energetic, live, concentrated mental activity. The law of concentration and of accumulation is simple, but it is mighty.

True concentration of power and conservation of forces demand goodness of heart and sincerity of motive. Goodness and forgiveness give power and knowledge, and assist men in attaining greater heights. The construction of a bridge, of a cottage, or of a palace is only the forming and the executing of an idea, or of an ideal. On the physical plane, everything is molded or created in conformity with the mind that originates and executes. Everything is created in harmony with itself. The pure does not conform with the impure, nor can the pure harmonize with the impure. The highest ideal demands nobility of purpose, goodness, purity and forgiveness of heart.

Goodness and purity and forgiveness of heart are influences that insure constructive, upbuilding tendencies. Many people are daily charging themselves with electrical, or magnetic, vibrations which tear down and tend toward disintegration. Their desire may be to attain perfection or Christship; but, through ignorance and varied weaknesses, they create destructive thought currents which scatter their forces rather than condense them.

The laws concerning thought forces and the principles of concentration are understood and operated by the great teachers and Masters long years before the people are ready to accept them. The divine laws did not originiate in the philosophies

of the Hindus, nor with Confucius. They arose in the beginning, with the gods of creation, and were given to man when the first beams of truth began to break upon his sordid, fleshly-imbued mind. As long ago as the time when Lemurian shadows draped the evening twilight in purple, heliotrope, and crimson gold, have these mystic laws of truth built up in gradual fold the ideals of perfection and adeptship.

Any man can become master of what he wills, if he will obey the laws given by the gods—the laws with which nature molds and creates the masterpieces of sunset, sky, and mountain range, which no artist's hand has yet been able to rival. Man is not altogether the slave of circumstances. He is in great measure the master of his own soul, the maker of his own laws, the creator of his own destiny. He may become the idol of his own ideal, and, through the great laws of truth, he is able to attain Christhood. To be sure, working in a world where laws are misused, he may be forced to suffer persecutions; but, if he holds fast to his ideals, he will become the hero of persecutions, and future ages will bow down to his memory. Such are the Immortals.

CHAPTER FIVE

THE POWER OF LOVE

The power of love is limitless. Love is the most beautiful, the most powerful, and yet the most abused of all things in the world. Love alone can accomplish that which nothing else can accomplish. Love is the key that unbars the gates of heaven. Love has always been supreme among emotions and thoughts, and will continue to be supreme unto the end of time. History cites instances in which men and women have given life for the sake of love. Love is the power that places one above suffering, and tries one's strength for the sake of those whom one loves. The fact that love is a power is recognized by all the world.

The beautiful love of Damon and Pythias has made a record in history that can not be effaced. These two men were philosophers of the Pythagorean school. They lived in the time of Dionysius, the tyrant of Sicily. Their love was so strong that they were ready to die for each other. Damon was condemned to death by Dionysius. He obtained permission to go to his own country to settle his affairs before death on condition that his friend Pythias should consent to be imprisoned in his stead, and put to death for him if he did not return before the day appointed for the execution. The attention of every one, even of the tyrant himself, was aroused to the highest pitch; all were curious to see what would be the outcome of so strange an affair.

The time appointed for the execution was almost at hand, and Damon had not yet appeared; but the friend in prison declared that he would return. He did not betray the least doubt or anxiety. How well he understood! Damon returned in due time, and surrendered himself to his fate. Such fidelity

and loyalty softened the heart of the tyrant. He pardoned the condemned man, and gave the two friends to each other, and begged them to give him a place in their affection.

Love is the secret of all attainment. This principle explains the philosopher's power. We must not limit the thought of love to a personal sentiment or to a personal fondness of one person for another. Love is an attracting and propelling force that indicates the direction of one's endeavor. Whatever a man loves most, he has power to attain. One's love, or desire, may be directed toward wealth, fame, power, peace, or Christhood and worthy service to mankind. Whatever vibration is strongest, becomes a mighty power, drawing one toward the object loved, or desired. Nothing can be brought into existence without love as an agency in its manifestation. Love is the creating principle of all life. We see the fact demonstrated on every hand—the power and the force of creative love.

Love was the secret of the Master Jesus. His life illustrates not merely love for humanity, although his love for humanity was remarkable; but his life illustrates in a wonderful manner the fact that love for divine attributes enables one to attain Christhood and Sonship with the Father. The supreme love, or desire, of one's life determines the channel in which one's creative energies are directed. The fact that Jesus attained Christhood and realized his Sonship with the Father proves that the supreme desire, the supreme love, of his being was centered in the attainment of Christhood and Divine Sonship. The fact that he demonstrated love and forgiveness toward humanity indicates that the leading desire of his life was to exemplify love and forgiveness. The fact that his life was characterized by service indicates that the supreme choice and decision of his life was in favor of service and ministry to others.

The supreme choice, the leading purpose, the fixed decision, of one's life determines the character of one's love. Love for God is the highest ideal. Many a person at some time in

his life has had a confused idea of what constitutes love for God. He has thought that love toward God ought to be a pronounced sentiment, an emotion, an affection, a personal attraction, such as one feels for an earthly friend. Not feeling thus toward God whom he has not seen, he has yielded to discouragement, concluding that he knows nothing of love toward God, the Maker of all things. The final test of love is in the choice, the decision, the purpose, of one's heart.

The definite choice to obey the laws of the Creator of all; the fixed purpose to walk in His footsteps, and to manifest in the daily life love, kindness, forgiveness, and goodness; the settled conviction that, from every point of view, it pays to meet the requirements of love and justice in one's dealings with men; the supreme desire to eradicate from the heart every semblance of inharmony with the Christic ideal of character—this indicates true love toward God. The desire to attain Christhood and to live such a life of service as Christhood represents, and the willingness to meet such requirements of thought, word, and deed as are necessary to attain Christhood and to live a life of service —this indicates love for the Christ.

Love of self is a potent factor in development. Love of self is by no means an indication of selfishness, nor is it necessarily ignoble. There is one aspect in which love of self-identifies itself with love for God. Love of the self as a potential expression of God is highly commendable. The desire for development of qualities that make the self a manifestation of its divine origin—this desire, this love of self, is a mighty power for good.

A distinction must be made between selfishness and a true love of self. True love of self is a desire for self-betterment and for the highest and best things in life for the sake of being able to render better service to others. Selfishness is a desire to benefit the self for one's own sake merely, regardless of others. Selfishness is a poison to the soul. It is a quality that destroys.

Divine love is a quality that saves the soul. It is a power that lifts one from the blackness of the earth plane to the beautiful realms of Christic power. The selfish desires must die in order that the lofty and pure desires of soul may spring forth. According as the desires of the selfish self vanish, does one know what love is, and of what love is created.

The poet says:

"Love took up the harp of life and smote on all the chords with might;
Smote the chords of Self, that, trembling, passed in music out of sight."

Do you realize that within yourself slumber two genii? That the one is good, and the other is not good? Have you ever reckoned upon the greatness of the love of self, or love of the good? Have you reckoned upon the greatness of the love of selfish interests, or love of the not-good? The one belongs to the force of Light—to the gods who seek to benefit men and all things living. The other belongs to the force of Might—which seeks to draw men away from true power and development. Each individual has within himself the power of the one type of love or of the other. Development soon manifests which type of love is in the ascendency.

They tell us that Atlantis is reincarnating. This means that the good and the not-good are reincarnating; that the not-good forces are uniting and gathering their bands with the power to destroy, as the great continent was destroyed ages ago. Every individual born into existence is born through the power of love, either of the good or of the not-good; and their attendant good or not-good forces are born with them. It is possible for each to know to which type of love he belongs. It is possible for each to transmute the undesirable tendencies, or the undesirable loves, into qualities of true strength and goodness. It is possible for each one to place himself on the side of safety. Let us study the tendency, the nature, the power, of our desires,

and determine whether they are for the good or for the less-good. If we love truth, we are drawn to the truth. If we really love the good, if we really so desire, we can become powers for good.

True love makes us stronger and greater. Love gives us understanding. The kingdom of heaven is love. All things are possible through love.

"Love never faileth."

"And though I understand all mysteries, and all knowledge; and though I have all faith so that I could remove mountains, and have not love, I am nothing."

The greatest of the Apostles tells us that "He was one who loved much, and who had the greatest power."

There is a power in love that few know, few realize. There is a mystery hidden deep, "hidden from generation and from ages," which gives the power of angels to those who truly love. To love truly, unlocks the strong-barred doors to all knowledge, and to all understanding of truth. It is man's to know, it is man's to have such love, if he so wills. Through the development of the love forces of his own nature, man is enabled to attain his fondest ideal. Many have travelled long winding paths in search of this deeper mystery, the veiled Isis; but few are they whose strength of love has been equal to the task of finding it.

Do you wish to know? This is the mystery "kings and prophets have desired to know and knew not."

Paul says: "For this cause shall a man leave father and mother, and shall be joined unto his wife, and they two shall be one flesh. This is a great mystery, but I speak about the Christ and the Church."

There is a deeper mystery in this verse of scripture than the materialist can discern; but there are those who read into the deeper significance of words, there are those *who know.*

There is no power greater than love. It can surmount all

obstacles. It can give life and create worlds. The secret is yours to have if you will to travel the Way and to live the Life and to know the Truth. It is mighty in its sublimity; for it reaches to the innermost throne of God. Many have attempted to thrust aside the veil, the veiled Isis, but few have really done so.

Why? Because few really love.

Our power is manifested in our desires and in our loves. In large measure, we are what we desire and what we love. We stand now on the earth plane; and our minds cling to things of earth if we love and desire material and physical life more than all else. If we love and desire the characteristics of the Infinite Being, our Maker and our Creator, more than all else, our lives partake of His nature and His attributes. Love of the Christ, and a desire to be at all times a representative of his qualities, indicate that one's love and desire are directed toward Christhood.

Mind is the agency for strengthening, directing, and developing the desires and longings of the soul. The mind is the electrical center of the soul. The character of the soul is determined by the character of the mind. The soul is formed and created by the mind. The quality of thought habitually held determines the quality of soul. In proportion as love, goodness, forgiveness, and unselfishness become the actuating principle of mind, in that proportion does the soul partake of the characteristics of Christhood.

As man enters upon development, his mind probes into "the secret places of the Most High." He reaches out for great understanding, understanding of deep and hidden truths pertaining to the soul and its destiny. The electrical center, the mind, is recharged with higher vibrations; and the electrical current spreads and extends farther. His power grows as he becomes more and more enlightened. The type of his loves and of his desires is manifested in what he does. He speaks words

which thrill the soul, words which feed the starved spirit with bread of life. He writes words which inspire men and women, and lead them to seek a higher goal. He heals the sick with the touch of the hand; for he knows how to draw upon the AEthic center, and to send out currents of healing, blessing, strength, and life.

Mental healers have done mighty works, but the field of their power is limited. In the great mystery of love there is a secret that gives man access to the storehouse of power unlimited. His ability to draw upon and to use the power thus attainable, is limited only by himself. The mystery of love applied to the needs of life was the secret of Jesus' power. Love applied to the needs of life is the Christ perfected.

It is possible to understand and to know. Those who love, those who are willing to accept "the way, the truth, and the life," can understand and know. Those who obey the divine laws will be amply repaid. "The things that are impossible with men are possible with God." To know the mighty mystery of love puts one in closest harmony with the Law of God, and lifts one above the hampering conditions of earth. It is well to emphasize the fact that it is possible for man to know and to understand; but it is also necessary to emphasize and to repeat the fact that true knowledge and true understanding and true wisdom come through growth of soul and through development rather than through processes of acquisition as man acquires facts concerning external things. Mental activity is an agency in development, is the creative and the constructive factor in growth of soul; yet wisdom and understanding of the deeper things of the Law of God are not the result of mere intellectual activity.

Love is the key that unlocks all doors of spaces and powers, the key that admits one to the kingdom of heaven. The power of such love is limitless, boundless; for it makes gods of men and endows them with the ability to create. Love is God, and

God is love. Consequently, the power of love is God-power. This is the Holy Spirit, the Divine Comforter which Jesus said should come.

Behold the power of love! All around, we see it manifesting its strange mysteries, and showering its spirit on all things. Has God any other seat than the earth, the seas, worlds and infinite spaces, the heavens, and heavenly virtues? Why does one look for God beyond these? Whatever we see, God is in it. Wherever we move, God is there.

The mysteries of love, the mysteries of desire for pure and holy virtues and lofty endeavors, are revealed only to the sincere and faithful seeker; only to those who are willing to accept "the way, the truth, and the life." We know the power of love only by living the life of love, in thought and in word and in deed. We know love only as we *become love.* Through investigation and acquisition, we know about things; but *to know truly, means to become what we know. True knowledge is the result of becoming; the result of inner growth; the result of growth of character, growth of soul. True knowledge is the result of a dynamic goodness of heart.* Knowledge as the result of goodness is power. Mere knowledge of facts, of externals, is not necessarily power.

All around us are invisible vibrations, vibrations of life, or that which produces life. They support the earth, encircle it, produce it, and surge through it, above and below and everywhere. Mesmer says that there is a similarity of magnetism in the heavenly bodies, in the earth, and in animal bodies. These vibrations are constantly accumulating life forces, constanly concentrating and transferring back and forth, each supporting and nourishing the other. This process of mutual exchange is magnetism that produces. There is magnetism in love. Magnetism is vibration. Vibrations can be felt but not seen. If harmonious, they draw and attract. The magnetism of love is stronger than any other kind of vibration, more potent for good

is it than any other form of vibration. More magnetism is produced by the forces of love than by any other kind of force.

Magnetism is attraction. Through friendship, we are attracted to some people. We like them and will do much to benefit and to aid them. Through pity or compassion, we are attracted to others. There is a desire to render help; but the feeling that prompts the inclination is different from the feeling of friendship. The relation of comradeship draws some lives together, and results in wholesome association. Capability and competency lead to attraction in business relations. Physical beauty of one, and brilliant mentality of another, attracts. All of these forces contain a certain amount of magnetism, or attracting power. It may be, however, that their attracting force is short-lived, being due to a temporary stage through which one is passing. But, when the magnetic flow of true love dominates us, then the powers of the universe are ours to have if we but know how to accumulate and to concentrate and to transfer this dynamic agency for good.

Why are some persons more beautiful than others? Why are some misshapen or crooked or dwarfed from birth? Have you ever thought that there might be a reason for such afflictions and deformities? Doubtless, some one transgressed the law of love; its power was limited and abused. There are a few who understand this mystery. It is a general belief and a common saying that God is love; but few readily understand that the Creator exists in love, and gives love the power to create.

Do you realize that you are a creator? That you are daily making use of creative power? We create what we love: to love a quality or an attribute indicates the power to create or to develop that very quality or attribute loved. We create the quality upon which we bestow our affection. By admiring goodness and kindness of heart, by cultivating the spirit of love and tenderness, we are exercising creative power, and are directing our creative power in the channel of our choice. Our love for

goodness gives us power to create goodness. By loving goodness we give it our power, we magnify it, we beautify it, we see it manifest in our characters.

The love in a man's heart gives him power to produce whatever that love creates within him. Discover your greatest love, and you have discovered where your power lies. Conversely, discover in what direction lies your greatest power, and you have discovered the object of your supreme love. "Where the treasure is there will the heart be also." One's treasure may be money. Love for money gives power to accumulate money. One's treasure may be competency and efficiency in a certain field of service. One's treasure may be "the heavenly vision" of Christhood, or Sonship with the Father, and the life of usefulness resulting therefrom. This desire acts as a creating force that leads one to such conditions in life as "make for righteousness" and a satisfactory understanding of "the way, the truth, and the life," which leads ultimately to Christhood and to Sonship with the Father.

Mind, with its power of thought and desire and imagery, with its potency of will and decision, is the creative agency. Mind is the creator. Thoughts and desires unfold and manifest the mind. The desire, or the love, hidden within the mind's center gives power to produce, or to create. The selfish man lavishes all thought upon himself. He creates and produces for self. His love is centered in self, and his power is selfish love. Love for money, worldly goods, home, country, children, fame indicates the direction in which one's power is being turned. To be sure, idle desiring, listless loving, is not the type of love referred to here. Effective love, creative desire, surges one on to honest and faithful endeavor in harmony with the desire.

Man has power according to his love. All men, in measure, are creators. They create what they love. Their love gives them power to create that which they love, whether good or not good.

CHAPTER SIX

THE CHRIST AND OSIRIS

It is generally accepted that the Bible is the authentic record of the Word of God. The Bible has been pointed out for generations as *the one book*. Men have sealed vows by kissing it in reverence and tenderness; yet no one considers this as an indication that they worship the Bible as a book.

Nevertheless, strange to say, many narrowly declare that the Egyptians worshipped the Sun as the Sun, and will not accord them justice when it is fully explained that in worshipping the sun they worshipped not the symbol, but the truth, or the reality, that the symbol represents.

The true Christian does not regard the Bible in itself as an object of worship. Neither did the true Osirian regard the sun in itself as an object of worship. The intelligent Christian respects and honors the Bible as a record of truth and righteousness. The intelligent Osirian entertained the attitude of reverence and awe for the sun as a symbol of the real spiritual Sun (or Son) of all ages. True, it must be granted that the worship of many an individual among the Egyptians may have been actuated by a superstitious devotion; but it must likewise be admitted that the religious attitude of many a Christian is tinctured with superstitious materialism. Nor should we in either case render harsh judgment. For who among us is free from all taint of superstition, and from all trace of materialism? As we are willing to grant to the devoted Bible reader a reasonable degree of enlightenment in his interpretation, so should we be willing to grant to the Sun Worshipper a reasonable degree of enlightenment.

To the devotee of Christianity, the Christ represents the

One God, the Father of all. To the devotee of Osirian worship, Osiris represents to man the One God, Creator and Maker of all things, the great unknowable Being who made the heavens and the earth and all that is in them. Fundamentally considered, the worship of the one is identical with the worship of the other.

To the Osirians, the Sun represented the Life, the Light, the All, God; and to them, Osiris was "the true light that lighteth every one that cometh into the world." The Egyptians saw in the sun far more than the ordinary light of day. They understood the mystery of Being concealed in every brilliant beam of sunlight. They recognized the Word when it was spoken. They knew the significance of the three-ply expression of each ray of light.

Why think of Fire Worship, or Sun Worship, as a form of heathenism and of unenlightenment? Why not gladly trace the points of similarity between Egyptian religious history and the Biblical records? We are told that God appeared to Moses in a "flame of fire." In Acts, we read that, before the disciples were filled with the Spirit, "there appeared unto them cloven tongues like as of fire, and it sat upon each of them." When Moses led the children of Israel out of bondage, the Lord went before them "as a pillar of fire by night, and as a pillar of cloud by day." The cloud was the shadow that covered the image of God by day. It corresponds to the "veil of Isis," or the Occult Shadow, which hides the mighty mystery of mysteries, and the deepest esoteric meaning of Fire Worship.

The Hebrews kept the fire burning continually on the Altar, never allowing it to go out by day or by night. It represented to them the light of the Most High, as the Sun represented the Most High to the Egyptians. In the record of the Judges are found these words: "Let them that love Him be as the sun when he goeth forth in his might." Here the sun is a symbol of righteousness and might, and corresponds accurately to the symbolism of the Egyptians. Through the prophet Malachi, the

Lord speaks to his children thus: "But unto you that fear my name shall the sun (Son) of righteousness arise with healing in his wings; and ye shall go forth, and grow up as calves of the stall."

John said to his disciples concerning Jesus, "He shall baptize you with the Holy Ghost and with Fire." The Holy Ghost is the Spirit of Truth. The Spirit of Truth is the Christ within. Fire, according to the teachings of the Bible, is a symbol of God. Spirit also means God, Truth means God, Fire means God, and Love is God Supreme. God baptizes man with Himself, His attributes, His qualities, with Fire, with the spirit of love and forgiveness. The Fire with which God baptizes man is Illumination of Soul, or Christhood. God can baptize man only with the Fire of Love and Righteousness, because these are His own predominant attributes. He can baptize only those who are willing to dedicate their lives to His service. Being of God and drawing to Him men who are to become gods, they would necessarily be immersed in the Divine Fire. Immersion, or Baptism with Fire, is simply a state of divinity, in which man is conscious of his oneness with God and of his Sonship with the Father. Baptism with Fire is the principle, and the experience, of Christhood, which Jesus taught and exemplified in his life.

The Christ is spoken of throughout the scriptures as "the light that shines," as "the sun," as "the fire." What is the Christ? And what does the Christ represent? The Christ is by no means to be limited to the personality of Jesus. Jesus himself said: "Of myself I can do nothing, but the Father which is within me, he doeth the works." The Christ was the Divine Principle brought to a state of consciousness and of dynamic activity in the personality of Jesus. The Christ is the Divine Principle in each personality, capable of being brought to a state of consciousness and of dynamic activity. The Christ is actually a form of divine fire. The Christ is the AEth Fire that ever burns on the altar in the Temple of the Illumined Soul.

The Christ is the Inner Light, the Voice within. The God-Principle of the man Jesus was the soulual "light that lighteth every man that cometh into the world."

Jesus said: "The righteous shine forth as the sun in the kingdom of the Father." Jesus taught that the Christ is the light of the Infinite in man, capable of being brought to a state of individualization. Jesus taught that the sun of righteousness may arise in man's consciousness, radiating its warmth of love and forgiveness, its light of true understanding, and its chemic quality of transmutation. Jesus and his disciples taught that it is possible for all men to bring forth the Christ in their being. The Christ represents the qualities of love, purity, souluality, and truth become dynamic in man's nature.

With the Egyptians, Osiris means all that the Christ represented to Jesus and his followers. Osiris is merely an Egyptian name for the essential features of "the Christ," as used by Jesus and his followers. In regard to the Divine Principle in man, teachings of the Osirians were identical with those of Jesus. The Osirians call it the Divine Spark in man. Furthermore, they teach definitely how to find the Divine Spark within, and how to feed and to fan and to foster it into a powerful flame. The Egyptians worshipped this thought. This is the key to the true interpretation of Fire Worship and of Sun Worship. This explains why the sun symbolized truth to the Ancients better than any other object in nature. This explains why fire so beautifully symbolized to their minds the dynamic flame of divine qualities—love, truth, goodness, and righteousness.

The true Osirians were the Initiates—the Initiate-Priests—who worshipped God in spirit and in truth. They knew God as the Divine Fire, and kept within themselves the evidence of His Being. The many symbols made and used by the Egyptian historians generally consign to heathendom and to the superstition of an unenlightened age. Historians are apt to overlook the fact that every symbol had an inner, an arcane, meaning; that to

the Ancients, stones, monuments, and hieroglyphs recorded in symbol what letters and words of the scriptures record for us. Are not the letters and words even a system of hierogylphs, after all? Do they not symbolize an idea, and serve as a means of conveying thought? To the Egyptians, pyramid, obelisk, monument, and hieroglyphic representations constitute a language—a system of preserving and of conveying thought. Furthermore, their language is distinctively and fundamentally a language of religious ideas. When understood as Osirian Priest-Initiates understood it, their language represents a religion, simple, pure, exalted, which, in essential features, runs parallel with the essential doctrines of Jesus concerning the Christ and the attainment of Christhood.

We read that Moses was instructed in all the learning of the Egyptians. In all things he received instruction and training from them. Does this explain why he was superior to other men of his own people? Does this explain why there was not another Hebrew equal to him? Why was it in keeping with the Divine Plan for him to be thrown into the hands of the Egyptians? Does this have anything to do with his becoming qualified to lead his own people out of darkness into light? Why was Joseph taken into Egypt preparatory to qualification as a leader? And why was the child Jesus taken into Egypt, there to be nourished and trained and taught during many years?

Masters may teach; but each individual must prove for himself the efficacy and the truth of the teachings. Each individual must prove his own worthiness to receive, before the baptism of divine love can be poured out upon him, before knowledge, which no man dares teach, is given him from the Higher Hierarchies. The God, the Good, in each one is witness of all that one does, and is the judge of every act. Whether the divine element in man's being awaiting development is called Osiris or the Christ, what does it matter? Whether the doctrine of the Inner Light, the Christ Flame, originated in Judaism, in Osirianism, in the

realms of gods and men, in the AEth Sphere, or whether it is inherent in man's own divine being—what does it matter? The thing of importance for us is to worship in spirit and in truth the God of Love, and to fan the Spark of Divinity in our own lives into a powerful Flame, thus experiencing Christhood.

CHAPTER SEVEN

EMPLOYMENT AND DEVELOPMENT

With some, there is the idea that, when one enters upon a systematic course of development of body, mind, and soul, one's occupation or employment should be given up, and that all one's time and energies should be directed to the more important work of development.

This is a serious mistake. The higher development goes hand in hand with honest and worthy labor. Not only is it unnecessary for a man to give up his occupation in order to promote the higher interests of soul culture, but it is even detrimental for him to do so. The higher development progresses more satisfactorily in every way if one follows a worthy occupation, and if one is interested in daily tasks that call for thought and careful attention.

"He that is faithful in the least is accounted faithful in much." In order to be counted worthy to do that which is greater, one must do one's duty in the lesser. Unless there is some good reason to prevent, it is man's duty to work. He owes it to himself to give the body necessary exercise in the way of honest toil in order to keep it in harmony with the laws of nature. When the body is inactive, and not exercised sufficiently, it consumes its own energy, and becomes weak and inert.

Not only are toil and daily employment good for the physical welfare of man, but they are decidedly beneficial to both mind and soul. The mind is controlled by the laws of concentration and activity. An indolent and sluggish body soon drags the mind into neglect and inactivity. The mind needs employment and demands a variety of interests. Fortunate indeed is the man whose daily occupation requires close application of thought and mental activity. If the daily work is such that one

can perform one's tasks mechanically, and in routine order, with meager incentive for improvement and with meager stimulus for originality, not only does one's mind become sluggish in regard to work, but it loses energy even for the higher development.

The laws of concentration, activity, and interest are by no means limited to higher culture. They pertain to every avenue of life. And, other things being equal, one's power of concentration, activity, and interest in the higher culture is proportionate to the amount of concentration, activity, and interest demanded by the other duties of life. For instance, if one has adopted a system of self-culture, which calls for definite concentration of interest and close application of thought for a few minutes each day, better results are obtained if other duties of the day, each in turn, demand undivided attention and unwavering interest. Generally speaking, as is one's zest in the duties of life, so will be one's anticipation and one's pleasure and one's progress in exercises of development.

Another point should not be overlooked: the purpose of true development is to improve one's self in body, mind, and soul, *for the sake of rendering service to others, and for the sake of living a life of usefulness.* This being the case, it follows that there is a close connection between the practical relations of life and the higher culture. Daily tasks should take on a new meaning as development advances. Daily duties of life should be a thermometer by which to gauge one's progress in the higher work. Daily duties afford an opportunity for applying the principles established by means of the cultural exercises. Daily tasks bring one in contact with others, and afford an outlet for the vibrations that have accumulated, thus opening the channels of the organism for a fresh supply of magnetism and energy. Higher development is a system of admitting to the organism "the daily bread" of ethereal essences from the higher sphere. Unless there is a daily expenditure of energy in useful activities, unless there is a giving out proportionate to the receiving, the

organism—body, mind, and soul—becomes clogged and sluggish in its movements. Thus, it appears that, to give up one's occupation and to devote one's time and attention exclusively to higher culture, defeats the very purpose for which higher culture is specifically intended.

With development, man's mind becomes more keen in its insight into conditions, more alert in its processes, more penetrating in its thought, more accurate in its movements, more specific and definite in its creation of ideas. Its faculties are like instruments of finest steel, which are being sharpened and shaped and tempered for use under the refining processes of development. They need, however, daily testing, and polishing by daily use. What can afford the needful testing and polishing better than the ever changing demands of a practical life? What better than the complications, the intricacies, the delays, the stubborn facts, incident to any occupation?

With development, the soul of man expands, and becomes a storehouse of divine qualities. The common things of life reveal a new meaning, the ordinary duties suggest a deeper significance. Love, kindness, goodness, forgiveness, become the actuating motive of all endeavor. The tiny spark of divinity latent in man's being, becomes a well-formed flame of love, radiating its powerful currents to those with whom he comes in contact. In time, it arises as "the sun of righteousness with healing in its wings." This being the case, both mind and soul, each with its expanding capabilities for usefulness, must have an avenue of manifestation, an avenue of expression. Employment and toil, contact with others in business relations, furnish an outlet for manifestation.

Nothing is gained by slighting one's work even for the sake of study and development along higher lines. To slight one's duties is only to cheat oneself. The truly great soul does his best in all things. It is an erroneous idea of development that inclines one to fall into careless and indifferent habits. He alone

makes a legitimate application of development who finds it to be a source of zest and ambition for daily improvement in practical affairs. Through a system of development properly followed, the mechanic becomes a more skilful workman, the carpenter becomes more competent in the handling of tools, and more accurate in the execution of designs; the salesman becomes more proficient in presenting his goods and in clinching the arguments that bring results. Let it be clearly understood, loss of interest in the demands of a useful life indicates that erroneous ideas regarding the purpose of development are creeping into the mind.

It is indeed harmful rather than beneficial for a person to apply himself too closely to study along any one line of thought. Constant study, and indifference to work form an injurious combination. Even if a man is so situated that work is not required of him in order to make a living for himself and others, best results in the higher development demands him to devise pursuits and lawful interests in other channels as a relief from thought in one direction. Not only are we commanded "to do this," but "not to leave the other undone." Many, even though doing this," fail in results because of "leaving the other undone." Insanity of various kinds is often caused by too much concentration of thought and effort in one particular line. This is true in material interests as well as in interests of soul culture, as is evident from the fact that ninety-five per cent of those experimenting with perpetual motion become mentally unbalanced. The mind requires relaxation and rest, change and diversion. It demands a variety of wholesome interests. It needs not only nourishment, but refreshment as well, not only "the bread of life," but the "wine of gladness." A staff is good for the support of age; but sprightliness and buoyancy of spirit are by no means to be despised. Indeed, if properly encouraged, they may enable one to dispense with artificial props and stays.

Work is one of the most important laws of development.

"In the sweat of thy brow shalt thou eat bread." We attain our desires by effort, energy, push, and untiring work. Labor does not reflect on a man's intellect or his goodness, nor does it make him less the gentleman. God is as much a farmer as he is a philosopher. By work, man polishes the mirror that reflects the divine image in which he was created. Work cleans and purifies the organism. It is a means of ridding the system of poisonous substances, a means of keeping the body clean and healthful. Inactivity consumes energy without opening the channels for receiving a fresh supply. Through activity, a new supply of energy is accumulated. Inactivity draws upon nature's storehouse without contributing anything in return for what it takes away. To take without making returns, tends toward self-destruction. Nature is full of life and energy, nor does she begrudge her blessings to those who make fair compensation. But, through the automatic operation of her own laws, she makes way with drones and laggards.

Nature honors life and activity. She is generous with her gifts; but to whom she gives she expects much. If she gives us a strong and healthful body, full of life and vigor, she will demand much of us. She herself is constantly giving and taking. The more she gives, the more right has she to take. The more she gives, the more she demands. When she is generous, she expects us to be generous in turn. She is a wise guardian of her treasures, bestowing her favors where they will be most appreciated, and where they will prove to be a profitable investment. Nature's principle of profitable investment is illustrated by Jesus the Master in the parable of the talents. The man with the five talents had accumulated more, and was accounted worthy to rule over ten cities.

Nature is honorable and just in her demands. The law of compensation not only is sure but is in strict harmony with fairness and justice. The greater one's obstacles, the greater is the power to surmount. God does not place small burdens on strong

shoulders nor heavy burdens on the weak. To carry burdens is a test of strength, of worthiness, of fitness. As one proves equal to difficulties, additional strength is given. The strongest, the bravest, the most valiant soldiers are chosen as leaders and generals of armies. Exceptions to this rule are few, and soon give place to the general principle. Nature treats man as if it was good for him to carry burdens, to bear the heat of the day, and to surmount difficulties; she treats him as if hardship and toil, labor and efforts, were to his ultimate advantage. Nature blesses toil and labor, blesses employment and occupation of mind and hand, of head and heart.

Nature is conscientious in her movements, manifesting a purpose in every form. Every part of the physical organism is designed for a purpose; and if one part shrinks from performing its specific work in the plan of life, other departments suffer in consequence. The hands were made for something, and should not be left idle. Aimless hanging of the arm from the shoulder leads to a paralyzed condition. In order that the different parts of the organic machinery may be kept in running order, the various muscles and organs must be well oiled, and harmoniously adjusted to neighboring muscles and organs. This, one accomplishes in a natural way by meeting the requirements of an active life. Unless there is sufficient physical activity, the effects react harmfully on the mental condition; and the mental state affects the soul. Thus we see that true development of mind, body, and soul demands not only proper nourishment, but proper channels of activity.

True development is in itself a type of work. It is consciously directed activity. It is by no means a listless waiting, an aimless relaxation, a passive receptivity. It is indeed a process of receiving power and vibratory waves from higher sphere; but its receptivity is active, conscious, definitely directed, and conscientiously guided.

The great men of the earth have come up from hard and

ceaseless toil, and have honored labor and activity. Abraham Lincoln worked his way up to the President's chair. The force and the energy that enabled him to split rails took him to the Capitol of the nation and made him ruler over many. Being faithful in lesser things, he became worthy of greater. Leo Tolstoi, regarded by many as the greatest writer of the age, a man whose fame became immortal while he still lived, worked as a laborer on his own farm. The carpenter's trade in no wise interfered with the development of Jesus, nor prevented him from becoming the leader of hosts of followers. Little lower than the angels, he was willing to engage in manual labor, as well as to serve others and minister to their needs in things pertaining to the soul. Peter, James, and John were fishermen. The Apostle Paul followed tent-making as a means of livelihood. With the exception of the Hindus, the great teachers all along the line have been men who honored labor and honest employment.

Great souls do not incarnate for the sake of ease and pleasure. They reincarnate in order to work, to accomplish, to achieve, to benefit humanity in every possible way. The obstacles in their path have proved to be stepping stones to higher achievement. Great souls seeking perfection, seeking a field of usefulness, do not choose homes of luxury and leisure. They do not select the vibrations that draw them into pleasure, and into careless, aimless living. Great souls incarnate *to work.* They choose fields in which work is most needed; and they are ever ready to fulfill each duty, great or small.

Mighty souls are the visible expression of the Creator, God, the Creator and Maker of all things, is a ceaseless worker. Nature is His laboratory. The universe is His workshop. Man is His messenger and His representative. In the realms of human interests, the great soul is a representative of the Infinite Being, and should manifest Him to mankind, in his

activity, in his creative ability, in his resourcefulness, in his service, and in his character.

Let us multiply our powers, our talents, our energy. The gods know whom to trust. If we desire to manifest our divine likeness in something visible and tangible; if we strive to accomplish; if we direct our creative powers into channels of useful endeavor—the finer essences from the AEthereal spheres will flow into our thought-molds, and will bless our efforts with success and victory. Let us realize our Oneness with the Creator, realize that we are a representative of the Creative Force. Let us thank God for congenial employment through which to express development of body, mind, and soul. Blessed be honest, congenial employment.

CHAPTER EIGHT

THE RELIGION DEMANDED BY THE PEOPLE

The world has become tinctured with ideas, doctrines, and theories of almost every description. The theories prevalent represent all shades and types of belief ranging between two extremes: those which are the result of cold, analytic, scientific research; and those which are the result of delving into phenomenal manifestations. These distinct and diverse doctrines have sprung up almost unawares. At the dawn of the twentieth century, Orthodoxy awoke to find that a great revolution of thought had taken place in religious dominions while the adherents of orthodoxy placidly slept. The revolution had spread among the folk of denominational creed and doctrine, and had made strong, but subtle, inroads into the congregations. Under existing conditions, one soon finds himself wandering from path to path, winding from theory to theory, from idea to idea, from this to that. The result is a maze of perplexity and unsettledness.

Much criticism has been expressed concerning the divisions of orthodox religions and their failure to harmonize and to draw together in unity; yet the same divergence of theories, the same lack of harmony, the same opposition, is manifest among leaders and organizers of modern cults. These conditions, however, need not prevent the earnest soul from finding his own center of poise and equilibrium; they need not interfere with his finding Illumination and Soul Consciousness; they need not interfere with peace and satisfaction of mind. Moreover, this very state of affairs affords an opportunity for usefulness and service.

The Illuminated Soul will not permit chaos to prevail. Even at the cost of all he holds dear, he will put forth effort to restore unity and harmony, and to establish peace and righteous-

ness among men. The state of unrest, the lack of ease, the hunger of mind and heart for that which satisfies—these very conditions, he accepts as an evidence of growth and wholesome appetite. Consequently, he accepts present conditions as an indication that the time is ripe for promulgation of the truth that has given satisfaction to hungry souls throughout the ages, the truth that has been at times "crushed to earth," but has always arisen again.

The religion of today must be one that can withstand the tides and the storms, and one that can give satisfaction to those who are earnestly striving to understand the truth. The people demand a religion that is able to withstand antagonistic criticism. They demand a religion that considers all men as belonging to one brotherhood, a religion that emphasizes both the immanence and the transcendence of Deity, a religion that individualizes and universalizes "the Word made flesh," and limits not the Divine Light to the man Jesus. It is doubtful whether men can be drawn into a fraternal relationship except through a religion that does not try to form creed-bound organizations. Teach man that he is the Church, the Temple, of the living God; that he is the builder of the Temple of Solomon, which is indeed a soulual structure.

The world stands today in the same attitude in which it stood two thousand years ago—hungering, thirsting, seeking a truth, real and worthy, that satisfies. At the time of the Master Jesus, people hovered near the threshhold of a great awakening, seeking that which they had not—love, understanding of truth, and a will-power trained in harmony with love and truth. Similar conditions are with us today. There is the same spirit of unrest, of seeking, contending, speculating, delving into the weird, and claiming phenomena where there is no phenomena; "straining at gnats and swallowing camels," proneness to disbelieve the strongest evidence of truth, and to authorize opinions

far more unstable and visionary than the ones they try to overthrow.

The religion demanded by the people today must be free from "profane babblings, and oppositions of science, falsely so-called, which some professing have erred concerning the faith." It must be free from those idealities which lift us so far up into the clouds of delusion and snares that we lose our foothold on mother earth. We need a religion that connects itself closely with practical interests; that enables man to be a representative of divine qualities in the affairs of life; that gives illustration of itself in the attributes of love, goodness, justice, and forgiveness. The religion of today must illustrate to the world through its adherents the Christ Ideal, must exemplify the Light within the individual life. Its teachers and its representatives must be more than gigantic intellects, must be qualified for more than literal interpretation of the scriptures, must be more than exponents of clever ideas and of wholesome ethics. They must have an experimental knowledge of the Word made flesh.

When the Word, which was spoken in the beginning, became flesh and dwelt among men, people knew him not. "The Word became flesh and dwelt among us, (and we beheld his glory, the glory of the only begotten of the Father) full of grace and truth." This is the Light that shineth in the darkness, and the darkness comprehendeth it not. It dwells among us, even in us, in reach of all who search and listen diligently. It dwells not in the clouds of the air, which are tossed about by the winds, without guidance of their own, and without stability. Nor does it dwell in the bablings of the disembodied. It dwells in the soul of each individual, and awaits the fanning and the nurture of the awakened mind to establish the purity of the flame and to direct the intensity of its heat.

When darkness reigned upon the face of the deep, when the earth was void and without form, the Spirit of God (Creation) moved upon the face of the waters, and God said: "Let

there be light, and there was light." When creation began there was light; and the spirit of God moved upon the face of the waters (mind). Therefore, when the spirit of creation stirred the minds of men, there was light; and the light was, and always will be. Visionists may stop aghast at this eternal truth, too simple to believe, a mystery not at all complex or astonishing; yet it is "the mystery that hath been hidden from ages and from generations, but now is made manifest to his saints"—the mystery of the Christ, and the Christic interpretation of truth.

Each individual has a particle of the divine light within his mind. He knows right from wrong; he knows the paths that lead from subterfuge and deceit; he knows when his heart is hardened, and why. All individuals have more or less light within their minds; and they are guided more less by that light. Your understanding—what is it? The mind of man—whence did it come? Where does it dwell? Tell me why it is the mind that suffers when suffering comes. Tell me why we seek peace and rest for the mind; why, when our minds are at peace, both soul and body are at ease.

Is it not an indication that the spark of divinity resting within the soul of man is guiding him to his destiny. Mind is the electrical spark from the Divine Force or Creation which lodges in the soul. It is the creating center of the Light, or the Spark of Divinity, in the soul. Every thought is a current of good or not-good radiating from that center. The mind draws to it currents in harmony with its own vibration, and makes or mars the destiny of man. It is through mind (thought) that the works of God are manifest. It is through mind that the invisible law and force predominate. Mind manifests daily the thoughts that are drawn into it; and he who knows, he who sees, is able to read with accuracy where the law has been obeyed and where it has been violated. Nature records every vibrating force that man is capable of giving.

The Supreme Mind, the Universal Consciousness, works in

all and through all. It is the receiver, the transmitter, the caretaker, the giver. No spot under the heavens is deprived of its presence.

Out in the desert, the same invisible law demonstrates the One Supreme Mind that functions in all and through all. Even in desolate places, even in plant and animal, there must be a receiver, a vessel, for these currents from the divine. Hence, there must be a spark in every plant, rock, vegetable, mineral, or animal, that is similar to, or that attracts, the force that flows into it; and the spark of unity manifests which ray, or force, or current from Deity it is.

Every force in nature is guided by the mind that rules all. God and science are not separate, not antagonistic. They are one, God is all and in all.

Have you ever watched the sunset in desert lands? Who or what paints that glowing crimson western sky? Those glistening mountain tops we see outlined against the red and gold are but pointing us toward the secret of their being. Yonder scraggly sage-bush, the feathery tree that shimmers down from over the rocky ledge like a shower of gold, and the crustly salt beds which outline our forms in indigo blues, are testifying and demonstrating that they are something, something, too, of life, of force, of power, of creation. They breathe, they feed, they grow.

Look upward beyond the dunes and watch the clouds gather in graceful groups, tinted with a blend of coloring no mortal mind can conceive or hand paint. They float away into the great beyond, a living testimonial of the One Great Force. Behind those clouds, is a Force, a Creator, a Love, so strong, so great, so powerful, so beautiful, that we turn away and say, "I only sense it."

God is there—out there in that lonely desert tract. Every hill, mountain, plant, animal, everything, moves and palpitates with His Force and Being. The clouds change to purple, to

gold, to blue. They gradually fade away as twilight sifts down silently with the rising breeze.

All around, the night is falling fast; but the moon is slowly rising, and lights the lonely waste with her weird glow. One by one, worlds of light are twinkling onward in their destiny, lending their force, their light, unto our own.

On every hand, the hierogylphs of nature testify to the everywhereness and to the superiority of the Infinite.

Each one may say: "I know my way. I know that the Hand that formed this vast plane into harmony and being will guide me safely home, if my desire is strong enough to reach home. Above the sandy barren waste, beyond the brilliant moon and the twinkling stars—aye, within my own soul—is a Greater Light. I see the Light and know its force, its power; and I will not fail because I recognize it as the Light that shineth in darkness, as the Spirit that moves upon the face of the deep, as the Mind that lives, breathes, surges through all, and eventually guides all into unity with its own."

It is the Light within. It is the Christ; and to find Salvation, or Immortality of Soul, each individual must find the Light within his own Being. The religion of the present age must be based on the doctrine of the Christ. It must be a science that will help man to find the Light in the Temple, and thus to know his God. To have found the Christ, to know one's God—this is the Church, or the Temple of Illumination. It is builded on the Illumination of each individual member. It must teach man "the way, the truth, and the life," as exemplified by Jesus, the Master. It must pave the way to Christhood.

CHAPTER NINE

THE TEMPLE OF ILLUMINATION

"He that getteth wisdom loveth his own soul." Wisdom leadeth to understanding, and understanding to Illumination. Solomon, the great King and Magician, found favor with the gods because he chose above all else wisdom and an understanding heart. And, because of his unselfish desire, great things were added unto him, the half of which was never told. The choice of a man's life molds his character.

Man is the Church, the Temple, the dwelling place, of the living God. God's Spirit, or Life, is within man. The Temple of Ilumination refers primarily, not to an outward organization so much as to the soul in which the Christ is being unfolded to consciousness and activity. Let it be understood that, fundamentally, the Illumined Soul of man is the Church, or the Temple, of Illumination. The Temple of Solomon is a soulual structure. Illumination is light—"the light that lighteth every man that cometh into the world." After man reaches Illumination, he becomes the Church, or the Temple, of Illumination.

The dimmest, most flickering light can illumine to some extent. When fanned and fed, the divine spark in man will burst into flame and light up the immensity of his nature; it becomes the indestructible fire. When the tiny spark is fed and nourished, it will grow beyond the expectation of human mind, and become the Christ.

To desire understanding of the laws of life, is wisdom. And the wise man loves his soul. He desires to develop the soul, to bring it into divine unity, to lead it to the Christ Consciousness. As long as man remains blind and deaf to the longings of his soul, he is in darkness. When God created man He created

him for a purpose. Man is potentially the Divine image. Within man's nature is the spark of divinity that may be unfolded into a true representation of the Divine. When the desires of the soul turn Godward, the spark begins to kindle into a flame. It sends out rays of heat and light; and the soul begins to understand that this light is the light that saves.

The greatest works known to the world have been accomplished by men who were in touch with divinity. All that man gives, his thoughts, his aim in life, are born from within his own being. A thought can grow to such immensity that it will fill all space. It produces ideas in minds, kingdoms and spaces far apart, and lights up a world with its own power. Thus it is that the tiny flame of divinity illumines the man within, and eventually produces a power that lifts him to the plane of Soul Consciousness. The still, small voice of one's own conscience is the Christ, "standing, knocking at the door of his heart." Conscience, awakened and enlightened, becomes Intuition.

The still, small voice of the Conscience, when awakened to the truth and enlightened by the Divine Law, becomes the Christ. The conscience is the messenger of the Creator to His own. By continued hearkening to the still, small voice, it will develop to such an extent that at any time it will respond to one's call. It is accurate and unfailing, although it is possible for the mind to misinterpret its message. When fully developed and enlightened, it illumines the whole mind with knowledge and power and peace; for it is a beacon light—it is the soul. The development of this tiny voice makes it possible for one to come in touch with god-like beings who have never lived on the earth, beings who will give their knowledge and power to those who desire to attain to exalted mental and spiritual states.

Through development and unfoldment of soul, man is led into Sonship with the Father. Then he becomes like the Christ; and on this rock the Christ built his Church, his Temple—the Church of Christhood and Illumination. "Thou art the Christ,

the Son of the living God," is the rock on which the Church is builded. Every person who has attained the glory of the Christ Consciousness, possesses the power of the Christ.

When the neophytes becomes illuminated in soul, when he feels the first thrills of conscious unity with God, he begins to manifest his likeness to the Divine. He responds with heart and soul to the betterment of his own condition and that of others. He sees new and larger fields of action. He sees the struggle of humanity and recognizes the captive soul striving for its freedom, he understands how to lend a helping hand to lead the soul to consciousness of its own existence. For him, the material life and mere material interests lose their glamor. He cares only for the real. The old doubts and distresses and the former physical longings are cast aside as one casts aside an old, worn-out garment. In time, he is enabled to think, to act, and to speak in conscious unity with the great ones of earth and heaven. Slowly the veil is lifted, and he sees "face to face" with Nature, and understands her secrets and laws. This knowledge increases love and adoration for the great Supreme Creator, the One true God.

Illumination is the Fire, the Flame, the Light, that destroys all darkness. Man cannot continue to live in darkness. Darkness is "the bottomless pit prepared for the devil and his angels;" for darkness of soul and the sting of conscience constitute the only hell there is—a hell provided for by the moral nature of man. As long as man continues to dwell in darkness, he will experience suffering. Through the activity of the conscience, the mind and the soul suffer for every violated law. When the mind suffers, the body suffers. This shows how closely allied are the physical and the mental forces. Do you realize that the body is built up by the mind? The mind is an electrical center, or unit, from which the whole being has arisen. In large measure, each individual is the creator of his own destiny, his own body, his own conditions, and all that he is.

When he was sent out from the Supreme Father, he was as a branch from the vine. A ray of light brought each individual into existence. The ray from which each one originated, gathered unto itself the good and the not good, the beautiful and the not beautiful, all things which were in harmony with its desires and its development.

God is life, He exists in all forms and expressions of life. Not only is God in matter, but, in a very true sense, it may be said that God IS matter. There are various grades and gradations of substance. Each, in its place, represents the Infinite Being. There is no truth in the supposition that matter does not exist. God made all that was made, and without Him was nothing made. All that He made is a part of Him, or is an expression of Him. All things are in unity, in harmony, with His plans. Man has discovered His laws and His plans, and accepts Him as the Father of all light. When man pursues a system of development or unfoldment, the Divine Laws become manifest to him. Development of soul enables him to see their effects—cause and its consequent effect.

The Divine Law first become manifest to the mind of man. The mind is invisible; but its form of expression and its thoughts are daily manifested and felt because there is a communication between mind and matter. Matter conveys the ideas and the workings of the mind in a more compact and tangible form. Within the AEth and the spaces about us, recognized and felt by the finer substance, Mind, dwell thoughts and ideas—a manifestation of the workings of some greater force. This is conveyed to matter (darkness) and is developed into a more compact and tangible form. The very fact that the idea, or the thought, becomes tangible is greater proof that a Supreme Force exists, and dwells in matter and in man, illumining them.

The idea once came to the mind of man that, in order to produce a certain kind of flower, two distinct and separate plants might be grafted together. Mind gave birth to the idea,

mind controlled the hand and the knife, and directed the impaling of one section into the other. Just so is the Christ born into mind, and becomes a visible and material manifestation of Good, or of God. It is a process of growth and development. The mind is the creator of the soul. The mind must guide and control the forces that build the soul structure. The mind must guide and control the process of engrafting the lower into the higher. Mind alone cannot save itself. The physical being must be controlled, or transmuted. It must be grafted into that which is of the soul. By right thinking, the mind guides the hand. By right thinking and doing, the mind guides the creative forces that unfold the soul and bring it to consciousness. Every member of the physical nature must be purged of evil, and must be grafted into purity and goodness. To a greater or a lesser degree, the physical reflects God. The purer and better a man becomes, the stronger and clearer is his reflection of the divine nature.

A tree in the fulness of the summer time expresses, or reflects, life. It moves, it breathes, it sways, it blooms, it grows. It gives visible expression of the life that is within. It is consuming, holding, building, and molding the forces of life, within itself. It draws its strength from the earth. By unfolding and expanding, by meeting the conditions of growth, by giving out life more abundantly, it manifests the earth's properties of life.

In like manner must man express the life that surges through him. He sends out to his fellowman a vibration, a current, a thought, of good-will, of love, of peace, of forgiveness. This vibration is drawn to others similar to itself. It draws strength from them, and becomes stronger. A dozen such thoughts sent out accumulate yet more according to their kind. Habitual good-will and generous thoughts become a nucleus of remarkable power. Thought responds to thought. Thus a dynamic center is established. In this way, the body, the dwelling place of the soul, becomes illuminated with the light of goodness

and truth. It becomes a temple of the Christ, the Son of God. This—the doctrine of the Christ in the individual life—is the teaching for which the organization, called the Temple of Illumination, stands.

*"The divine spark in each individual may become a well-formed center of pure, white light. It may become a dynamic nucleus of Fire—the Fire of Love, the Light of Truth. This fact gives the key to the significance of the name, the Temple of Illumination. The name signifies that each individual is capable of becoming a center of Illumination. Man is the Church of Illumination, the Temple of the living Christ. Man is the architect of the Temple of Solomon, which is a spiritual structure. The purified love of his own heart and the clarified understanding of his own soul become the Altar-Fire of this temple. This flame unconsciously radiates its light of understanding and its warmth of 'good-will toward men.'

"Man is made in the image of God. He is a reflection of the Divine, possessing the powers and the attributes of the Infinite. In different beings, these divine qualities are in different stages of unfoldment. In one, they may be in a latent state, concealed from view beneath the crust of a selfish personality; but, unless they have been seered and burned by the fire of persistent wrong-doing, they are none the less a potentiality, awaiting the unfolding processes of growth. In another, they may be in the incipient stages of a nucleus of goodness. In this state, they indicate an active wholesome conscience, although the life may be painfully fettered and hampered by the lower personality. Yet, again, these qualities may have become such a dynamic expression of individualized life that the soul is conscious of its inseparable connection with the Infinite. They may

*Taken from *"The Fundamental Principles of the Church of Illumination" in* "THE INITIATES," November, 1912.

have condensed into a center of radiation, into a perfect pyramidal flame which warms the desire nature with love, and illumines the understanding with truth. In this state, the divine qualities of love, truth, and justice unconsciously radiate, to those with whom the life comes in contact, the blessings of their inherent goodness."

To summarize in regard to the Temple of Illumination:

Each individual is capable of becoming a Center of dynamic Light; and, as such, he is the Church, or the Temple, of Illumination.

Fundamentally, the Temple of Illumination refers to the Illumined Soul of the individual. It refers to those who are striving to live such a life as will lead ultimately to Christhood.

Again, the Temple of Illumination refers to the association or the union of Awakened Minds—a band, or circle, of co-workers, whose ideals, standards, aims, and purposes urge them on to higher and ever higher endeavor in service for humanity. They endeavor, through thought, word, and deed, to help others to find the Light within their own natures. Their united effort, their harmony of purpose, their concentration of pure and noble thought, set into motion vibratory waves of power, which become to the many, both members and non-members, an avenue of blessing unmeasured.

To become a member of the Temple of Illumination, as an organization, is by no means in itself a confession of having attained Illumination, or Christhood. It is a confession, however, of subscribing to the principles and the ideals taught by the Temple of Illumination. Membership is a tacit confession of one's desire and purpose to live a life in harmony with the ideal of Illumination and Christhood. It confesses that, amid human imperfections, frailties, and weaknesses, there is *the one supreme desire* to attain Soul Consciousness and Illumination, the *one fixed purpose* to live such a life as leads to Illumination of Soul, or Christhood, the *one settled conviction* that Christ-

hood is for all who live the Christ life. Thus, it is made clear that membership in the Church, or Temple, of Illumination is not inconsistent with the "humility, silence, discretion, and prudence," that are ever recognized as marks of Initiation. It is by no means a glaring and pompous confession to have attained perfection.

CHAPTER TEN

THE POWER OF PRAYER

There is power in sincere, earnest prayer. Real desire is prayer. A long, wordy prayer is superfluous and gains nothing. The prayer of the hypocrite is of this kind and avails nothing, no matter what attitude of body he may assume, whether standing or kneeling in apparent devotion. If the prayer is not from the heart—created and formulated by the soul, the immortal part of man—it avails nothing.

A man may be a sinner, an outcast, he may be a prodigal existing on the "husks which the swine have left." Yet, if he prays with all his heart and all his soul, he benefits by it; for he sets into motion vibrations which will lift him up, and, if he continues to pray such prayers and pours out such pleas for help, he is sure to free himself from the conditions under which he may be placed.

A desire is created by the mind but really comes from the heart. A thought or a desire is a vibration created and sent forth by the mind at the unconscious dictation of the heart or the soul. A thought spoken is stronger than an unspoken thought. A spoken word produces vibrations stronger than an unspoken word. Therefore, prayer is, in one sense, concentration—concentration because it is an act of centering one thought, one desire, and of voicing that desire and sending it forth to the Throne from which all things may be granted to man.

To assume an attitude of real prayer necessitates concentration of thought on what we wish to say. Thus, we concentrate and accumulate thoughts of one kind and form vibrations through this concentration. In fact, during concentration we are creating, we are forming images of that which the heart desires;

and all we need do in order to receive is to give life to these images through faithfulness in works that are in harmony with our prayer or our desire.

Thoughts and desires are created and formed by the mind; but they are dictated by the heart. Strong vibrations are accumulated through definite forming of thought and desire. If we recognize that God is not a personal being who regulates everything to suit Himself; if we have full knowledge and understanding of the laws of vibration and of the power of concentration, we know that a prayer spoken aloud, under proper conditions, and not for show, has more power to bring that which is desired than any other form of concentration. In prayer, we do something which we do in no other form of concentration—we appeal directly to the God-head, to the Father, just as the child appeals to its earthly father; and we do this with full expectation that our prayer, or desire, will be granted to us. Through prayer, or invocation, we appeal to the Center of All Being.

In true prayer, the whole heart, mind, and soul are given up to the desire uppermost within us, and this to the exclusion of all else. Besides this, we appeal directly to the Divinity both within and without; to the Creator of all things; to the Creator that is manifested and to the Creator as yet unmanifested.

A weak spoken desire is no stronger than a weak unspoken desire. The voice is simply a current, a vibration so strong that it produces a sound. The mind and the soul control the voice, and give it the impetus to be silent or to be active The voice is a high rate of vibration of the thought from the mind. At the behest of the heart the mind forms the thought in harmony with the heart's desire. Vibrations strong enough to produce sound are then created. This forms a continuous vibration, which is most intense when it becomes audible. There is power in the human voice when deep feelings or deep emotions are using the voice for a purpose.

Sound is simply a reproduction of thought. In other words, thought becomes waves of sound. "A word, or its equivalent, produces a ripple in the air just the same as a pebble thrown into the water creates a ripple on the surface."

Voices are of the same quality as the thoughts they represent. A sad voice is unmistakable evidence of sad thoughts. Laughter is indicative of happiness or pleasure; and we all know that an angry voice betrays the mind that produces the voice.

Thought is one form of vibration, voice is another form. Silent thought and desire of an ennobling character lift one to a higher plane, and are a means of harmonizing with purity, truth, and goodness; they become a power that insures enlightenment and help from the Higher Forces. But the same thought and desire if voiced would have more power. The voiced thought and desire are stronger; for it takes more force to produce sound than silence. Consequently, the prayer that is sounded is more effective than silent prayer, provided the same intensity of feeling and concentration and desire is behind it.

The Master Jesus taught silent prayer; for he advocated going into the secret closet and there praying. But he recognized also the value of voiced prayer and voiced commands. He himself often prayed aloud. The last words he spoke was a prayer for recognition and assistance. On that occasion, we are told that he spoke with a loud voice. His command calling Lazarus from the grave was in a loud voice. In the cases of healing recorded, we note that he gave the suggestions of health and strength aloud. When he prayed on behalf of his disciples for Unity and Oneness, they stood about him in receptive attitude. He prayed aloud: "That they all may be one; as thou, Father, art in me, and I in thee, that they also may be one in us." This prayer formed vibrations of Unity and Harmony. The disciples were receptive at that moment to the forces set into motion by the prayer, and at the same time they were positive (non-receptive) to earthly desires and vibrations.

Neither did he nor his disciples depend entirely on the power of silent thought. Peter bade the beggar at the Temple Beautiful to rise up and walk. With all the force of thought and voice he accumulated and transferred the vibrations of health and strength.

When the air is enclosed by walls or coves the voice produces an echo. It reverberates for some distance and then rebounds. This is nothing but vibration. When it reaches the limit of its force, it is then carried back by the return wave, and mind recognizes its own sound.

Prayer often takes the form of confession or request for forgiveness. Much condemnation and, ofttimes, ridicule have been placed upon the priests of different schools of religion for praying for the forgiveness of penitents. People condemn the confessional. But why should they?

When a sinner confesses to another his wrong doing, and asks for prayer and help, he has created the desire within his own soul for a better condition. He has reached out toward higher vibrations. No matter how black his soul may be, he has reached out toward something better and higher. Shall he not have it?

We are not to think of answer to prayer as something that God grants, or arbitrarily brings about. It simply means that, like all other types of concentration and creation, man creates a new condition, and comes into harmony with the vibrations of the Higher Spheres. This is the secret of prayer, and explains why miracles have been wrought through prayer.

Thought vibrations are real whether uttered or silent. A thought does not lose its power when spoken. The hypocrite's prayer avails nothing, either when silent or spoken. Why? Because it does not come from the heart or the soul—it is only a lifeless thought.

While in the attitude of prayer, one's mind is concentrated and receptive at the same time. An earnest petition sent in the

spirit of love upward to the Throne of Love, or the Hierarchy of Love, will draw to the petitioner vibrations that enable him to realize the answer to his petition. For this reason, prayer may become very powerful; and, when a true and faithful priest, especially an AEth Priest who understands the AEth Forces, mingles the voice of his own soul with that of the sincere penitent of the true seeker, a force is created that is extremely powerful.

The prayer of the penitent does not cause the sin of the past to be forgiven; for, "as we sow, so shall we reap." Through prayer he receives something that is infinitely better than forgiveness of past sin, as that expression is usually understood. Through the attitude of prayer, a new condition is created in the life of him who prays; a new plane is reached; new vibrations are set into motion; and, if earnest and sincere, the penitent comes into touch with a new and higher Hierarchy.

All real power is of the soul, although mind is builder of the soul. All vibration is set into motion by the mind. The most compact, solid object ever produced by the hands of man was really formed by the thought forces or vibrations of his mind. When the idea began to unfold, he began to put it into form; otherwise, it could not have materialized. It is thus with all things made by man.

All true prayer is elevating and ennobling, and brings desired results if the vibrations are strong enough. The hypocrite never really prays, he simply utters thoughts that have formed in the mind for the purpose of show. Such a prayer does not create powerful vibrations; for it is not from the heart and the soul. It is therefore surface prayer, it is artificial.

A prayer, like a thought, is a vibration, or a current; and these vibrations, or currents, always attract their own kind. Hence good and elevating thoughts, or prayers, gravitate to each other, accumulate, and dwell on a plane apart from others. This explains the power of true prayer. This is the secret of

prayer, and explains why seeming miracles have been performed through prayer. Peace attracts harmony and rest. It attracts or inducts any of its vibrations or principles into any other vibration that becomes receptive to it or attains to its plane.

When man truly prays, he is both positive and negative: he is positive in that which he desires and demands; and he is receptive in that his mind, heart, and soul are ready to receive that for which he asks.

Such receptivity must not be confused with passivity of body, muscles, and mind. It is not negativeness. In order to become receptive to the good and the harmonious, we must rid ourselves of inharmonious thoughts, feelings, and actions; we must become harmonious and good at least to a certain degree. The greater the degree of harmony to which we attain, the more good will we receive.

The true receptive attitude of mind is really a positive attitude. It is active and alert, it works consciously and with a definite object in view. It is positive (non-receptive) to all that it does not desire; but it is receptive to those things which the heart has formulated as desirable and which it wants. The true receptive attitude of mind gives because it expects to receive. It simply makes an exchange, an exchange that is good for all.

To be truly receptive means to be positive (non-receptive) towards the non-good. It means to be on the plane of goodness, to be in harmony with the Hierarchy or the Sphere, of the good and the true. For instance, we pray for knowledge, wisdom, goodness, truth. To become able to receive these attributes, we must lift ourselves up to these planes. All knowledge, goodness, and truth have been stored up on their respective planes, in certain Hierarchies. We can come into touch with any of these planes, spheres, Hierarchies, when we prepare ourselves; when we fit ourselves to do so; when through desire, through prayer, we reach to them.

The vibrations of goodness and truth do not flow down into

the minds and the souls of men until they fit themselves, prepare themselves, to receive these particular vibrations. In order to do this, they must prepare themselves by becoming free from impure and unholy thoughts; for man is composed of the vibrations of the thoughts he thinks. Through holy desire (prayers) and through will-power, and effort executed in accordance with the desires, man reaches the plane of thought and realization to which he aspires.

Renew your confidence in prayer. Let every act of your life be a manifested prayer. All life should be a prayer, not a prayer of mere words arising from the heart, but a continuous prayer of good works and good deeds. This is true prayer.

CHAPTER ELEVEN

SOUL SCIENCE AND HEALTH

Soul Science, or Soul Development, and physical health go hand in hand. Development of Soul is conducive to health of body. In development of Soul, mind, being the creative power, is the chief actor.

Distinction must be made between unawakened, unenlightened mind and Awakened, Enlightened, or Illumined Mind. Awakened mind has become conscious of (has awakened to) its mission as an active agency in Soul Development. It realizes that mind is responsible for development of soul. Unawakened mind may be keen and alert in intellectual operations and may have accumulated vast knowledge on the intellectual plane, but it has not yet awakened to the truth that there must be a creative agency in development of soul and that mind is that creative agency. When the mind has become thoroughly convinced of this fact and has cheerfully accepted the responsibility of its function as builder of soul, it is called the Awakened Mind.

Awakened Mind is the builder of the Illuminated Soul. Solomon, the mind of man, builds the temple, which is nothing more nor less than the Soul that has become Illuminated, the Soul that has lighted the fires on the Altar. The literal, material temple of Solomon was threefold in its arrangement. The outer court of the building, or the wall, corresponds to the body of man. Next to this, the main apartment of the building where all may enter, represents the mind of man. Last and most important of all is the inner sanctuary. The Holy of Holies, the place where none may enter except the Initiated Priest, represents the Inner Center in man wherein is the Altar on which burn the unquenchable fires whence issues the Light.

Soul Science, however, is not limited to development of soul. It concerns the threefold being of man, body, mind, and soul. But it deals with man's threefold being only on the higher plane—never on the carnal plane; for a carnal soul cannot be builded. The mind may be carnally inclined, the body may be carnal in every department; but the soul cannot be carnal. If body and mind are carnal, the soul simply sleeps, and will not be aroused until man changes his thoughts and his life, and begins to look upward instead of downward. Through looking upward, he finds health, happiness, and peace.

Unawakened mind may acquire knowledge, it may acquire shrewdness and cunning, it may think and produce; but it cannot grow or develop or become the awakened mind unless it reaches out for greater and more divine things than it already possesses. It can accumulate on the mental plane; but it grows on the higher plane only through lofty aspirations and noble ideals. Rubbish can be accumulated; but rubbish is rubbish always, and will not grow. The non-good accumulates non-good. It becomes more; but it does not grow because it cannot produce life, and without life nothing can grow. Soul Science pertains to life and to living products; hence, it functions on the higher plane and always tends upward. The unenlightened mind may accumulate from its own plane all that plane affords; but it does not attain or produce anything that lives or possesses the quality of life. Accumulation is not growth. It is simply a retention of something that is received from without. Accumulation merely as such, gives neither health nor peace unless it is applied, made use of, and manifested through good works, good thoughts, and good desires.

Mere accumulation of knowledge—knowledge that is only of the mind, and that is accumulated without a desire to do good—does not build an Illuminated Soul. It simply establishes an intellectual storehouse, which, though very desirable, does not make for Immortality, nor does it give power to create health

either within the self or in others. But, when the mind seeks to know the truth for the sake of living in harmony with the truth; when it seeks for the knowledge that others have found helpful for the sake of making use of it for the good of its own being and for the good of others, then its acquisitions become applied knowledge. Through applied knowledge, the mind itself becomes illumined and enlightened; and a new being is manifested. This new manifestation means growth of the Illumined Soul.

Such a soul, through the Awakened Mind, will not only be able to obtain health and peace for the body, the temple in which it dwells, but it will also be able to point out the way of life to millions of other souls that yet dwell in darkness. These souls, through obedience to the truth, will likewise be able to obtain health and peace, success and happiness. This is the mission of Soul Science.

Concentration of power followed by transference of power is the basis of Soul Science. Concentration, however, is not growth. To concentrate is to hold one desire, one basic thought, in the mind. Through this one desire, this one thought, the mind comes into harmonious vibration with other minds of like nature. Moreover, it comes into touch, makes connection, with the spheres of that thought and that desire. Thus, concentration means accumulation; and when concentration and accumulation are followed by the right use of that which is accumulated, then comes growth, development, and Immortality. Through concentration, we attract or draw to us; and, through the faculty of a well-trained will, we send out or transfer every thought or force thus drawn to our center. The Soul manifests its true self by the visible forces it draws around it and by the forces it transfers. Thus, fundamentally considered, concentration of forces followed by intelligent transference and distribution of forces forms the basis of Soul Science.

Since Soul Science deals with life, with growth, and with conditions of life and growth, and since concentration and accu-

mulation are the first steps in applying Soul Science, it follows that we must concentrate upon qualities that produce growth, qualities that are endowed with the principle of life. If the mind that is inclined toward the non-good concentrates on goodness and thoughts of life and growth, it will draw to itself currents of life and goodness, and will be able to transmute tendencies toward non-good into positive goodness.

Concentration may be a blessing or a curse. Concentrate upon goodness and virtue, and you will accumulate and produce goodness and virtue. Concentration is a process of thinking a definite focussing of the attention at a given time upon one single object or subject to the exclusion of everything else. Thus, "As a man thinketh in his heart, so is he." A good, perfect tree does not bring forth defective fruit. Neither can a pure mind produce sensual or degraded thoughts.

Soul Science is conducive to health in that it stimulates harmonious states of mind. The mind is the center from which electrical currents are sent to all parts of the body, building it up or tearing it down, according to the thoughts, whether good and constructive or inharmonious and destructive. According to their character, thought waves are positive or negative. Positive thoughts go out in currents of pure, wholesome, beneficent, happy, constructive vibrations. These currents renew and build up broken-down cells. They induce health and vitality, peace and contentment. Negative and destructive thoughts act just contrary to the way in which positive thoughts act.

Pure, wholesome, beneficent, health-inspiring thought waves are the AEth currents of the true Healer. Through an accurate use of a well-developed and well-trained will-power, he transfers these forces to the diseased parts of the patient's body. With a careful study of the AEth Philosophy and of Soul Science, one may so develop understanding and will-power as to become a successful healer.

There is a right way and a wrong way of treating disease.

The purer and healthier the mind, the stronger the healing power. A pure-minded person can impart greater force to the thoughts he transfers than can a person of immoral character. It is possible for the immoral person to employ positive thoughts in healing; but he cannot endow them with sufficient strength to exist for any great length of time.

Soul Science and the AEth Philosophy are based on laws much higher than the ordinary hypnotic trance, which many have employed as a means of healing disease and of producing phenomena. Suggestions are helpful and beneficial in the extreme when rightly and wisely given. But it is by no means necessary to make the patient or the subject helpless and unconscious in order to effect a cure.

Unless a person understands the divine laws, and how to use them; unless he is an adept in applying Nature's secret forces, which are known only to the very, very few, he should never employ hypnotism or any type of hypnotic methods in the treatment of disease. There are conditions regarding hypnotism which make it extremely dangerous both to the operator and to the subject. There are sensitive subjects whom we call hypnotic subjects; but it is dangerous for such subjects to come under the control of a hypnotist. The harm lies not so much in the science as in the individual who demonstrates. Results depend on the plane of mentality and souluality the operator has attained.

Every thought acts as a suggestion to some one. Every time we utter a word, we give expression to thought. An unspoken thought likewise has manifold power. Thought is vibration, just the same as an electrical current from a charged wire or as a ripple of water created by throwing a pebble across its surface. The spoken word is more powerful than the unspoken. Power greater than every other type of power dwells in mind. Man could destroy worlds by a single thought if he fully comprehended the power of thought. Thought is the foundation of all

things. It is the secret force of all creation and of all science. Thoughts grow into beauty or non-beauty according as the heart guides; for the heart brings forth all thoughts, and "as ye sow, so shall ye reap."

The true Scientist will begin by practicing on himself. He will purify his body of all gross material, and will purge his mind of unclean, lustful, destructive thoughts. His creed is: "As a man thinketh in his heart so is he." He will manifest loyalty to this creed by keeping his own heart pure, noble, and clean.

Soul Science demands a wholesome type of introspection and self-examination. What are these coarser elements within us which are manifested every day of our lives? Did you ever stop to think? Have you ever analyzed yourself? Did you ever sit down alone in the silence and ponder the actions, words, and thoughts of the day? If not, then do so. Interview yourself. Parade yourself as you are before your own mind, and carefully weight every view you get of yourself, and find out where you belong. If we take such a detailed view of ourselves and then stop there, it will only be detrimental to us. Self-examination is harmful unless it is followed by prompt, courageous action—action directed toward self-betterment. Introspection that stops short of definite endeavor and determined effort in the direction of self-improvement is morbid and unwholesome. Introspection that is immediately followed by "Right about, Face," the minute an unfortunate tendency is discovered, is beneficial, and tends toward keeping the powers both of body and mind alert and active. Such introspection as this, is a stimulus to the cultivation of a masterful will.

Soul Science is based on the foundation of truth, and good-will to all creatures. Godliness gives power and the power of Godliness is greater than all other power. When your own heart witnesseth that you think only good, sincere, uplifting thoughts

toward all mankind, you have mastered the first and the hardest lesson of Science, true Soul Science.

If you wish to develop your powers properly, sit alone in the silence for ten or fifteen minutes at a time each day and meditate upon love, goodness, peace to every human creature. In the cultivation of good-will toward all, be sure to include your enemies; and you will be able to utilize and draw towards you the forces of the Christs who have learned the beautiful, but perhaps the hardest, lesson of life—forgiveness. Remember that a thought is vibration, vibration as strong as a charge of electricity, and that it goes in unerring accuracy in the direction in which it is sent. It bears fruit of its kind. It reaps what it sows.

If you wish the best, send out the best you have. Your thoughts mingle with the thoughts of others of like quality; and the forces of this accumulation of thought sustain and strengthen one another and produce effects. With good, bad, or indifferent thoughts, the principle is the same. They float in waves, in masses, in the atmosphere of all minds, and cause each mind to act in harmony with their character, and exert an influence over every mind with which they come in contact.

Much good can be accomplished through the silent forces of thought. Thought-control is therefore the first thing to aim at in true development. The first stage of development of soul is training of thought. It may well be called Mind-Soul Science. The Soul is the real, the vital, that which is capable of becoming immortal. It is the connecting link between God and man. The Soul vibrates in currents throughout the body, building and making the body in conformity with its laws and its forces. Therefore one should be careful what manner of spirit one cultivates, for it will be reflected in one's body.

CHAPTER TWELVE

HEALING

It is absolutely necessary for the student who desires to become a healer to have at least some knowledge of the Laws of Being; of the cause that brought man into the world, his mind, his soul, and the occult principle on which these are constructed. There are few healers who really understand the Great Mystery of Being. Those who are contemplating the practice of the healing art should have a careful training under the care of one who thoroughly understands the Supreme AEth Mystery.

Physicians are required to understand the physical body; of what it is composed; its normal and its abnormal conditions; the diseases of the various organs of the body, and how to treat them, both acute and chronic. Yet the average physician knows very little about the great mystery of being, of the mind, its normal and its abnormal states; and, especially along soulual lines, he knows still less.

Suggestions may be given by healers in different forms. Suggestions given without a thorough knowledge of the Divine Mysteries are like taking a dose of medicine without a physician's prescription. It is more chance and guess work than anything else. Yet Suggestion is a great Law, a powerful healing agent. Good suggestions are always beneficial; but to become a perfectly skilled and accurate healer one should understand the first principles, or secrets, of LIFE. In this knowledge lie all the possibilities of perfection in healing. When positive and forceful, suggestions are lasting, and may effect the cure of any curable disease.

The mind is that part of our being which responds to

Divinity. It is the only agent through which we can attain consciousness of Divinity. Mind is the Unite of Creation. By its thoughts are all things created. It holds within itself the cusps of transition from God to man, and from man to Divinity again. It is the sustainer, the equilibrator of all forces, the good and the so-called not-good. We think, we eat, we move, we live, entirely through mind; for in mind are the corresponding forces of Divinity. "In Him we live and move and have our being."

The mind, this unit that springs from the Father, builds up for itself the aura that constitutes the soul. The soul is the finer substance created by the thoughts of the mind. The center of the mind is too fine and light to become visible to the physical eye.

In the center of the mind, the currents are produced by positive and receptive action of the creating forces. Similar to the Greater Forces, these vibrations become more compact as they are inducted into receptive principles. The farther away from the center, the more compact and firm the body becomes; hence, the outward or external formation of the body is more compact than the inner, which is nearer the center of the soul.

When the mind is held by currents of sensual pleasures of the material or grosser life, these vibrations are sent throughout the aura; and the body is formed or created, molded and stamped, by this accumulation of vibrations, and takes on the likeness of the thoughts contained in the mind. If a man will not lift himself above gross and material types of thought, if he is content to remain on the animal plane of desire and feeling, the predominant character of his mind will be accurately reflected in his physical being. The currents of the mind and the soul are the real foundation of the body. The physical manifests conditions of grossness and sensuality when such thoughts mold the flesh.

An accurate reader of human nature can readily distinguish the sensual from the pure, the weak from the strong, the positive from the negative. This he does from the features of the face, from the character of the body, from the carriage and general bearing of the figure, as well as from the aura of thought that surrounds the personality. If a man walks carelessly and manifests shiftlessness; if he presents a "don't care" look, it gives evidence that he is discouraged and ambitionless, because the whole vibration from center to circumference is created and built up by the thought currents of his mind. We all carry about with us the thoughts that we create. We all show to the world the character of the soul, whether fine and light or compact and coarse; for the flesh is composed of the same substance as the mind. Indeed, in a very true sense, the flesh IS mind as truly as is the invisible mind, it is MIND SEEN OR VISIBLE, it is a compact form of mind.

It is very important for the healer to understand these principles. He must understand that all is really formed of mind and created by mind. He must have more than a mere intellectual comprehension of the principles of thought. He must have a sure and undoubted realization of the truth of these statements. He will then have satisfactory knowledge of the basis of the Laws of Healing.

When a part of the body is diseased, it only proves that certain currents of health are resisted or retarded by an antagonistic force in that part of the body. Sometimes the vibrations or thoughts of the mind are sensual, gloomy, pessimistic, hateful, revengeful. These vibrations go through the body and destroy nerve tissues and cells. Often, when the body is racked with some dread disease, the cause is to be traced to mental conditions. The mind creates everything. The vibrations of hate, envy, malice, jealousy, doubt, fear, anger, and kindred thoughts and feelings are charged with poison. This poison is sent through the entire system in tiny subtle currents. Fine and penetrating they are, and are capable of utterly destroying when

they are accumulated and held, or transferred to those with whom one comes in contact.

Happy, hopeful, healthful, kind, forgiving thoughts build up instead of tear down. The healer must be able to transfer the strength of his mind into the mental currents of the patient. If disease is brought on by abnormal thought tendencies, it follows that it may be corrected by normal thought power. Many difficulties and physical disorders are produced by the abuse of sex laws. Every healer should have a thorough knowledge of the divine mysteries of the sexual nature. He is then able to determine whether the disease is to be accounted for in thought conditions merely or in abuse of sex laws.

Diagnose your case thoroughly through your knowledge of natural laws. Indigestion and dyspepsia are often produced by currents of worry, hate, and greed; often, by incorrect selection and combination of foods. These difficulties, to be sure, affect other organs; but the stomach is the vital spot to be affected by worry and hatred. Sensual, lustful thoughts produce brain disorders, and weaken the digestive organs. Jealousy and anger are nerve-wreckers; and, as a rule, nagging men and women are jealous and high tempered. Timid, shrinking, pallid people are constipated and bilious. Fear stops the strong throbbing currents of health, and makes the blood thin and insufficient.

To treat these cases properly, one must remove the cause. If fear is the cause, proceed to eliminate fear from the mind. Produce a current of fearlessness and courage and happiness by mental suggestions, by teaching the patient the principles of Soul Science, and by an application of the hands over the diseased parts. If the difficulty is due to incorrect dietary conditions, proceed to rectify them. In all cases, seek the cause; and then seek to remove the cause of ill health by substituting normal conditions.

During treatment, the patient is negative, or receptive; while the healer must be positive. The healer must have regard for

the negative and the positive poles of the patient's organism. The body is divided into portions or zones positive and negative. The healer must understand their location; for many mistakes are made by incorrect application of the hand. The right hand is positive, and the left is negative. The right hand should be placed with the negative circle, while the left should follow the positive portion. When properly done, this will create a vibration distinctly felt, either electric or magnetic or AEthic; and the currents created and transferred will surge through the affected parts just as a battery charge is felt. Properly understood and directed, these vibrations will master and cure any curable disease.

If a case is stubborn, and does not yield to the first treatment, be assured, it will yield after several treatments; for, unless the system is thoroughly impaired, these electro-magnetic-AEthic charges WILL build up the diseased nerves, tissues, and cells. They restore because they create anew that which was destroyed. If a portion of the body is diseased because of broken vibrations, or currents, it can be made whole by restoring new, strong AEth currents, just as any magnetic substance can be made alive and magnetic by being recharged.

During treatment, strong mental suggestions must be given. Allow nothing to weaken the attention or to swerve the mind from its object. Demand health, strength, and vitality to your patient, and they will be sure to come. Reason gently, firmly, positively with the patient, and show him why he should be a representative of health and strength instead of being a manifestation of illness. Arouse his ambition to become strong and healthful. Lead him to recognize the Godhood within his own Being, and teach him how to call upon the unfailing source of Divinity within for health, strength, and vigor.

From AEth Sphere, draw the AEth Force, and transfuse it into the organism of your patient. Do not allow the disease to assert itself. Forget the presence of the disease by holding your

mind so full of health-inspiring thoughts that there is no place for disease-thoughts; and send these health-inspiring thoughts to your patient. Be careful, however, not to became rigid and intense yourself. Maintain a quiet, calm, positive attitude. Do not allow yourself at any time to become excited, over anxious, or impatient. At all times be calm and serene. Examine the patient carefully, quietly, calmly. This keeps harmonious vibrations in circulation.

Positive affirmations are better than negative assertions or statements. Do not say: "You have no disease; you are not ill." Yet be careful, on the other hand, not to AFFIRM the presence of disease and difficulty. AFFIRM health, peace, and happiness. Affirm the power of the AEth forces to restore normal conditions. Affirm the power of nature to do her own work of healing when you do your part toward making conditions of health. The following is a good statement to use for affirmation, and may be repeated over and over, mentally; or, it may even be used aloud as an absent treatment: "I WILL that this persons draws to himself or herself the vibrations of health, peace, and happiness. The Divine in me sends forth these currents of health, strength, and vitality; and I WILL them to continue with the person indefinitely."

By use of a similar affirmation, instil into his mind thoughts of purity, good-will, and kindness toward others. WILL that healthful thought-vibrations become transfused into his thoughts and actions. By doing so, you destroy carnal vibrations, and set into motion currents of purity and goodness. These currents will live if persistent and continued treatment is given. Best results are obtained if these treatments are given while the patient is in a relaxed, restful, trustful state of mind and body.

Be careful not to become vacillating and careless. Always keep a positive attitude. Do not become aggressive and argue against a complaint or pet theory or the patient, although it is wise and necessary to turn his thoughts into other channels. Be

in command of yourself, then you can command others. The true Mystic is self-controlled and self-possessed.

If antagonistic thoughts are set against you, meet them with love. Love is a fire that consumes all destructive qualities. The stronger the AEth Forces in your organism, the easier it is to counteract hatred, envy, malice, and other inharmonious conditions. There is more heart in love than in hatred. There is more strength in affirmation and in goodness than in denial. If genuine and strong, good overcomes. Keep your own mind clean, and free from all poisonous thoughts; then you send out or transfer only vibrations that build up and restore health, mentally, morally, and physically. Concentrate forcibly on whatever you desire. Concentration accumulates vibrations that are in harmony with the mind. It accumulates and gives you power to transfer. When you desire to implant a thought in another mind, you can do so by strong forceful concentration. Through concentration and will-power you accumulate certain forces or conditions within yourself. Through transference, you draw from the AEth Spheres, and WILL that certain forces or conditions go to other persons or places. This expresses briefly the meaning of accumulation and transference—two powerful laws which all healers should thoroughly understand, and know how to operate properly.

Beware of using any law to wrong another; for, in so doing, you accumulate around you thoughts that are of like character with the ones you send out. Thus, by harming another, you harm yourself more than any one else. In a very true sense, you are your brother's keeper. He is his own creator and the author of his own destiny. Nevertheless, you have no authority to WILL harm to any one. To will harm to another destroys the vibrations of love and the power of attainment within yourself. Do good, and think kind, generous thoughts toward all; and good will return to you.

The AEth Mysteries teach the exact truth regarding the

laws of being, and the great harm resulting from wrong thought and transference of wrong thought. Mind is creator. It is always producing or creating. It is the image, or the likeness, of the Father; and, through power of mind, we are able to save. The mind possesses all power of the good and of the not-good.

In whatever channel we direct our thoughts, that vibration is always in harmony with us until we break it by thoughts of a different nature. Not only while giving treatment is the healer to guard his thoughts, but he should constantly be accumulating and storing up the forces that comes from healthful, pure thoughts. His own health improves as he surrounds himself with a wholesome aura.

Fundamentally, the healer's power over disease comes from the Christ of his own being. He who desires to become a healer should first of all strive to attain Christhood. Love is the healer's agency. Christhood manifests itself though the power of love.

"Every effort has been made by the Fed (Federal Reserve System) to conceal its powers but the truth is – the Fed has usurped the Government. It controls everything here (in Congress) and it controls all our foreign relations. It makes and breaks governments at will."

Hon. Louis T. McFadden.
Chairman. Banking & Currency
Committee. "Congressman
McFadden on the Federal
Reserve Corporation".
CONGRESSIONAL RECORD.
1934. page 3

HE SOLUTION

THE TREACHEROUS AND DISLOYAL CONDUCT OF THE FEDERAL RESERVE BOARD AND THE FEDERAL RESERVE BANKS

Friday, June 10, 1932

Mr. MCFADDEN. Mr. Chairman, we have in this country one of the most corrupt institutions the world has ever known. I refer to the Federal Reserve Board and the Federal reserve banks. The Federal Reserve Board, a Government board, has cheated the Government of the United States and the people of the United States out of enough money to pay the national debt. The depredations and the iniquities of the Federal Reserve Board and the Federal reserve banks acting together have cost this country enough money to pay the national debt several times over. This evil institution has impoverished and ruined the people of the United States; has bankrupted itself, and has practically bankrupted our Government. It has done this through the defects of the law under which it operates, through the maladministration of that law by the Federal Reserve Board, and through the corrupt practices of the moneyed vultures who control it.

Some people think the Federal Reserve Banks are United States Government institutions. They are not Government institutions. They are private credit monopolies which prey upon

the people of the United States for the benefit of themselves and their foreign customers; foreign and domestic speculators and swindlers; and rich and predatory money lenders. In that dark crew of financial pirates there are those who would cut a man's throat to get a dollar out of his pocket; there are those who send money into States to buy votes to control our legislation; and there are those who maintain an international propaganda for the purpose of deceiving us and of wheedling us into the granting of new concessions which will permit them to cover up their past misdeeds and set again in motion their gigantic train of crime.

Those 12 private credit monopolies were deceitfully and disloyally foisted upon this country by bankers who came here from Europe and who repaid us for our hospitality by undermining our American institutions. Those bankers took money out of this country to finance Japan in a war against Russia. They created a reign of terror in Russia with our money in order to help that war along. They instigated the separate peace between Germany and Russia and thus drove a wedge between the allies in the World War. They financed Trotsky's mass meetings of discontent and rebellion in New York. They paid Trotsky's passage from New York to Russia so that he might assist in the destruction of the Russian Empire. They fomented and instigated the Russian revolution and they placed a large fund of American dollars at Trotsky's disposal in one of their branch banks in Sweden so that through him Russian homes might be thoroughly broken up and Russian children flung far and wide from their natural protectors. They have since begun the breaking up of American homes and the dispersal of American children.

It has been said that President Wilson was deceived by the attentions of these bankers and by the philanthropic poses they assumed. It has been said that when he discovered the manner in which he had been misled by Colonel House, he turned against that busybody, that "holy monk" of the financial empire, and showed him the door. He had the grace to do that, and in my opinion he deserves great credit for it.

President Wilson died a victim of deception. When he came to the Presidency, he had certain qualities of mind and heart which entitled him to a high place in the councils of this Nation; but there was one thing he was not and which he never aspired to be; he was not a banker. He said that he knew very little about banking. It was, therefore, on the advice of others that the iniquitous Federal reserve act, the death warrant of American liberty, became law in his administration.

Mr. Chairman, there should be no partisanship in matters concerning the banking and currency affairs of this country, and I do not speak with any.

In 1912 the National Monetary Association, under the chairmanship of the late Senator Nelson W. Aldrich, made a report and presented a vicious bill called the National Reserve Association bill. This bill is usually spoken of as the Aldrich bill. Senator Aldrich did not write the Aldrich bill. He was the tool, but not the accomplice, of the European-born bankers who for nearly 20 years had been scheming to set up a central bank in this country and who in 1912 had spent and were continuing to spend vast sums of money to accomplish their purpose.

The Aldrich bill was condemned in the platform upon which Theodore Roosevelt was nominated in the year 1912, and in that same year, when Woodrow Wilson was nominated, the Democratic platform, as adopted at the Biltmore convention, expressly stated: "We are opposed to the Aldrich plan or a central bank." This was plain language. The men who ruled the Democratic Party then promised the people that if they were returned to power there would be no central bank established here while they held the reins of government. Thirteen months later that promise was broken, and the Wilson administration, under the tutelage of those sinister Wall Street figures who stood behind Colonel House, established here in our free country the wormeaten monarchical institution of the "king's bank" to control us from the top downward, and to shackle us from the cradle to the grave. The Federal reserve act destroyed our old and characteristic way of doing business;

it discriminated against our 1-name commercial paper, the finest in the world; it set up the antiquated 2-name paper, which is the present curse of this country, and which has wrecked every country which has ever given it scope; it fastened down upon this country the very tyranny from which the framers of the Constitution sought to save us.

One of the greatest battles for the preservation of this Republic was fought out here in Jackson's day, when the Second Bank of the United States, which was founded upon the same false principles as those which are exemplified in the Federal reserve act, was hurled out of existence. After the downfall of the Second Bank of the United States in 1837, the country was warned against the dangers that might ensue if the predatory interests, after being cast out, should come back in disguise and unite themselves to the Executive, and through him acquire control of the Government. That is what the predatory interests did when they came back in the livery of hypocrisy and under false pretenses obtained the passage of the Federal reserve act.

The danger that the country was warned against came upon us and is shown in the long train of horrors attendant upon the affairs of the traitorous and dishonest Federal Reserve Board and the Federal reserve banks. Look around you when you leave this chamber and you will see evidences of it on all sides. This is an era of economic misery and for the conditions that caused that misery, the Federal Reserve Board and the Federal reserve banks are fully liable. This is an era of financed crime and in the financing of crime, the Federal Reserve Board does not play the part of a disinterested spectator.

It has been said that the draughtsman who was employed to write the text of the Federal reserve bill used the text of the Aldrich bill for his purpose. It has been said that the language of the Aldrich bill was used because the Aldrich bill had been drawn up by expert lawyers and seemed to be appropriate. It was indeed drawn up by lawyers. The Aldrich bill was created by acceptance bankers of European origin in New York City. It was a copy and in general a translation of the

statutes of the Reichsbank and other European central banks.

Half a million dollars was spent on one part of the propaganda organized by those same European bankers for the purpose of misleading public opinion in regard to it, and for the purpose of giving Congress the impression that there was an overwhelming popular demand for that kind of banking legislation and the kind of currency that goes with it, namely, an asset currency based on human debts and obligations instead of an honest currency based on gold and silver values. Dr. H. Parker Willis had been employed by the Wall Street bankers and propagandists and when the Aldrich measure came to naught and he obtained employment from CARTER GLASS to assist in drawing a banking bill for the Wilson administration, he appropriated the text of the Aldrich bill for his purpose. There is no secret about it. The text of the Federal reserve act was tainted from the beginning.

Not all of the Democratic Members of the Sixty-third Congress voted for this great deception. Some of them remembered the teachings of Jefferson; and, through the years, there have been no criticisms of the Federal Reserve Board and the Federal reserve banks so honest, so outspoken, and so unsparing as those which have been voiced here by Democrats. Again, although a number of Republicans voted for the Federal reserve act, the wisest and most conservative members of the Republican Party would have nothing to do with it and voted against it. A few days before the bill came to a vote, Senator Henry Cabot Lodge, of Massachusetts, wrote to Senator John W. Weeks as follows:

New York City, December 17, 1913.

My Dear Senator Weeks: ° ° ° Throughout my public life I have supported all measures designed to take the Government out of the banking business ° ° °. This bill puts the Government into the banking business as never before in our history and makes, as I understand it, all notes Government notes when they should be bank notes.

The powers vested in the Federal Reserve Board seem to

me highly dangerous, especially where there is political control of the board. I should be sorry to hold stock in a bank subject to such domination. The bill as it stands seems to me to open the way to a vast inflation of the currency. There is no necessity of dwelling upon this point after the remarkable and most powerful argument of the senior Senator from New York. I can be content here to follow the example of the English candidate for Parliament who thought it enough "to say ditto to Mr. Burke." I will merely add that I do not like to think that any law can be passed which will make it possible to submerge the gold standard in a flood of irredeemable paper currency.

I had hoped to support this bill, but I can not vote for it as it stands, because it seems to me to contain features and to rest upon principles in the highest degree menacing to our prosperity, to stability in business, and to the general welfare of the people of the United States.

Very sincerely yours,

HENRY CABOT LODGE.

In the 18 years which have passed since Senator Lodge wrote that letter of warning all of his predictions have come true. The Government is in the banking business as never before. Against its will it has been made the backer of horse-thieves and card sharps, bootleggers, smugglers, speculators, and swindlers in all parts of the world. Through the Federal Reserve Board and the Federal reserve banks the riffraff of every country is operating on the public credit of the United States Government. Meanwhile, and on account of it, we ourselves are in the midst of the greatest depression we have ever known. Thus the menace to our prosperity, so feared by Senator Lodge, has indeed struck home. From the Atlantic to the Pacific our country has been ravaged and laid waste by the evil practices of the Federal Reserve Board and the Federal reserve banks and the interests which control them. At no time in our history has the general welfare of the people of the United States been at a lower level or the mind of the people

so filled with despair.

Recently in one of our States 60,000 dwelling houses and farms were brought under the hammer in a single day. According to the Rev. Father Charles E. Coughlin, who has lately testified before a committee of this House, 71,000 houses and farms in Oakland County, Mich., have been sold and their erstwhile owners dispossessed. Similar occurrences have probably taken place in every county in the United States. The people who have thus been driven out are the wastage of the Federal reserve act. They are the victims of the dishonest and unscrupulous Federal Reserve Board and the Federal reserve banks. Their children are the new slaves of the auction block in the revival here of the institution of human slavery.

In 1913, before the Senate Banking and Currency Committee, Mr. Alexander Lassen made the following statement:

> But the whole scheme of a Federal reserve bank with its commercial-paper basis is an impractical, cumbersome machinery, is simply a cover, to find a way to secure the privilege of issuing money and to evade payment of as much tax upon circulation as possible, and then control the issue and maintain, instead of reduce, interest rates. It is a system that, if inaugurated, will prove to the advantage of the few and the deteriment of the people of the United States. It will mean continued shortage of actual money and further extension of credits; for when there is a lack of real money people have to borrow credit to their cost.

A few days before the Federal reserve act was passed Senator Elihu Root denounced the Federal reserve bill as an outrage on our liberties and made the following prediction:

> Long before we wake up from our dreams of prosperity through an inflated currency, our gold, which alone could have kept us from catastrophe, will have vanished and no rate of interest will tempt it to return.

If ever a prohphecy came true, that one did. It was impos-

sible, however, for those luminous and instructed thinkers to control the course of events. On December 23, 1913, the Federal reserve bill became law, and that night Colonel House wrote to his hidden master in Wall Street as follows:

> I want to say a word of appreciation to you for the silent but no doubt effective work you have done in the interest of currency legislation and to congratulate you that the measure has finally been enacted into law. We all know that an entirely perfect bill, satisfactory to everybody, would have been an impossibility, and I feel quite certain fair men will admit that unless the President had stood as firm as he did we should likely have had no legislation at all. The bill is a good one in many respects; anyhow good enough to start with and to let experience teach us in what direction it needs perfection, which in due time we shall then get. In any event you have personally good reason to feel gratified with what has been accomplished.

The words "unless the President had stood as firm as he did we should likely have had no legislation at all," were a gentle reminder that it was Colonel House himself, the "holy monk," who had kept the President firm.

The foregoing letter affords striking evidence of the manner in which the predatory interests then sought to control the Government of the United States by surrounding the Executive with the personality and the influence of a financial Judas. Left to itself and to the conduct of its own legislative functions without pressure from the Executive, the Congress would not have passed the Federal reserve act. According to Colonel House, and since this was his report to his master, we may believe it to be true, the Federal reserve act was passed because Wilson stood firm; in other words because Wilson was under the guidance and control of the most ferocious usurers in New York through their hireling, House. The Federal reserve act became law the day before Christmas Eve in the year 1913, and shortly afterwards the German international

bankers, Kuhn, Loeb & Co., sent one of their partners here to run it.

In 1913, when the Federal reserve bill was submitted to the Democratic caucus, there was a discussion in regard to the form the proposed paper currency should take.

The proponents of the Federal reserve act, in their determination to create a new kind of paper money, had not needed to go outside of the Aldrich bill for a model. By the terms of the Aldrich bill, bank notes were to be issued by the National Reserve Association and were to be secured partly by gold or lawful money and partly by circulating evidences of debt. The first draft of the Federal reserve bill presented the same general plan, that is, for bank notes as opposed to Government notes, but with certain differences of regulation.

When the provision for the issuance of Federal reserve notes was placed before President Wilson he approved of it, but other Democrats were more mindful of Democratic principles and a great protest greeted the plan. Foremost amongst those who denounced it was William Jennings Bryan, the Secretary of State. Bryan wished to have the Federal reserve notes issued as Government obligations. President Wilson had an interview with him and found him adamant. At the conclusion of the interview Bryan left with the understanding that he would resign if the notes were made bank notes. The President then sent for his secretary and explained the matter to him. Mr. Tumulty went to see Bryan and Bryan took frm his library shelves a book containing all the Democratic platforms and read extracts from them bearing on the matter of the public currency. Returning to the President, Mr. Tumulty told him what had happened and ventured the opinion that Mr. Bryan was right and that Mr. Wilson was wrong. The President then asked Mr. Tumulty to show him where the Democratic Party in its national platforms had ever taken the view indicated by Bryan. Mr. Tumulty gave him the book, which he had brought from Bryan's house, and the President read very carefully plank after plank on the currency. He then said, "I am convinced there is a great deal in what Mr. Bryan

says," and thereupon it was arranged that Mr. Tumulty should see the proponents of the Federal reserve bill in an effort to bring about an adjustment of the matter.

The remainder of this story may be told in the words of Senator GLASS. Concerning Bryan's opposition to the plan of allowing the proposed Federal reserve notes to take the form of bank notes and the matter in which President Wilson and the proponents of the Federal reserve bill yielded to Bryan in return for his support of the measure, Senator GLASS makes the following statement:

> The only other feature of the currency bill around which a conflict raged at this time was the note-issue provision. Long before I knew it, the President was desperately worried over it. His economic good sense told him the notes should be issued by the banks and not by the Government; but some of his advisers told him Mr. Bryan could not be induced to give his support to any bill that did not provide for a "Government note." There was in the Senate and House a large Bryan following which, united with a naturally adversary party vote, could prevent legislation. Certain overconfident gentlemen proferred their services in the task of "managing Bryan." They did not budge him. * * * When a decision could no longer be postponed the President summoned me to the White House to say he wanted Federal reserve notes to "be obligations of the United States." I was for an instant speechless. With all the earnestness of my being I remonstrated, pointing out the unscientific nature of such a thing, as well as the evident inconsistency of it.
>
> "There is not, in truth, any Government obligation here, Mr. President," I exclaimed. "It would be a pretense on its face. Was there ever a Government note based primarily on the property of banking institutions? Was there ever a Government issue not one dollar of which could be put out except by demand of a bank? The suggested Government obligation is so remote it could never

be discerned," I concluded, out of breath.

"Exactly so, GLASS," earnestly said the President. "Every word you say is true; the Government liability is a mere thought. And so, if we can hold to the substance of the thing and give the other fellow the shadow, why not do it, if thereby we may save our bill?"

Shadow and substance! One can see from this how little President Wilson knew about banking. Unknowingly, he gave the substance to the international banker and the shadow to the common man. Thus was Bryan circumvented in his efforts to uphold the Democratic doctrine of the rights of the people. Thus the "unscientific blur" upon the bill was perpetrated. The "unscientific blur," however, was not the fact that the United States Government, by the terms of Bryan's edict, was obliged to assume as an obligation whatever currency was issued. Mr. Bryan was right when he insisted that the United States should preserve its sovereignty over the public currency. The "unscientific blur" was the nature of the currency itself, a nature which makes it unfit to be assumed as an obligation of the United States Government. It is the worst currency and the most dangerous this country has ever known. When the proponents of the act saw that Democratic doctrine would not permit them to let the proposed banks issue the new currency as bank notes, they should have stopped at that. They should not have foisted that kind of currency, namely, an asset currency, on the United States Government. They should not have made the Government liable on the private debts of individuals and corporations and, least of all, on the private debts of foreigners.

The Federal reserve note is essentially unsound.

As Kemmerer says:

> The Federal reserve notes, therefore, in form have some of the qualities of Government paper money, but in substance, are almost a pure asset currency possessing a Government guaranty against which contingency the Government has made no provision whatever.

Hon. E. J. Hill, a former Member of the House, said, and truly:

> ° ° ° They are obligations of the Government for which the United States has received nothing and for the payment of which at any time it assumes the responsibility looking to the Federal reserve bank to recoup itself.

If the United States Government is to redeem the Federal reserve notes when the general public finds out what it costs to deliver this flood of paper money to the 12 Federal reserve banks, and if the Government has made no provision for redeeming them, the first element of their unsoundness is not far to seek.

Before the Senate Banking and Currency Committee, while the Federal reserve bill was under discussion, Mr. Crozier, of Cincinnati, said:

> In other words, the imperial power of elasticity of the public currency is wielded exclusively by these central corporations owned by the banks. This is a life and death power over all local banks and all business. It can be used to create or destroy prosperity, to ward off or cause stringencies and panics. By making money artificially scarce interest rates throughout the country can be arbitrarily raised and the bank tax on all business and cost of living increased for the profit of the banks-owning these regional central banks, and without the slightest benefit to the people. These 12 corporations together cover the whole country and monopolize and use for private gain every dollar of the public currency and all public revenues of the United States. Not a dollar can be put into circulation among the people by their Government without the consent of and on terms fixed by these 12 private money trusts.

In defiance of this and all other warnings, the proponents of the Federal reserve act created the 12 private credit corporations and gave them an absolute monopoly of the cur-

it in dollars, the Federal reserve banks will buy that bill and use it as collateral for Federal reserve notes. Thus, they compel our Government to pay the German brewer for his beer. Why should the Federal Reserve Board and the Federal reserve banks be permitted to finance the brewing industry of Germany, either in this way or as they do by compelling small and fearful United States banks to take stock in the Isenbeck brewery and in the German bank for brewing industries?

Mr. Chairman, if Dynamit Nobel of Germany wishes to sell dynamite to Japan to use in Manchuria or elsewhere, it can draw its bill against its Japanese customers in dollars and send that bill to the nefarious open-discount market in New York City, where the Federal Reserve Board and the Federal reserve banks will buy it and use it as collateral for a new issue of Federal reserve notes, while at the same time the Federal Reserve Board will be helping Dynamit Nobel in stuffing its stock into the United States banking system. Why should we send our representatives to the disarmament conference at Geneva while the Federal Reserve Board and the Federal reserve banks are making our Government pay Japanese debts to German munitions makers?

Mr. Chairman, if a bean grower of Chile wishes to raise a crop of beans and sell them to a Japanese customer, he can draw a bill against his prospective Japanese customer in dollars and have it purchased by the Federal Reserve Board and the Federal reserve banks and get the money out of this country at the expense of the American public before he has even planted the beans in the ground.

Mr. Chairman, if a German in Germany wishes to export goods to South America or anywhere else, he can draw his bill against his customer and send it to the United States and get the money out of this country before he ships or even manufactures the goods.

Mr. Chairman, why should the currency of the United States be issued on the strength of Chinese human hair? Why should it be issued on the trade whims of a wigmaker? Why should it be issued on the strength of German beer? Why

should it be issued on a crop of unplanted beans to be grown in Chile for Japanese consumption? Why should the Government of the United States be compelled to issue many billions of dollars every year to pay the debts of one foreigner to another foreigner? Was it for this that our national bank depositors had their money taken out of our banks and shipped abroad? Was it for this they had to lose it? Why should the public credit of the United States Government and likewise money belonging to our national bank depositors be used to support foreign brewers, narcotic drug vendors, whiskey distillers, wigmakers, human hair merchants, Chilean bean growers, and the like? Why should our national bank depositors and our Government be forced to finance the munition factories of Germany and Soviet Russia?

Mr. Chairman, if a German, in Germany, wishes to sell wheelbarrows to another German, he can draw a bill in dollars and get the money out of the Federal reserve banks before an American farmer could explain his request for a loan to move his crop to market. In Germany, when credit instruments are being given, the creditors say, "See you, it must be of a kind that I can cash at the reserve." Other foreigners feel the same way. The reserve to which these gentry refer is our reserve, which, as you know, is entirely made up of money belonging to American bank depositors. I think foreigners should cash their own trade paper and not send it over here to bankers who use it to fish cash out of the pockets of the American people.

Mr. Chairman, there is nothing like the Federal reserve pool of confiscated bank deposits in the world. It is a public trough of American wealth in which foreigners claim rights equal to or greater than those of Americans. The Federal reserve banks are the agents of the foreign central banks. They use our bank depositors' money for the benefit of their foreign principals. They barter the public credit of the United States Government and hire it out to foreigners at a profit to themselves.

All this is done at the expense of the United States Government, and at a sickening loss to the American people. Only

our great wealth enabled us to stand the drain of it as long as we did.

I believe that the nations of the world would have settled down after the World War more peacefully if we had not had this standing temptation here—this pool of our bank depositors' money given to private interests and used by them in connection with illimitable drafts upon the public credit of the United States Government. The Federal Reserve Board invited the world to come in and to carry away cash, credit, goods, and everything else of value that was movable. Values amounting to many billions of dollars have been taken out of this country by the Federal Reserve Board and the Federal reserve banks for the benefit of their foreign principals. The United States has been ransacked and pillaged. Our structures have been gutted and only the walls are left standing. While this crime was being perpetrated everything the world could rake up to sell us was brought in here at our own expense by the Federal Reserve Board and the Federal reserve banks until our markets were swamped with unneeded and unwanted imported goods priced far above their value and thus made to equal the dollar volume of our honest exports and to kill or reduce our favorable balance of trade. As agents of the foreign central banks, the Federal Reserve Board and the Federal reserve banks try by every means within their power to reduce our favorable balance of trade. They act for their foreign principals and they accept fees from foreigners for acting against the best interests of the United States. Naturally there has been great competition among foreigners for the favors of the Federal Reserve Board.

What we need to do is to send the reserves of our national banks home to the people who earned and produced them and who still own them and to the banks which were compelled to surrender them to predatory interests. We need to destroy the Federal reserve pool, wherein our national-bank reserves are impounded for the benefit of foreigners. We need to make it very difficult for outlanders to draw money away from us. We need to save America for Americans.

Mr. Chairman, when you hold a $10 Federal reserve note in your hand you are holding a piece of paper which sooner or later is going to cost the United States Government $10 in gold, unless the Government is obliged to give up the gold standard. It is protected by a reserve of 40 per cent, or $4 in gold. It is based on Limburger cheese, reputed to be in a foreign warehouse; or on cans purporting to contain peas but which may contain no peas but salt water instead; or on horse meat; illicit drugs; bootleggers' fancies; rags and bones from Soviet Russia of which the United States imported over a million dollars' worth last year; on wine, whiskey, natural gas, on goat or dog fur, garlic on the string, or Bombay ducks. If you like to have paper money which is secured by such commodities, you have it in the Federal reserve note. If you desire to obtain the thing of value upon which this paper currency is based—that is, the Limburger cheese, the whiskey, the illicit drugs, or any of the other staples—you will have a very hard time finding them. Many of these worshipful commodities are in foreign countries. Are you going to Germany to inspect her warehouses to see if the specified things of value are there? I think not. And what is more, I do not think you would find them if you did go.

Immense sums belonging to our national-bank depositors have been given to Germany on no collateral security whatever. The Federal Reserve Board and the Federal reserve banks have issued United States currency on mere finance drafts drawn by Germans. Billions upon billions of our money has been pumped into Germany and money is still being pumped into Germany by the Federal Reserve Board and the Federal reserve banks. Her worthless paper is still being negotiated here and renewed here on the public credit of the United States Government and at the expense of the American people. On April 27, 1932, the Federal reserve outfit sent $750,000, belonging to American bank depositors, in gold to Germany. A week later, another $300,000 in gold was shipped to Germany in the same way. About the middle of May $12,000,000 in gold was shipped to Germany by the Federal Reserve Board

and the Federal reserve banks. Almost every week there is a shipment of gold to Germany. These shipments are not made for profit on exchange since German marks are below parity against the dollar.

Mr. Chairman, I believe that the national-bank depositors of the United States are entitled to know what the Federal Reserve Board and the Federal reserve banks are doing with their money. There are millions of national-bank depositors in this country who do not know that a percentage of every dollar they deposit in a member bank of the Federal reserve system goes automatically to the American agents of foreign banks and that all of their deposits can be paid away to foreigners without their knowledge or consent by the crooked machinery of the Federal reserve act and the questionable practices of the Federal Reserve Board and the Federal reserve banks. Mr. Chairman, the American people should be told the truth by their servants in office.

In 1930 we had over half a billion dollars outstanding daily to finance foreign goods stored in or shipped between foreign countries. In its yearly total, this item amounts to several billion dollars. What goods are those upon which the Federal reserve banks yearly pledge several billion dollars of the public credit of the United States? What goods are those which are hidden in European and Asiatic storehouses and which have never been seen by any officer of this Government, but which are being financed on the public credit of the United States Government? What goods are those upon which the United States Government is being obliged by the Federal reserve banks to issue Federal reserve notes to the extent of several billion dollars a year?

The Federal Reserve Board and the Federal reserve banks have been international bankers from the beginning, with the United States Government as their enforced banker and supplier of currency. But it is none the less extraordinary to see those 12 private credit monopolies buying the debts of foreigners against foreigners in all parts of the world and asking the Government of the United States for new issues of Federal

reserve notes in exchange for them.

I see no reason why the American taxpayers should be hewers of wood and drawers of water for the European and Asiatic customers of the Federal reserve banks. I see no reason why a worthless acceptance drawn by a foreign swindler as a means of getting gold out of this country should receive the lowest and choicest rate from the Federal Reserve Board and be treated as better security than the note of an American farmer living on American land.

The magnitude of the acceptance racket, as it has been developed by the Federal reserve banks, their foreign correspondents, and the predatory European-born bankers who set up the Federal reserve institution here and taught our own brand of pirates how to loot the people, I say the magnitude of this racket is estimated to be in the neighborhood of $9,000,000,000 a year. In the past 10 years it is said to have amounted to $90,000,000,000. In my opinion, it has amounted to several times as much. Coupled with this you have, to the extent of billions of dollars, the gambling in United States securities, which takes place in the same open discount market — a gamble upon which the Federal Reserve Board is now spending $100,000,000 a week.

Federal reserve notes are taken from the United States Government in unlimited quantities. Is it strange that the burden of supplying these immense sums of money to the gambling fraternity has at last proved too heavy for the American people to endure? Would it not be a national calamity if the Federal Reserve Board and the Federal reserve banks should again bind this burden down on the backs of the American people and, by means of the long rawhide whips of the credit masters, compel them to enter upon another 17 years of slavery? They are trying to do that now. They are taking $100,000,000 of the public credit of the United States Government every week in addition to all their other seizures, and they are spending that money in the nefarious open market in New York City in a desperate gamble to reestablish their graft as a long concern.

They are putting the United States Government in debt to the extent of $100,000,000 a week, and with this money they are buying up our Government securities for themselves and their foreign principals. Our people are disgusted with the experiments of the Federal Reserve Board. The Federal Reserve Board is not producing a loaf of bread, a yard of cloth, a bushel of corn, or a pile of cordwood by its check-kiting operations in the money market.

A fortnight or so ago great aid and comfort was given to Japan by the firm of A. Gerli & Sons, of New York, an importing firm, which bought $16,000,000 worth of raw silk from the Japanese Government. Federal reserve notes will be issued to pay that amount to the Japanese Government, and these notes will be secured by money belonging to our national-bank depositors.

Why should United States currency be issued on this debt? Why should United States currency be issued to pay the debt of Gerli & Sons to the Japanese Government? The Federal Reserve Board and the Federal reserve banks think more of the silkworms of Japan than they do of American citizens. We do not need $16,000,000 worth of silk in this country at the present time, not even to furnish work to dyers and finishers. We need to wear home-grown and American-made clothes and to use our own money for our own goods and staples. We could spend $16,000,000 in the United States of America on American children and that would be a better investment for us than Japanese silk purchased on the public credit of the United States Government.

Mr. Speaker, on the 13th of January of this year I addressed the House on the subject of the Reconstruction Finance Corporation. In the course of my remarks I made the following statement:

> In 1928 the member banks of the Federal reserve system borrowed $60,598,690,000 from the Federal reserve banks on their 15-day promissory notes. Think of it! Sixty billion dollars payable upon demand in gold in the course

of one single year. The actual payment of such obligations calls for six times as much monetary gold as there is in the entire world. Such transactions represent a grant in the course of one single year of about $7,000,000 to every member bank of the Federal reserve system. Is it any wonder that there is a depression in this country? Is it any wonder that American labor, which ultimately pays the cost of all the banking operations of this country, has at last proved unequal to the task of supplying this huge total of cash and credit for the benefit of stock-market manipulators and foreign swindlers?

Mr. Chairman, some of my colleagues have asked for more specific information concerning this stupendous graft, this frightful burden which has been placed on the wage earners and taxpayers of the United States for the benefit of the Federal Reserve Board and the Federal reserve banks. They were surprised to learn that member banks of the Federal reserve system had received the enormous sum of $60,598,-690,000 from the Federal Reserve Board and the Federal reserve banks on their promissory notes in the course of one single year, namely, 1928. Another Member of this House, Mr. BEEDY, the honorable gentleman from Maine, has questioned the accuracy of my statement and has informed me that the Federal Reserve Board denies absolutely that these figures are correct. This Member has said to me that the thing is unthinkable, that it can not be, that it is beyond all reason to think that the Federal Reserve Board and the Federal reserve banks should have so subsidized and endowed their favorite banks of the Federal reserve system. This Member is horrified at the thought of a graft so great, a bounty so deterimental to the public welfare as sixty and a half billion dollars a year and more shoveled out to favored banks of the Federal reserve system.

I sympathize with Mr. BEEDY. I would spare him pain if I could, but the facts remain as I have stated them. In 1928, the Federal Reserve Board and the Federal reserve banks

presented the staggering amount of $60,598,690,000 to their member banks at the expense of the wage earners and taxpayers of the United States. In 1929, the year of the stock market crash, the Federal Reserve Board and the Federal reserve banks advanced fifty-eight billions to member banks.

In 1930, while the speculating banks were getting out of the stock market at the expense of the general public, the Federal Reserve Board and the Federal reserve banks advanced them $13,022,782,000. This shows that when the banks were gambling on the public credit of the United States Government as represented by Federal reserve currency, they were subsidized to any amount they required by the Federal Reserve Board and the Federal reserve banks. When the swindle began to fail, the banks knew it in advance and withdrew from the market. They got out with whole skins and left the people of the United States to pay the piper.

On November 2, 1931, I addressed a letter to the Federal Reserve Board asking for the aggregate total of member bank borrowings in the years 1928, 1929, 1930. In due course, I received a reply from the Federal Reserve Board, dated November 9, 1931, the pertinent part of which reads as follows:

My Dear Congressman: In reply to your letter of November 2, you are advised that the aggregate amount of 15-day promissory notes of member banks during each of the past three calendar years has been as follows:

1928	*$60,598,690,000*
1929	*58,046,697,000*
1930	*13,022,782,000*

* * * * * *

Very truly yours,

CHESTER MORRILL, SECRETARY.

This will show the gentleman from Maine the accuracy of my statement. As for the denial of these facts made to him by the Federal Reserve Board, I can only say that it must have been prompted by fright, since hanging is too good for a Government board which permitted such a misuse of Govern-

ment funds and credit.

My friend from Kansas, Mr. MCGUGIN, has stated that he thought the Federal Reserve Board and the Federal reserve banks lent money by rediscounting. So they do, but they lend comparatively little that way. The real rediscounting that they do has been called a mere penny in the slot business. It is too slow for genuine high flyers. They discourage it. They prefer to subsidize their favorite banks by making these $60,000,000,000 advances, and they prefer to acquire acceptances in the notorious open discount market in New York, where they can use them to control the prices of stocks and bonds on the exchanges. For every dollar they advanced on rediscounts in 1928 they lent $33 to their favorite banks for gambling purposes. In other words, their rediscounts in 1928 amounted to $1,814,271,000, while their loans to member banks amounted to $60,598,690,000. As for their open-market operations, these are on a stupendous scale, and no tax is paid on the acceptances they handle; and their foreign principals, for whom they do a business of several billion dollars every year, pay no income tax on their profits to the United States Government.

This is the John Law swindle over again. The theft of Teapot Dome was trifling compared to it. What king ever robbed his subjects to such an extent as the Federal Reserve Board and the Federal reserve banks have robbed us? Is it any wonder that there have lately been 90 cases of starvation in one of the New York hospitals? Is it any wonder that the children of this country are being dispersed and abandoned?

The Government and the people of the United States have been swindled by swindlers de luxe to whom the acquisition of American gold or a parcel of Federal reserve notes presented no more difficulty than the drawing up of a worthless acceptance in a country not subject to the laws of the United States, by sharpers not subject to the jurisdiction of the United States courts, sharpers with a strong banking "fence" on this side of the water—a "fence" acting as a receiver of the worthless paper coming from abroad, indorsing it and getting the currency out of the Federal reserve banks for it as quickly as possible, ex-

changing that currency for gold, and in turn transmitting the gold to its foreign confederates.

Such were the exploits of Ivar Kreuger, Mr. Hoover's friend, and his hidden Wall Street backers. Every dollar of the billions Kreuger and his gang drew out of this country on acceptances was drawn from the Government and the people of the United States through the Federal Reserve Board and the Federal reserve banks. The credit of the United States Government was peddled to him by the Federal Reserve Board and the Federal reserve banks for their own private gain. That is what the Federal Reserve Board and the Federal reserve banks have been doing for many years. They have been peddling the credit of this Government and the signature of this Government to the swindlers and speculators of all nations. That is what happens when a country forsakes its Constitution and gives its sovereignty over the public currency to private interests. Give them the flag and they will sell it.

The nature of Kreuger's organized swindle and the bankrupt condition of Kreuger's combine was known here last June when Hoover sought to exempt Kreuger's loan to Germany of one hundred twenty-five millions from the operation of the Hoover moratorium. The bankrupt condition of Kreuger's swindle was known here last summer when $30,000,000 was taken from American taxpayers by certain bankers in New York for the ostensible purpose of permitting Kreuger to make a loan to Colombia. Colombia never saw that money. The nature of Kreuger's swindle and the bankrupt condition of Kreuger was known here in January when he visited his friend, Mr. Hoover, at the White House. It was known here in March before he went to Paris and committed suicide there.

Mr. Chairman, I think the people of the United States are entitled to know how many billions of dollars were placed at the disposal of Kreuger and his gigantic combine by the Federal Reserve Board and the Federal reserve banks and to know how much of our Government currency was issued and lost in the financing of that great swindle in the years during which the Federal Reserve Board and the Federal reserve banks took

care of Kreuger's requirements.

Mr. Chairman, I believe there should be a congressional investigation of the operations of Kreuger and Toll in the United States and that Swedish Match, International Match, the Swedish-American Investment Corporation, and all related enterprises, including the subsidiary companies of Kreuger and Toll, should be investigated and that the issuance of United States currency in connection with those enterprises and the use of our national bank depositors' money for Kreuger's benefit should be known to the general public. I am referring, not only to the securities which were floated and sold in this country, but also to the commercial loans to Kreuger's enterprises and the mass financing of Kreuger's companies by the Federal Reserve Board and the Federal reserve banks and the predatory institutions which the Federal Reserve Board and the Federal reserve banks shield and harbor.

A few days ago the President of the United States, with a white face and shaking hands, went before the Senate on behalf of the moneyed interests and asked the Senate to levy a tax on the people so that foreigners might know that the United States would pay its debts to them. Most Americans thought that it was the other way around. What does the United States owe to foreigners? When and by whom was the debt incurred? It was incurred by the Federal Reserve Board and the Federal reserve banks when they peddled the signature of this Government to foreigners for a price. It is what the United States Government has to pay to redeem the obligations of the Federal Reserve Board and the Federal reserve banks. Are you going to let those thieves get off scot free? Is there one law for the looter who drives up to the door of the United States Treasury in his limousine and another for the United States veterans who are sleeping on the floor of a dilapidated house on the outskirts of Washington?

The Baltimore & Ohio Railroad is here asking for a large loan from the people and the wage earners and the taxpayers of the United States. It is begging for a hand-out from the Government. It is standing, cap in hand, at the door of the Re-

construction Finance Corporation, where all the other jackals have gathered to the feast. It is asking for money that was raised from the people by taxation, and it wants this money of the poor for the benefit of Kuhn, Loeb & Co., the German international bankers. Is there one law for the Baltimore & Ohio Rainroad and another for the needy veterans it threw off its freight cars the other day? Is there one law for sleek and prosperous swindlers who call themselves bankers and another law for the soldiers who defend the United States flag?

Mr. Chairman, some people are horrified because the collateral behind Kreuger and Toll debentures was removed and worthless collateral substituted for it. What is this but what is being done daily by the Federal reserve banks? When the Federal reserve act was passed, the Federal reserve banks were allowed to substitute "other like collateral" for collateral behind Federal reserve notes but by an amendment obtained at the request of the corrupt and dishonest Federal Reserve Board, the act was changed so that the word "like" was stricken out. All that immense trouble was taken here in Congress so that the law would permit the Federal reserve banks to switch collateral. At the present time behind the scenes in the Federal reserve banks there is a night-and-day movement of collateral. A visiting Englishman, leaving the United States a few weeks ago, said that things would look better here after "they cleaned up the mess at Washington." Cleaning up the mess consists in fooling the people and making them pay a second time for the bad foreign investments of the Federal Reserve Board and the Federal reserve banks. It consists in moving that heavy load of dubious and worthless foreign paper—the balls of wigmakers, brewers, distillers, narcotic drug vendors, munition makers, illegal finance drafts, and worthless foreign securities, out of the banks and putting it on the back of American labor. That is what the Reconstruction Finance Corporation is doing now. They talk about loans to banks and railroads but they say very little about that other business of theirs which consists in relieving the swindlers who promoted investment trusts in this country and dumped worthless foreign securities into

them and then resold that mess of pottage to American investors under cover of their own corporate titles. The Reconstruction Finance Corporation is taking over those worthless securities from those investment trusts with United States Treasury money at the expense of the American taxpayer and wage earner.

It will take us 20 years to redeem our Government, 20 years of penal servitude to pay off the gambling debts of the traitorous Federal Reserve Board and the Federal reserve banks and to earn again that vast flood of American wages and savings, bank deposits, and United States Government credit which the Federal Reserve Board and the Federal reserve banks exported out of this country to their foreign principals.

The Federal Reserve Board and the Federal reserve banks lately conducted an anti-hoarding campaign here. Then they took that extra money which they had persuaded the trusting American people to put into the banks and they sent it to Europe along with the rest. In the last several months, they have sent $1,300,000,000 in gold to their foreign employers, their foreign masters, and every dollar of that gold belonged to the people of the United States and was unlawfully taken from them.

Is not it high time that we had an audit of the Federal Reserve Board and the Federal reserve banks and an examination of all our Government bonds and securities and public moneys instead of allowing the corrupt and dishonest Federal Reserve Board and the Federal reserve banks to speculate with those securities and this cash in the notorious open discount market of New York City?

Mr. Chairman, within the limits of the time allowed me, I cannot enter into a particularized discussion of the Federal Reserve Board and the Federal reserve banks. I have singled out the Federal reserve currency for a few remarks because there has lately been some talk here of "fiat money." What kind of money is being pumped into the open discount market and through it into foreign channels and stock ex-

changes? Mr. Mills of the Treasury has spoken here of his horror of the printing presses and his horror of dishonest money. He has no horror of dishonest money. If he had, he would be no party to the present gambling of the Federal Reserve Board and the Federal reserve banks in the nefarious open discount market of New York, a market in which the sellers are represented by 10 great discount dealer corporations owned and organized by the very banks which own and control the Federal Reserve Board and the Federal reserve banks. Fiat money, indeed!

After the several raids on the Treasury Mr. Mills borrows the speech of those who protest against those raids and speaks now with pretended horror of a raid on the Treasury. Where was Mr. Mills last October when the United States Treasury needed $598,000,000 of the tarpayers' money which was supposed to be in the safe-keeping of Andrew W. Mellon in the designated depositories of Treasury funds, and which was not in those depositories when the Treasury needed it? Mr. Mills was the Assistant Secretary of the Treasury then, and he was at Washington throughout October, with the exception of a very significant week he spent at White Sulphur Springs closeted with international bankers, while the Italian minister, Signor Grandi, was being entertained—and bargained with—at Washington.

What Mr. Mills is fighting for is the preservation whole and entire of the bankers' monopoly of all the currency of the United States Government. What Mr. PATMAN proposes is that the Government shall exercise its sovereignty to the extent of issuing some currency for itself. This conflict of opinion between Mr. Mills as the spokesman of the bankers and Mr. PATMAN as the spokesman of the people brings the currency situation here into the open. Mr. PATMAN and the veterans are confronted by a stone wall—the wall that fences in the bankers with their special privilege. Thus the issue is joined between the hosts of democracy, of which the veterans are a part, and the men of the king's bank, the would-be aristocrats, who deflated American agriculture and robbed this country for the

benefit of their foreign principals.

Mr. Chairman, last December I introduced a resolution here asking for an examination and an audit of the Federal Reserve Board and the Federal reserve banks and all related matters. If the House sees fit to make such an investigation, the people of the United States will obtain information of great value. This is a Government of the people, by the people, for the people, consequently nothing should be concealed from the people. The man who deceives the people is a traitor to the United States. The man who knows or suspects that a crime has been committed and who conceals or covers up that crime is an accessory to it. Mr. Speaker, it is a monstrous thing for this great Nation of people to have its destinies presided over by a traitorous Government board acting in secret concert with international usurers. Every effort has been made by the Federal Reserve Board to conceal its power but the truth is the Federal Reserve Board has usurped the Government of the United States. It controls everything here and it controls all our foreign relations. It makes and breaks governments at will. No man and no body of men is more entrenched in power than the arrogant credit monopoly which operates the Federal Reserve Board and the Federal reserve banks. These evildoers have robbed this country of more than enough money to pay the national debt. What the National Government has permitted the Federal Reserve Board to steal from the people should now be restored to the people. The people have a valid claim against the Federal Reserve Board and the Federal reserve banks. If that claim is enforced, Americans will not need to stand in breadlines or to suffer and die of starvation in the streets. Homes will be saved, families will be kept together and American children will not be dispersed and abandoned. The Federal Reserve Board and the Federal reserve banks owe the United States Government an immense sum of money. We ought to find out the exact amount of the people's claim. We should know the amount of the indebtedness of the Federal Reserve Board and the Federal reserve banks to the people and we should collect that amount immediately. We certainly

should investigate this treacherous and disloyal conduct of the Federal Reserve Board and the Federal reserve banks.

Here is a Federal reserve note. Immense numbers of these notes are now held abroad. I am told they amount to upward of a billion dollars. They constitute a claim against our Government and likewise a claim against the money our people have deposited in the member banks of the Federal reserve system. Our people's money to the extent of $1,300,000,000 has within the last few months been shipped abroad to redeem Federal reserve notes and to pay other gambling debts of the traitorous Federal Reserve Board and the Federal reserve banks. The greater part of our monetary stock has been shipped to foreigners. Why should we promise to pay the debts of foreigners to foreigners? Why should our Government be put into the position of supplying money to foreigners? Why should American farmers and wage earners add millions of foreigners to the number of their dependents? Why should the Federal Reserve Board and the Federal reserve banks be permitted to finance our competitors in all parts of the world? Do you know why the tariff was raised? It was raised to shut out the flood of Federal reserve goods pouring in here from every quarter of the globe—cheap goods produced by cheaply paid foreign labor on unlimited supplies of money and credit sent out of this country by the dishonest and unscrupulous Federal Reserve Board and the Federal reserve banks. Go out in Washington to buy an electric light bulb and you will probably be offered one that was made in Japan on American money. Go out to buy a pair of fabric gloves and inconspicuously written on the inside of the gloves that will be offered to you will be found the words "made in Germany" and that means "made on the public credit of the United States Government paid to German firms in American gold taken from the confiscated bank deposits of the American people."

The Federal Reserve Board and the Federal reserve banks are spending $100,000,000 a week buying Government securities in the open market and are thus making a great bid for foreign business. They are trying to make rates so attractive

that the human-hair merchants and distillers and other business entities in foreign lands will come here and hire more of the public credit of the United States Government and pay the Federal reserve outfit for getting it for them.

Mr. Chairman, when the Federal reserve act was passed the people of the United States did not perceive that a world system was being set up here which would make the savings of an American school-teacher available to a narcotic-drug vendor in Macao. They did not perceive that the United States was to be lowered to the position of a coolie country which has nothing but raw materials and heavy goods for export. That Russia was destined to supply man power and that this country was to supply financial power to an international superstate—a superstate controlled by international bankers and international industrialists acting together to enslave the world for their own pleasure.

The people of the United States are being greatly wronged. If they are not, then I do not know what "wronging the people" means. They have been driven from their employments. They have been dispossessd of their homes. They have been evicted from their rented quarters. They have lost their children. They have been left to suffer and to die for the lack of shelter, food, clothing, and medicine.

The wealth of the United States and the working capital of the United States has been taken away from them and has either been locked in the vaults of certain banks and great corporations or exported to foreign countries for the benefit of the foreign customers of those banks and corporations. So far as the people of the United States are concerned, the cupboard is bare. It is true that the warehouses and coal yards and grain elevators are full, but the warehouses and coal yards and grain elevators are padlocked and the great banks and corporations hold the keys. The sack of the United States by the Federal Reserve Board and the Federal reserve banks and their confederates is the greatest crime in history.

Mr. Chairman, a serious situation confronts the House of Representatives to-day. We are the trustees of the people and

the rights of the people are being taken away from them. Through the Federal Reserve Board and the Federal reserve banks, the people are losing the rights guaranteed to them by the Constitution. Their property has been taken from them without due process of law. Mr. Chairman, common decency requires us to examine the public accounts of the Government to see what crimes against the public welfare have been or are being committed.

What is needed here is a return to the Constitution of the United States. We need to have a complete divorce of Bank and State. The old struggle that was fought out here in Jackson's day must be fought over again. The Independent United States Treasury should be reestablished and the Government should keep its own money under lock and key in the building the people provided for that purpose. Asset currency, the device of the swindler, should be done away with. The Government should buy gold and issue United State currency on it. The business of the independent bankers should be restored to them. The State banking systems should be freed from coercion. The Federal reserve districts should be abolished and State boundaries should be respected. Bank reserves should be kept within the borders of the States whose people own them, and this reserve money of the people should be protected so that international bankers and acceptance bankers and discount dealers can not draw it away from them. The exchanges should be closed while we are putting our financial affairs in order. The Federal reserve act should be repealed and the Federal reserve banks, having violated their charters, should be liquidated immediately. Faithless Government officers who have violated their oaths of office should be impeached and brought to trial. Unless this is done by us, I predict that the American people, outraged, robbed, pillaged, insulted, and betrayed as they are in their own land, will rise in their wrath and send a President here who will sweep the money changers out of the temple. [Applause.]