Restoration Planning Work Group

Nov 1, 1990

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Judy Bittner	DNR/SHPO	907-762-2622	762-2535
ART WEINER	DNR	762-2295	~~762-2271~~
Rick Thompson	ADNR	762-2270	
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Les Gara	Ak. Dept of Law	2763550	~~FTS/~~
Charlie de Saillan	EPA - Enforcement	FTS/ 202-382-3103	FTS/ 202-382-306[illegible]
Liza McCracken	DOL	(907) 276-2775	278-7022
Jim Wolfe	Forest Service	907/786-4756	
Maria Lisowski	DOA/OGC	907/586-8826	586-7251

RPWG

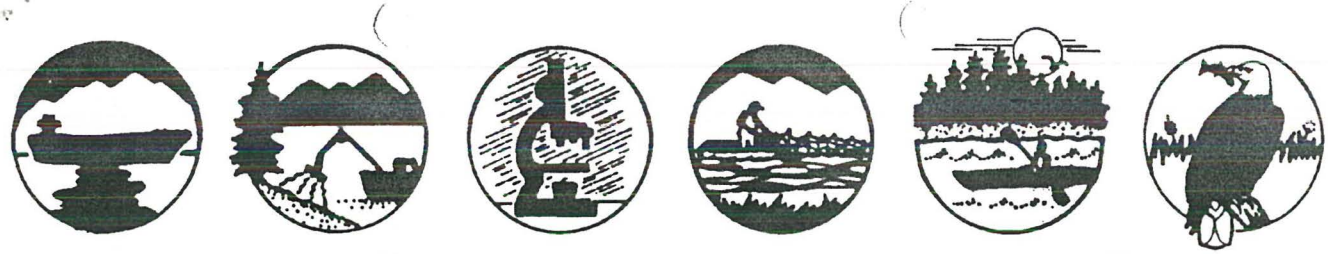
RESTORATION WORK PLAN SCHEDULE

1991

March 24, 1991	Publish final FR notice
March 15	FR notice to Office of FR
March 1	Complete review of and response to public comment
February 13	Close of public comment period

1990

December 28, 1990	Publish draft FR notice
December 21	FR notice to Office of FR
December 17-20	Revision of FR notice
December 17	Final comments due from WPG and State of Alaska
December 14	Final draft submitted to WPG
December 13	Trustee Council review and recommendation
December 12	Final draft submitted to Trustee Council through Management Team
December 7	Comments due from the Management Team
November 28	Draft 1991 work plan/1990 status report submitted to Management Team
November 12	Background sections and detailed outline of draft public document submitted to RPWG
October 10-11	RPWG meeting to adjust internal schedule and make assignments
October 5	Teleconference of Trustees and/or Washington Representatives
October 4	Circulate schedule and draft initial FR notice



OIL SPILL RESTORATION PLANNING OFFICE

437 E Street, Suite 301 Anchorage, Alaska 99501
(907) 271-2461 FAX: (907) 271-2467

October 30, 1990

MEMORANDUM

SUBJECT: Formats for submitting 1991 restoration project or feasibility study proposals

FROM: Brian Ross, John Strand
Restoration Planning Work Group

TO: Principal investigators, peer reviewers, and other restoration worksession participants

Attached you will find formats to be followed when submitting proposals to this office for 1991 restoration projects, feasibility studies, or natural recovery monitoring projects. Your write-ups will be used as the basis for describing potential 1991 projects in the draft Restoration Work Plan and 1991 Restoration Program to be published in the Federal Register in late December, 1990. Because this document will be distributed specifically for public review and comment, descriptions of injuries must remain brief and general in your initial write-ups. (The Legal Team will be reviewing all descriptions prior to publication, so it is safe to err for now on the side of describing injuries in somewhat more detail, rather than less.)

Overall, we are looking for 1-2 page project descriptions at this time. These write-ups must be submitted no later than November 14 in order for them to be considered for the 1991 program. We will be asking for detailed study plans at approximately the first of the year for those proposals that the Management and Legal Teams direct us to move forward with. The detailed study plans will not be for public distribution, and should contain more specific linkages to known injuries as part of their justifications.

We recognize that the time frame for developing these proposals is short. If we can be of any assistance or if there are any questions, don't hesitate to call your RPWG member, or contact me directly at this office. We look forward to receiving your proposals!

Format :

Proposed 1991 Restoration Project Description

Title:

Lead Agency:

Principal Investigator:

Introduction:

- Background
  (including: link to known injury)
- Goal and Objectives
  (Incl.: reasonable to implement considering expectations for natural recovery; importance of implementing or beginning to implement in 1991)

Methods:

- Including known technical feasibility
- Will not interfere with cleanup activities or ongoing NRDA studies

Duration and Scope:

Expected Results:

- Anticipation of net environmental benefits

Alternatives Considered:

- No Action: consequences of not implementing in 1991
- Other potential approaches to Goal and Objectives (why proposal is best approach currently available)

Cost:

Format:
Proposed 1991 Feasibility Study Description

Title:

Lead Agency:

Principal Investigator:

Introduction:
- Background
  (Including: link to known or reasonably expected injury; importance of target resource)
- Goal and Objectives
  Incl.: likelihood of approach being applied as a full-scale restoration measure if successful; importance of implementing in 1991)

Methods:
- Ability to evaluate success of study
- Ability to reasonably determine feasibility after one year of study
- Will not interfere with cleanup activities or ongoing NRDA studies

Duration and Scope:

Expected Results:
- Applicability of approach if successful

Cost of study:

Format :

Proposed 1991 Restoration Project Description,
Natural Recovery Monitoring Project

Title:

Lead Agency:

Principal Investigator:

Introduction:
- Background
  (Including: link to known or reasonably expected injury; importance of target resource)
- Goal and Objectives
  (Incl.: importance of continuing to monitor the indicator of injury/ongoing exposure; importance of implementing in 1991)

Methods:

Duration and Scope:

Expected Results:

Alternatives Considered:
- No Action: consequences of not implementing in 1991

Cost:

Restoration Synthesis Meeting:
Proposed 1991 Restoration Program

November 1-2, 1990
Simpson Bldg., Anchorage

DRAFT AGENDA

Thursday, Nov. 1

09:00	Introductions, purpose of meeting	Senner/Ross
09:15	Basis for 1991 Restoration Program: overview of injuries presented at RPWG/PI/PR work sessions	Senner/Ross/Strand Rabinowitch/ Meacham/Spies
10:30	Break	
10:45	Summary: RPWG approach to developing 1991 Restoration Program (incl. discussion of issues list, attached)	Senner/Ross
12:00	Lunch	
13:00	Discussion of agency proposals for 1991 restoration projects	Senner/Ross/Strand Rabinowitch
14:45	Break	
15:00	Discussion of agency proposals for 1991 restoration projects, continued	Senner/Ross/Strand Rabinowitch
17:00	End of day 1	

Restoration Synthesis Meeting:
Proposed 1991 Restoration Program

November 1-2, 1990
Simpson Bldg., Anchorage

DRAFT AGENDA

Friday, Nov. 2

08:30	Discussion of agency proposals for 1991 feasibility studies	Senner/Ross/Strand Rabinowitch
10:00	Break	
10:15	Discussion of agency proposals for 1991 restoration monitoring projects	Senner/Rabinowitch, Strand/Meacham
12:00	Lunch	
13:00	Synthesis discussion: recommendations for 1991 Restoration Program	Senner/Ross
14:30	Break	
14:45	Synthesis discussion, continued	Senner/Ross
16:00	December FR report outline revisions	Ross
16:30	Adjourn	

Restoration Synthesis Meeting:
Proposed 1991 Restoration Program

November 1-2, 1990
Simpson Bldg., Anchorage

RPWG ISSUES FOR DEVELOPMENT OF 1991 RESTORATION PROGRAM

Presented below is a preliminary list of issues relating to RPWG's development of the draft Restoration Work Plan and 1991 Restoration Program. It is proposed that RPWG's approach to addressing these issues be articulated to the Management Team as soon as possible so that any misconceptions can be addressed before the first draft of the document is presented to the Management Team on November 28, 1990.

- Definition of Restoration projects versus NRDA projects ("factors")
- Role of natural recovery monitoring in the 1991 Restoration Program
- Likelihood of reimbursement for 1991 restoration projects
- Identification of injuries via NRDA studies versus other sources
- Prioritization of projects (not RPWG role if projects meet "factors")
- Consolidation of projects
- Cost sharing among agencies
- Approach where lack of consensus (elevate to Management Team, etc.)

11-1-90 Restoration Synthesis Meeting

@ Simpson

9:20 AM Start

Purpose + Intros - Me + Stan

Spies - we should collect back all copies of summaries with injuries - before people leave.

Coastal Hab Studies Concurrence by lawyers present.

Subtidal - monitoring, some impacts (starfish parasites, polych. lesions, etc).

Intertidal - fucus impacts, settlement of limpets / barnacles impeded (reciprocal rock experiments); fish gill lesions + blood parasites, mussels, mussel HC ~~exposure~~ tissue levels,

Fish/Shellfish - Chuck Meacham - slides + / summary sheet.

Birds - Stan - 1 or 2 handouts (~~some~~ combined)

Mammals - John / Carol
- → Whales → Orca + Humpb. → Orca - 7 indivs missing AB pod '89 - 6 more '90 (40% of pod)
  - 22 " " AN pod - back in '90
  - 2 " " AD(?) pod 89 - still gone in '90
  - 4 (subgroup of) AT pod 89 - still missing (1 stranded + died)
  - Humpb - PWS repro % lower in 89, but #'s + % higher now.
- → HC in tissues, unsure if impacts
- Sea Otters / Sea Lions
  - PWS 89+90 = declining #'s continuing
  - Histo, etc = oil was cause
  - Repro rate low in rehab'd otters
- John Harbor Seals - morts. found linked to oil (tissues) (But ≥ stat sign. declines in # counted in 88, 89 and 90.
- Terr. Mammals - Roy N not here:
  - spies: land otters (mvmt) -

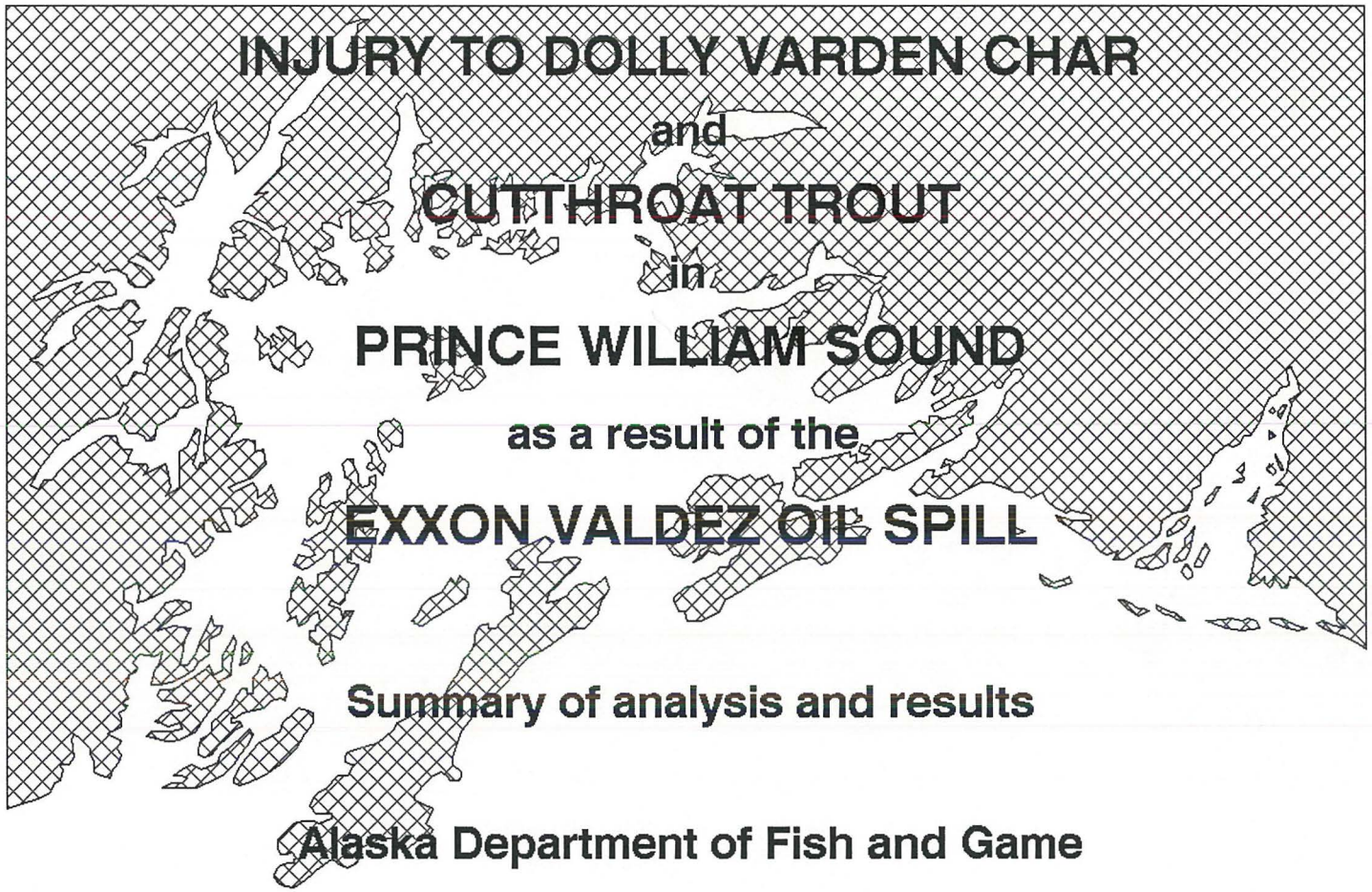
- Break -

Recreational Res. - Sandy - No NRDA studies - 89 or 90

Cultural / Archeological - Judy Bitner

Just starting some studies now. Think Exxon surveys missed sites - esp. low intertidal.

- Increased awareness of sites ⇒ increased risk of vandalism. A few documented cases of vandalism during cleanup (arrest for disturbance of burial site), but biggest concern is for future + ongoing vandalism.
- Oiling - potential effects on ability to age artifacts, + on masking of other recoverable info (soil horizons, etc.) →



INJURY TO DOLLY VARDEN CHAR
and
CUTTHROAT TROUT
in
PRINCE WILLIAM SOUND
as a result of the
EXXON VALDEZ OIL SPILL

Summary of analysis and results

Alaska Department of Fish and Game

Sport Fish / OSIAR

Kelly Hepler Pat Hansen Andy Hoffmann

OBJECTIVES

1. Test for difference in growth between control and oiled sites for Dolly Varden char and cutthroat trout.

2. Test for difference in survival between control and oiled sites for Dolly Varden char and cutthroat trout.

3. Test for migration of fish from control sites into oiled sites.

CONCLUSIONS

Objective 1 - Growth

1) There was no difference in growth for Dolly Varden char between control and oiled sites.

2) There was a significant difference in growth of cutthroat trout between control sites and Eshamy, an oiled site.

CONCLUSIONS

Objective 2 - Survival

1) There was a significant difference in survival of Dolly Varden char between control and oiled sites.

2) There was a significant difference in survival of cutthroat trout between control and oiled sites.

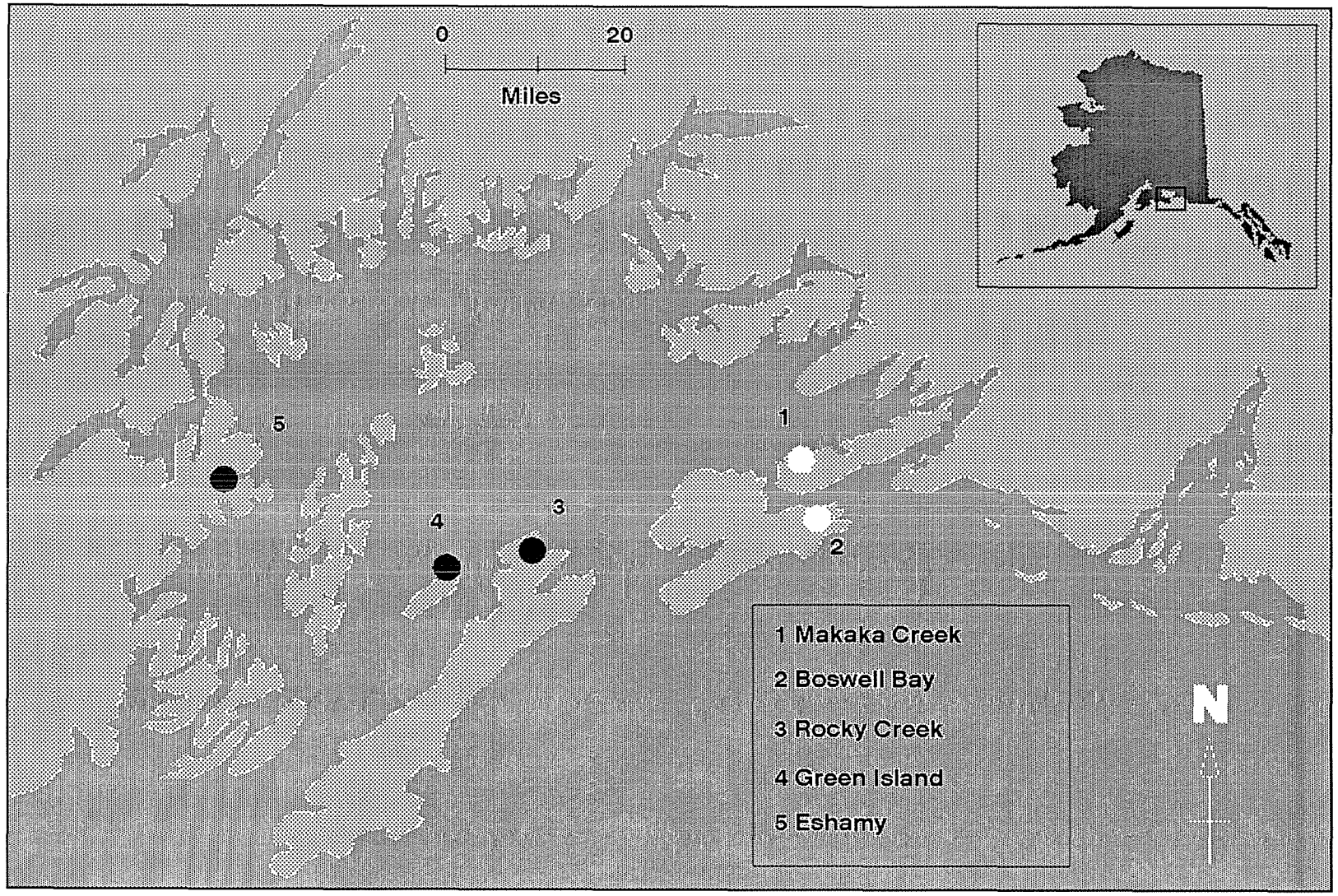
CONCLUSIONS

Objective 3 - Migration

1) There was no significant migration of Dolly Varden char among control and oiled sites.

2) There was no significant migration of cutthroat trout among control and oiled sites.

WEIR LOCATIONS IN PRINCE WILLIAM SOUND



TAG SUMMARY

DOLLY VARDEN CHAR

SITE	TAGS PUT OUT 1989	TAGS PUT OUT 1990	FISH EXAMINED 1990
BOSWELL	75	6,955	7,295
MAKAKA	5,239	11,508	20,382
Total control	5,314	18,463	27,677
ROCKY	4,413	14,438	19,335
GREEN	263	1,626	1,654
ESHAMY	867	4,203	4,820
Total oiled	5,543	20,267	25,809
TOTAL	10,857	38,730	53,486

TAG SUMMARY

CUTTHROAT TROUT

SITE	TAGS PUT OUT 1989	TAGS PUT OUT 1990	FISH EXAMINED 1990
BOSWELL	112	1,326	1,355
MAKAKA	745	689	1,620
Total control	857	2,015	2,975
ROCKY	10	27	42
GREEN	9	18	19
ESHAMY	210	206	242
Total oiled	229	251	303
TOTAL	1086	2266	3,278

GROWTH

OBJECTIVE:

To test the hypothesis that the mean growth of fish from control areas is equal to the mean growth of fish from oiled areas.

$$H_o: \mu_o = \mu_c$$
$$H_a: \mu_o < \mu_c$$

ANALYSIS OF VARIANCE

Sources of variation:

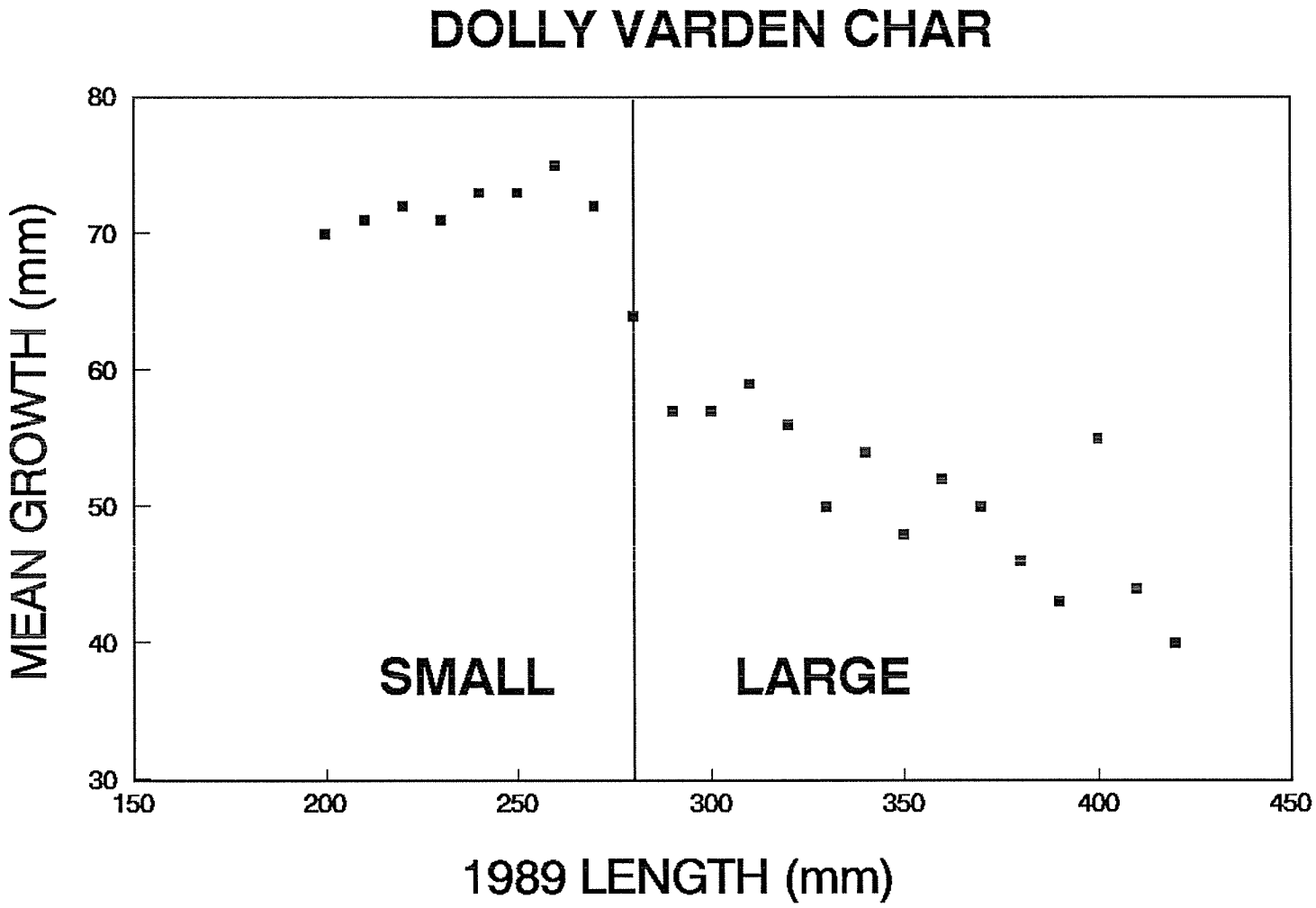
1) Recording error

2) Differences in length frequencies between sites.
   a) block
   b) covariate

3) Differences in growth of fish
   between control and oiled sites.

4) Differences in growth of fish
   between sites of the same treatment.

5) Differences in the growth of fish
   within the same site.


DOLLY VARDEN CHAR
MEAN GROWTH (mm)
80
70
60
50
40
30
SMALL
LARGE
150
200
250
300
350
400
450
1989 LENGTH (mm)

DOLLY VARDEN CHAR

Model for ANOVA

GROWTH = BLOCK + TMT + SITE(TMT) + ERROR

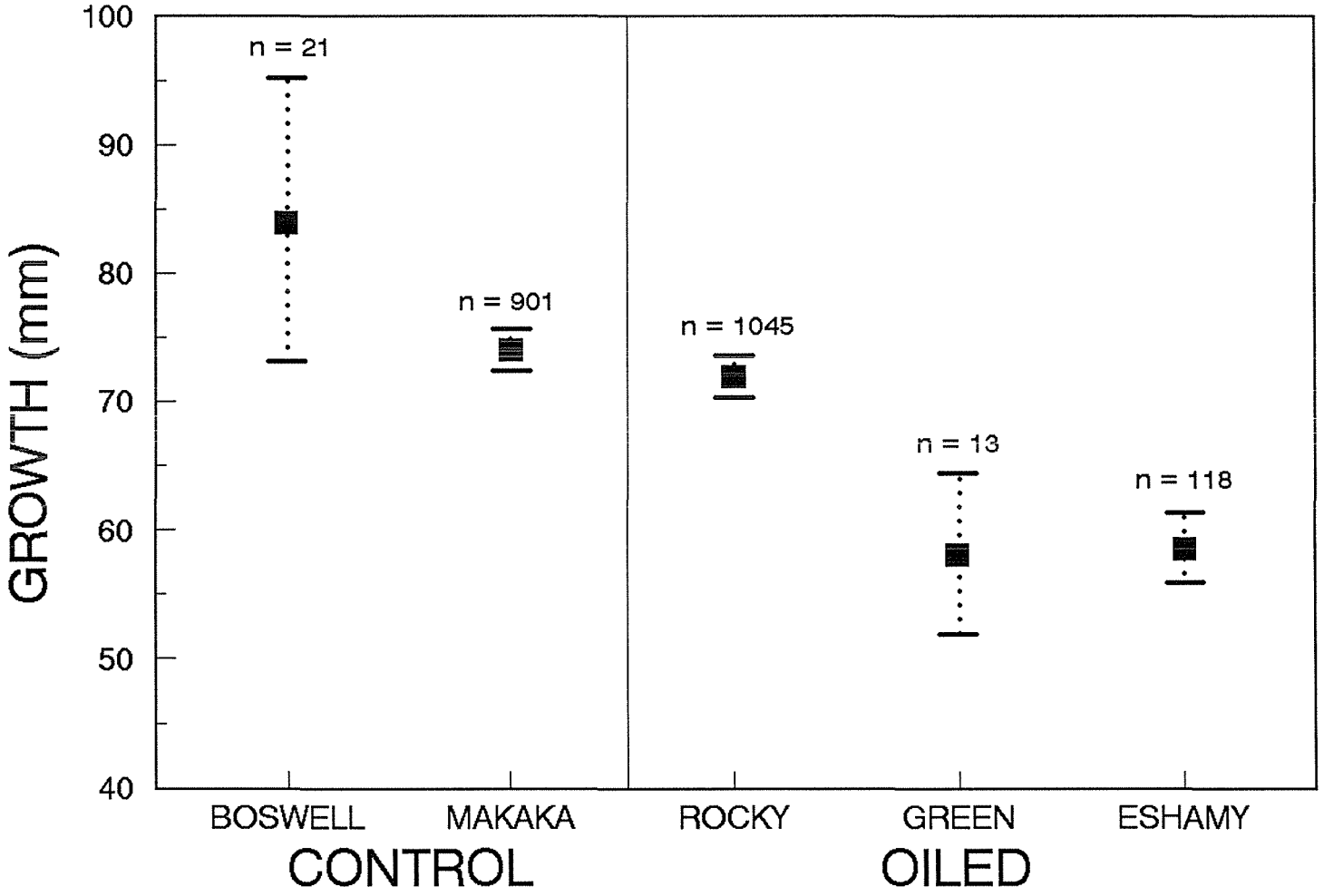
ANOVA

SOURCE	df	Type I SS	F	P>F
block	1	47,072		
between tmt groups	1	6,940	0.73	0.44
sites within tmt groups	4	38,168		
error	2,377	604,055		
Total	2,383	696,235		

DOLLY VARDEN CHAR

Growth of Small Fish

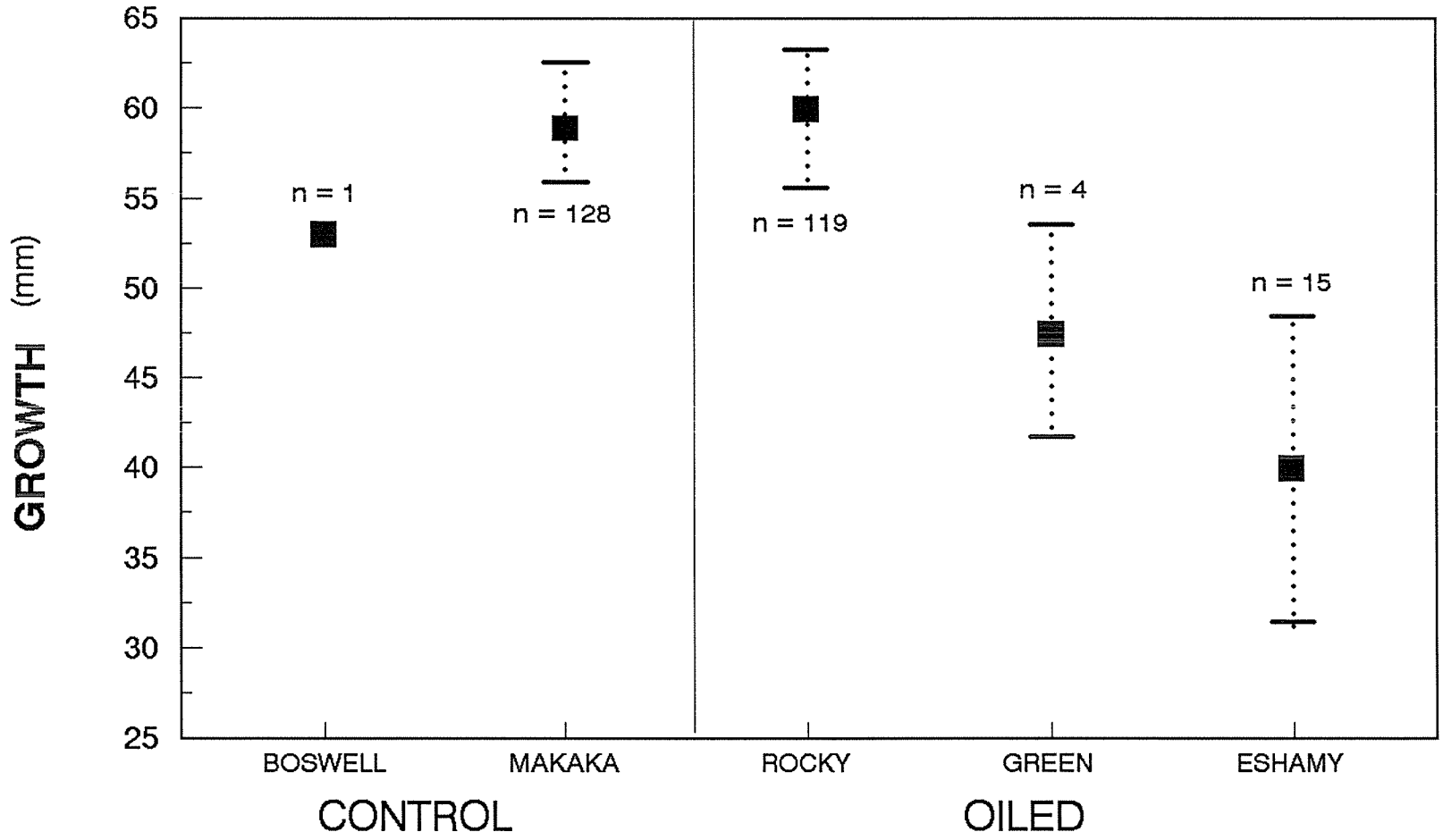
95% Confidence Intervals



DOLLY VARDEN CHAR

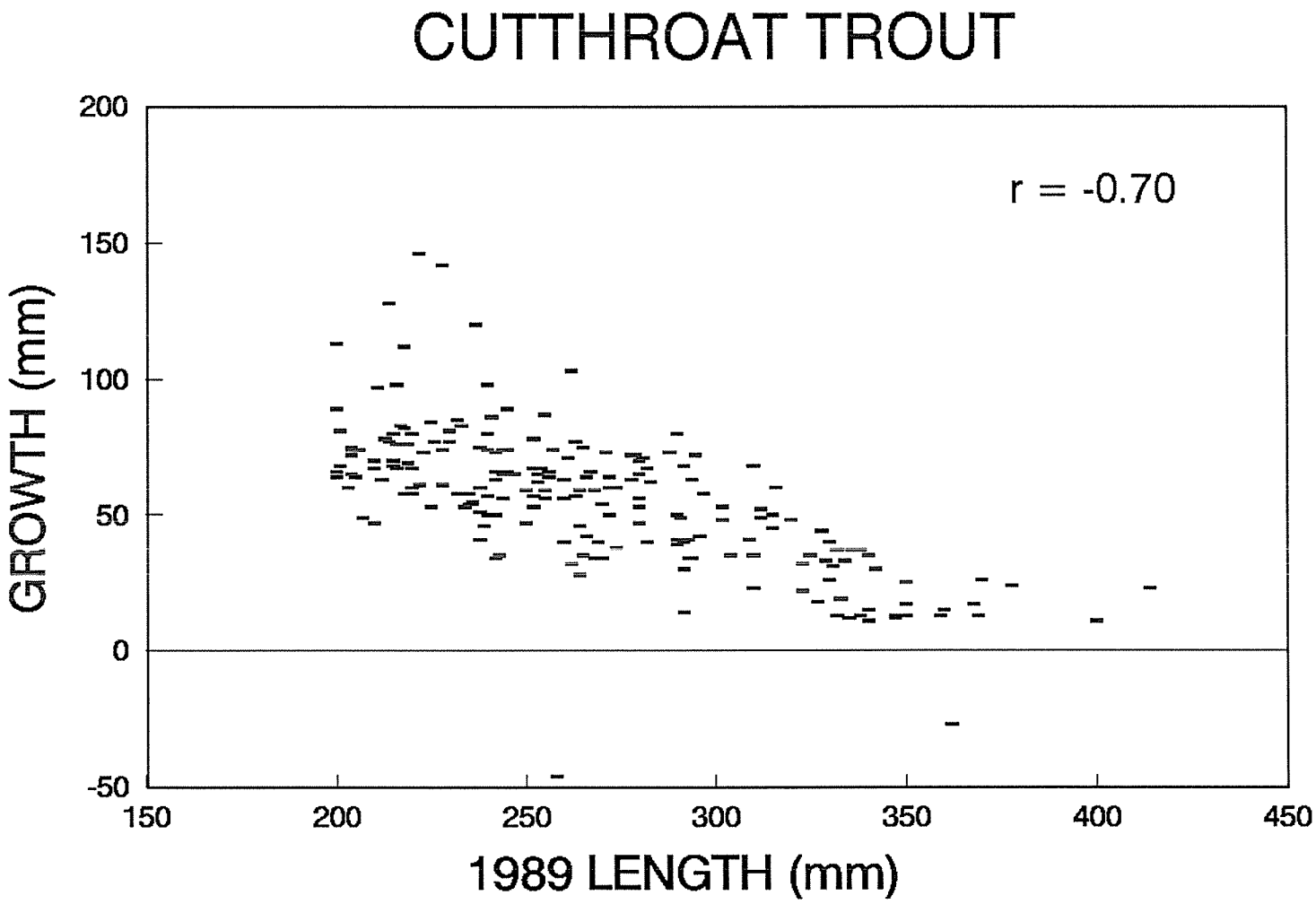
Growth of Large Fish

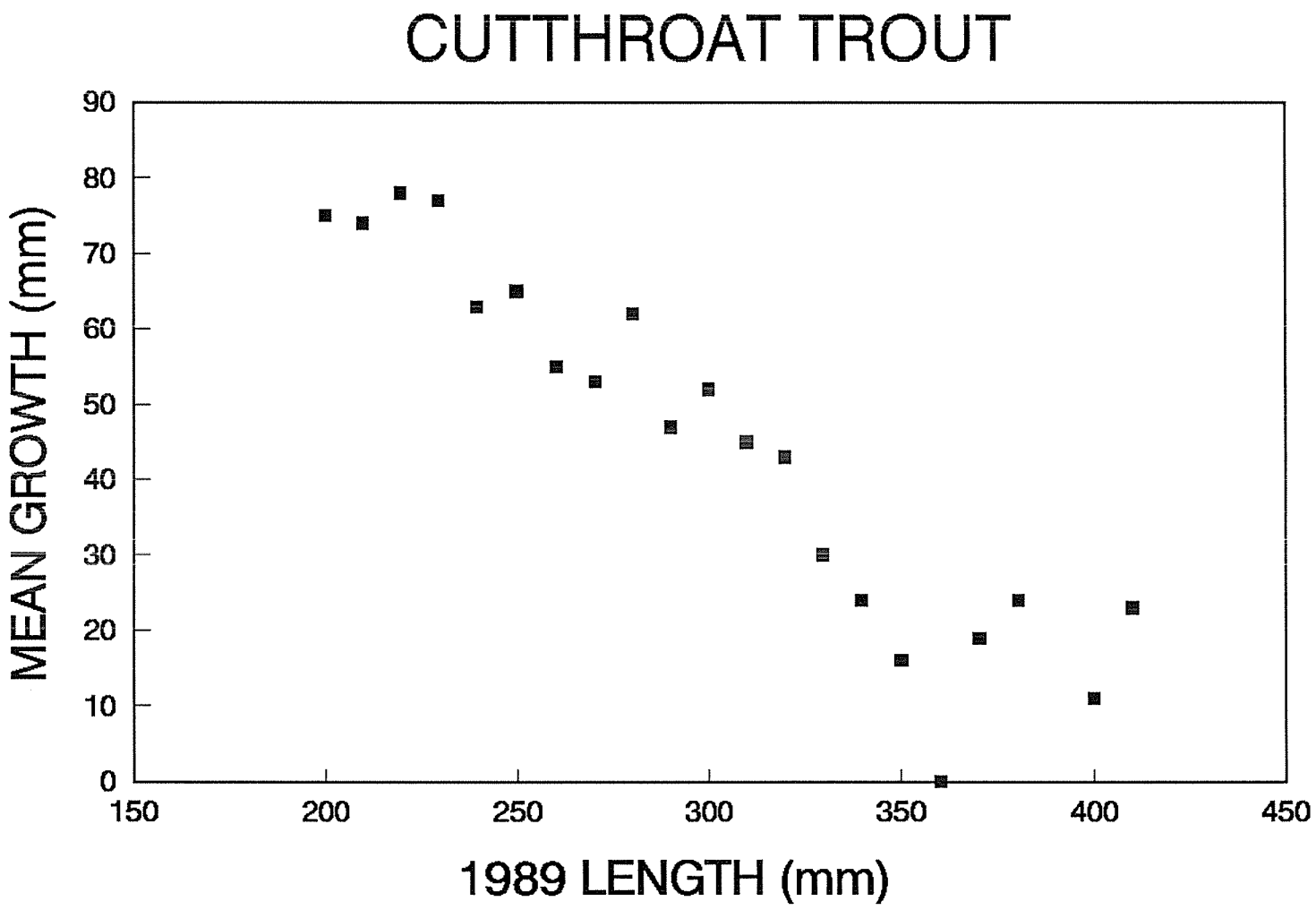
95% Confidence Intervals



CONCLUSION:

No significant differences in the growth of Dolly Varden char from control and oiled sites.


CUTTHROAT TROUT
r = -0.70
GROWTH (mm)
200
150
100
50
0
-50
150
200
250
300
350
400
450
1989 LENGTH (mm)


CUTTHROAT TROUT
MEAN GROWTH (mm)
90
80
70
60
50
40
30
20
10
0
150
200
250
300
350
400
450
1989 LENGTH (mm)

CUTTHROAT TROUT

Model for ANOVA

GROWTH = SITE + LENGTH 89 + ERROR

ANOVA

SOURCE	df	Type III SS	F	P>F
between sites	2	7,181	22.21	<0.001
length 89	1	23,137		
error	182	29,418		
Total	185	59,736		

PAIRWISE COMPARISON FOR LEAST SQUARES MEANS

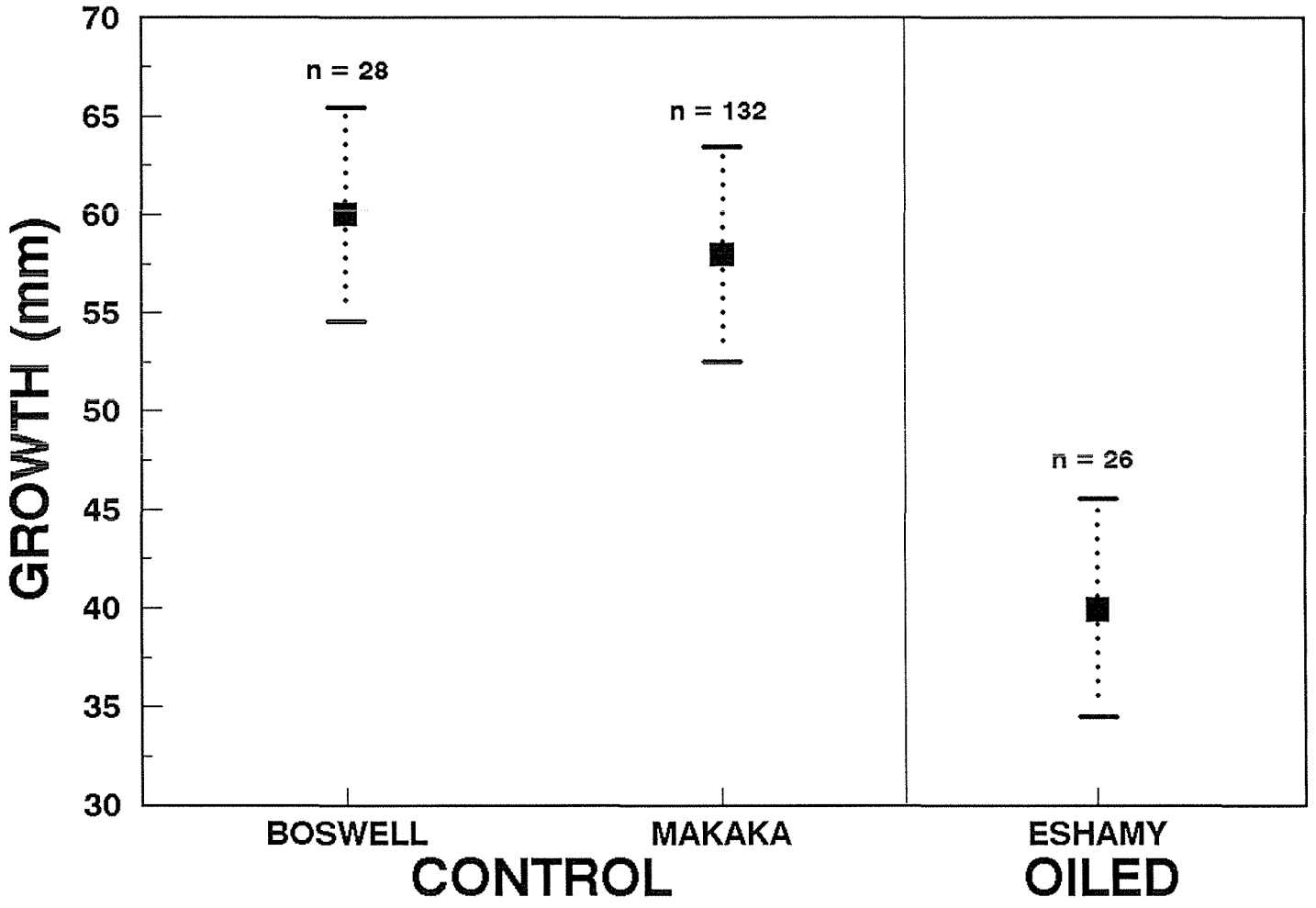
Pr > |T| H_o : LS Means are equal

	Makaka	Eshamy
Boswell	0.4574	0.0001
Makaka		0.0001

CUTTHROAT TROUT

Fish growth

Least Square means and 95% Confidence Intervals



CONCLUSION:

Cutthroat trout from Eshamy, an oiled site, grew slower than fish from control sites.

SURVIVAL

OBJECTIVE:

To test the hypothesis that survival of tagged fish from control areas is equal to survival of tagged fish from oiled areas.

$$H_o: S_o = S_c$$
$$H_a: S_o < S_c$$

DOLLY VARDEN CHAR

SUMMARY OF RECAP DATA

SITE	FISH TAGGED 1989	FISH RECAPPED 1990	FISH NOT RECAPPED
BOSWELL	75	23	52
MAKAKA	5239	1094	4145
ROCKY	4413	1205	3208
GREEN	263	21	242
ESHAMY	867	151	716

SOURCES OF VARIATION

1) Fishing Mortality

   A. Commercial Fishery

      1. time and area of fishing greatly limited in 1989

      2. one tag return

   B. Sport Fishery - On site creel survey found no tags

2) Tag loss

   A. Dolly Varden char - Tag loss was less than 2% for all sites except Boswell (8%)

   B. Cutthroat Trout - undetectable

SOURCES OF VARIATION

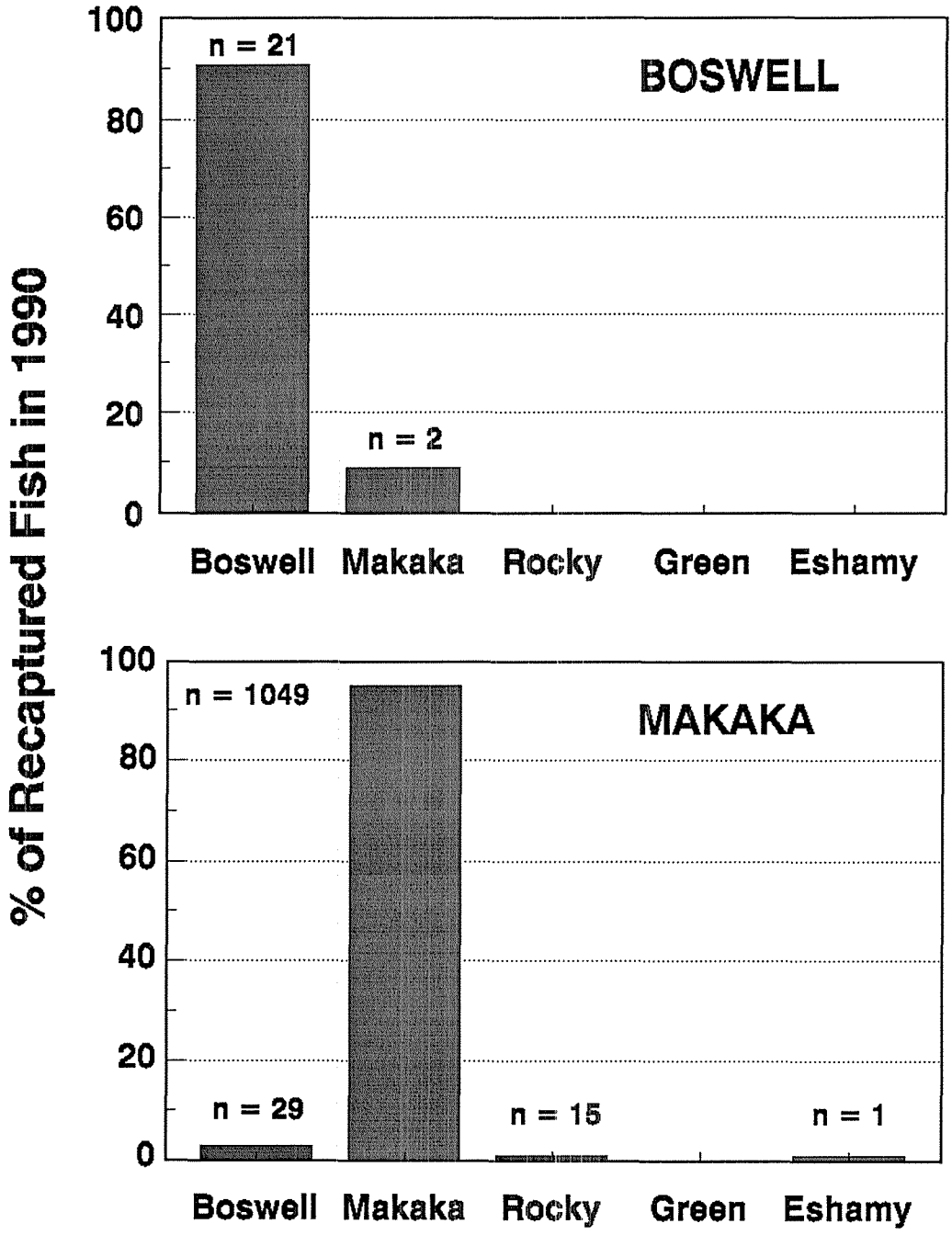
3) Weir Washout in 1990

Control sites - 2 days out of 59
Oiled sites - 0 days out of 59

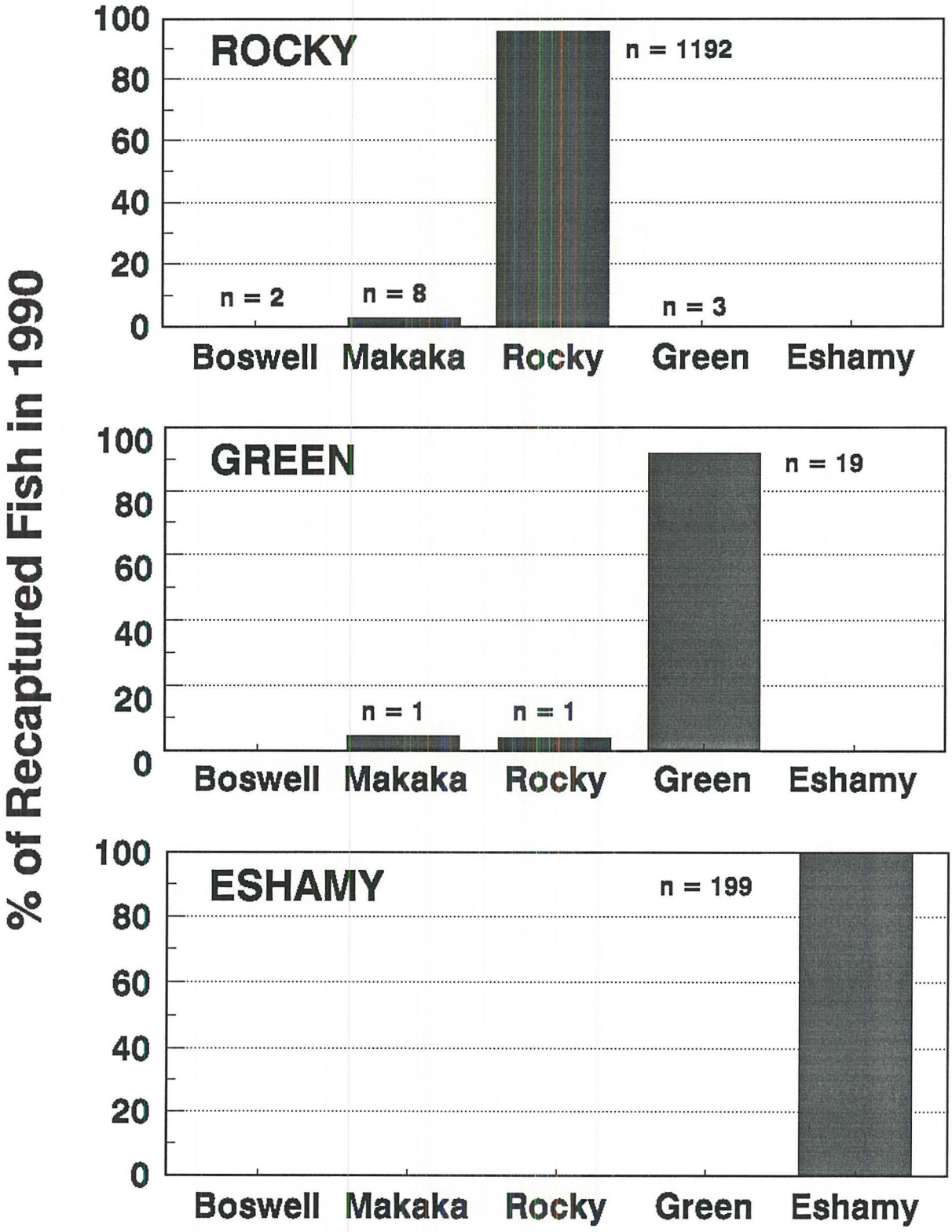
4) Migration

5) Differences in length frequencies between sites

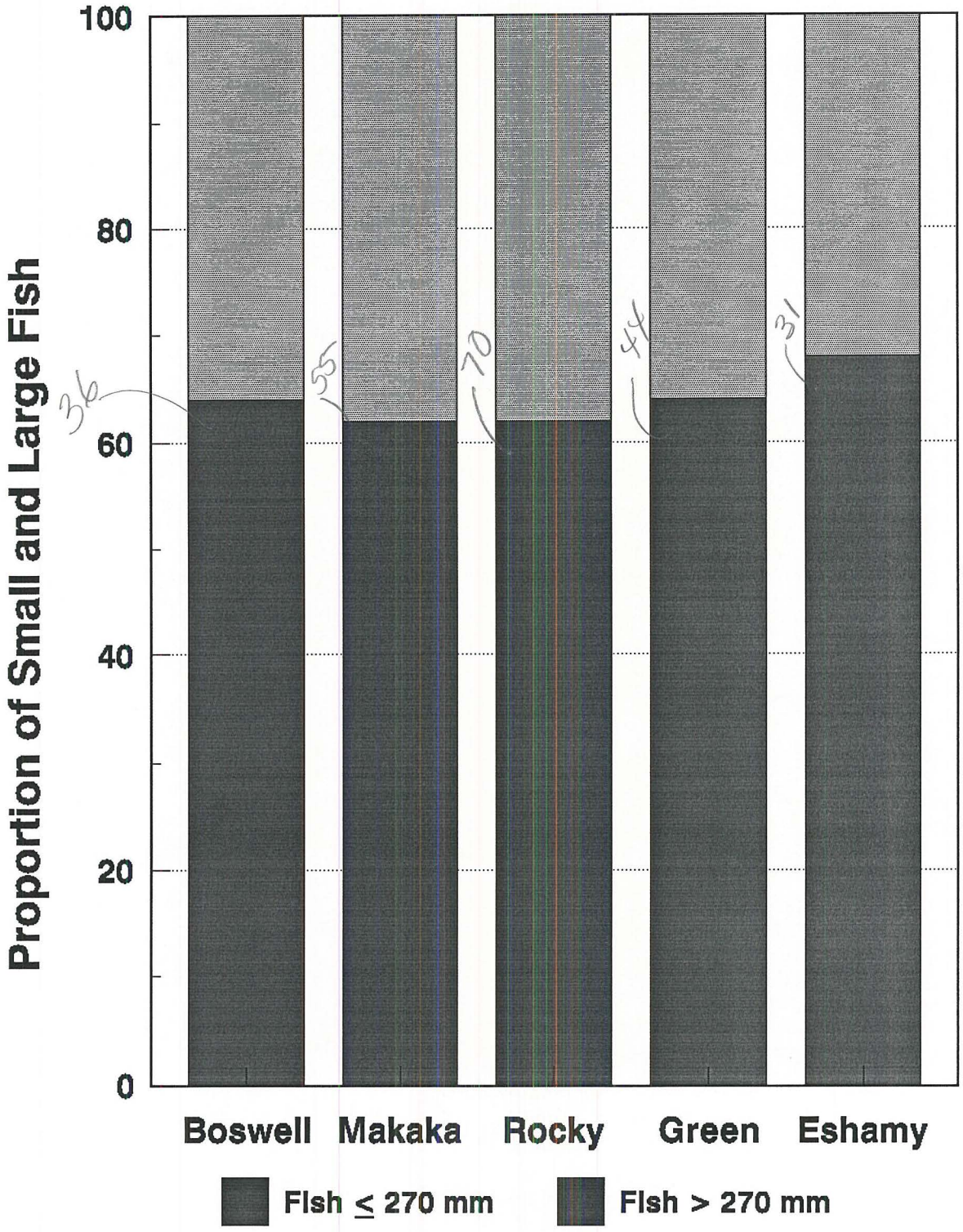
RECAPTURE LOCATIONS OF MARKED DOLLY VARDEN FROM CONTROL SITES IN 1990



RECAPTURE LOCATIONS OF MARKED DOLLY VARDEN FROM OILED SITES IN 1990



PROPORTIONS OF SMALL AND LARGE DOLLY VARDEN MARKED IN 1989



MULTINOMIAL ANALYSIS OF VARIANCE

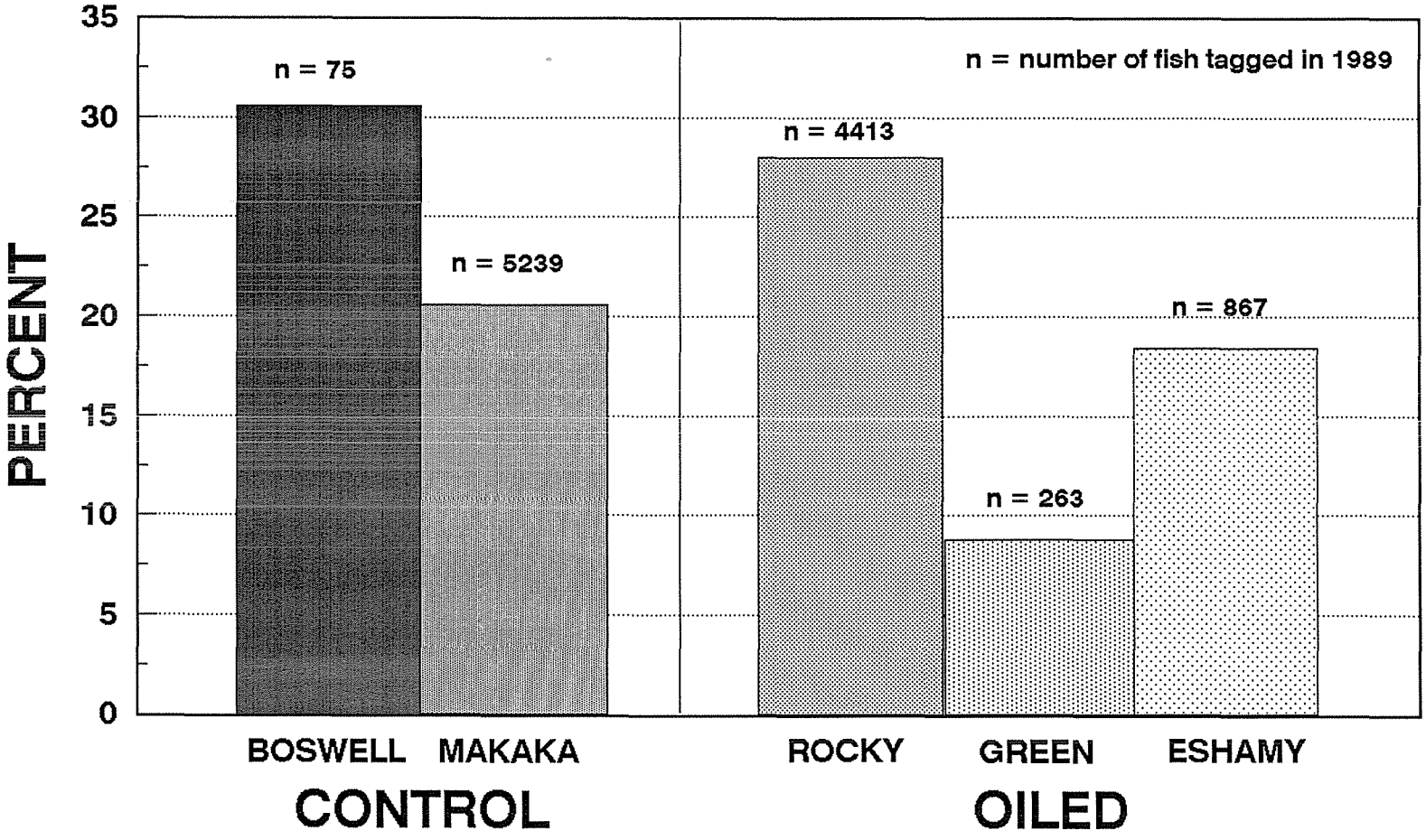
Allows the dependent variable to
be a "YES" or "NO" response

MODEL:

RECAPTURE = SITE
(YES OR NO)

The test of the hypothesis
is done through a contrast

DOLLY VARDEN CHAR
PERCENT RECAPS BY SITE



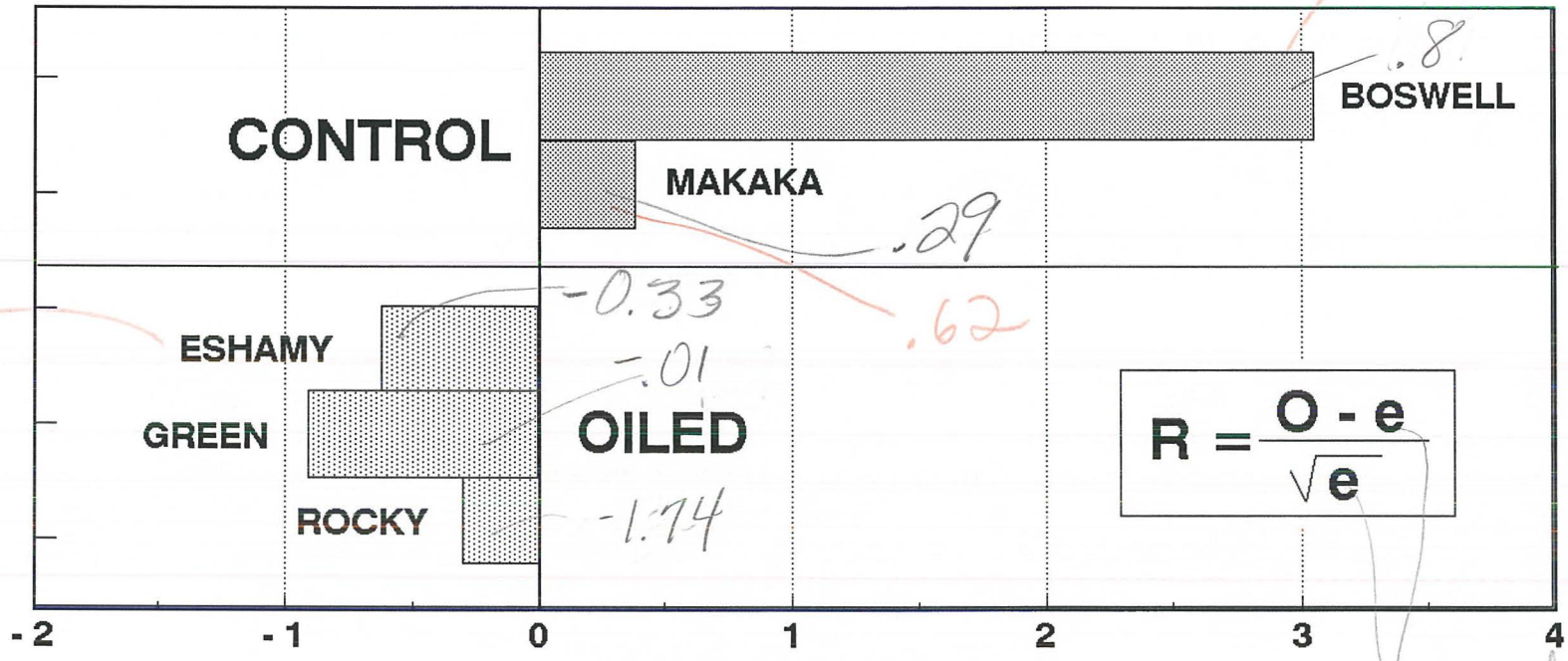
MULTINOMIAL ANALYSIS OF VARIANCE

DOLLY VARDEN CHAR

SITE	OBSERVED PROPORTIONS	ML PREDICTED PROPORTIONS	N
BOSWELL	0.3067	0.1641	75
MAKAKA	0.2088	0.2064	5239
ROCKY	0.2731	0.2754	4413
GREEN	0.0798	0.0972	263
ESHAMY	0.1742	0.1831	867

PEARSON CHI-SQUARE = 12.792
df = 1
P < 0.001

DOLLY VARDEN CHAR



Measure of deviation of survival at each site from predicted survival.

CONCLUSIONS:

Dolly Varden char from oiled areas had a 32% higher mortality rate than fish from control areas.

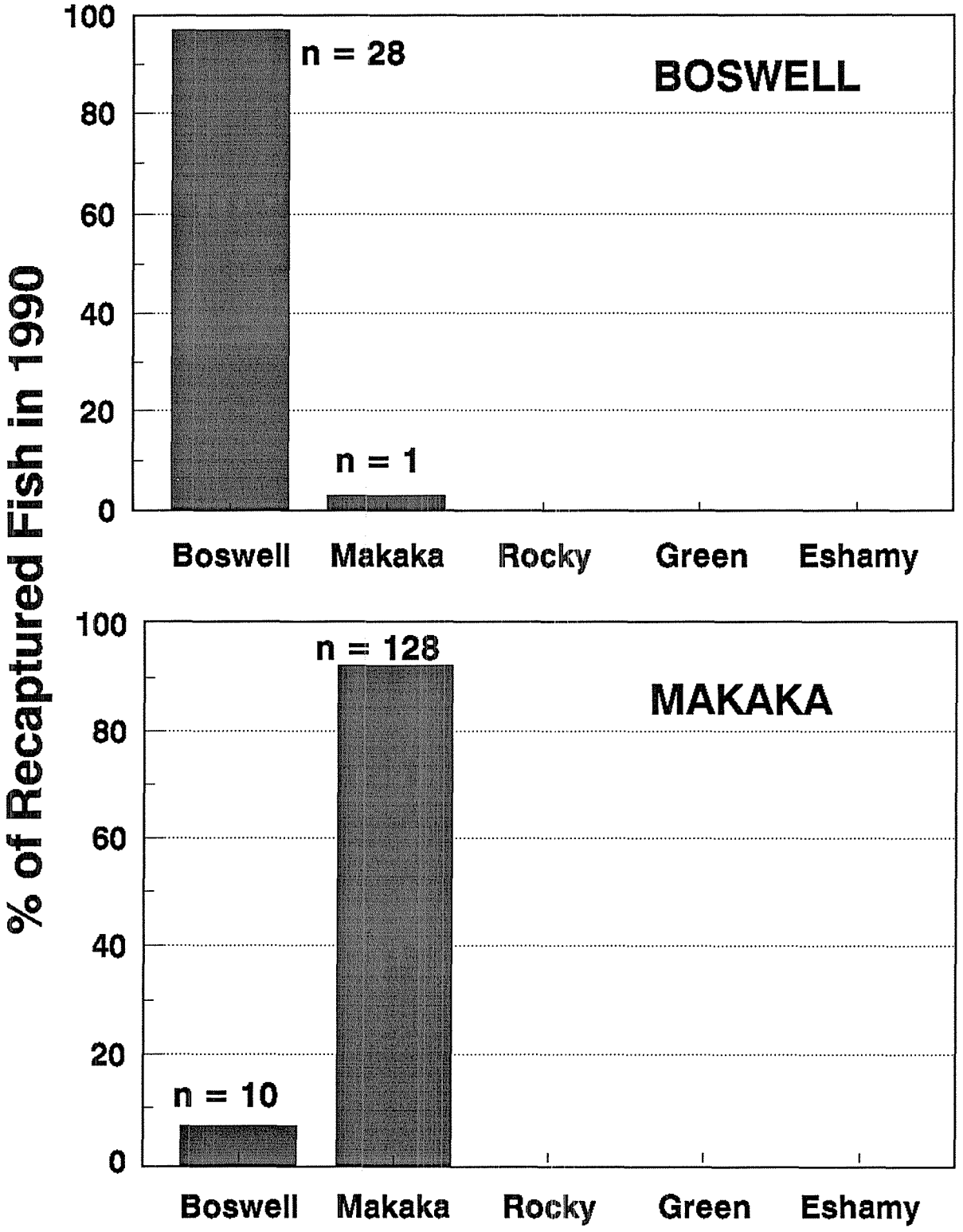
Small fish had a higher mortality than large fish.

CUTTHROAT TROUT

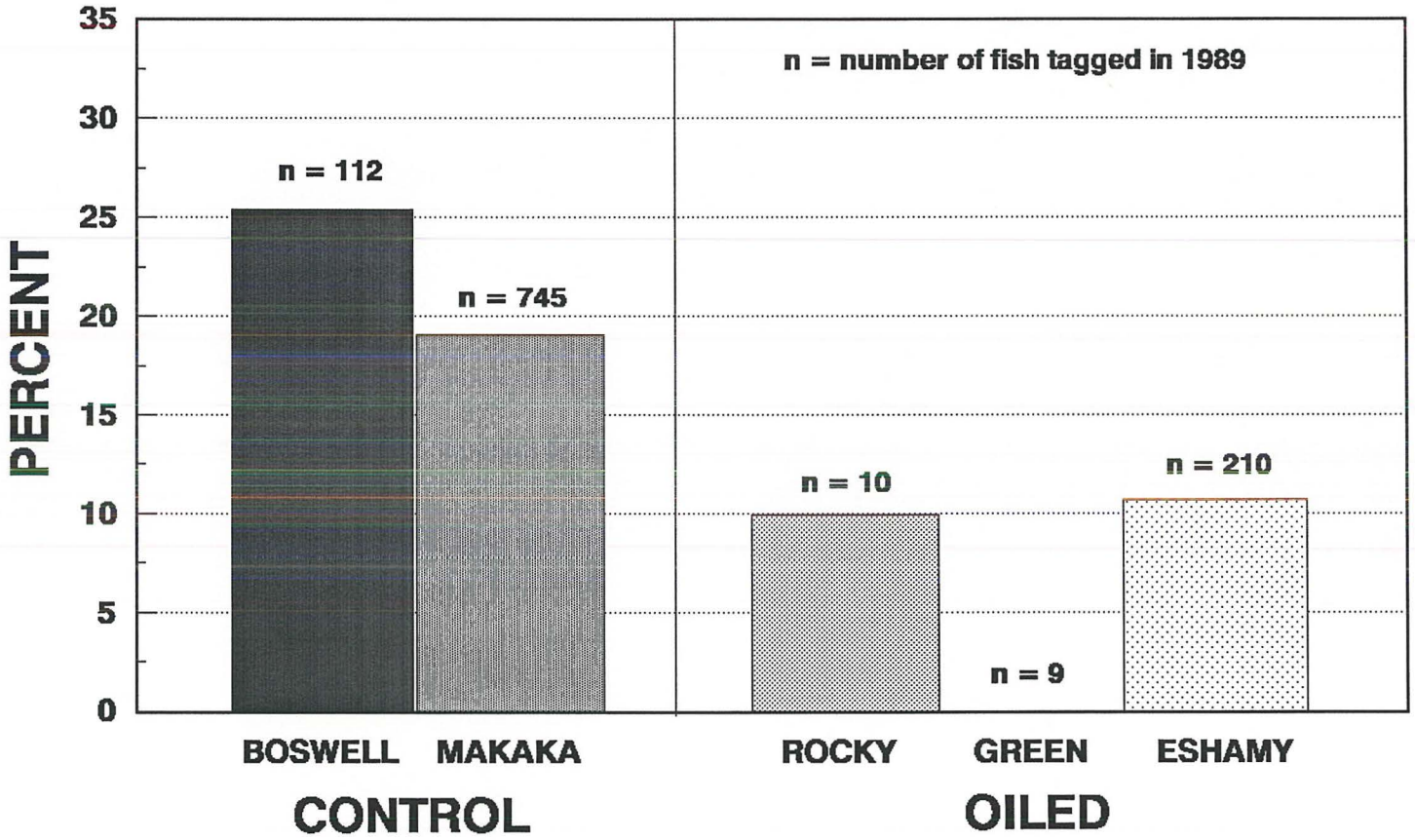
SUMMARY OF RECAP DATA

SITE	FISH TAGGED 1989	FISH RECAPPED 1990	FISH NOT RECAPPED
BOSWELL	112	29	83
MAKAKA	745	138	607
ROCKY	10	1	9
GREEN	9	0	9
ESHAMY	210	24	186

RECAPTURE LOCATIONS OF MARKED CUTTHROAT TROUT FROM CONTROL SITES IN 1990

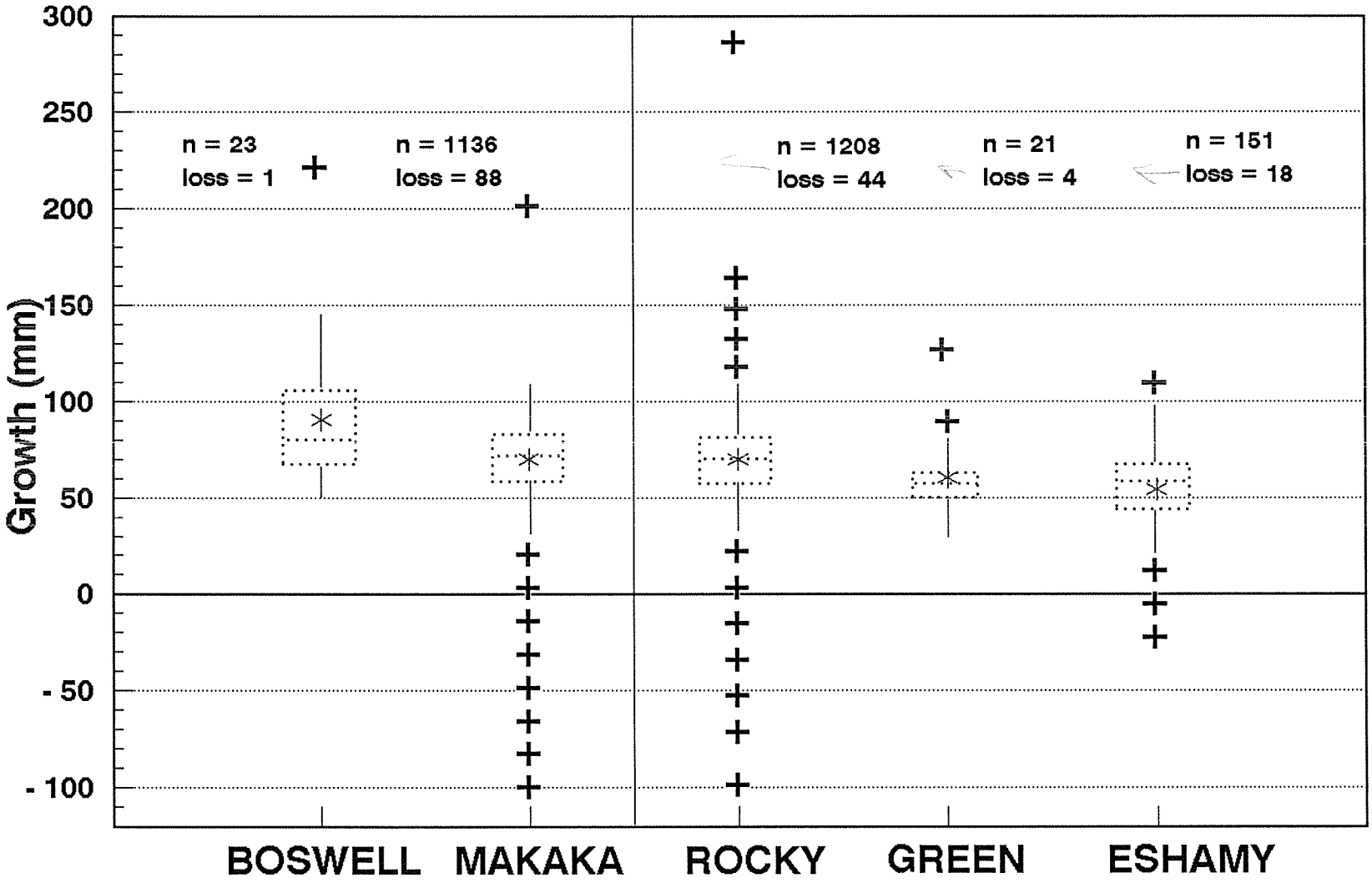


CUTTHROAT TROUT
PERCENT RECAPS BY SITE



DOLLY VARDEN CHAR

EDA Procedure to Eliminate Outliers Errors

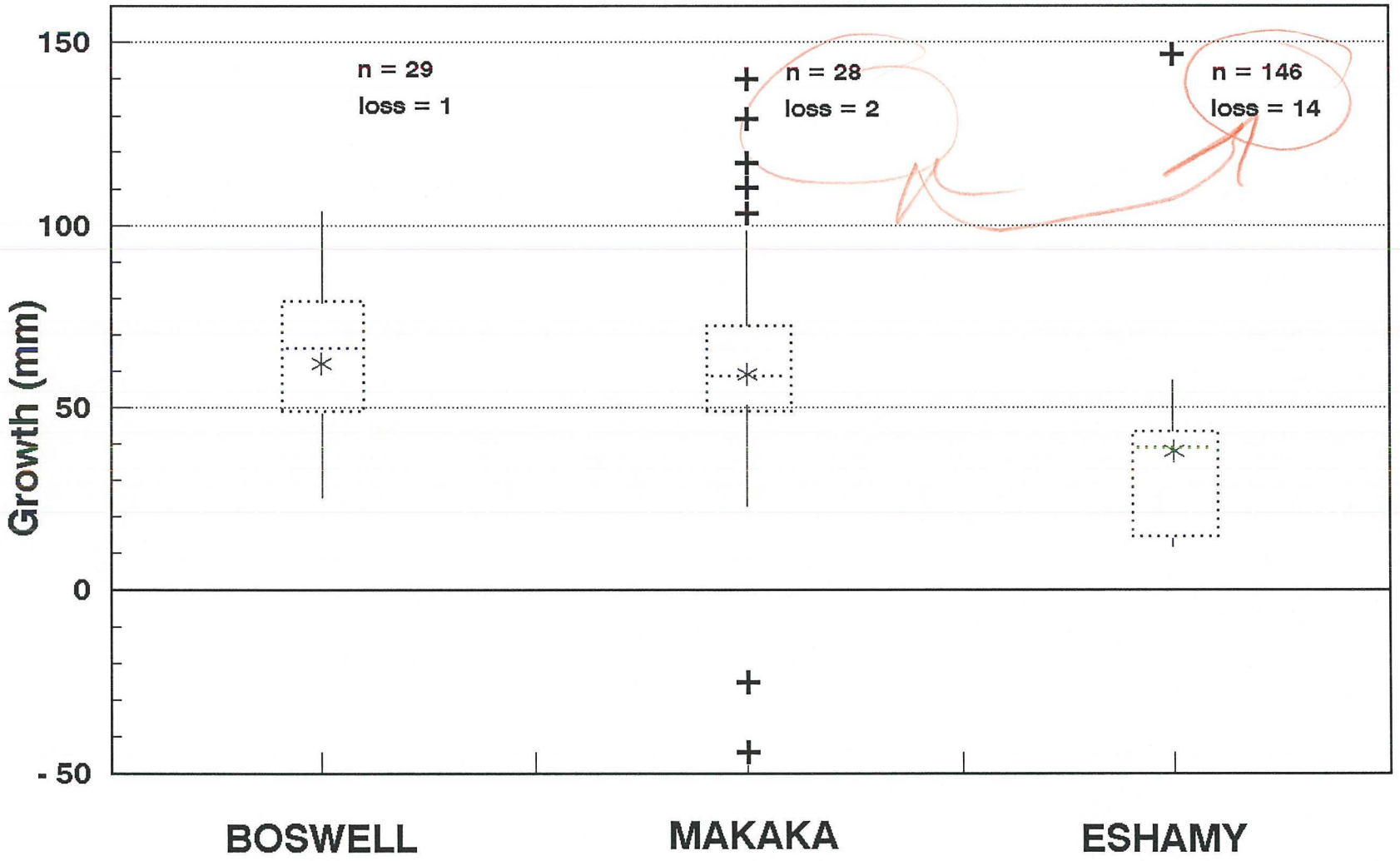


CONCLUSION:

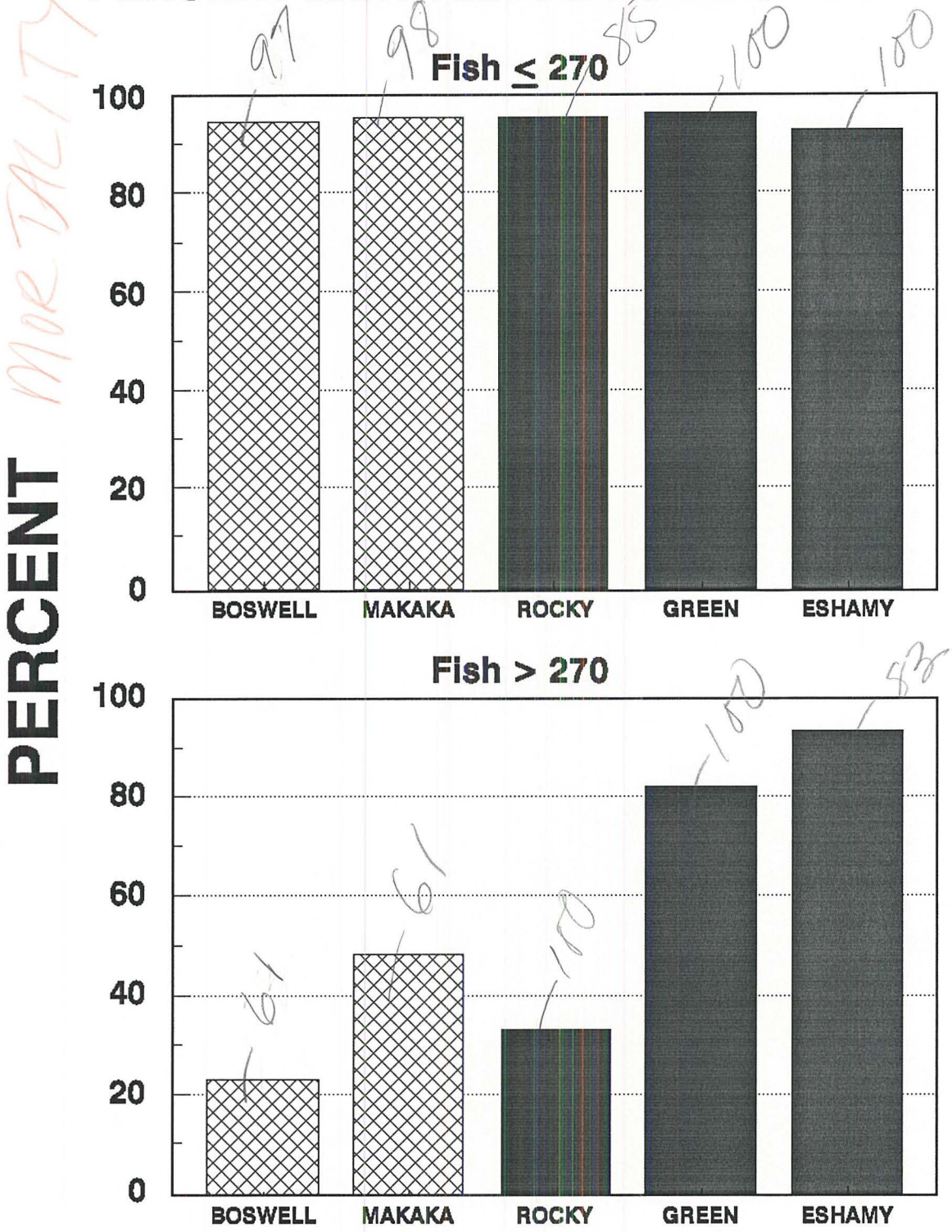
Cutthroat trout from control areas had a higher survival rate than fish from Eshamy, an oiled area.

CUTTHROAT TROUT

Procedure to Eliminate Outliers



DOLLY VARDEN CHAR
PERCENT MORTALITY BY SIZE GROUP



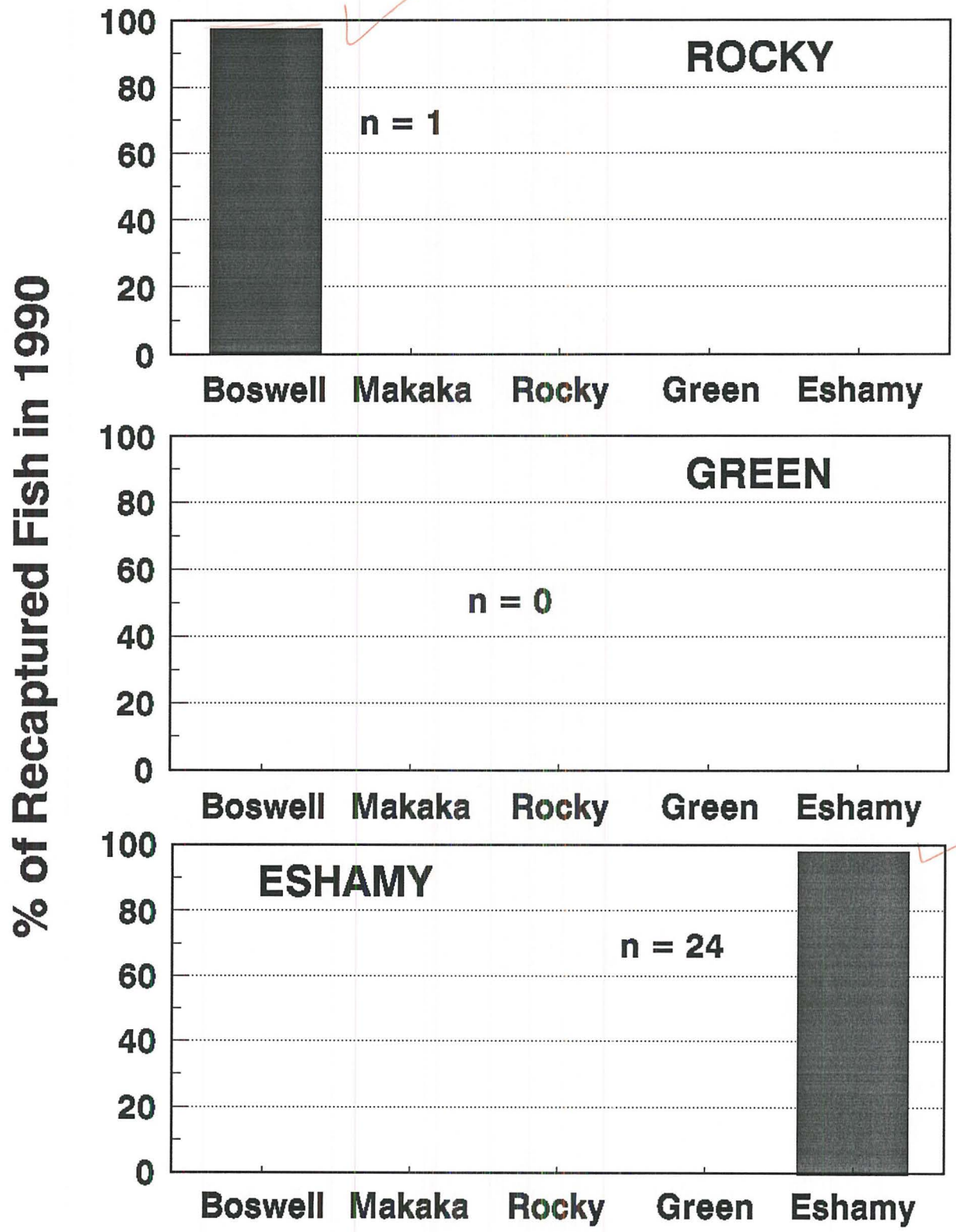
MULTINOMIAL ANALYSIS OF VARIANCE

CUTTHROAT TROUT

SITE	OBSERVED PROPORTIONS	ML PREDICTED PROPORTIONS	N
BOSWELL	0.2589	0.2365	112
MAKAKA	0.1852	0.1825	745
ROCKY	0.1000	0.2926	10
GREEN	0.0000	0.2169	9
ESHAMY	0.1143	0.1189	210

PEARSON CHI-SQUARE =	3.695
df =	1
P =	0.055

RECAPTURE LOCATIONS OF MARKED CUTTHROAT TROUT FROM OILED SITES IN 1990



PAIRWISE COMPARISON FOR LEAST SQUARES MEANS

Pr > |T| H_o : LS Means are equal

	Makaka	Eshamy
Boswell	0.4574	0.0001
Makaka		0.0001

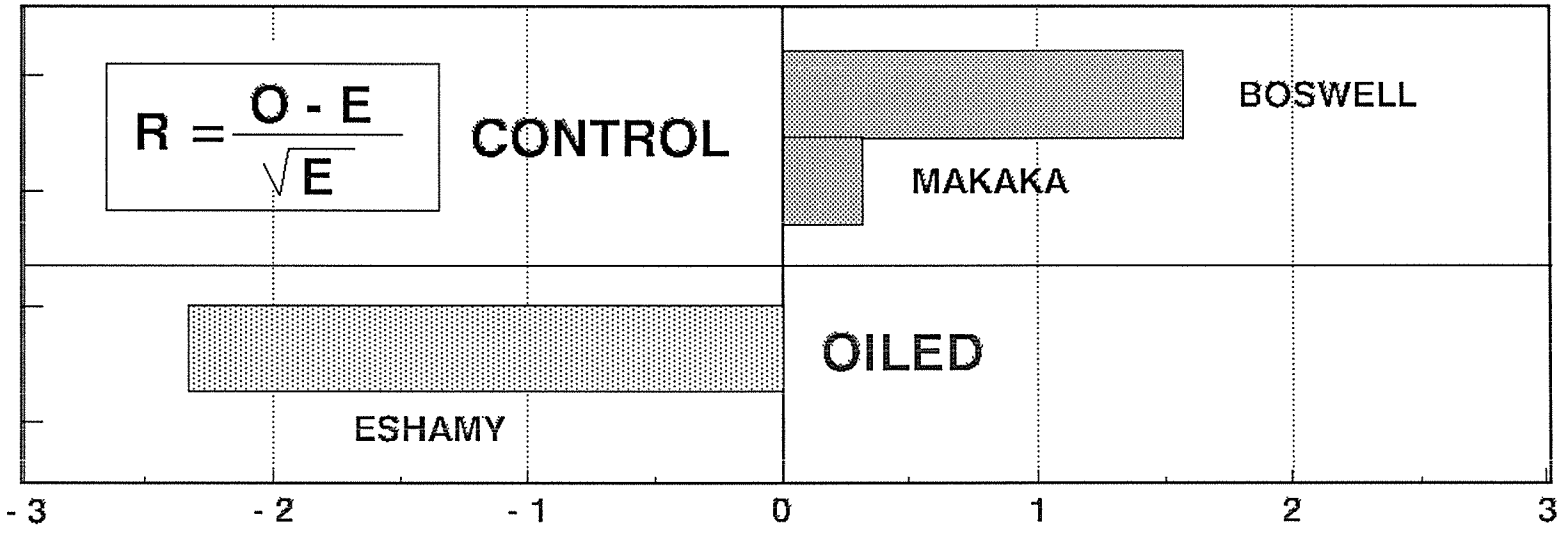
MULTINOMIAL ANALYSIS OF VARIANCE

CUTTHROAT TROUT

SITE	OBSERVED PROPORTIONS	ML PREDICTED PROPORTIONS	N
BOSWELL	0.2589	0.1917	112
MAKAKA	0.1852	0.1758	745
ESHAMY	0.1143	0.1837	210

PEARSON CHI-SQUARE = 10.482
df = 1
P = 0.001

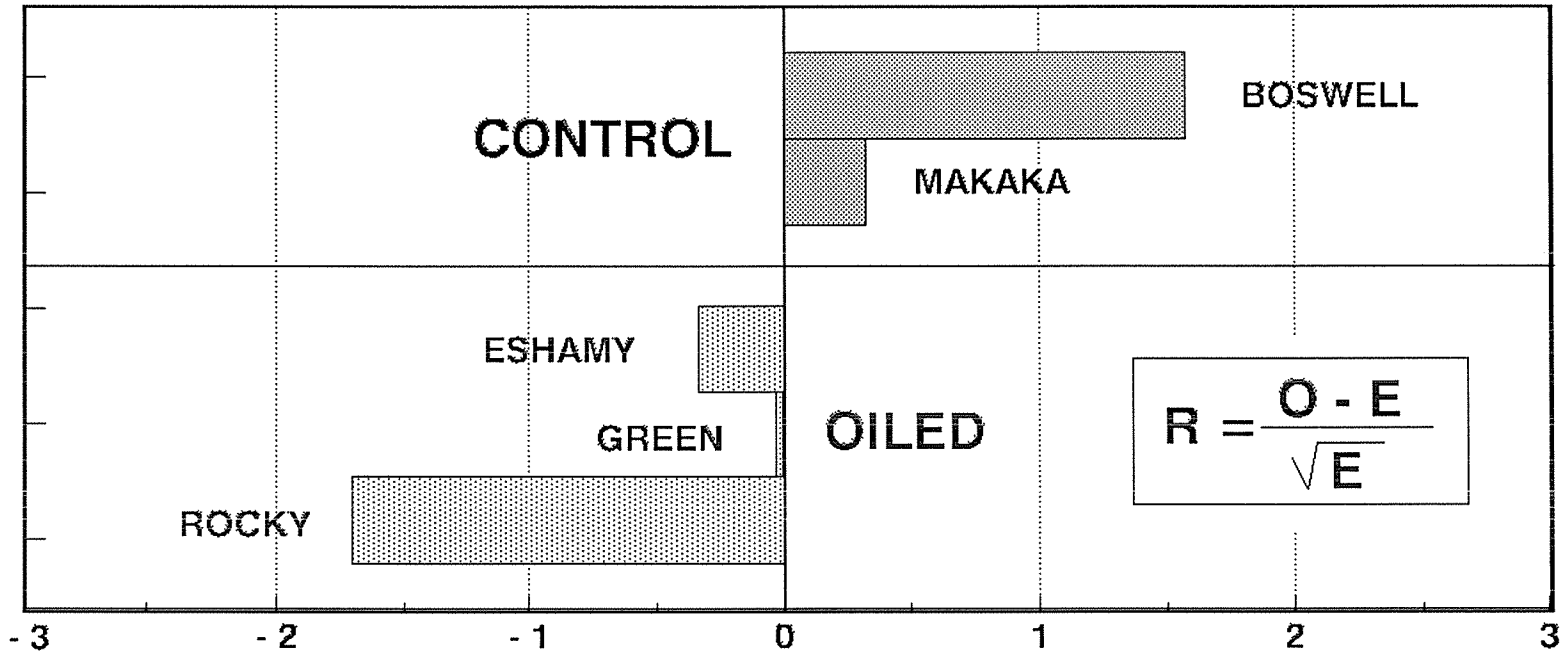
CUTTHROAT TROUT



PEARSON RESIDUALS

Measure of deviation of survival at each site from predicted survival.

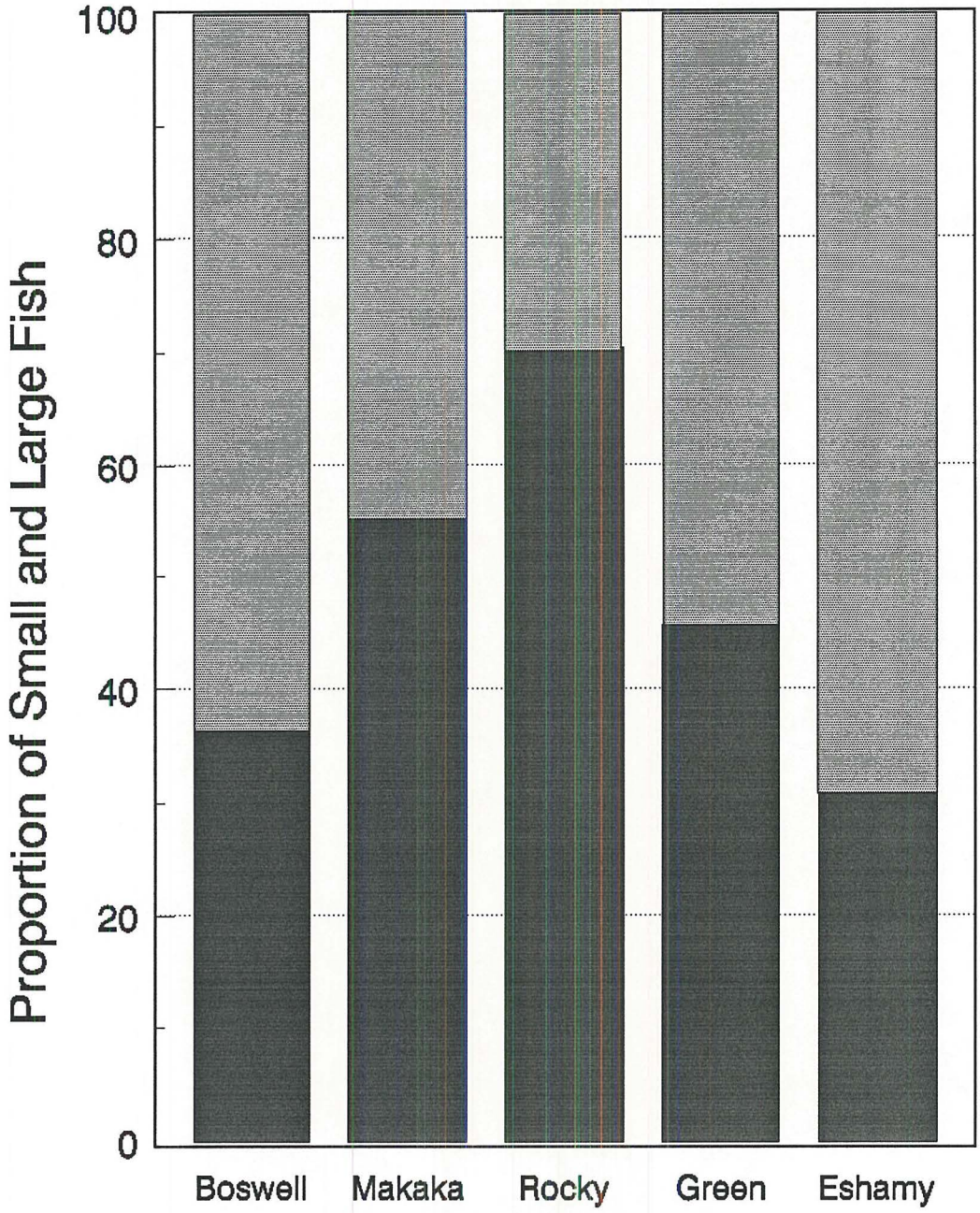
CUTTHROAT TROUT



PEARSON RESIDUALS

Measure of deviation of survival at each site from predicted survival.

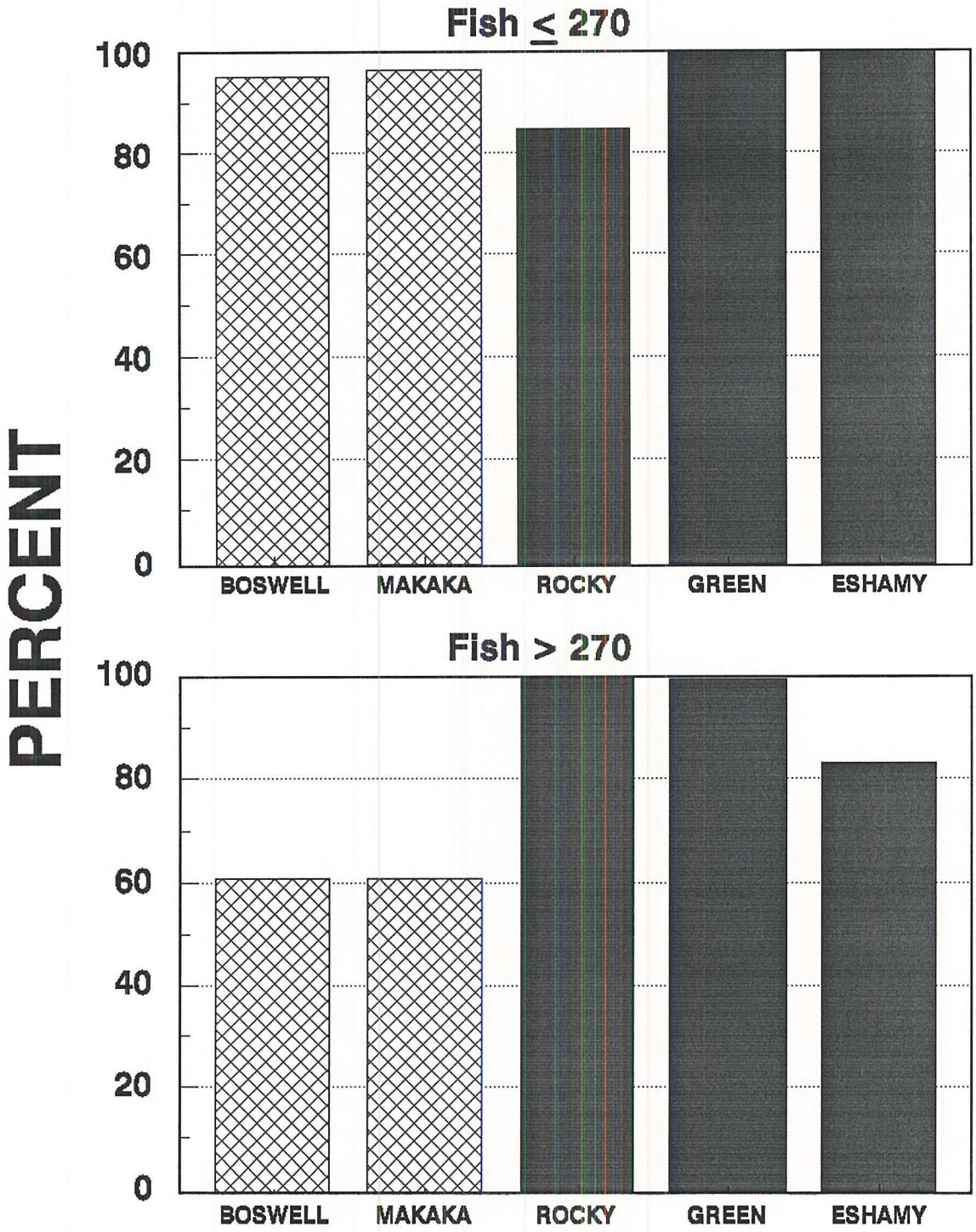
PROPORTIONS OF SMALL AND LARGE
CUTTHROAT TROUT
MARKED IN 1989



Hatched: Fish > 270 mm

Solid: Fish < 270 mm

CUTTHROAT TROUT
PERCENT MORTALITY BY SIZE GROUP



MULTINOMIAL ANALYSIS OF VARIANCE

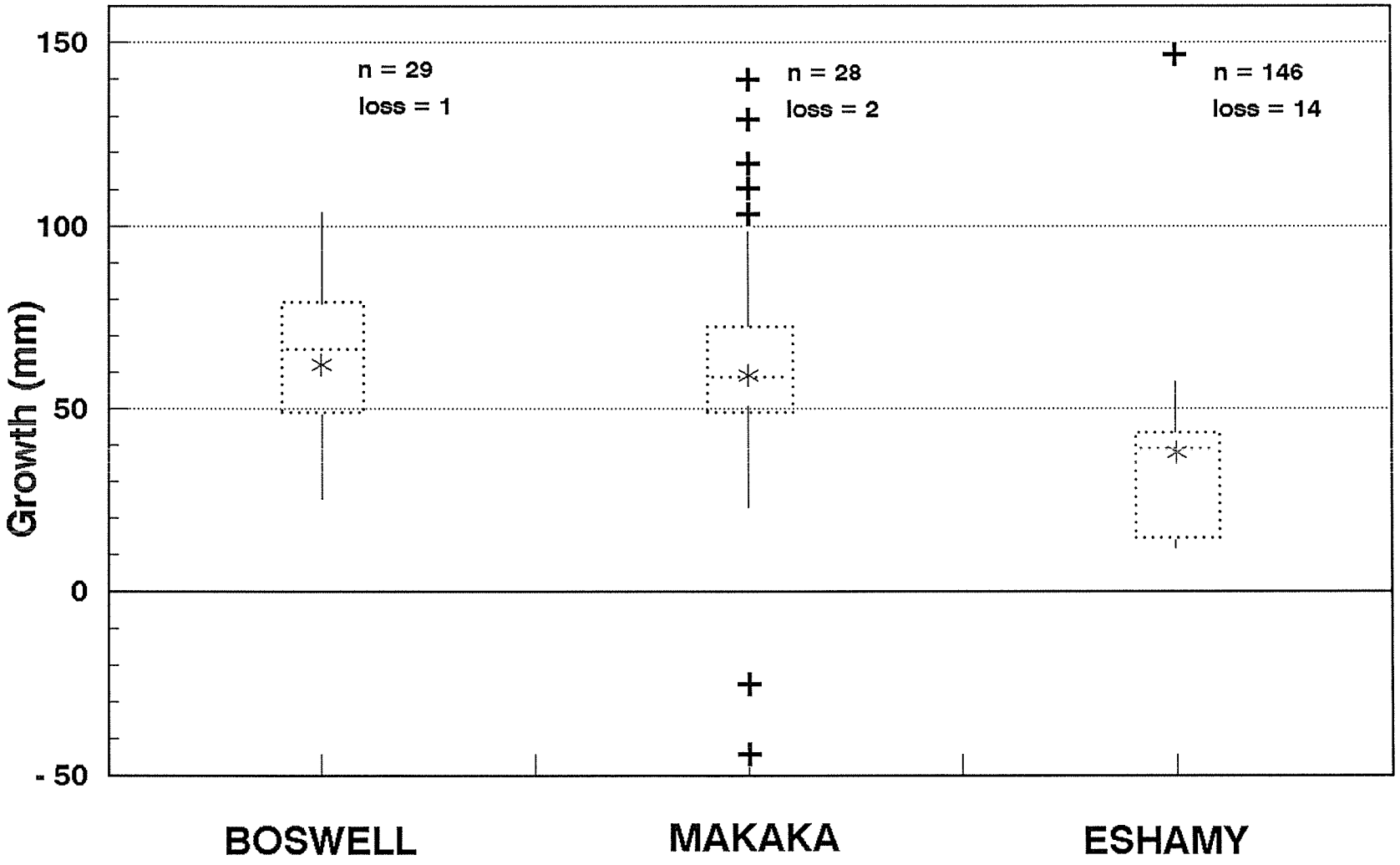
CUTTHROAT TROUT

SITE	OBSERVED PROPORTIONS	ML PREDICTED PROPORTIONS	N
BOSWELL	0.2589	0.2232	112
MAKAKA	0.1852	0.1807	745
ROCKY	0.1000	0.4837	10
GREEN	0.0000	0.0005	9
ESHAMY	0.1143	0.1221	210

PEARSON CHI-SQUARE =	6.944
df =	1
P =	0.008

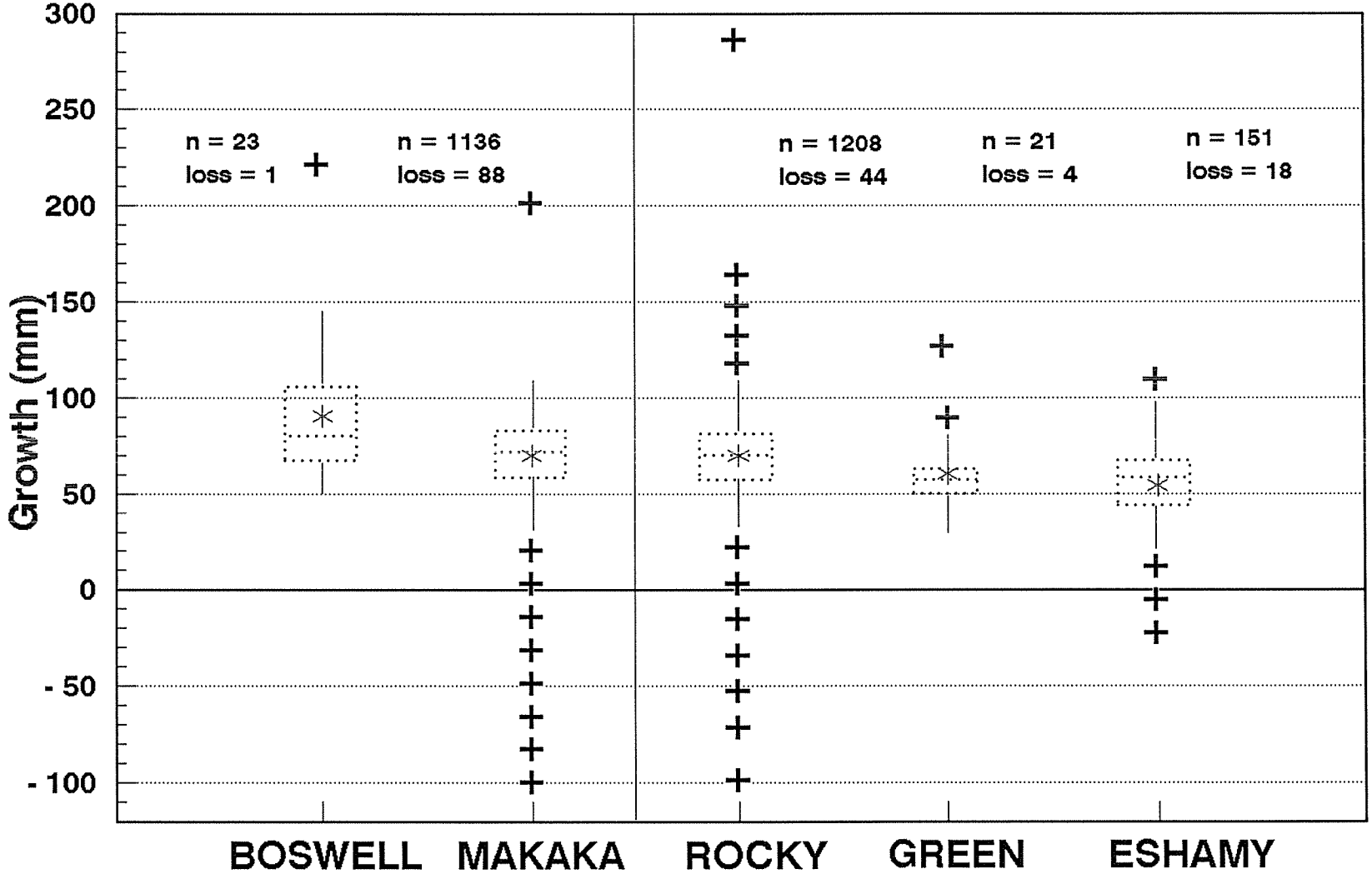
CUTTHROAT TROUT

EDA Procedure to Eliminate Errors



DOLLY VARDEN CHAR

EDA Procedure to Eliminate Errors



THE UNIVERSITY OF NORTH CAROLINA
AT
CHAPEL HILL

Institute of Marine Sciences
919/726-6841
FAX: 919-726-2426

The University of North Carolina at Chapel Hill
3407 Arendell Street
Morehead City, North Carolina 28557

31 October 1990

Mr. Brian Ross
Oil Spill Restoration Planning Office
437 E Street, Suite 301
Anchorage, Alaska 99501

Dear Brian:

As I feared, I do have an unavoidable commitment here in NC both today (Wednesday) and tomorrow (Thursday) that prevents me from attending the Restoration Meeting. I hope that my thoughts last week will be of use to you this week, and I am sorry not to be with you in person in Anchorage. Thanks sincerely for your confidence in me, and I look forward to making more contributions to restoration planning.

Sincerely,

Pete

C. H. Peterson

CHP:lw

THE UNIVERSITY OF NORTH CAROLINA
AT
CHAPEL HILL

Institute of Marine Sciences
919/726-6841
FAX: 919-726-2426

The University of North Carolina at Chapel Hill
3407 Arendell Street
Morehead City, North Carolina 28557

TELECOPY TRANSMITTAL FORM

To: BRIAN ROSS

Location: ANCHORAGE, ALASKA

FAX No.: 907 271-2467

From: C. H. PETERSON
UNC-IMS

FAX No.: 919 726-2426

Total No. of Pages, including this page 2

Date: 10-31-90 Time: _____ a.m. _____ p.m.

If you do not receive all pages, please contact our office at (919) 726-6841.

COMMENTS:

STATE OF ALASKA

STEVE COWPER, GOVERNOR

DEPARTMENT OF FISH AND GAME

333 RASPBERRY ROAD
ANCHORAGE, ALASKA 99518-1599
PHONE: (907) 344-0541

FRED DIVISION

FAX NUMBER: (907)349-5532

Office Number: (907)267-2158

RAPIFAX TRANSMITTAL SHEET

TO: Brian Ross

DATE: 10-30

NO. PAGES: 16
(following this page)

FROM: Tom KRON
FRED - DIVISION
ADF&G

MESSAGE:

OCT 30 '90 15:50 DEPT FISH & GAME

Please fax this to Brian Ross at 271-2467.

Brian: Please review this. If it is OK, I'll send it out to get things moving.

Thanks
Tom

Memorandum

State of Alaska

TO: Distribution

DATE: January 1, 1980

FILE:

FROM: Tom Kron
Regional Supervisor
Anchorage

SUBJECT: Restoration

A joint State-Federal team is beginning work to line out specific projects to restore damage done by the Exxon-Valdez oil spill. Brian Ross from EPA is coordinating the fish and shellfish portion of this effort. Brian would like to get input from the Regional Planning Teams in Prince William Sound, Cook Inlet, and Kodiak relative to this process. He asked that I help him get on the agenda for upcoming RPT meetings in the three regions. As I understand it, they want to gather restoration proposals for work which could begin next summer by early December and solidify a package by late winter. Please contact Brian Ross directly at:

Brian Ross
Oil Spill Restoration Planning Team Leader
Restoration Planning Office
Suite 301
437 E Street
Anchorage, Alaska 99501
phone: 271-2461 fax: 271-2467

Thanks.

xc L.White
L.Peltz
T.Walker

RECREATION RESTORATION 10/26/90

NAME	AGENCY	PHONE #	FAX # (IF KNOWN)
✓ DAVE PATTERSON	USFWS	786-3389	5627 (0336 FWS SWD)
✓ BUD RICE	NPS	Kenai (?) 224-3175	REALTY # (USFS SWD FAX) 224-3268
ART WEINER	DNR	762-2515 Anchorage	762-2270
RICK THOMPSON	DNR	762-2270	
✓ Ken Rice	Forest Service	2788012 Anchorage	2767178
✓ Frank Smedley	Chugach Nat. Forest	271-2534 Anchorage	278-7520
SANDY RABINOWICH	NPS/DOI		
KIRSTEN BALLARD	USEPA		
✓ Mike Goodwin	DNR/ST. PARKS	762-2614	762-2535
~~Mike Mitchell~~	Preston Thorgrimson	276-1969 Anchorage	276-1365
✓ KENT ROTH	ADFG SPORT FISH DIV.	267-2153 Anchorage	522-1413

Mike Stekon

Jim Bodkin

Kim Scandberg

Angela Duroff

Andy Hacker

Ray Highsmith

O = corrected fax sent

Spies + Peterson full Packets ok?

10/25

Coastal Habitat

Name	Affiliation	Phone	FAX # (if Known)
Sandy Rabinowitch	Dept. of the Interior	257-2563	257-2510
MARTHA FOX	EPA - SEATTLE	(206) 442-1497	
Stephen Bugbee	EPA - Anch.	278-8012	276-7178
Malin Babcock	NOAA Auke Bay Lab	789-6018	789-6094
Tom Dean	Coastal Resources Assoc.	(619) 438-0588	(619) 438-8684
Mike Stekoll	U of ALASKA	907-789-4579	907-789-4447
Charles H Peterson (WHOLE PACKET)	Univ. of North Carolina	(919)-726-6841	(919)-726-2426
DAVE GIBBONS	FOREST SERVICE	586-8784	586-8781
BRIAN ROSS	EPA - RPWG	271-2461	271-2467
~~ART WEINER~~	DNR - RPWG	762-2515	762-2570
Andy Hooten	UAF	(301) 564-0024	↑
Ray Highsmith	UAF	(907) 474-7836	(907) 474-5804
Ken Rice	Forest Service	278-8012	276 7178 Anchorage
John F. Karinen	NOAA/NMFS/ABL	(907) 789-6054	
Linda Comerci	USEPA	(907) 271-2461	271-2467 Anch
Richard Meganck	Corvallis EPA Lab	503 757 4600	757-4799
Jim Bodkin	USFWS, AFWRC	907 786-3451	← (907) 562-0431
Angela Doroff	USFWS / AFWRC	(907) 786-3572	← (907) 562-0431
~~Karsten Ballard~~	USEPA	271-2461	271-2467
Kim Sundberg	ADF&G	267-2374	← ~~349~~-1723
~~Mike Mitchell~~	Preston Thorgrimson	276-1969	276-1365
Bob Spies	AMS/LLLM	(425) 373-7142	373-7834
David Cantillon	NOAA/NMFS	907-789-6601	907-789-6601
Mark Brodersen	ADEC	465-2610	
John Stafford	NOAA/NMFS	907-789-6605	907-789-6608
~~[illegible]~~			

OIL SPILL RESTORATION PLANNING OFFICE

437 E Street, Suite 301 Anchorage, Alaska 99501
(907) 271-2461 FAX: (907) 271-2467

DATE 10-31-90

TO: _____

PHONE _____ FAX _____

FROM: Jackie _____

PAGES (INCLUDING COVERSHEET) 5

MEMO: Your fax should include

1. Memo from Brian Ross "Formats for submitting 1991....."
2. Format pages (3 each)

Please discard all previous fax.

Thank you for your patience!!

OIL SPILL RESTORATION PLANNING OFFICE

437 E Street, Suite 301 Anchorage, Alaska 99501
(907) 271-2461 FAX: (907) 271-2467

October 30, 1990

MEMORANDUM

SUBJECT: Formats for submitting 1991 restoration project or feasibility study proposals

FROM: Brian Ross, John Strand
Restoration Planning Work Group

TO: Principal investigators, peer reviewers, and other restoration worksession participants

Attached you will find formats to be followed when submitting proposals to this office for 1991 restoration projects, feasibility studies, or natural recovery monitoring projects. Your write-ups will be used as the basis for describing potential 1991 projects in the draft Restoration Work Plan and 1991 Restoration Program to be published in the Federal Register in late December, 1990. Because this document will be distributed specifically for public review and comment, descriptions of injuries must remain brief and general in your initial write-ups. (The Legal Team will be reviewing all descriptions prior to publication, so it is safe to err for now on the side of describing injuries in somewhat more detail, rather than less.)

Overall, we are looking for 1-2 page project descriptions at this time. These write-ups must be submitted no later than November 14 in order for them to be considered for the 1991 program. We will be asking for detailed study plans at approximately the first of the year for those proposals that the Management and Legal Teams direct us to move forward with. The detailed study plans will not be for public distribution, and should contain more specific linkages to known injuries as part of their justifications.

We recognize that the time frame for developing these proposals is short. If we can be of any assistance or if there are any questions, don't hesitate to call your RPWG member, or contact me directly at this office. We look forward to receiving your proposals!

Format :

Proposed 1991 Restoration Project Description,
Natural Recovery Monitoring Project

Title:

Lead Agency:

Principal Investigator:

Introduction:
- Background
  (Including: link to known or reasonably expected injury; importance of target resource)
- Goal and Objectives
  (Incl.: importance of continuing to monitor the indicator of injury/ongoing exposure; importance of implementing in 1991)

Methods:

Duration and Scope:

Expected Results:

Alternatives Considered:
- No Action: consequences of not implementing in 1991

Cost:

Format:

Proposed 1991 Feasibility Study Description

Title:

Lead Agency:

Principal Investigator:

Introduction:

- Background
  (Including: link to known or reasonably expected injury; importance of target resource)
- Goal and Objectives
  Incl.: likelihood of approach being applied as a full-scale restoration measure if successful; importance of implementing in 1991)

Methods:

- Ability to evaluate success of study
- Ability to reasonably determine feasibility after one year of study
- Will not interfere with cleanup activities or ongoing NRDA studies

Duration and Scope:

Expected Results:

- Applicability of approach if successful

Cost of study:

Format :

Proposed 1991 Restoration Project Description

Title:

Lead Agency:

Principal Investigator:

Introduction:
- Background
  (including: link to known injury)
- Goal and Objectives
  (Incl.: reasonable to implement considering expectations for natural recovery; importance of implementing or beginning to implement in 1991)

Methods:
- Including known technical feasibility
- Will not interfere with cleanup activities or ongoing NRDA studies

Duration and Scope:

Expected Results:
- Anticipation of net environmental benefits

Alternatives Considered:
- No Action: consequences of not implementing in 1991
- Other potential approaches to Goal and Objectives (why proposal is best approach currently available)

Cost:

3

DRAFT

437 E Street, Suite 301
Anchorage, Alaska 99501
(907) 271-2461
FAX: (907) 271-2467

Oil Spill Restoration Planning

TO: Conrad

OFFICE/PHONE:

FROM: Kirsten Ballard

DATE:

NUMBER OF PAGES (Incl. Cover):

MESSAGES:

INITIAL Draft

Not even proof-read.

COASTAL HABITAT RESTORATION WORKSHOP 10/25/90

DRAFT

CONFIDENTIAL
DRAFT

INITIAL DRAFT (not even proof-read!)

In Attendance:
Sandy Rabinowitch, DOI
Martha Fox, EPA
Stephan Bugbee, EPA
Malin Babcock, NOAA
Tom Dean, Coastal Resources Assoc.
Mike Stekoll, UA
Charles Peterson, UNC
Dave Gibbons, USFS
Brian Ross, EPA
Art Weiner, DNR
Andy Hooten, UAF
Ray Highsmith, UAF
Ken Rice, USFS
John F. Karinen, NOAA/NMFS
Linda Comerci, EPA
Richard Meganck, EPA Contractor
Jim Bodkin, USFWS
Kirsten Ballard, EPA
Kim Sundberg, ADFG
Mike Mitchell, Preston Thorgrimson
Bob Spies, AMS/UCLLM(?)
David Cantillon, NOAA/NMFS
Mark Brodersen, ADEC
John Strand, NOAA/NMFS

The Session was divided into two parts. The morning session discussed damages noted to date, the afternoon session discussed restoration proposals on the table.

FUCUS:

Mike Seckel presented the data for Mike Foster.

Fucus was studied in Herring Bay over the summer of 1990. Oiled areas in general were in worse "fucus shape" than unoiled control areas. Oiled areas include areas where residue remains and/or treatment of one sort or another took place (records are incomplete for treatment types, esp. in 1989). Observed in oiled areas were fewer plants and fewer

fertile plants. What seems to compound the recovery of the fucus in the oiled areas is the lack of shade by older plants, thereby increasing desiccation and hence survival of younger plants.

Grazers were not factored into the "recovery equation" used in 1990. It was assumed that since there were fewer grazers due to cleanup, that they would not pose a significant recovery problem for Fucus.

Two experiments were conducted for restoration of Fucus. Seeded plates were set out, and bags of Fucus were anchored to the substratum. Neither experiments were considered successful. None of the seeded plate plants survived. Few of the innoculum bags provided surviving plants. Bare surface as opposed to oily residue, was more successful.

Plants are can reproduce after about 3 years of age. Less Fucus is present in Herring Bay, and that that is present is immature, as compared to control sites.

Oil has been noted to have effects on the ability of eggs to fertilize.

CRITICAL FAUNA

15 pairs of study sites were set up in Herring Bay in 1990. The presence and absence of fauna were noted (in Fucus plots as well). Differences in the numbers of organisms in oiled vs. control plots are the results of oil. Cleaning appears to have benefited barnacles.

Areas were set up with predator excluding fences (no cover) and cages (covered). Exclosures without algae lost limpets to predation (birds?).

EELGRASS

Some dead polychetes were noted in oiled and control areas. Some infauna were noted with sub-lethal effects in the form of lesions (polychetes). Oil has been noted in sediments to 20 meter's depth in protected bays.

Less death and destruction of starfish, squid, octopi etc. was noted in 1990 as compared to 1989. Damage to eelgrass has not been noted, except in isolated cases of heavy equipment damage.

NOAA Air Water II and III

III- Caged Mussel Deployment

25 sites inside and outside of PWS were selected for study. Mussels from clean areas in southeast Alaska were deployed in cages in oiled areas. After a certain period of time, the mussels were collected and measured for hydrocarbons. 1990 data is unavailable. 1989 data showed bioaccumulation of hydrocarbons in some of the samples.

III- Hydrocarbons in Sediments

27 sites were studied in 1989 and '90. Hydrocarbons were detected in one location at 100 meters depth. 7 sites showed contamination at 20 meters. Meiofaunal and infaunal samples were taken, no data is available yet.

In a related exercise, hydrocarbons in water and mussels were studied. 20 sites were sampled in 1989, 18 sites in 1990. The results are not in.

NOAA- REMOTE SENSING TECHNIQUE

3 sites were examined using CASI airborne remote sensing imagery. This technique compares several hundred bands of spectral light which can be used to detect fucus and other algae and can be used to compare with beach transect data. All areas examined showed less algal cover than control beaches. Th images were then ground truthed. This technique offers much higher resolution than satellite imagery.. 3 dimensional models can be done with topographical and overlay.

Afternoon session-RESTORATION PORPOSALS:

Beach Ryegrass- Stoney Wright

Some areas visited would benefit from repair/planting of Beach Ryegrass. 6 sites were visited, and 3 were recommended for restoration work. Funding needs to be expanded so more sites can be visited and evaluated. The group felt that areas which were damaged under the permit process should be restored under that process (e.g. the helipad on Block Island that Exxon built). Areas damaged otherwise, should be included in the restoration.

Marshes-EPA

Natural recovery is slow in these saltwater tidal marshes, therefore restoration is beneficial. Unfortunately, NRDA studies were not performed on salt marshes and little quantitative data is available regarding damages. Less than 1% of the impacted shoreline is salt marsh, and less than half

have been damaged. The value of these few areas has not been established.

The group thought that since there was little quantitative damage data regarding marshes, the value had not been determined and the area(s) involved did not seem to justify the expense in the proposal. EPA proposed re-writing the proposal for re-submission. The detailed proposal should address and inventory damage.

Other concerns were the impact on donor marshes. Seed propagation was suggested as a feasibility study. Many seeds were collected and technology exists so that they can be propagated.

FWS expressed concern that if the marshes are re-planted, that they might create an "attractive nuisance", drawing wildlife into areas which still contain oil.

MUSSELS and SEDIMENTS-NOAA

A feasibility/monitoring study is proposed for placement of mussels on impacted beaches (on the sediment, rather than in the water of the bay) and natural recovery monitoring. More information is needed regarding damages for restoration of mussel habitat. Questions to be answered are : will a certain level of hydrocarbons inhibit recruitment; is there damage; what are the effects on spat and larvae, etc.

Concern regarding this proposal were that it too closely matches Air Water III and that it might duplicate what's already being done, and that clams might be a better indicator of hydrocarbons in the sediments since they live in the sediments. The group gave it's tentative approval so long as the study does not duplicate what is already being done, and that it should concentrate on natural recovery.

FUCUS-Mike Foster

A survey to find out what needs to be restored using CASI imaging is proposed. Growth rates, differences between oiled and control areas needs to be measured, best restoration techniques need to be assessed, and the 3 factors of fucus growth need to be examined (surface, slope, aspect).

The group seemed to favor such a study.

Air Water III-NOAA

The need to track contamination out of the environment (re-oiling) continues. Data from 1990 is not in yet (hydrocarbon levels in mussels). If hydrocarbons are found in mussels in 1990, using mussel cages to track the complete history of the distribution and fate of the oil can be done. It was pointed out that it would be important to continue evaluating sites outside of PWS. The caged mussel technique may prove extremely valuable in the "how clean is clean" debate on the "dirty dozen" beaches.

The group favored continuation of Air Water III.

Air Water II-NOAA

1989 samples, and 1990 samples are still being worked up. Oil is being found in ocean floor sediments. The fact that oil contamination is being found indicates a further pathway for oil contamination to enter the food chain. It was recommended to use ADEC's sediment traps to correlate and justify continuance (since NOAA's data has not been analyzed yet).

EELGRASS -Tom Dean

Continued monitoring of the species that use these areas should continue because of sub-lethal effects and possible impacts on Dolly Varden Char juveniles. Mr. Dean felt that overall there was little damage to the populations that use these areas and there are few feasible techniques to restore eelgrass to justify a restoration project. If monitoring can continue under restoration, (if not continued under DA), this should be done.

IN SUMMARY:

Beach Rye Grass- Cut up the proposal to restore those areas that do not fall under the permit process.

Marsh Study- Lots of concern, the proposal should be rewritten. Current damages need to be documented and marshes need to be identified for PWS. The Net Environmental Cost Benefit needs to be determined.

Eelgrass/intertidal areas- Parts need to be re-written for restoration with no overlap.

Air Water II- Continue. DEC sediment trap work needs to be worked in with no overlap.

Air Water III- Should be continued with a linkage to the "dirty dozen" beaches.

MEMORANDUM

DEPARTMENT OF NATURAL RESOURCES
OIL SPILL PROJECT OFFICE

State of Alaska

DIVISION OF LAND & WATER MANAGEMENT
SOUTHCENTRAL REGION

TO: Distribution

DATE: October 31, 1990

FILE NO:

TELEPHONE NO: 762-2515

FROM: Rick Thompson Rick
Project Manager

SUBJECT: Recreation
Restoration
Proposals

As promised, here are Art Weiner's three draft proposals for recreation restoration projects. Included in this package are: Environmental Education Program; Potable Water Quality Study: and Recreation Site Restoration/Rehabilitation.

Please review and add your comments/suggestions either directly on the proposals, or separately, and return to Art as soon as you possibly can. To be useful, your comments should be received no later than November 5, 1990. If you have questions, or wish to discuss any aspect of these proposals with Art, please do not hesitate to call. Our number is listed above.

The Oil Spill Project Office's Fax number is 762-2290.

Thank you for your prompt attention to these proposals.

Environmental Education Program

Background

The public's perception of the condition of the area affected by the *Exxon Valdez* oil spill has been determined, to a very great extent, by media reports that date from March 24, 1989 and the following summer. Much of this information is outdated and somewhat misleading leaving the viewer/reader without a clear understanding of the extent of the impact, the actual damage inflicted upon natural resources nor the outcome of cleanup activities and natural recovery processes. Consequently, there is a huge gap between the public's perception of the current condition of the affected area and the reality of the existing conditions. The ramifications of this misapprehension are both widespread and profound.

Users of the affected area and its resources must be made aware of the reality of the current situation in order to restore their confidence in the health of its fisheries and aesthetic amenities. If the prevailing perception that the affected area remains oiled and its fisheries are tainted, the repercussions to the economy of southcentral Alaska will long outlive the actual effects of the spill.

By the time the field season of 1991 is over, three years of impact surveys, damage assessment studies and cleanup activities will have been completed. Moreover, natural processes will have been at work for this period healing the damage. Thus, an enormous amount of unequivocal information will be available to document the actual condition of the affected area.

Objectives

- To restore the public's confidence in the health of the affected area.
- To provide background natural history information on the affected area.
- To present empirically objective information on the impact of the spill.
- To present a description of the cleanup activities and an unbiased evaluation of their efficacy.
- To visually depict the existing condition of the affected area.
- To present the data, in laymen's terms, that predicts the anticipated future condition of the affected area.
- To pass on "the lessons learned".

Scope of Work

The first step in this feasibility process would be to contact private sector and government producers of documentaries and interpretive programs. The rationale for these contacts would be to work up agreements for joint production of the desired products. Several of these outfits have already produced programs on the spill. The basic strategy would be to have one or more of these experienced professionals design and carry out the production of the desired products with guidance from RPWG and others most familiar with the spill and the affected environment. Organizations to be contacted would include:

1. The Discovery Channel
2. The Public Broadcast System [PBS]
3. National Public Radio [NPR]
4. NOVA
5. USFWS
6. NPS
7. ADNR Division of Parks and Outdoor Recreation
8. Environmental education consultants

Once relationships between one or more of these groups is established product details would be defined and RFP's would be worked up. The most desirable scenario would be one in which production costs of the desired products would be underwritten by the producer as a public service.

Products

Detailed descriptions and cost estimates for production of the following:

- ❑ Video that depicts:
  - a) Initial impacts,
  - b) Cleanup techniques
  - c) Existing conditions of the affected area and its resources.
- ❑ Educational curriculum package for grades 6 through 12.
- ❑ Interpretive programs at strategically located State and Federal visitor centers.
- ❑ Kiosk-type displays at:
  - a) Sport fishing access point,
  - b) Ferry terminals,
  - c) Airports.
- ❑ Brochure for dissemination to tourists through travel agencies, hotels and visitor centers.

Responsible Agency

A subgroup of RPWG should carry out this study with consulting guidance from resource agency media experts and PIO offices.

Period of Performance

One month should be necessary to make the necessary contacts and ascertain the potential for joint agreements.

Two additional months should be required to work up product design and detail and write RFP's.

Budget

The budget should include estimates of time, travel and communication costs for the RPWG subgroup to contact producers and collaborate with them on RFP particulars.

DRAFT
Feasibility Study Proposal

Potable Water Quality Study

Background

A number of recreational pursuits that take place within the affected area involve time periods ranging from hours to several days or even weeks. These types of activities include: camping, kayaking, sailing and sport fishing. Due to the size of the area and the difficulty of logistics supply from distant sources, recreationalists are often forced to utilize local sources of potable water, i.e., freshwater streams. The quality of the water within these streams is often suspect due to the possible presence of pathogens. The most common is *Giardia lamblia* a protozoan that causes an infection of the intestinal tract known as giardiasis. The protozoan can be transmitted by wild mammals and by man through cysts in fecal material that are deposited in water reservoirs. Potable water sources are also now possibly contaminated by petroleum hydrocarbons.

Although *Giardia* possibly occurred in the affected area prior to the spill, individual streams had never been surveyed for its presence. During the several seasons of cleanup, thousands of people worked on the beaches and ventured into the uplands. It is not unreasonable to assume that human fecal material was deposited in or adjacent to streams that are sources of potable water. This raises the possibility that the protozoan was introduced into these areas even by people who were non-symptomatic[1]. Once established in wild mammal populations it will undoubtable be persistent and represent a threat to recreationalists.

Objectives

- ❑ To determine feasibility of identifying potable water sources in high use recreation areas within the affected area.
- ❑ To determine feasibility of carrying out microbiological water quality analyses of potable water sources within the affected area.
- ❑ To determine whether potable water sources are affected by the presence of petroleum hydrocarbons from the EVOS.

---

1 "They are found in stools of many normal persons in the cyst form." Fuerst, Robert, 1983. Microbiology in Health and Disease, W.B. Saunders Co., Philadelphia, p. 399.

Scope of Work

1. Contact local water testing labs to determine feasibility of testing fresh water for the presence of *Giardia* and cysts both in the field and in the lab.

2. Evaluate practicality of collection and testing procedures.

3. Utilizing existing data bases, determine feasibility of identifying potable water sources in high use recreation sites within the affected area.

Period of Performance

Winter, 1991.

Budget

To be determined.

Responsible Agency

ADNR

DRAFT
Restoration Project Proposal

Recreation Site Restoration/Rehabilitation

Background

An undefined number of recreation sites in the spill impact area have been adversely affected by the oil and/or cleanup. These include camping areas, potable water sources and small boat haul outs. These sites were identified during the 1990 spring and summer assessment surveys. The observed damage to these sites includes: heavy equipment impacts to tent sites, oil in streams that are used as potable water sources, and recalcitrant deposits of oil in areas used for kayak and canoe haul outs. In some of these areas, surface oil in the form of covers and coats represent an aesthetic eyesore to users and diminish the areas' value for recreation wilderness experience. Based upon the cleanup experience of the last two seasons, it is not anticipated that these oiling and cleanup impacts will be addressed during the 1991 season.

Objectives

- To recontour/rehabilitate impacted tent sites to their historic condition.
- To remove all sources of oil from and around fresh water streams used as potable water sources.
- To remove all oil that could be transferred on to boats or camping gear.
- To remove all oil that represents an aesthetic eyesore or which diminishes the wilderness experience.
- To remove all man-made debris from high use recreation areas.

Scope of Work

1. Review digital data bases and hard copy reports to locate high use recreational sites that require restoration.

2. Survey these sites as part of the 1991 spring shoreline assessment to provide details on extent of cleanup/rehabilitation required.

3. Work up site specific restoration plans.

4. Contract out and carry out restoration.

Period of Performance

Spring/summer 1991.

Budget

- Cost of data base review and survey could be incorporated in response planning for the spring survey.

- Restoration planning should take several weeks and possibly require consultation with an engineering contractor for ground work design.

- Actual restoration time and costs estimates will require completion of the above-listed items.

Responsible Agency

ADNR

RESTORATION OF DOLLY VARDEN CHAR AND CUTTHROAT TROUT POPULATIONS IN PRINCE WILLIAM SOUND

Lead Agency: Alaska Department of Fish and Game
Principle Investigator: Kelly Hepler

Information collected by NRDA programs has documented that there were significant differences in the survival of Dolly Varden char and cutthroat trout and growth of cutthroat trout between oiled and control sites in PWS. Additionally, analysis of bile from Dolly Varden char have shown elevated levels of hydrocarbon metabolites in both Oil Year 1 and 2. A study would be warranted under restoration in order to determine long term persistence of these lethal and sub-lethal effects and to provide a greater resolution of management strategies.

Many of the field activities associated with this project could be integrated into the field programs proposed for the restoration of pink salmon stocks in PWS. This would increase the cost effectiveness of the both programs. The feasibility for this type of project is well established and the project can be readily established for the 1991 field season.

We feel that collecting the necessary data to increase the precision of the management of affected stocks is the most effective method available at the present time to enhance the recovery of char and trout in PWS and should be undertaken immediately. A greater resolution in our management approach will allow the Department to restrict the catch of fish on a site specific basis instead of enacting area wide restrictions which would greatly reduce the opportunities available to anglers. It will also be necessary to study populations of char and trout outside of impacted areas. This will allow us to possibly redirect angling effort from impacted populations to other healthier populations of fish and therefore providing alternative fishing opportunities for anglers who were displaced due to management actions taken to ameliorate impacts of the oil spill. Additionally, data collected from this program could be used to identify further restoration methods for these stocks such as identifying possible sites for the placement of fish passes or critical habitat areas that could be protected through the purchase of private inholdings or mineral rights.

The Department of Fish and Game did not have any programs on the ground in PWS before the oil spill to study the char and trout populations. Our only source of data on these stocks before the oil spill was a statewide harvest survey which provided us basic catch data. The harvest survey was expanded after the oil spill to provide a greater resolution of catch statistics. We also know through tag recoveries in 1990 that there is fishing mortality attributed to the incidental catch of char and trout in the commercial fishery although the full extent of the incidental catch is not known. These harvests plus a known mortality associated with oil have caused concern that some of the impacted stocks could be below levels that are necessary to maintain the populations on a sustained yield basis.

Proposed 1991 Restoration Project Description

Title: Prince William Sound Herring Stock Management Accuracy

Lead Agency: Alaska Department of Fish and Game

Principal Investigator(s): Evelyn Biggs, Tim Baker and Fritz Funk

Introduction: Prince William Sound adult herring spawning migration timing coincided with the Exxon Valdez spill disaster and as a result, over 40% of the spawning area was oiled before and during egg deposition. Significant sublethal effects and resulting damage was measured on herring eggs and larvae and there is evidence from data collected in 1990, as well as from historic literature, that second and third year affects are and will occur due to direct and indirect oiling of herring roe, deposited eggs, and hatched larvae. Damage resulting from 1989 and subsequent years will affect recruiting herring spawning as early as 1992 (as partially recruited 3 year olds) and beyond (as fully recruited 4 year olds and older). An extremely effective restoration tool, that is relatively low cost (since logistics are already partially in place), is accurate fisheries management. Accuracy in management enables managers to make fine-tuned adjustments in fishing quotas which could more effectively result in measurable rehabilitation for PWS herring stocks. Ecosystem damage (to every thing from mammals and birds to other species of fish and invertebrates) resulting from herring prey contamination and decline (herring being an integral and major part of the food chain biomass in the Sound) would therefore be partially rehabilitated as well.

The following goals and objectives have been identified that will add accuracy to fisheries management of Prince William Sound herring:

1) Maintain strict accuracy in the spawn deposition (ground) survey estimate which is used to estimate the total herring escapement biomass.

2) Continue an egg loss study, as the egg loss component is a direct multiplier in the spawner escapement biomass estimate model.

3) Improve biomass forecasting model with extended biometric review and analysis.

4) Stock identification and tagging study to establish and define the management unit(s) of the PWS stock.

Methods: The following methods will be employed to complete the objectives listed above:

1) The spawn deposition survey estimate is improved through increased sample size (more transects), employing third year calibrated divers, by conducting sufficient AWL sampling in all the spawn areas, and by sampling for fecundity from the AWL samples.

2) Egg loss data has been collected in 1990 in Prince William Sound and in 1982 in Togiak; similar methods can be employed for two additional seasons and analyzed to assist in fine-tuning the multiplier. In addition, a literature review would be conducted. This study would be subcontracted to the University of Alaska as a graduate student project.

3) Staff biometricians would reanalyze historic and current data to improve population models used to predict future herring stock sizes, age compositions, and recruitment. Standard fisheries management and population statistics will be employed and developed.

4) Fish will be subsampled from the regular herring AWL program in place for examination of genetic, meristic and morphologic, or otolithic differences (all stock identification methods currently being used) to help define the PWS management units. In addition a tagging program will be instigated to help describe the area utilized by the PWS stock(s) or unit(s) and define the degree of stock mixing.

Duration and Scope: The scope of project will be include all coastal areas in Prince William Sound, and the outer cape areas westward past Seward to Gore Point and eastward to Cape Suckling.

Various phases of the project will last from three to five years in duration.

Expected Results: Increased accuracy in fisheries management is expected to result in a more rapid and complete rehabilitation of damaged herring stocks and affected ecosystem components. Individual stocks or management units having been identified that may have been damaged disproportionately due to oil exposure, compared to other undamaged individual stocks, can more easily be protected from additional damage due to fishing mortality; fishing pressure can be shifted to undamaged units.

Alternatives Considered: No action. Results would include inability to conclusively identify individual stocks, that may be affected differently, losing the ability to direct fishing pressure to known, undamaged stocks. In addition, without an increase in accuracy of forecasting and quota setting, fishing pressure

could counteract other rehabilitation measures; conversely, unjustified conservative fishery management could add increased damage due to overescapement and could result in large losses to the commercial industry and fish tax dollars (net loss to the State).

Cost: For 1991 the four objective components would cost approximately:

1) $50,000

2) $40,000

3) $15,000

4) $225,000 for phase I

Total projected 1991 costs are $330,000. Cost/Benefit analysis would be relatively easy to construct for this project.

PROPOSED 1991 RESTORATION PROJECT DESCRIPTION

Title: Public Access

Lead Agency: Alaska Department of Fish and Game

Principal Investigator: Kent J. Roth

Introduction:

Prince William Sound (PWS) supports a significant recreational fishery for salmon, trout, char, and bottomfish. Additional sportfishing opportunities have been created in recent years with the enhancement of salmon in Valdez and Cordova. The 1989 oil spill impacted the native populations of fish in PWS and has increased public awareness and use of the recreational resources of PWS. While public use of access sites in PWS have been increasing in recent years, activity levels have increased dramatically as a direct result of the spill. There has been an increase in pressure placed on both impacted and nonimpacted fish stocks, increased demand and competition for parking areas, and a shortage of proper sanitation facilities on already crowded existing sites. The increased activity levels are a result of both increased awareness and recreational use by the public as well as increased use by transients working both directly and indirectly with spill cleanup and restoration programs.

The goals of the access restoration project is improve access, parking and sanitation facilities in the Cordova and Valdez areas which have resulted from the large influx of people to PWS as a result of the oil spill.

Methods:

Parking areas, access sites, and sanitation facilities would be expanded and upgraded in Cordova at Flemming Spit and in Valdez in the area near Allison Point; two areas impacted from increased awareness and activity as a result of the oil spill.

Duration and Scope:

The program would initially run from June 1, 1991 through May 30, 1992. Program completion would depend on the time frame required to obtain any permits, designs, and bids required for the program. The scope of the program will include the research, permitting, land acquisition, design, and construction of the facilities and parking areas in Cordova and Valdez.

Expected Results:

The improvements to parking and access would help relieve the problems of congestion, overcrowding, sanitation, and accessibility in Cordova and Valdez. This would help restore these fisheries back to the previous levels of a quality fishing experience for the recreational angler. In addition, a reduction of ground litter and erosion is expected.

Alternatives Considered:

No action. Not implementing this program in 1991 will result in the continued access, crowding, and sanitation problems observed at these sites during 1989 and 1990. A second alternative considered was the use of Dingall-Johnson (DJ) funds for these improvements. Although access and facility improvements at these sites were expected to be needed in the future, the oil spill has resulted in these developments being required much sooner than they would have had the spill not occurred. The appropriation of access funds from DJ monies for these programs at this time would eliminate the much needed access and development projects scheduled for other sites from the current and near-future DJ appropriations.

Cost:

No cost estimates have been formulated to date. Evaluation of project scope, engineering and design costs, and materials and labor will need to be completed before a final cost estimate can be provided.

PROPOSED 1991 RESTORATION PROJECT DESCRIPTION

Title: Public Information

Lead Agency: Alaska Department of Fish and Game

Principal Investigator: Kent J. Roth

Introduction:

Prince William Sound (PWS) supports both anadromous and resident populations of cutthroat trout and Dolly Varden char as well as stocks of demersal and pelagic rockfish. The trout in PWS are at the upper limits of their native range and populations are generally small site specific with complex migratory behavior. Many of the rockfish species are relatively stationary, long lived, and late to mature resulting in their increased susceptibility to over exploitation. Little is presently known on the numbers and species of rockfish harvested by the charter boat operators in PWS.

Fish and Shellfish Studies No. 5 and 17 have documented injury to rockfish, cutthroat trout, and Dolly Varden char in PWS as a result of the 1989 oil spill. In addition, increased awareness of fishing opportunities by sport anglers due to the increased activity and publicity in PWS as a result of the spill is expected to increase effort and harvest levels for selected stocks. Management concerns are that, due to injury from the spill, selected stocks may now be biologically depressed such that continued sport and/or commercial targeting of these species may further reduce these populations below naturally sustainable levels.

The goals of the organization and dissemination of information to the commercial and sport users in PWS is to redistribute the effort and harvest away from stocks for which there is known or anticipated biological concerns for their management. In addition to protecting these stocks, an objective of the program would include inform anglers of other fishing opportunities within PWS to allow them to continue to utilize PWS for recreational fishing.

Methods:

Stocks of biological or management concern would be presented in brochures and publications on fishing opportunities in PWS and alternative angling sites and/or species would be suggested. In addition, a logbook survey would be initiated with the charter boat fishing operators working in the major ports in areas affected by the spill to document the numbers, species, and location of rockfish harvested by their clients. No conflicts are expected with other programs or ongoing clean-up efforts as a result of this program.

Duration and Scope:

The program would run from June 1, 1991 through May 30, 1992. The scope of the program will include the research, design, printing, and dissemination

of the brochures and logbooks to anglers and supporting organizations, businesses, and charter boat operators. Data collected from the proposed rockfish and cutthrouat trout/Dolly Varden char studies would be incorporated

Expected Results:

The brochures and information dissemination will assist in redistributing effort and harvest in PWS resulting in the a reduction in pressure on selected stocks and providing protection to the selected species and stocks from over exploitation. At the same time, anglers will be provided information on the other angling opportunities available in PWS so that a diversity of continued recreational opportunities remain available. The long-term result will be the rebuilding of the selected stocks allowing the eventual return of these angling opportunities. The charter boat logbooks will assist in providing the data necessary to evaluate and protect the rockfish in PWS through and increase in the precision of management strategies.

Alternatives Considered:

No action. Not implementing this program in 1991 may result in the over exploitation of specific stocks of cutthroat trout, Dolly Varden char, and rockfish beyond the point of natural recover to pre-spill levels. A second approach to achieving the goal of stock protection is the closure of fisheries known or suspected to be injured. However, this approach would restrict angling opportunities without providing information on other available opportunities. The program proposed for 1991 would be the most cost-effective approach to protect injured stocks while maintaining recreational diversity and opportunity.

Cost:

Line 100	6 man-months at $3,000/month for research, design, and distribution	$18,000
Line 200	Travel-distribution of brochures	1,000
Line 300	Printing	4,000
Line 400	Miscellaneous supplies	600
Line 500	No expenditures anticipated	0
	TOTAL	$23,600

Proposed 1991 Restoration Project Description,
Natural Recovery Monitoring Project

Title: Prince William Sound Ecosystem Damage Affects

Lead Agency: Alaska Department of Fish and Game

Principal Investigator(s): James Brady and Evelyn Biggs

Introduction: Prince William Sound adult herring spawning migration timing coincided with the Exxon Valdez spill disaster and as a result, over 40% of the spawning area was oiled before and during egg deposition. Significant sublethal effects and resulting damage was measured on herring eggs and larvae and there is evidence from data collected in 1990, as well as from historic literature, that second and third year affects are and will occur due to direct and indirect oiling of herring roe, deposited eggs, and hatched larvae. Damage resulting from 1989 and subsequent years will affect recruiting herring spawning as early as 1992 (as partially recruited 3 year olds) and beyond (as fully recruited 4 year olds and older). Effects on herring stocks of further damage to the ecosystem, for example by upland timber harvest and log storage, are virtually unknown; these effects would compound the damage done by the spill. Therefore, it is proposed that possible damage from upland timber and log storage be examined in areas currently used for timber harvest that overlap herring spawning areas. In this way an evaluation could be made, in terms of the herring resource alone, of acquisition of upland timber and marine sanctuary creation as a restoration tool that prevents further stock damage by protecting further ecosystem damage.

The following goals and objectives have been identified that will add monitor effects of upland timber resources on herring spawn:

1) Measure rates of sedimentation, water quality, herring egg survival, and hatching success in sites selected directly adjacent to active logging areas. Compare these rates to nearby sites with comparable spawn densities that are pristine.

2) Expand the normal aerial survey program to enable daily monitoring of schools of spawning herring near timber harvest areas and document their behavior and movement.

Methods: The following methods will be employed to complete the objectives listed above:

1) Methods would be employed similar to those already utilized in the spawn deposition survey and herring egg mortality

projects that are well in place. ADFG Habitat Division data and possibly DEC water quality sampling would be incorporated to evaluate changes in the water column and ecosystem affects.

2) Standard aerial survey methods would be employed to follow and enumerate herring schools; these methods have been in place for over ten years; additional staff time and training would be required.

Duration and Scope: The scope of project will be include all coastal areas in and near Prince William Sound where timber harvest activities coincide with herring spawn. It is expected that a one year scope will be sufficient to evaluate the effects of upland use on herring spawn.

Expected Results: Knowledge of effects of upland ecosystem activity and damage will be revealed through this study. The results gained may help in evaluating upland timber resource acquisition as a restoration tool.

Alternatives Considered: No action. Effects of logging and timber storage on herring spawn will remain unknown.

Cost: For 1991 the monitoring would cost approximately $15,000.

Title: Salmon Coded-Wire Tag Studies in Prince William Sound

Lead Agency: Alaska Department of Fish and Game

Principal Investigator: Sam Sharr

Introduction:

Salmon stocks in Prince William Sound which were impacted by the Exxon Valdez Oil Spill (EVOS) are also heavily exploited in commercial, sport, and subsistence fisheries and can most effectively be restored through stock specific management practices designed to reduce exploitation on impacted stocks. The stocks in areas heavily impacted by the EVOS occur in mixed stock fisheries dominated by hatchery stocks and migrant wild stocks from unimpacted areas of the Sound. Restoration premised on stock specific management of the commercial fishery for reduced exploitation of impacted stocks will require accurate inseason estimates of the stock composition of the commercial catch by time and area.

This project is designed to provide accurate, real time, estimates of hatchery and wild stock contributions to the fisheries of PWS. The project will also provide some contribution estimates for impacted versus unimpacted wild stocks. Accurate inseason stock specific contribution estimates will enable fisheries managers to identify exploitation rates which are too high for impacted stocks and alter fishing patterns to reduce or eliminate exploitation of those stocks. The manager will also be able to identify any under exploitation of hatchery stocks or unimpacted wild stocks and direct very localized fishing effort on those stocks to harvest the surplus fish. Post season analyses of the coded-wire tagging project together with results from proposed escapement enumeration projects will provide stock specific estimates of total return and enable managers to assess the effectiveness of their stock specific management strategies.

In the absence of the improved stock specific management capabilities afforded by this project, salmon stocks in western PWS which have already badly stressed and depleted by the impacts of oil will potentially be over exploited in the commercial, sport and subsistence fisheries. Population levels may be reduced below those consistent with rapid recovery of the resource and in some instances may result in virtual elimination of impacted stocks.

Methods:

The technology and methodology for stock identification based on coded-wire tagging studies is well established for all species of salmon. The Alaska Department of Fish and Game and private non-profit aquaculture associations in PWS pioneered the use of half length coded-wire tags in pink salmon. The existing NRDA projects have greatly enlarged the scope of the pre-spill coded-wire tag projects and the proposed salmon coded-wire tag project to be used for restoration through improved, stock specific fisheries management practices is a logical extension the NRDA process.

Duration and Scope:

The restoration of impacted odd and even year pink salmon stocks may require selective management over at least two generations for each cycle

(ie. a minimum 4 years beginning in 1991). Chum and sockeye salmon require three to five years to mature and restoration will take longer for those species.

Expected Results:

Because salmon are a major vehicle for the transport of energy and nutrients from the high seas environment to the nearshore and upland ecosystems, restoration of impacted stocks will have important ramifications for all recovering plant and animal communities in those areas.

Alternatives Considered:

Failure to implement a package of programs designed to improve stock specific management capabilities may result immediate and serious exploitation of stocks already seriously stressed by the impacts of oil. Long term disastrous declines in those populations may be the result of such an option.

An alternative to no action would be to impose extremely conservative harvest strategies upon all stocks in the PWS fisheries. This would probably achieve the desired effect of providing protection for impacted stocks but could mean that a harvestable surplus of several million hatchery fish and millions of fish from unimpacted wild stocks would not be utilized. From an economic stand point this could have disastrous immediate as well as long term effects on the highly capitalized fishing industry in PWS. From a resource management point of view it could also be deleterious. For some species of salmon which rear in freshwater (ie. sockeye) the effects of allowing too many spawners in the systems utilized by unimpacted stocks could lead to serious overpopulation of available rearing area and subsequent major declines in fry populations. The effects of over escapement of unimpacted pink salmon stocks is still a hotly debated subject but it is clear that there is no biological benefit in exceeding the carrying capacity of the spawning grounds and there may be serious harmful effects such as superimposition or excessive egg deposition and subsequent oxygen starvation.

Cost:

Tagging Hatchery Stocks $250,000
Tag Recovery of Hatchery Stocks: $550,000
Tagging Wild Stocks: $200,000
Tag Recovery of Wild Stocks: $180,000
(If the proposed adult enumeration weirs are funded it makes sense to put those weirs on wild stock streams where tags were applied in 1990. In that case the weir crews could do the recovery and the wild stock recovery budget shown here could be very greatly reduced.)

Title: Development of Pink salmon Stock Separation Techniques Through the Application of Otolith Mass Marking Technology.

Principal Investigators: Larry Peltz, FRED Division; Dr. Jim Hasbrouck, FRED Division; Karen Crandall, FRED Division; Hal Geiger, Division of Comm Fisheries.

Introduction: Link to known NRDA injury, Goals and Objectives

Pink salmon populations in oil impacted areas of coastal Alaska demonstrate signs of physical exposure to oil, and populations of some small stocks may have been damaged. As such, these natural stocks may respond to rehabilitation. Managers propose to restore these stocks population numbers by allowing for increased escapement to respective streams of origin. In the process of reducing exploitation to small stocks of salmon that have been stressed, exploitation may be reduced on larger and unimpacted populations. This could create biological and economic feedbacks. Biological feedbacks could occur, in that stronger stocks may over-escape, causing decreased production. Economic feedbacks could occur, in that the harvest of some hatchery stocks may be reduced or restricted to terminal areas with reduced quality and decreased value.

The ability to separate all discrete stock components is important for management of the Pink Salmon fishery and for evaluating the consequences of specific restoration alternatives in Prince William Sound, as well as Lower Cook Inlet and Kodiak.

Methods

Existing studies in the NRDA process intend to gain a better understanding pink salmon fishery interactions. Some of the new studies proposed below could be combined with the tasks that would be continuing under the existing pink salmon damage assessment studies.

The spacial and temporal distribution of enhanced, and wild stocks in oil impacted areas will be determined through coded wire tagging in a related study. In this study, otolith marking will be tested as potential alternative to coded-wire tagging.

1. Coded-wire tagging is assumed to continue at the same locations and levels of tag application as in NRDA study #3. Additional wild stock sites may be added if deemed necessary.

2. Otolith marking will be attempted at one or more hatcheries. Catch contributions will be compared to results obtained from coded-wire tagging. The presence of naturally occurring otolith marks will be investigated at wild stock sites.

3. The use of scale pattern analysis (in this study or as part of conventional marking studies) to differentiate wild and hatchery stocks of fish may also be investigated.

4. This project would be linked with a population modeling effort which may occur as part of this study or could be contained in a related study.

Duration and Scope:

This study could commence in FY 91, and would be expected to continue for at least 3 years. Useful data for restoration could be obtained as early as the second year.

Expected Results.

Application of CWT's and associated recovery programs to enhanced and selected wild stocks will, on its own, provide new knowledge of stock composition of harvests. Thus, probability of success is close to 100 %. New quantitative marking tools (proposed in this study) are promising, and may provide reliable and affordable stock separation techniques. A breakthrough in this area is deemed likely, because of the success with this identification technique in the enhancement of sockeye salmon.

Cost of study.

Additional coordination required with other tagging and evaluation work will be required to project costs.

Title: Aerial Enumeration of Salmon Escapements in Prince William Sound

Lead Agency: Alaska Department of Fish and Game

Principal Investigator: Sam Sharr

Introduction:

Salmon stocks in Prince William Sound (PWS) which were impacted by the Exxon Valdez Oil Spill (EVOS) are also heavily exploited in commercial, sport, and subsistence fisheries can most effectively be restored through stock specific management practices designed to reduce exploitation on impacted stocks. The stocks in areas heavily impacted by the EVOS occur in mixed stock fisheries dominated by hatchery stocks and wild stocks from unaffected areas of the Sound. Restoration premised on stock specific management of the commercial fishery for reduced exploitation of impacted stocks will require accurate inseason estimates of the escapements of impacted and unimpacted wild stocks.

This project is designed to provide accurate, real time, escapement estimates for salmon stocks of Prince William Sound. Accurate inseason escapement estimates will enable fisheries managers to identify shortfalls in the numbers of fish spawning in impacted streams and impose fisheries restriction to reduce harvest rates on those stocks. The manager will also be able to identify any excesses in escapement in unimpacted stocks and direct very localized fishing effort on those stocks to harvest the surplus fish. Post season analyses of the escapement enumeration project together with results from the proposed Coded-Wire Tagging project will provide stock specific estimates of total return and enable managers to assess the effectiveness of their stock specific management strategies.

In the absence of the improved stock specific management capabilities afforded by this project, salmon stocks in western PWS which have already badly stressed and depleted by the impacts of oil will potentially be over exploited in the commercial, sport and subsistence fisheries. Population levels may be reduced below those consistent with rapid recovery of the resource and in some instances may result in virtual elimination of impacted stocks.

Methods:

The technology and methodology for escapement enumeration by using data from a systematic aerial survey program are all well established and have a long history of success in Alaska. The historic aerial survey data base for Prince William Sound is the best in Alaska and will provide important base line data for restoration efforts. An expanded aerial survey program would compliment existing NRDA projects for salmon. Aerial surveys impose no impact on the resource and would result in no impact on cleanup activities.

Scope:

The restoration of impacted odd and even year pink salmon stocks may require selective management at over an minimum of two generations for each cycle. Chum and sockeye salmon require three to five years to mature will require more time for full restoration of impacted stocks.

Expected Results:

Because salmon are a major vehicle for the transport of energy and nutrients from the high seas environment to the nearshore and upland ecosystems, restoration of impacted stocks will have important ramifications for plant and animal communities in those areas.

Alternatives Considered:

Failure to implement a package of programs designed to improve stock specific management capabilities may result immediate and serious exploitation of stocks already seriously stressed by the impacts of oil. Long term disastrous declines in those populations may be the result of such an option.

An alternative to no action would be to impose extremely conservative harvest strategies upon all stocks in the PWS fisheries. This would probably achieve the desired effect of providing protection for impacted stocks but could mean that a harvestable surplus of several million hatchery fish and fish from unimpacted wild stocks would not be utilized. From an economic stand point this could have disastrous immediate as well as long term effects on the highly capitalized fishing industry in PWS. From a resource management point of view it could also be deleterious. For some species of salmon which rear in freshwater (ie. sockeye) the effects of putting too many spawners in the systems utilized by unimpacted stocks could lead to serious overpopulation of available rearing area and subsequent major declines in fry populations and future adult returns. The effects of over escapement of unimpacted pink salmon stocks is still a hotly debated subject but it is clear that there is no biological benefit in exceeding the carrying capacity of the spawning grounds and there may be serious harmful effects such as superimposition or excessive egg deposition and subsequent oxygen starvation.

Cost:

Expansion of existing aerial survey program: $40,000

Title: Ground Enumeration of Salmon Escapements in Prince William Sound

Lead Agency: Alaska Department of Fish and Game

Principal Investigator: Sam Sharr

Introduction:

Salmon stocks in Prince William Sound which were impacted by the Exxon Valdez Oil Spill (EVOS) are also heavily exploited in commercial, sport, and subsistence fisheries can most effectively be restored through stock specific management practices designed to reduce exploitation on impacted stocks. The stocks in areas heavily impacted by the EVOS occur in mixed stock fisheries dominated by hatchery stocks and wild stocks from unaffected areas of the Sound. Restoration premised on stock specific management of the commercial fishery for reduced exploitation of impacted stocks will require accurate inseason estimates of the escapements of impacted and unimpacted wild stocks.

This project is designed to greatly improve the accuracy of real time, escapement estimates for salmon stocks of Prince William Sound. The project will allow fisheries managers to adjust escapement estimates based on and aerial survey program by correlating the aerial counts with counts from a systematic ground survey program on a subset of the same streams. Ground surveys are considerably more accurate than aerial surveys but cannot be done with nearly the frequency nor can they be done as efficiently on as many streams. They are not a replacement for aerial counts but are an important means of checking and calibrating aerial counts. Accurate inseason escapement estimates will enable fisheries managers to identify shortfalls in the numbers of fish spawning in impacted streams and impose fisheries restriction to reduce harvest rates on those stocks. The manager will also be able to identify any excesses in escapement in unimpacted stocks and direct very localized fishing effort on those stocks to harvest the surplus fish. Post season analyses of the escapement enumeration project together with results from the proposed Coded-Wire Tagging project will provide stock specific estimates of total return and enable managers to assess the effectiveness of their stock specific management strategies.

In the absence of the improved stock specific management capabilities afforded by this project, salmon stocks in western PWS which have already badly stressed and depleted by the impacts of oil will potentially be over exploited in the commercial, sport and subsistence fisheries. Population levels may be reduced below those consistent with rapid recovery of the resource and in some instances may result in virtual elimination of impacted stocks.

Methods:

The technology and methodology for escapement enumeration by coupling ground counts with an extensive systematic aerial survey program are well established and have a long history of success in Alaska. The historic aerial and ground survey data base for Prince William Sound is the best in Alaska and will provide important base line data for restoration efforts. The existing NRDA projects greatly enlarged the scope of the pre-spill escapement enumeration projects and the proposed salmon escapement

enumeration projects to be used for restoration through improved fisheries management are a logical extension the NRDA process.

Duration and Scope:

The restoration of impacted odd and even year pink salmon stocks may require selective management over several generations and may take eight to ten years. Species such as chum and sockeye salmon require three to five years to mature and this longer life history will require as long or longer for full restoration of impacted stocks.

Expected Results:

Because salmon are a major vehicle for the transport of energy and nutrients from the high seas environment to the nearshore and upland ecosystems, restoration of impacted stocks will have important ramifications for plant and animal communities in those areas.

Alternatives Considered:

Failure to implement a package of programs designed to improve stock specific management capabilities may result immediate and serious exploitation of stocks already seriously stressed by the impacts of oil. Long term disastrous declines in those populations may be the result of such an option.

An alternative to no action would be to impose extremely conservative harvest strategies upon all stocks in the PWS fisheries. This would probably achieve the desired effect of providing protection for impacted stocks but could mean that a harvestable surplus of several million hatchery fish and fish from unimpacted wild stocks would not be utilized. From an economic stand point this could have disastrous immediate as well as long term effects on the highly capitalized fishing industry in PWS. From a resource management point of view it could also be deleterious. For some species of salmon which rear in freshwater (ie. sockeye) the effects of putting too many spawners in the systems utilized by unimpacted stocks could lead to serious overpopulation of available rearing area and subsequent major declines in fry populations and future adult returns. The effects of over escapement of unimpacted pink salmon stocks is still a hotly debated subject but it is clear that there is no biological benefit in exceeding the carrying capacity of the spawning grounds and there may be serious harmful effects such as superimposition or excessive egg deposition and subsequent oxygen starvation.

Cost:

Ground Survey Program: $280,000

Title: Weir Enumeration of Salmon Escapements in Prince William Sound

Lead Agency: Alaska Department of Fish and Game

Principal Investigator: Sam Sharr

Introduction:

Salmon stocks in Prince William Sound which were impacted by the Exxon Valdez Oil Spill (EVOS) are also heavily exploited in commercial, sport, and subsistence fisheries can most effectively be restored through stock specific management practices designed to reduce exploitation on impacted stocks. The stocks in areas heavily impacted by the EVOS occur in mixed stock fisheries dominated by hatchery stocks and wild stocks from unaffected areas of the Sound. Restoration premised on stock specific management of the commercial fishery for reduced exploitation of impacted stocks will require accurate inseason estimates of the escapements of impacted and unimpacted wild stocks.

This project is designed to provide accurate, real time, escapement estimates for salmon stocks of Prince William Sound. Accurate inseason escapement estimates will enable fisheries managers to identify shortfalls in the numbers of fish spawning in impacted streams and impose fisheries restriction to reduce harvest rates on those stocks. The manager will also be able to identify any excesses in escapement in unimpacted stocks and direct very localized fishing effort on those stocks to harvest the surplus fish. Post season analyses of the escapement enumeration project together with results from the proposed Coded-Wire Tagging project will provide stock specific estimates of total return and enable managers to assess the effectiveness of their stock specific management strategies.

In the absence of the improved stock specific management capabilities afforded by this project, salmon stocks in western PWS which have already badly stressed and depleted by the impacts of oil will potentially be over exploited in the commercial, sport and subsistence fisheries. Population levels may be reduced below those consistent with rapid recovery of the resource and in some instances may result in virtual elimination of impacted stocks.

Methods:

The method of enumerating the total escapement for individual streams by counting the fish as they pass through a weir (fence) in route to upstream spawning areas is widely used and well established. Weirs are very accurate but cannot feasibly be installed on the hundreds of salmon streams in PWS. On the other hand a few weirs on selected streams can play an extremely important validation and calibration role in aerial escapement estimating procedures used for 211 streams in PWS.

In addition to providing accurate counts on selected streams weired streams can also be used for gathering very important instream residence time (stream life) data for salmon. Stream life is typically estimated through tagging studies on spawning fish and requires extensive daily surveys of the spawning grounds. Weired streams are logical candidates for such studies. Accurate estimates of stream life are critical to any escapement estimate based on systematic aerial observations because of the

necessity to account for duplicate observations between surveys. Improved estimates of stream residence time can also be applied to historic data. The historic aerial and ground survey data base for Prince William Sound is the best in Alaska and will provide important base line data for restoration efforts when complimented by the improved stream life estimates. The existing NRDA projects greatly enlarged the scope of the pre-spill escapement enumeration projects. This proposed salmon escapement enumeration project to be used for restoration through improved fisheries management is a logical extension the NRDA process. The weirs in this project can also compliment NRDA Study #3 by acting as a means for recovering wild stock fish bearing coded-wire tags applied in the spring of 1990.

Duration and Scope:

The restoration of impacted odd and even year pink salmon stocks will require selective management a minimum of two generations for each cycle. Chum and sockeye salmon require three to five years to mature and will require longer for full restoration of impacted stocks.

Expected Results:

Because salmon are a major vehicle for the transport of energy and nutrients from the high seas environment to the nearshore and upland ecosystems, restoration of impacted stocks will have important ramifications for plant and animal communities in those areas.

Alternatives Considered:

Failure to implement a package of programs designed to improve stock specific management capabilities may result immediate and serious exploitation of stocks already seriously stressed by the impacts of oil. Long term disastrous declines in those populations may be the result of such an option.

An alternative to no action would be to impose extremely conservative harvest strategies upon all stocks in the PWS fisheries. This would probably achieve the desired effect of providing protection for impacted stocks but could mean that a harvestable surplus of several million hatchery fish and fish from unimpacted wild stocks would not be utilized. From an economic stand point this could have disastrous immediate as well as long term effects on the highly capitalized fishing industry in PWS. From a resource management point of view it could also be deleterious. For some species of salmon which rear in freshwater (ie. sockeye) the effects of putting too many spawners in the systems utilized by unimpacted stocks could lead to serious overpopulation of available rearing area and subsequent major declines in fry populations and future adult returns. The effects of over escapement of unimpacted pink salmon stocks is still a hotly debated subject but it is clear that there is no biological benefit in exceeding the carrying capacity of the spawning grounds and there may be serious harmful effects such as superimposition or excessive egg deposition and subsequent oxygen starvation.

Cost:

Weir Program and Stream Life Studies: $230,000

Title: Salmon Otolith Marking Studies in Prince William Sound

Lead Agency: Alaska Department of Fish and Game

Principal Investigator: Sam Sharr

Introduction:

Salmon stocks in Prince William Sound which were impacted by the Exxon Valdez Oil Spill (EVOS) are also heavily exploited in commercial, sport, and subsistence fisheries and can most effectively be restored through stock specific management practices designed to reduce exploitation on impacted stocks. The stocks in areas heavily impacted by the EVOS occur in mixed stock fisheries dominated by hatchery stocks and wild stocks from unaffected areas of the Sound. Restoration premised on stock specific management of the commercial fishery for reduced exploitation of impacted stocks will require accurate inseason estimates of the escapements of impacted and unimpacted wild stocks.

This project is designed to test the feasibility of using thermal or stress marks on otoliths to identify stocks in the fisheries of PWS and make time and area specific catch contribution estimates for those stocks. Otolith marking has a proven track record as a stock identification tool and has advantages over existing coded-wire tag stock identification procedures because it allows researchers to effectively tag every fish in the population instead of a relatively small random subsample. Otolith marking has never been done on the scale which will be necessary in PWS. This project will begin by testing the feasibility of applying thermal marks on the otoliths of fish in the massive hatchery releases in PWS. If otolith marking can be adapted to the large scale of the hatchery releases in PWS it may provide much more accurate and reliable option to existing the existing coded-wire tag technology. This program will also investigate that stressed wild stocks (ie. oil impacted) may also exhibit unique otolith patterns. If this is so, the technique may also be used to estimate contribution rates of oil impacted stocks to fisheries. Accurate inseason stock specific contribution estimates will enable fisheries managers to identify exploitation rates which are too high for impacted stocks and alter fishing patterns to reduce or eliminate exploitation of those stocks. The manager will also be able to identify any under exploitation of hatchery stocks or unimpacted wild stocks and direct very localized fishing effort on those stocks to harvest the surplus fish. Post season analyses of the coded-wire tagging project together with results from proposed escapement enumeration projects will provide stock specific estimates of total return and enable managers to assess the effectiveness of their stock specific management strategies.

In the absence of the improved stock specific management capabilities afforded by this project, salmon stocks in western PWS which have already badly stressed and depleted by the impacts of oil will potentially be over exploited in the commercial, sport and subsistence fisheries. Population levels may be reduced below those consistent with rapid recovery of the resource and in some instances may result in virtual elimination of impacted stocks.

Methods:

The technology and methodology for stock identification based on otolith marking studies is well established on a smaller scale for hatchery stocks of salmon in Washington and the technique has been used for sockeye salmon in Alaska. The Alaska Department of Fish and Game and PWS area aquaculture associations have begun testing the procedure for hatchery stocks of pink salmon. The existing NRDA projects have greatly enlarged the scope of the pre-spill coded-wire tag projects. If feasible otolith marking could provide a reliable, accurate and more cost effective alternative to expensive CWT technology and would be a logical extension of CWT studies as part of restoration through improved fisheries management.

Duration and Scope:

The restoration of impacted odd and even year pink salmon stocks will require selective management over a minimum of two generations for each cycle. Chum and sockeye salmon require three to five years to mature and will require more time for full restoration of impacted stocks.

Expected Results:

Because salmon are a major vehicle for the transport of energy and nutrients from the high seas environment to the nearshore and upland ecosystems, restoration of impacted stocks will have important ramifications for plant and animal communities in those areas.

Alternatives Considered:

Failure to implement a package of programs designed to improve stock specific management capabilities may result immediate and serious exploitation of stocks already seriously stressed by the impacts of oil. Long term disastrous declines in those populations may be the result of such an option.

An alternative to no action would be to impose extremely conservative harvest strategies upon all stocks in the PWS fisheries. This would probably achieve the desired effect of providing protection for impacted stocks but could mean that a harvestable surplus of several million hatchery fish and fish from unimpacted wild stocks would not be utilized. From an economic stand point this could have disastrous immediate as well as long term effects on the highly capitalized fishing industry in PWS. From a resource management point of view it could also be deleterious. For some species of salmon which rear in freshwater (ie. sockeye) the effects of putting too many spawners in the systems utilized by unimpacted stocks could lead to serious overpopulation of available rearing area and subsequent major declines in fry populations and future adult returns. The effects of over escapement of unimpacted pink salmon stocks is still a hotly debated subject but it is clear that there is no biological benefit in exceeding the carrying capacity of the spawning grounds and there may be serious deleterious effects such as superimposition or excessive egg deposition and subsequent oxygen starvation.

RESTORATION EFFORTS FOR MONITORING CONTAMINATION AND SUB-LETHAL EFFECT ON ROCKFISH AND SHALLOW REEF HABITAT IN THE AREAS AFFECTED BY THE EXXON VALDEZ OILSPILL

We know that there were lethal effects to rockfish, as shown by the recovery of dead and dying rockfish immediately after the spill, and that there was some level of sub-lethal effects, based on bile samples taken later in 1989. The results of the 1990 field studies will help in determining the long term persistence of the sub-lethal effects and to what extent the shallow reef habitats and food sources were affected. If the presence of hydrocarbons is detected in the tissue, food samples, or sediment samples collected in 1990; or the histopathological examination or enzyme activity indicates persistent sub-lethal effects of the oil, then studies similar to Fish/Shellfish Study 17 conducted in 1990 would be warranted under restoration in order to determine the long term persistence of these sub-lethal effects.

Studies should be directed toward collecting samples to determine the continued presence of hydrocarbons in the reef habitats through analysis of sediments, sessile organisms and food organisms. In addition samples of rockfish tissue should be collected for analysis for hydrocarbons and histopathological examinations to determine the presence of long term sub-lethal effects. The 1989 and 1990 studies were limited in geographic scope to Prince William Sound and the lower Kenai Peninsula. This study could encompass the entire geographic area impacted by the oil spill.

RESTORATION OF ROCKFISH AND OTHER BOTTOM FISH POPULATIONS IN PRINCE WILLIAM SOUND

Lead Agency: Alaska Department of Fish Game
Principal Investigator: Kelly Hepler

The lethal and sub-lethal effects of the oil spill have added a major factor in the potential decline of rockfish, an increasingly popular sport and commercial fish. Additionally, there were sub-lethal effects to pollack and possible sub-lethal effects to select prey species. Nearshore areas which are used as nursery grounds for some species of bottom fish were also impacted by the oil spill. The results of the 1990 field studies will help in determining the long term persistence of the sub-lethal effects and to what extent the shallow reef habitats and food sources were affected.

Current information indicate that select stocks of bottom fish, including rockfish, are depressed. Rockfish are long lived fish (with maximum age approaching 100 years) and exhibit relatively slow recruitment making restoration a long term, very difficult process; for lost or damaged resources. This project should logically transition toward continued evaluation of stocks of rockfish with emphasis on stock status and population dynamics of these fish.

There is a paucity of population dynamics and catch information for these stocks and there is an immediate need to collect these data in order improve the precision of the management of these stocks. An examination of historical commercial fisheries data coupled with a port sampling program evaluating sport and commercial harvests would provide a database of harvest levels and the basic age and size composition information for these fish providing a basis for assessing sustainable yields of these stocks. In addition, the age structure data would permit cohort analysis to determine if specific age groups are weak. It is also necessary to assess the distribution and abundance of these stocks within the area affected by the spill in order to manage these stocks geographically. A stock inventory program could be initiated to determine the distribution and species composition of these fish. This would be accomplished by divers, hook and line or trawl type surveys. Diving techniques are preferred in order to avoid mortality associated with destructive sampling techniques in areas of low stock density. The data collected during this project would also allow us to possibly redirect fishing effort and catch from impacted populations to other healthier populations of fish and therefore provide alternative harvest opportunities for fishermen who were displaced due to management actions taken to ameliorate impacts of the oil spill. These studies will also serve to expand our database in preparation for future spills.

Proposed 1991 Feasibility Study Description

Title: Herring Spawn Substrate and Herring Egg Transplant

Lead Agency: Alaska Department of Fish and Game

Principal Investigator(s): Evelyn Biggs

Introduction: Prince William Sound adult herring spawning migration timing coincided with the Exxon Valdez spill disaster and as a result, over 40% of the spawning area was oiled before and during egg deposition. Significant sublethal effects and resulting damage was measured on herring eggs and larvae and there is evidence from data collected in 1990, as well as from historic literature, that second and third year affects are and will occur due to direct and indirect oiling of herring roe, deposited eggs, and hatched larvae. Damage resulting from 1989 and subsequent years will affect recruiting herring spawning as early as 1992 (as partially recruited 3 year olds) and beyond (as fully recruited 4 year olds and older). Enhancing and increasing natural larval production from a spawning area would be one approach to mitigating any damage to the Prince William Sound stock(s).

A direct restoration tool that deserves evaluation is transplantation of spawning substrate (certain kelp species or artificial substrates) and transplantation of loose egg windrows transported to shore following storms (normally these eggs die unless resubmerged in seawater). There is evidence that herring egg survival and hatching success is variable with the type of kelp substrate utilized for spawning and with the number of egg layers deposited. Generally, species with large interstitial spaces (e.g. hair kelps and fern kelps) promote better oxygen exchange and spacing between eggs, which enhances survival of the eggs and hatching success, that other species of leafy kelps (such as the Laminarians). In addition, the greater the number of egg layers deposited, the poorer the total egg survival, fertilization rate, and hatching success; therefore increasing spawning substrate in an area being utilized by spawners should decrease overall egg density per area unit.

In some years when storms coincide with egg incubation, wave action transports a significant (at times measurable in tons) amount of herring eggs pulled loose from spawning substrate to the upper limit of the high tide line. Normally, these eggs remain exposed to predation and air, rotting in place. Canadians measured a degree of success in transplanting these eggs to underutilized areas (Hay and Marliance, 1988); success was measured in observed larvae hatching from the resubmerged eggs and measuring remaining egg mortality.

The following goals and objectives have been identified that will test the feasibility of this type of technique to assist in stock rehabilitation:

1) Test the feasibility of spawn substrate transplant in a single area, typically utilized by spawners and representing the oiled spawning areas; success will be measured by comparing egg survival, hatching success, and larval densities from a transplant area versus a control area with similar total egg density.

2) Test the survival and success of hatch in transplanted, windrowed eggs moved to specially designed containment trays submerged in nearshore areas.

Methods: The following methods will be employed to complete the objectives listed above:

1) Sites will be selected in Rocky Bay and western beaches of northern Montague Island; 3 control and 3 test sites will be identified; hair kelps, other species of red kelps, and possibly artificial substrates will be cut from areas south on Montague and reanchored nearshore the test sites; after spawning the sites will be surveyed, egg densities measured, and they will be monitored every 4-5 days until hatch; egg survival and % hatch will be measured from each monitor period and after hatch, larval trawls (designed after sampling devices used by Finnish researchers) will be employed to measure larval density.

2) After storm events in areas near those sites listed above, egg left on the beach will be carefully shovelled to holding trays, transported to skiff, kept moist by periodically spraying with seawater, and deposited in two meter square small mesh trays suspended one to two meters from the surface. When the kelp transplant sites are checked, suspended trays will be sampled for egg survival, % hatch, and after hatch, total eggs remaining will be measured, revealing overall success.

Duration and Scope: The scope of project will be include the northern and western portions of Montague Island; the time frame is April to mid-May, 1991. The project will last for one year; feasibility will be analyzed by the fall of 1991.

Expected Results: Exact cost versus benefit are unknown at this time, but can hopefully be formulated once the success of the venture is measured. The feasibility study will measure the level of enhancement and increase in productivity possible with this kind of venture.

Alternatives Considered: None were proposed that seemed feasible without a considerable amount of expense and exploratory

research (i.e. a herring hatchery).

Cost: For 1991, both study objectives could be completed at a cost of approximately $40,000.

Literature Cited:

Hay, D.E. and J.B. Marliave. 1988. Transplanting Pacific herring eggs in British Columbia: a stocking experiment. AFS Symposium 5:49-59.

FWS Restoration Feasibility Proposals as of 10/19/90

Birds

1. Identification and protection of important bald eagle habitats in the Exxon Valdez oil spill area.

2. Delineation and protection of prey resources for bald eagles in the Exxon Valdez oil spill area.

3. Reduction of potential sources of disturbance for bald eagles in the Exxon Valdez oil spill area.

4. Long-term population monitoring for bald eagles in the Exxon Valdez oil spill area.

5. Effects of intertidal restoration on black oystercatchers.

6. Removal of introduced animals on selected colonial seabird nesting islands (modified from initial submission).

7. Identification of upland habitats used by wildlife, particularly the marbled murrelet, affected by the Exxon Valdez oil spill.

8. Temporal and spatial differences in food habits of black-legged kittiwakes, pigeon guillemots and marbled murrelets in Prince William Sound.

* 9. Population status and reproductive success of pigeon guillemots in Prince William Sound.

* 10. Population status and reproductive success of arctic terns in Prince William Sound.

* 11. Population status and reproductive success of mew gulls in Prince William Sound.

* 12. Reproductive success of black-legged kittiwakes in Prince William Sound.

* 13. Reproductive success of marbled murrelets in Prince William Sound.

* 14. Identify, characterize and rank colonial seabird nesting, foraging and wintering habitats that need protection, either through purchase or legislation.

* 15. Identify marbled murrelet nesting habitat that needs protection, either through purchase or legislation.

* 16. Designate Prince William Sound as Marine Sanctuary, Estuarine Reserve or Critical Habitat area.

* 17. Educate tourists, tour operations and commercial fishing industry in seabird conservation, protection and viewing etiquette.

* 18. Determine the importance or the subsistence harvest of birds to Alaska Natives in Prince William Sound, Kenai Peninsula and Kodiak Island.

19. 1991 PWS Harlequin Duck Restoration Study

20. Recolonization & Restoration of Murre Colonies

Marine Mammals - Sea Otters

not included

1. Determination of key sea otter prey species in western Prince William Sound for enhancement of restored or non-contaminated sea otter habitat.

2. Consumption of contaminated prey by sea otters in Prince William Sound.

3. Variation in effects of oil exposure among sea otters living in areas affected by the Exxon Valdez oil spill.

4. Determination of sea otter foraging depths in western Prince William Sound for population and habitat restoration.

Birds and Marine Mammals

1. Population monitoring of marine birds and mammals in the Exxon Valdez oil spill area.

2. Aerial surveys of birds and marine mammals

3. Development of a conceptual ecosystem model for Prince William Sound.

4. Determine distribution, relative abundance and spatial and temporal variability of fish, foraging birds and mammals.

* Study description not available.

COASTAL HABITAT RECOVERY PROGRAM

TITLE: Monitoring recovery of intertidal seaweeds using remote sensing.

PRINCIPAL INVESTIGATOR: Kimbal A. Sundberg, Alaska Department of Fish and Game.

INTRODUCTION AND PURPOSE: Damage assessment studies including the Coastal Habitat Injury Assessment (CHIA) have documented injury to intertidal seaweeds, primarily *Fucus* resulting from the oil spill and subsequent clean up activities. Injuries have been most prevalent in the upper two meters of tidal elevation where persistent oiling and the majority of clean up activities have occurred. Injuries have resulted in significant bare patches in the intertidal zone which are devoid or sparsely populated with algae and associated invertebrates. Intertidal seaweeds are a key component of coastal habitats, providing basic food and shelter for invertebrates and fishes, substrate for herring spawning, and food for deer. Recovery of coastal habitats to the pre-spill condition will depend, in large part, on the recovery of intertidal seaweeds. Recovery rates for intertidal seaweeds in the spill area are not known but it is thought that they will be slow, particularly on sites that are stressed by additional factors including persistent oiling, desiccation, and seasonal ice.

Remote sensing techniques with high spatial and spectral resolution can provide a cost effective means to quantify and monitor bare patches and the recovery of intertidal seaweeds in the spill area. The Compact Airborne Spectrographic Imager (CASI) is a state-of-the-art multispectral scanner designed for applications which require very fine spatial resolution and high spectral selectivity. Tests in 1990 using the CASI in Prince William Sound successfully delineated the distribution of intertidal seaweeds and measured reductions in algal cover at three pairs of oiled and control CHIA study sites. The purpose of this study is to quantify and monitor the distribution and abundance of intertidal seaweeds in the spill area using remote sensing to support the injury assessment studies and to determine rates of recovery.

METHODS: Monitoring will occur at CHIA study sites which are classified as exposed rocky and sheltered rocky habitats. In addition, those sites classified as coarse textured habitat which support significant intertidal algae will also be included. Approximately 40 sites (paired oiled and control sites) will be monitored throughout the spill area, distributed approximately as follows: PWS-20, CIK-8, and KAP-12. A sufficient number of randomly selected CHIA sites will be included to allow statistically robust inferences to be made about other spill affected shorelines.

A digital terrain map (DTM) will be prepared for each site with elevation contours of 1 ft. plus-or-minus 0.5 ft. The DTM will be

prepared using 1:1,200 stereo-pair airphotos obtained for each site, and standard photogrametric modeling techniques. CASI images will be obtained during April-May when *Fucus* growth is at a maximum and red algae are easiest to identify. Both the DTM and CASI images will be registered to ground control markers which will be placed at permanent monuments (metal tags) which currently mark measured transects at CHIA sites. Both DTM and CASI images will be obtained during minus tide series, whenever possible. CASI images will be field processed and ground truthed to classify pixels and to verify their validity. Based on 1990 tests, we expect to achieve a pixel resolution of approximately 0.5 square meters.

The CASI images will be overlaid on the DTM using a raster-based GIS image processing and modeling software (ERDAS) to derive percent cover, distribution, and abundance estimates. This GIS software will work with the ArcInfo GIS software used under Technical Services Study Number 3 to support the Coastal Habitat program. Seaweeds will be classified and mapped at the lowest achievable taxonomic level.

DURATION AND SCOPE: CASI images will be acquired annually until recovery is complete.

EXPECTED RESULTS: This study will produce precise annual measurements of percent cover, distribution and abundance of intertidal seaweeds at oiled and unoiled shorelines. This information will be used to determine duration of injury (loss of services) and recovery rates.

ALTERNATIVES CONSIDERED:
NO ACTION - The measurements of seaweed cover are derived from statistical extrapolation of a limited number of CHIA quadrats.
CASI W/O DTM - Measurements of are limited to two dimensions. This is less precise than three dimensional modeling and generally under estimates total surface area.

COSTS: Costs for acquiring the DTM and image processing hardware/ software are one-time expenses. Monitoring in subsequent years will be limited to the costs of acquiring and processing CASI data.

Line Item		Costs($ thousands)
100	Personnel	38.7
200	Travel	4.0
300	Contractual	
	DTM and control	100.0
	CASI	150.0
	Aircraft	40.0
	UA-SE(ground truth)	21.2
400	Supplies	4.0
500	Equipment	
	Sun Workstation/ERDAS	55.0
	TOTAL	**412.9**

DRAFT

PROPOSED 1991 RESTORATION PROJECT DESCRIPTION
NATURAL RECOVERY MONITORING PROJECT

Title: Long - Term Monitoring of Marine Mammals Affected by the Exxon Valdez Oil Spill.

Lead Agency: NOAA, National Marine Mammal Lab

Principal Investigator: Tom Loughlin
Marilyn Dahlheim

Introduction:

Evidence is available suggesting that the oil spill and associated response activities have affected marine mammals in PWS and contiguous waters; particularly killer whales. Other cetaceans as well as pinnipeds may also have been affected. Some species such as Dall porpoise and harbor porpoise, while likely impacted, have not been studied under the inter-agency damage assessment program.

Methods:

Boat/aerial survey to determine:
1) seasonal abundance
2) reproductive success
3) other

Target species:
1) killer whales
2) harbor porpoise
3) Dall porpoise
4) Steller sea lion (proposed to be coordinated with ADF&G)
5) harbor seal (proposed to be coordinated with ADF&G)

Duration and Scope: 5 years

Expected Results:

This study will determine the status and trends for affected populations and specifically determine estimated times to recovery. It will also provide resource managers with recommendations regarding management strategies to ensure full recovery of affected species.

Alternatives Considered:

This information is vital to monitoring recovery of affected species, particularly killer whales. Not developing this information could delay recovery of the animals.

Cost: ?

Confidential

Fish/Shellfish Summary

Known Damage:

Salmon -

Pink salmon:

- egg and alevin in spawning gravel (>50% increase in mortality in oiled streams).
- stock work still inconclusive - decreased returns for hatchery (AFK) - survival rate less than 1/2 that for Ester Is. hatchery (usually similar).
- reduced growth of juveniles in oiled areas.
- increased HC body burden in '89; not in '90 samples.
- increased MFO induction in fish from oiled areas.
- significant fin erosion in '90 samples (chum?)

Herring

- morphologic & cytogenetic effects shown from eggs exposed to oil, but raised in lab (effects in '89 and '90; more drastic in '89).
- egg mortality surveys - survival decreased in oiled area ('89 and '90, less drastic in '90).
-

Dolly Varden

- heavy concentration HC in bile (highest of any fish)
- >30% increase in mortality in oiled areas.

Cutthroat Trout

- >30% increase in mortality in oiled areas.
- significant difference in growth.

Rockfish

- first finfish to show mortality due to oil.
- increased HC in bile (showed up in other bottom fish also - flatfish, halibut, pollock).

Nearshore fish

- (field info available in 2 weeks)
- increased levels of blood parasites in fish from oiled areas (153/ml vs 0.3/ml in control, 5/ml in lab exposed fish).
- increased rate of respiration in fish from oiled areas.
- increased MFO levels in oiled areas (DEC study, not NRDA).

Clam use

- highest level of HC in any organism (subsistence use shut down in Windy Bay).

Subsistence/Recreational uses

Probable Damage:

Ground fish

- some sublethal effects (data not yet available).

Clams

Shrimp

- increase in % spot shrimp with dead eggs in oiled areas (in '89; '90 data not in).

1991 Potential Projects:

Public Information (sport fish)

Habitat Rehabilitation

Identify multi-beneficial acquisition/protection

Access (sport fish)

Restoration survey (prioritization)

Continued exposure/sublethal effects monitoring

1990 Recommendations:

Salmon/herring escapement

Salmon/herring tagging

Port sampling

Otolith marking

Herring spawning area catalogue

COPY

Stan's notes

1 November 1990

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09:15

Introductions

Ross opened with comments about accelerated process that includes actual restoration in addition to feasibility-type studies

Senner talked about process: report to Management Team, including recommendations, which then must be cleared by Trustee Council, Washington Policy, and State of Alaska. Before document goes public, various policy and other considerations will be factored in.

Reports on damages

Bob: Coastal Habitats -- general insult to intertidal/nearshore flora and fauna, but recovery rate is unclear

Stan:birds -- clearest damages for murres, oystercatchers, harlequins, bald eagles, and birds in the freezers

Chuck: Fish -- clearest damages for pink salmon eggs/juveniles; herring eggs/juveniles; dolly varden/cutthroats, including adults

John/Carol: mammals -- definite impacts: sea otter and harbor seal; possible damage -- killer whales

Sandy: recreation -- discussion about not having NRDA data; does it matter? Must be evidence of injury/lost use, and it is stronger if it is quantitative; no NRDA data on recreation, but lots of anecodotal information. Likely be criticism if recreation not addressed to some degree.

Judy Bittner: archaeological
-two studies: one on radiocarbon dating (contract let last week) and the other is a field assessment survey;
-indications of impacts from clean-up workers; Exxon surveys missed some sites; increased knowledged leading to looting, etc.
-contamination creates data problems, but also may inhibit to learn other types of information (e.g., soil profiles)
-disruption of Native lifestyles

13:30

Policy Issues

Restoration versus NRDA projects/Monitoring/Reimbursability
-Freedman--if you have a restoration program, including monitoring, for a resource for which there is no injury, it won't be reimbursable
-Senner--bird group distinguished between long-term monitoring programs, which might be most important post settlement, from monitoring recovery of damaged resources for which monitoring might lead to opportunity to done restoration work

Documentation by NRDA versus other sources
-some documentation is key, but it need not be from NRDA
-Feds (Wash Policy Group) hope to release NRDA data in December, but Susan doesn't think that they are aware of all the barriers to doing that

Prioritization
-not RPWG role to determine that fish are more important than birds, for example; need to advance proposals necessary to address damages, largely without regard to cost
-concern about making clear to the public that putting a lot of ideas out in a public document could build the expectation that all the projects will be done

Consolidation
-

Cost sharing
-don't know where the money is coming from
-less money coming for NRDA studies, with or without accelerated restoration program

Approach where lack of consensus
-cannot get bogged down debating some intractable issues; may simply have to buck them up the line

Factors/criteria
-concern about duration of projects: will projects that require multiple years have strikes against them?
-questions about geographic scope: in reality, 1991 projects will be in spill area or directly connected to damaged resources
-question of existing management activities and what is justified for funding under restoration? Birds and archaeology are to be monitored anyway.
Nicoll--increased management must be justified by direct need to increase effort to restore injured resources.
-affects/conflicts with NRDA and clean-up activities: Bittner--spotty compliance with historic preservation law.
-need for studies to determine ecological requirements as well as perhaps to look at it from the other end, which is the ecosystem as a whole
-question about applicability of NEPA: Fox--there are real concerns; Nicoll--Justice is looking into it.

Judy Bittner: Archaeology studies/project

Protection
- -protection from vandalism
  - -education about law, value of resources, etc. (Rest)
  - -enforcement and surveillance (Rest)
  - -stewardship, monitoring (ties in w/KANA project) (Rest)
  - -erosion control (Rest)

Data Collection
- -excavation (Rest 1 site; Study 9 sites)
- -inventory of artifact collections that came from spill area (study)

Education
- -popular publications describing cultural history/resources (Rest)
- -oral history of spill effects on village life (Rest)
- -traditional skills, loss of (Rest)
  - -recording "how things were done"; this was disrupted

questions:
- -is inventory project needed in 1991?
- -can law enforcement be increased in 1991?
- -is traditional skills project related to damage assessment?
- -is popular public. project needed in 1991? Should it wait until more information is in.
- -how does excavation project relate to existing NRDA study

2 November

four categories of conclusions (projects and studies):

(A) looks good, we think we can recommend it, write it up
(B) possibly good for 1991, but need more information
(C) work is needed but may be more appropriate as an NRDA study
(D) maybe sometime, but does not meet criteria for 1991; cannot recommend now

Recreation program:

(1) Sport fish improvement (defer to fish section)

(2) Marine debris
- (a) trash removal
  - -linkage to damage? Oil and debris are problem for recreationists and individual marine wildlife
  - Category B: documentation of displacement
- (b) garbage removal
  - -Category D: no immediate link to damage

(3) Education Program Category A, if targeted to recreation

users

(a) interpretive plan

(b) multimedia - video, brochures, etc.

(c) life histories - interpretive information

(4) (a) recreation site restoration Category A-B-C
attempt should be to bill as response
permits on FS land may require restoration to previous land contour

(b) drinking water safety Category D
check water on high quality sites in concert with above

(5) replacement of cabins, etc. Category B
what is nature of damage at specific sites? Caused by clean up; not ready to put new cabins at new sites.

(6) recreational user survey Category B/C
economics studies may cover much of this

(7) management plans
review/rewrite all or sections; probably premature to talk about rewrites at this stage
Category D

but need Phase II of current land status study
Category A

(8) acquisition (defer)

Archaeology

(1) Protection of resources (related to vandalism)

education Category A, if specific sites known
enforcement "
stewardship (enhance KANA program) "

erosion control (at least 5 sites) Category A
needs to interrelate with NRDA field survey
Coastal habitat beach rye project

(2) Data Collection
Excavation Category A
again need to coordinate with NRDA field survey

Inventory of artificat Category D
not in 1991 - no argument for

(3) Education

traditional skills - Category D
popular publications -
Category A, but pick up as component under education
oral history - Category D

Fish and Shellfish

(1) Natural Recovery Monitoring (John)
(a) exposure of juvenile salmon to hydrocarbon contam.
(b) recovery of epibenthic prey populations for juvenile salmon
(c) exposure of groundfish/shellfish to hydrocarbon contamination (sublethal effects included)

all of the above: Category A/C natural recovery monitoring (exposure) fish/shellfish, coastal habitat, etc. (Bob, Chuck, Carol, John)

(2) Restoration
(a) Herring Protection: supplements what is done under damage assessment, but if NRDA project continues, this will be lower priority at this time. Category A/C
(b) Sportfish restoration: Category A (pick up under general education).
(c) Sportfish public access: Category D: Premature until there is overall understanding of restoration program and interrelationships among proposed measures
(d) spawning channel (Piggot Bay), reconstruction of Harrison Creek diversion, and Chalmers River chum reintroduction - Category B

(3) Feasibility/Technical Support
(a) Herring stock ID: Category A
(b) Coded wire tagging: Category A
(c) spawner protection: supplements aerial survey for escapement; the expands existing nonNRDA program; responds to need for intensive post-spill management
(d) PIT tagging: Category A
(e) herring egg transplant: transplant substrate and windrowed herring eggs - Category A
(f) otolith marking - Category A
(g) clam transplant - Category D; wait for more info on damages
(h) rockfish transplant - Category B/D

(4) Monitoring
(a) Dolly Varden (part of hydrocarbon): Category A/C
(b) Rock Fish (ditto) Category: A/C
(c) Herring logging effects: Category D

(5) Monitoring
(a) Herring logging effect: Category D (?)

(6) Sport Fishing

a. Access acquistion: Category D
b. Artificial Reefs: Category D
c. Trout Stream rehabilitation: Category B
d. Coho habitat improvemenet: Category B

Marine Mammals

Sea Otters - Lisa Rotterman

Damage documented, new damage continues to occur. Further damage can be avoided by protecting habitat.

Proposals-see handout

(1) Identification and prioritaization of sea otter critical habitat areas by monitoring adult females and young with radion transmitters: Category__

(2) Monitor population recovery: Category __
a.evaluating physical conditions of pups
b.aerial survey of recolonization
c.evaluation of movement and survival of females and weanlings

(3) Determine certain life history information through monitoring of adult and weanling females: Category __

James Bodkin

(4) Assessment of the effects of, and recovery from the EVOS on the Western Prince William Sound sea otter population (has 7 component studies)
a) population assessment
b) foraging
c) blood
d) tissue toxicology
e) mortality
g) prey selection
h) habitat determination

(defer until peer review later in November; need to make request of Management Team to make peer meeting possible--do next week).

(5) aerial/boat survey proposed by NMFS
(6) aerial/boat survey proposed by USFWS (both birds and mammals)

(above two perhaps combined in one package)

(7) Kathy Frost proposal for harbor seal research

(discuss at marine mammal synthesis meeting in Seattle on 6-7 November)

In Summary:

DAMAGES

1) Selected User Decline
   perception of impacts

2) Loss of Wilderness Values
   a) perception of the public/misinformation
   b) loss of characteristics

3) Potential business thawarted
   a) loss of revenue
      i) local business
      ii) user/permit fees
   b)Restricted Opportunity

4) Loss of natural values
5) Increased pressure in other areas
   a) management problems shift
   b) diversion of users/impacts
   c) Charter/tour service increase

6) Loss of services to Public due to cancelation of existing programs (lost opportunity), possible loss of appropriated funds.

Discussion followed regarding these damages and what types of restoration projects/technical support projects/feasibility studies could be considered. The following list of proposals was generated: (agencies in parentheses indicated that they would try to draw up a proposal by November 15 for consideration into the FR notice)

3

Sport Fish Improvement *(it was agreed that many of these projects would be covered under the Fish/shellfish program)*
- Access acquisition
- Artificial Reefs
- Trout Stream Rehabilitate
- Coho habitat improvement

Marine Litter Pick-up *(USFS, KEFJ Nat. Park)*
- Trash Removal (in untreated areas where Exxon did not remove trash)
- Garbage Barge

Education Program (psychological restoration) *(DNR)*
- Interpretive plan
- Multi-media "campaign"
- Natural History/Environments' response to stress
- Displays/park signs
- Recreational opportunities

Direct Restoration *(DNR)*
- Site Restoration/Rehabilitation
- New site survey
- Water Quality Survey (no giardia in PWS before spill, is this still the case?)

Replacement of Displaced Resources *(USFS)*
- Cabin Construction
- Trail Construction
- Boat Moorings

Survey of Recreation user perceptions *(KEFJ)*

4

MEMORANDUM OF CALL

Previous editions usable

TO: Brian

☐ YOU WERE CALLED BY– ☐ YOU WERE VISITED BY–

Pete Nogel

OF (Organization) Chugach. Corp.

☑ PLEASE PHONE ☐ FTS ☐ AUTOVON

☐ WILL CALL AGAIN ☐ IS WAITING TO SEE YOU

☐ RETURNED YOUR CALL ☐ WISHES AN APPOINTMENT

MESSAGE

He wanted you to have fax
so we sent it on to you
at CACI.

RECEIVED BY	DATE	TIME
JC	11/1	

63-110 NSN 7540-00-634-4018 STANDARD FORM 63 (Rev. 8-81)
Prescribed by GSA
FPMR (41 CFR) 101—11.6

☆ GPO : 1986 0 - 157-353

CHUGACH ALASKA CORPORATION
CHUGACH ALASKA BUILDING
3000 'A' STREET, SUITE 400
ANCHORAGE, ALASKA 99503-4086

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11/1/90		(907) 563-8402

SENDER: Peter C. Nagel, Director

DEPARTMENT: Land & Natural Resources

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TO:

RECIPIENT	FAX NUMBER
Brian Ross	271-2467

COMPANY: EPA

DEPARTMENT:

CITY: Anch

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MESSAGE:

CHUGACH ALASKA CORPORATION

November 1, 1990

Mr. Brian Ross, Team Leader
Oil Spill Restoration Planning
Restoration Planning Office
437 E Street, Suite 301
Anchorage, Alaska 99501

Dear Mr. Ross:

Thank you, Stan Senner and Russ Messerole for meeting with Chugach Alaska Corporation recently to update us on the status of the restoration planning process. This is to provide your team with CAC's input on the matter.

To begin, it is appropriate to remember the words of our Chairman, Edgar Blatchford, spoken at your Symposium last spring; "The [restoration] plan must include cultural and economic aspects such as fishing, logging and tourism industries - it must be a balanced approach." And again, "As we look into the twenty-first century, ...Chugach is a small corporation organized for profit, but [having] a moral and social responsibility to protect its cultural history."

The implementation of the Exxon Valdez Oil Spill Restoration Plan has tremendous potential to influence the quality of life for the residents of the "oil spill zone", Chugach Native region, Prince William Sound and lower Kenai Penninsula well into the twenty-first century. These comments are offered to assure that the Plan improves that quality of life by including community, economic and cultural programs.

Please note that the Chugach Heritage Foundation can provide cultural resource protection services to the CERCLA Trustee's for sites on federal or state lands. As you may already know, Chugach has already completed damage assessments on numerous sites and is negotiating directly with

Chugach Alaska Building 3000 'A' Street, Suite 400 Anchorage, AK 99503-4086
(907) 563-8866 Telex 981224 Fax (907) 563-8402

Exxon on settling damage claims for cultural resources on Native lands proposing a program involving site monitoring, education and salvage. It makes imminent sense for the Trustees to engage the services of a Native American organization already mobilizing to address the restoration of these resources.

Enhancing response to future oil spills or other disasters in Prince William Sound is a very important role which the restoration fund could play. By assisting the construction of a twenty-four hour, 365 day, automobile road to Whittier, the public sector would significantly improve the agency/industry response capability currently being developed. Even more significant to the road's construction, however, would be the improved opportunities it will provide for restoring recreation, commercial and subsistence fisheries and other industries in Prince William Sound and its communities.

The restoration plan should pay substantial attention to improving community waste facilities in the oil impact zone. Maintaining and improving water quality is a key factor in restoring the biotic community of Prince William Sound. As the communities of Prince William Sound experience accelerated growth for various reasons in the wake of the spill, their waste handling capacities will be stretched to the breaking point. The restoration fund should be used to subsidize the construction of community waste facilities and thereby enhance the opportunities which the various communities can offer the public for natural resource use such as fish and wildlife, recreation and interpretation.

Concerning your notice that certain Chugach Alaska Corporation shoreline at KN136 is being considered for limited, "research-type" restoration work in 1991, we await a draft proposal for the work before we can decide firmly whether or not to permit such work. Based on the advice of one of the Chugach Oil Spill Task Force's response experts, the company is generally opposed to actual restoration work taking place on this shoreline until several years of natural scouring and possible subsequent man-powered treatment has occurred.

Finally, Chugach Alaska Corporation is reluctant to reveal its development plans but is not necessarily opposed to any given proposal to purchase certain rights to certain of its lands including its subsurface estate beneath

village corporation lands. If approached indiscriminately, however, the immature condition of the various natural resource inventories and values, would render any discussion of such a use of the restoration fund both premature and counter-productive to the growth of a multi-faceted economy in the oil spill impact zone. CAC will review again its holdings and development plans for any areas deemed sensitive by the Restoration Planning Office.

In closing, thank you for your time and consideration. Our Chairman's words again hit the mark; "[T]he Chugach people will remain....I have hope the Chugach people will be heard, because economic opportunities must be generated in areas where Natives live....Support our efforts to defend our traditional properties....Treat us as legitimate and equal partners."

As always, we are available to meet with you at your convenience to facilitate your goals.

Sincerely,

John Black
Chugach Oil Spill Task Force

c: Chenega Corporation
English Bay Corporation
Eyak Corporation
Port Graham Corporation
Tatitlek Corporation

Privileged

MEMORANDUM
FROM
TO: Martha Fox
EPA office of Regional Counsel

Format :

Proposed 1991 Restoration Project Description

11-2-90 Suggested changes from CA Fish & Game

Title:

Lead Agency:

Principal Investigator:

Introduction:
- Background
  (including: link to known injury)
- Goal and Objectives
  (Incl.: reasonable to implement considering expectations for natural recovery; importance of implementing or beginning to implement in 1991)

Methods:
- Including known technical feasibility
- Will not interfere with cleanup activities or ongoing NRDA studies

Duration and Scope:

Expected Results:
- Anticipation of net environmental benefits

Alternatives Considered:
- No Action: consequences of not implementing in 1991
- Other potential approaches to Goal and Objectives (why proposal is best approach currently available)

Cost:

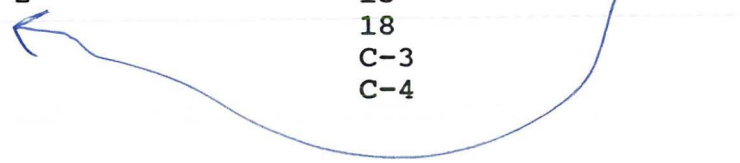
NRDA Results

Definite damage: murres, oystercatchers, harlequins, eagles, birds in the freezers

Probable damage: murrelets, guillemots, kittiwakes, loons

Types of Studies on USFWS List

Restoration	Monitoring	Technical Support	Feasibility
3	4	1	5
6	9	2	C-1
16	10	7	
17	12	8	
	13	14	
	C-2	15	
		18	
		C-3	
		C-4	



10/30/90 Bird Castration Meeting

Name	Affiliation	Phone	Fax (if known)
Linda Comeria	USEPA	(907) 271-2461	(907) 271-2467
Sandy Rabinowitch	Dept. Interior	907 257-2653	907 257-2510
Kaye Bowden	Colo. State Uni.	303 491 5077	303 491-7895
Alex Kholsein	USFWS	907-786-3523	562-2297
John Pratt	USFWS	907 786-3549	"
DAVID / RONS	"	786-3376	"
KENT WOLL	USFWS	786-3503	562-2297
Robert Hunter	ADF&G	424-3215	424-3505
MARTHA FOX	EPA	206 442-1497	
JAMES PATTEN	ADF&G	907-344-0541 ext 376	
KIM NELSON	OREGON STATE UNIV.	(503)737-1962	(503)737-3590
Dan Roby	Southern Illinois Univ.	(618) 536-7766	
Carol [illegible]	USFWS	786-3520	907-786-335
JOHN WRIGHT	ADF&G	456-5156	
Mary Anne Bishop	CRDI, USFS	1-424-7212	1-424-7214
Keith Schlentner	Corvallis Dist USFS	424-7661	"
Kathy Kuletz	USFWS	(517)-786-3453	
TOM ROTHE	ADF&G	267-2206	344-7914

10-31

John Strand
Brian Ross
Steve Buzbee
Bob Leedy

11-1-90 Restn Synthesis mtg 2

- Also, disruption felt by natives over their lifestyle (culture) as well as their heritage (artifacts, etc. - above).

Thinks N Pac. Rim taking oral histories, etc, to get at contemporary cultural impacts.

—Lunch—

"Issues" —

"Factors" —

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DEPARTMENT: Land & Natural Resources

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Brian Ross	271-2467

COMPANY: EPA

DEPARTMENT:

CITY: Anch

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John Black
Chugach Oil Spill Task Force

c: Chenega Corporation
English Bay Corporation
Eyak Corporation
Port Graham Corporation
Tatitlek Corporation

11-1-90

NRDA Results

Definite damage: murres, oystercatchers, harlequins, eagles, birds in the freezers

Probable damage: murrelets, guillemots, kittiwakes, loons

CONFIDENTIAL

Recreation

In Summary:

DAMAGES

1) Selected User Decline
   perception of impacts

2) Loss of Wilderness Values
   a) perception of the public/misinformation
   b) loss of characteristics

3) Potential business thawarted
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      ii) user/permit fees
   b)Restricted Opportunity

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5) Increased pressure in other areas
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- Recreational opportunities

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- New site survey
- Water Quality Survey (no giardia in PWS before spill, is this still the case?)

Replacement of Displaced Resources *(USFS)*
- Cabin Construction
- Trail Construction
- Boat Moorings

Survey of Recreation user perceptions *(KEFJ)*

4

Restoration Synthesis Meeting:
Proposed 1991 Restoration Program

November 1-2, 1990
Simpson Bldg., Anchorage

DRAFT AGENDA

Thursday, Nov. 1

09:00	Introductions, purpose of meeting	Senner/Ross
09:15	Basis for 1991 Restoration Program: overview of injuries presented at RPWG/PI/PR work sessions	Senner/Ross/Strand Rabinowitch/ Meacham/Spies
10:30	Break	
10:45	Summary: RPWG approach to developing 1991 Restoration Program (incl. discussion of issues list, attached)	Senner/Ross
12:00	Lunch	
13:00	Discussion of agency proposals for 1991 restoration projects	Senner/Ross/Strand Rabinowitch
14:45	Break	
15:00	Discussion of agency proposals for 1991 restoration projects, continued	Senner/Ross/Strand Rabinowitch
17:00	End of day 1	

Restoration Synthesis Meeting:
Proposed 1991 Restoration Program

November 1-2, 1990
Simpson Bldg., Anchorage

DRAFT AGENDA

Friday, Nov. 2

08:30	Discussion of agency proposals for 1991 feasibility studies	Senner/Ross/Strand Rabinowitch
10:00	Break	
10:15	Discussion of agency proposals for 1991 restoration monitoring projects	Senner/Rabinowitch, Strand/Meacham
12:00	Lunch	
13:00	Synthesis discussion: recommendations for 1991 Restoration Program	Senner/Ross
14:30	Break	
14:45	Synthesis discussion, continued	Senner/Ross
16:00	December FR report outline revisions	Ross
16:30	Adjourn	

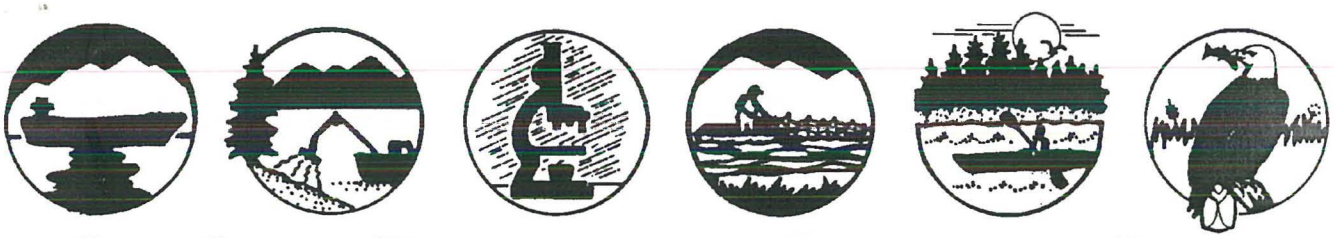
Restoration Synthesis Meeting:
Proposed 1991 Restoration Program

November 1-2, 1990
Simpson Bldg., Anchorage

RPWG ISSUES FOR DEVELOPMENT OF 1991 RESTORATION PROGRAM

Presented below is a preliminary list of issues relating to RPWG's development of the draft Restoration Work Plan and 1991 Restoration Program. It is proposed that RPWG's approach to addressing these issues be articulated to the Management Team as soon as possible so that any misconceptions can be addressed before the first draft of the document is presented to the Management Team on November 28, 1990.

- Definition of Restoration projects versus NRDA projects ("factors")
- Role of natural recovery monitoring in the 1991 Restoration Program
- Likelihood of reimbursement for 1991 restoration projects
- Identification of injuries via NRDA studies versus other sources
- Prioritization of projects (not RPWG role if projects meet "factors")
- Consolidation of projects
- Cost sharing among agencies
- Approach where lack of consensus (elevate to Management Team, etc.)



OIL SPILL RESTORATION PLANNING OFFICE

437 E Street, Suite 301 Anchorage, Alaska 99501
(907) 271-2461 FAX: (907) 271-2467

October 30, 1990

MEMORANDUM

SUBJECT: Formats for submitting 1991 restoration project or feasibility study proposals

FROM: Brian Ross, John Strand
Restoration Planning Work Group

TO: Principal investigators, peer reviewers, and other restoration worksession participants

Attached you will find formats to be followed when submitting proposals to this office for 1991 restoration projects, feasibility studies, or natural recovery monitoring projects. Your write-ups will be used as the basis for describing potential 1991 projects in the draft Restoration Work Plan and 1991 Restoration Program to be published in the Federal Register in late December, 1990. Because this document will be distributed specifically for public review and comment, descriptions of injuries must remain brief and general in your initial write-ups. (The Legal Team will be reviewing all descriptions prior to publication, so it is safe to err for now on the side of describing injuries in somewhat more detail, rather than less.)

Overall, we are looking for 1-2 page project descriptions at this time. These write-ups must be submitted no later than November 14 in order for them to be considered for the 1991 program. We will be asking for detailed study plans at approximately the first of the year for those proposals that the Management and Legal Teams direct us to move forward with. The detailed study plans will not be for public distribution, and should contain more specific linkages to known injuries as part of their justifications.

We recognize that the time frame for developing these proposals is short. If we can be of any assistance or if there are any questions, don't hesitate to call your RPWG member, or contact me directly at this office. We look forward to receiving your proposals!

Format :

Proposed 1991 Restoration Project Description

Title:

Lead Agency:

Principal Investigator:

Introduction:
- Background
  (including: link to known injury)
- Goal and Objectives
  (Incl.: reasonable to implement considering expectations for natural recovery; importance of implementing or beginning to implement in 1991)

Methods:
- Including known technical feasibility
- Will not interfere with cleanup activities or ongoing NRDA studies

Duration and Scope:

Expected Results:
- Anticipation of net environmental benefits

Alternatives Considered:
- No Action: consequences of not implementing in 1991
- Other potential approaches to Goal and Objectives (why proposal is best approach currently available)

Cost:

Format:
Proposed 1991 Feasibility Study Description

Title:

Lead Agency:

Principal Investigator:

Introduction:
- Background
  (Including: link to known or reasonably expected injury; importance of target resource)
- Goal and Objectives
  Incl.: likelihood of approach being applied as a full-scale restoration measure if successful; importance of implementing in 1991)

Methods:
- Ability to evaluate success of study
- Ability to reasonably determine feasibility after one year of study
- Will not interfere with cleanup activities or ongoing NRDA studies

Duration and Scope:

Expected Results:
- Applicability of approach if successful

Cost of study:

Format :

Proposed 1991 Restoration Project Description,
Natural Recovery Monitoring Project

Title:

Lead Agency:

Principal Investigator:

Introduction:
- Background
  (Including: link to known or reasonably expected injury; importance of target resource)
- Goal and Objectives
  (Incl.: importance of continuing to monitor the indicator of injury/ongoing exposure; importance of implementing in 1991)

Methods:

Duration and Scope:

Expected Results:

Alternatives Considered:
- No Action: consequences of not implementing in 1991

Cost:

DRAFT

1991 Restoration Projects -
Factors to be considered in proposing projects

Agencies have decided to consider appropriate restoration projects for implementation in 1991. This is not contingent on whether any restoration funds become available in the immediate future from the responsible party. Proposed projects will be those that are technically feasible and can be implemented in the 1991 field season. Recovery of an injured resource being the primary goal, projects should also provide, either directly or indirectly, a net environmental benefit. Potential projects will include those that will mitigate known or documented damages and also any actions which will mitigate other sources of environmental disturbance (immediate threats) interfering with the natural recovery of injured resources. Finally, neither the timing nor the magnitude of any potential settlement for damages should be considered when proposing candidate projects. Factors to be considered include:

1) addresses known NRDA damage (including intrinsic values); must be restoration of damage resulting from the spill.

2) known technical feasibility.

3) reasonable to implement considering the expectations for natural recovery.

4) importance of implementing in 1991; examples include:
   - ability to implement project in 1991
   - addresses an existing damage which would likely continue to cause impacts;
   - addresses the threat of additional (cumulative) impacts which, if eliminated, would allow a quicker recovery of an injured resource;
   - should be implemented immediately by the agencies even if funds from the responsible party are not yet available.

5) net environmental benefit expected.

6) benefits ecosystem/multiple species.

7) reasonable duration of project (multi-year o.k.); results you expect from the project and ability to evaluate and submit results in a reasonable period of time.

8) geographic scope (should not be restricted to PWS, unless that is the only area that damage may be effectively addressed at this time).

9) cost of implementation.

10) extent to which something will be done anyway through routine agency management activities (e.g. restoration funds should not go towards maintenance of USCG navigation lights or ADFG normal fisheries management, etc.).

11) any project should not interfere with cleanup activities or NRDA studies/projects.

DRAFT

1991 Feasibility Studies -
Factors to be considered in proposing studies

Proposed projects should reflect the need to determine technical feasibility or environmental benefit of candidate restoration approaches or techniques (i.e., those potential restoration projects specifically related to a damaged resource which, if technically feasible, have the likelihood of being realistically considered/implemented as a restoration measure). Besides technical feasibility, projects may also address information necessary to confirm the benefits or enable the implementation of a potential technique otherwise feasible. For example, one of the 1990 studies provided necessary information to confirm the use of upland forested areas as habitat for marbled murrelets and harlequin ducks. Factors to be considered include:

1) must be restoration of damage resulting from the spill; injury documentation; link to NRDA (including intrinsic values).

2) likelihood of project ultimately being proposed as a full-scale restoration measure.

3) probability of successful study.

4) ecological importance of target resource.

5) ability to evaluate success and document ecological value of project.

6) cost of feasibility study.

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Recreational Resources

In Summary:

DAMAGES

1) Selected User Decline
   perception of impacts

2) Loss of legislated Wilderness Values
   a) perception of the public/misinformation
   b) loss of characteristics/qualities, reqd by legislation

3) ~~Potential business thawarted~~ Govt Revenues
   a) loss of revenue
      i) local business
      ii) user/permit fees
   b)Restricted Opportunity

4) Loss of natural values
5) Increased pressure in other areas (Displacement)
   a) management problems shift
   b) diversion of users/impacts
   c) Charter/tour service increase

6) Loss of other services to Public due to cancelation of existing programs (lost opportunity), possible loss of appropriated funds.

Discussion followed regarding these damages and what types of restoration projects/technical support projects/feasibility studies could be considered. The following list of proposals was generated: (agencies in parentheses indicated that they would try to draw up a proposal by November 15 for consideration into the FR notice)

3

Sport Fish Improvement *(it was agreed that many of these projects would be covered under the Fish/shellfish program)*
- Access acquisition
- Artificial Reefs
- Trout Stream Rehabilitate
- Coho habitat improvement

Marine Litter Pick-up *(USFS, KEFJ Nat. Park)*
- Trash Removal (in untreated areas where Exxon did not remove trash)
- Garbage Barge

Education Program (psychological restoration) *(DNR)*
- Interpretive plan
- Multi-media "campaign"
- Natural History/Environments' response to stress
- Displays/park signs
- Recreational opportunities

Direct Restoration *(DNR)*
- Site Restoration/Rehabilitation
- New site survey
- Water Quality Survey (no giardia in PWS before spill, is this still the case?)

Replacement of Displaced Resources *(USFS)*
- Cabin Construction
- Trail Construction
- Boat Moorings

Survey of Recreation user perceptions *(KEFJ)*

4

NRDA Results

Definite damage: murres, oystercatchers, harlequins, eagles, birds in the freezers

Probable damage: murrelets, guillemots, kittiwakes, loons

Types of Studies on USFWS List

Restoration	Monitoring	Technical Support	Feasibility
3	4	1	5
6	9	2	~~C-1~~
16	10	7	murres - vocalizn/decoys
17	12	8	
	13	14	
	C-2	15	
	C-1	18	
		C-3	
		C-4	
		Harlequins	

NRDA Results

Definite damage:	murres, oystercatchers, harlequins, eagles, birds in the freezers
Probable damage:	murrelets, guillemots, kittiwakes, loons

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Fish/Shellfish Summary

Known Damage:

Salmon -

Pink salmon:

- egg and alevin in spawning gravel (>50% increase in mortality in oiled streams).
- stock work still inconclusive - decreased returns for hatchery (AFK) - survival rate less than 1/2 that for Ester Is. hatchery (usually similar).
- reduced growth of juveniles in oiled areas.
- increased HC body burden in '89; not in '90 samples.
- increased MFO induction in fish from oiled areas.
- significant fin erosion in '90 samples (chum?)

Herring

- morphologic & cytogenetic effects shown from eggs exposed to oil, but raised in lab (effects in '89 and '90; more drastic in '89).
- egg mortality surveys - survival decreased in oiled area ('89 and '90, less drastic in '90).
-

Dolly Varden

- heavy concentration HC in bile (highest of any fish)
- >30% increase in mortality in oiled areas.

Cutthroat Trout

- >30% increase in mortality in oiled areas.
- significant difference in growth.

Rockfish

- first finfish to show mortality due to oil.
- increased HC in bile (showed up in other bottom fish also - flatfish, halibut, pollock).

Nearshore fish

- (field info available in 2 weeks)
- increased levels of blood parasites in fish from oiled areas (153/ml vs 0.3/ml in control, 5/ml in lab exposed fish).
- increased rate of respiration in fish from oiled areas.
- increased MFO levels in oiled areas (DEC study, not NRDA).

Clam use

- highest level of HC in any organism (subsistence use shut down in Windy Bay).

Subsistence/Recreational uses

Probable Damage:

Ground fish

- some sublethal effects (data not yet available).

Clams

Shrimp

- increase in % spot shrimp with dead eggs in oiled areas (in '89; '90 data not in).

1991 Potential Projects:

Public Information (sport fish)

Habitat Rehabilitation

Identify multi-beneficial acquisition/protection

Access (sport fish)

Restoration survey (prioritization)

Continued exposure/sublethal effects monitoring

1990 Recommendations:

Salmon/herring escapement

Salmon/herring tagging

Port sampling

Otolith marking

Herring spawning area catalogue

OIL SPILL RESTORATION PLANNING OFFICE

437 E Street, Suite 301 Anchorage, Alaska 99501
(907) 271-2461 FAX: (907) 271-2467

October 19, 1991

MEMORANDUM

SUBJECT: Restoration Work Sessions with PIs, PRs, and Senior Scientist

FROM: Brian D. Ross Brian D. Ross
Restoration Planning Work Group

TO: Management Team, Legal Team

The Restoration Planning Work Group has organized a series of work sessions with the Senior Scientist, selected Peer Reviewers and Principal Investigators to be held October 25 - 31, 1990, at the Simpson Building in Anchorage. The purpose of this series of work sessions is to identify candidate restoration projects that can be considered for implementation in 1991, as well as to identify any need to conduct further feasibility studies on promising restoration technologies or approaches. Following the individual work sessions, RPWG will hold a synthesis meeting on November 1 - 2 with the Senior Scientist and representatives of the Legal Team to determine the overall suite of projects that are most appropriate to include in the December 28 Federal Register document ("draft Restoration Work Plan and 1991 Restoration Program"). A schedule of the meeting dates and the lists of participants invited to the Coastal Habitat, Fish/Shellfish, and Mammals sessions, is attached for your reference. (Participant lists for theBird and Recreational Resources sessions should be available early next week.) Of course participation by the Management Team or other members of the Legal Team, is welcomed at any of these meetings.

In order to focus the work sessions, RPWG has developed draft lists of factors to be considered by the participants in discussing possible restoration projects and feasibility studies. These lists, intended to help guide discussions only, have been sent to the invitees and are also attached for your information. As you will notice, a primary factor for 1991 projects is a clear tie to injury.

This series of work sessions is critical to our ability to produce a scientifically credible document for publication in the Federal Register on the schedule we have been given. We look forward to frank and productive discussions so that we may proceed with development of the best possible proposals for 1991.

(ATTACHMENTS)

RPWG

Proposed Meeting Schedule

Meeting	Date	RPWG Organizer
Coastal Habitat/Intertidal	Oct 25	Dave
Recreation	Oct 26	Sandy, Art
Fish/Shellfish	Oct 26	Brian, John
Birds	Oct 30/31	Stan
Marine Mammals	Oct 31	John, Carol
RPWG Synthesis	Nov 1/2	All members

Invited Participants - Restoration Work Sessions

October 25, 1990 Coastal Habitat

NAME	AFFILIATION	PHONE	FAX
Roy Nowlin	ADFG	267-2136	522-3148
Ray Highsmith	UA/FBX	474-7836	474-7204
Andy Hooten	UA/FBX	474-7836	474-7204
John Karinen	NOAA/Juneau	789-6054	789-6094
Josh Schimmel	UA/FBX	474-7682	474-6967
Kim Sundberg	ADFG/Anchorage	267-2334	349-1723
Steve Jewett	UA/FBX	474-7840	474-7204
Don Boesch	UM/Maryland	(301) 228-9250	228-3843
Charles Peterson	UNC/N.Carolina	(919) 726-6841	962-8330
Jeep Rice	NOAA/Juneau	789-6020	789-6094
Mike Foster	USJSU/Calif.	(408) 755-8658	753-2826
Hal Kibby/Rich M.	EPA/ORD/Corvallis	(503) 420-4625	420-4799

Invited Participants - Restoration Work Sessions

October 26, 1990 Fish/Shellfish

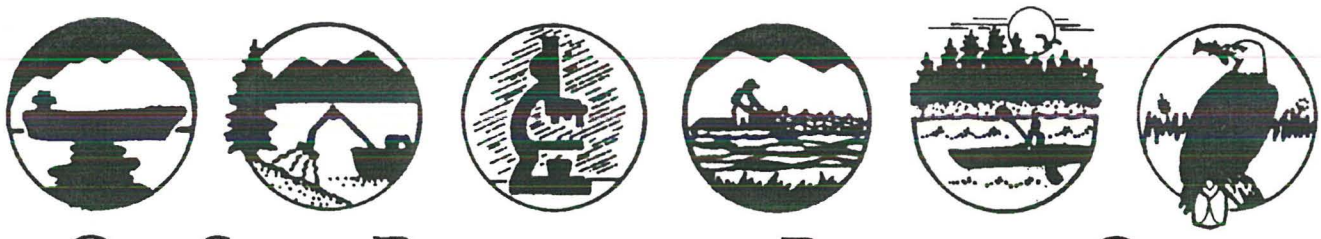
NAME	AFFILIATION	PHONE	FAX
Jeff Short	NMFS/Juneau	789-6600	789-6608
Pat Rounds	NMFS/Juneau	789-6600	789-6608
Alex Wertheimer	NMFS/Juneau	789-6040	789-6094
Evan Haynes	NMFS/Juneau	789-6600	789-6608
Charles O'Clair	NMFS/Juneau	789-6016	789-6094
Usha Varanasi	NMFS/Seattle	442-7737	442-2359
Dave Irons	USFWS/Anch	786-3396	562-2297
Will Barber	UA/FBX	474-7177	474-7204
Phil Mundy	CRIFC/Portland	(503) 238-0667	255-4228
Jeff Hartman	ADFG/FRED/Juneau	465-4160	465-4168
Doug McBride	ADFG/Sport/Anch	267-2227	522-1413
Doug Eggers	ADFG/Comm./Juneau	465-4210	465-2604
James Fall	ADFG/Subst./Anch	267-2359	349-1723
Sam Sharr	ADFG/Comm./Cordova	424-3212	424-3235
Kelly Hepler	ADFG/OSIAR/Anch	267-2218	522-1413
Evelyn Biggs	ADFG/Comm./Cordova	424-3212	424-3235
Dave Cantillon	NMFS		
Bob Spies	Livermore Lab/Calif	(415) 422-5792	422-1370

TOM KRON

Invited Participants - Restoration Work Sessions

October 31, 1990 Marine Mammals

NAME	AFFILIATION	PHONE	FAX
Tom Loughlin	NOAA/Seattle	(206)526-4045	526-6615
Marilyn Dahlheim	NOAA/Seattle	(206)526-4045	526-6615
Larry Pank	USFWS/Anchorage		
Brenda Bellachey	USFWS/Anchorage	786-3570	869-3417
Jim Bodkin	USFWS/Anchorage		
Kathy Frost	ADFG/FBX	456-5156	456-3091
Lloyd Lowry	ADFG/FBX	456-5156	456-3091



OIL SPILL RESTORATION PLANNING OFFICE

437 E Street, Suite 301 Anchorage, Alaska 99501
(907) 271-2461 FAX: (907) 271-2467

October 19, 1990

EXAMPLE

MEMORANDUM

SUBJECT: Fish/Shellfish Restoration Work Session

FROM: Restoration Planning Work Group

TO: xxxx xxxxx
xxxx xxxxx

This is to formally request your participation in the Fish/Shellfish work session on restoration to be held on Friday, October 26, 1990, beginning at 8:30 A.M. The location will be the Simpson Building at 645 G Street, Anchorage, Alaska. The objectives of the work session are 1) to identify a candidate suite of actual restoration projects addressing known injuries from the oil spill that can be initiated in 1991; and 2) to identify the need for, and propose for the 1991 field season, further feasibility studies of promising restoration technologies or approaches.

Attached you will find two sets of factors to be considered in proposing either restoration projects or feasibility studies. If possible, please prepare a brief description of any proposed projects/studies for consideration at the work session, or submit any such proposals to this office prior to October 26 if you cannot attend. More detailed proposals will be requested by the Restoration Planning Work Group for those projects that best address the factors on the attached sheets.

Should you have any questions do not hesitate to call the Restoration Planning Office at (907)271-2461. Your attendance at this session is appreciated.

DRAFT

1991 Restoration Projects - Factors to be considered in proposing projects

Agencies have decided to consider appropriate restoration projects for implementation in 1991. This is independent of whether any restoration funds become available in the immediate future from the responsible party. Proposed projects will be those that are technically feasible and can be implemented in the 1991 field season. Recovery being the prime goal, projects should also provide, either directly or indirectly, a net environmental benefit to an injured resource. These potential projects will include those that will mitigate known or documented damages and also any actions which will mitigate other sources of environmental disturbance (immediate threats) interfering with the natural recovery of injured resources. Finally, neither the timing nor the magnitude of any potential settlement for damages should be considered when proposing candidate projects. Factors to be considered include:

1) addresses known NRDA damage.

2) technical feasibility known.

3) reasonable to implement considering the expectations for natural recovery.

4) importance of implementing in 1991; examples include:
   - addresses an immediate/existing damage which would likely continue to cause impacts;
   - addresses the threat of additional (cumulative) impacts which, if eliminated, would allow a quicker recovery of an injured resource;
   - should be implemented immediately by the agencies even if funds from the responsible party are not yet available.

5) net environmental benefit expected.

6) ecosystem/multiple species benefits.

7) duration of project; expected results.

8) geographic scope (should not be restricted to PWS, unless that is the only area that damage may be effectively addressed at this time).

9) cost of implementation (cost effectiveness to be addressed by RPWG).

DRAFT

1991 Feasibility Studies - Factors to be considered in proposing studies

Proposed projects should reflect the need to determine technical feasibility or environmental benefit of candidate restoration approaches or techniques (i.e., those potential restoration projects specifically related to a damaged resource which, if technically feasible, have the likelihood of being realistically considered/implemented as a restoration measure). Besides technical feasibility, projects may also address information necessary to confirm the benefits or enable the implementation of a potential technique otherwise feasible. For example, one of the 1990 studies provided necessary information to confirm the use of upland forested areas as habitat for marbled murrelets and harlequin ducks. Factors to be considered include:

1) injury documentation; link to NRDA.

2) likelihood of project ultimately being proposed as a full-scale restoration measure.

3) probability of successful study.

4) ecological importance of target resource.

5) ability to evaluate success and document ecological value of project.

6) cost of feasibility study.

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In Attendance:
Chair: Sandy Rabinowitch, NPS/DOI
Dave Patterson, USFWS
Bud Rice, NPS
Art Weiner, DNR
Rich Thompson, DNR
Ken Rice, USFS
Frank Smedley, USFS
Kirsten Ballard, USEPA
Mike Goodwine, DNR
Mike Mitchel, Preston Thorgrimson
Kent Roth, ADFG

The meeting opened with introductions, background information and a question and answer period.

One of the more significant questions was "Is an 'individual' precluded from restoration action if a proposal is not in by November 15?" Sandy's interpretation of the FR process was that this would not be the case. The document goes out for public comment until February 13, 1991. Therefore, anyone can send in comments until then.

One of the largest obstacles recognized in proposing Recreation projects is the lack of supportive NRDA damage information. Many NRDA studies for recreation were proposed at first, but were denied. Some general statistics presented at the meeting support the fact that there has been an impact on recreation. Fewer campers, hikers, kayakers, and kayak rental businesses who have considerably lower numbers of people going out, have been noted. There was also speculation of businesses that haven't opened because of EVOS. From this discussion, it was agreed that a user survey of potential users of the resource should be performed.

Also stemming from the above discussion was that public perceptions of the spill area, and Alaska in general (relating to the oil

spill), are not correct. Many people view the entire coastline as completely covered with oil, when this is not the case. An education program to change these perceptions--school curriculum, interpretive signs, video/PBS coverage to the lower 48, etc., was proposed. This could be especially important in view of damaging statements made by Governor Cowper regarding the spill (he advised that anyone who might be interested in kayaking in Alaska should avoid Kenai Fjords National Park (KEFJ), which now notes a decrease in kayaker usage by half). Coupled with this could be a "alternate site" survey of areas that were untouched by oil which would still offer a visitor the pristine experience that was expected.

Much of the management which normally goes towards running recreational programs in the state and federal agencies has been diverted to continued EVOS "response". Many programs which would have been done, have not been done because of the diversion of resources. Trails have not been built as planned, other programs have been delayed. This has resulted in the loss of revenue for the recreations departments (the use it or lose it syndrome). Funds and personnel that could go towards restoration of management and lost services was suggested as a restoration option.

The government agencies are charged with providing recreational opportunities to the public, therefore, it was discussed that if businesses did not start because of the spill, then it could possibly be charged that the government failed to provide those opportunities. Even if those opportunities were provided, who can judge the value or the actual quality experienced during those visits. Is a trip any less successful if you only saw 100 vs. 200 birds when you (the public) didn't know how many you would see anyway? Or if you didn't see one species of bird at all, how would you know that it was supposed to be there unless you were told?

To be included in the submittals should be a summary of damages and supporting information regarding those damages.

The issue of public vs. governmental damages was discussed. Mike Mitchell pointed out that a restoration of lost services to the public in general may be justifiable as restoration options. However, a reallocation of resources may be beyond this process (e.g. the state is seeking direct reimbursement of funds through Exxon). Government loss vs. public loss. Can NPS be reimbursed, and/or is it a public loss

because Sandy is doing EVOS restoration rather than planning or reviewing proposals for public facilities?

In Summary:

DAMAGES

1) Selected User Decline
   perception of impacts

2) Loss of Wilderness Values
   a) perception of the public/misinformation
   b) loss of characteristics

3) Potential business thawarted
   a) loss of revenue
      i) local business
      ii) user/permit fees
   b)Restricted Opportunity

4) Loss of natural values
5) Increased pressure in other areas
   a) management problems shift
   b) diversion of users/impacts
   c) Charter/tour service increase

6) Loss of services to Public due to cancelation of existing programs (lost opportunity), possible loss of appropriated funds.

Discussion followed regarding these damages and what types of restoration projects/technical support projects/feasibility studies could be considered. The following list of proposals was generated: (agencies in parentheses indicated that they would try to draw up a proposal by November 15 for consideration into the FR notice)

Sport Fish Improvement *(it was agreed that many of these projects would be covered under the Fish/shellfish program)*
- Access acquisition
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- Coho habitat improvement

Marine Litter Pick-up *(USFS, KEFJ Nat. Park)*
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- Garbage Barge

Education Program (psychological restoration) *(DNR)*
- Interpretive plan
- Multi-media "campaign"
- Natural History/Environments' response to stress
- Displays/park signs
- Recreational opportunities

Direct Restoration *(DNR)*
- Site Restoration/Rehabilitation
- New site survey
- Water Quality Survey (no giardia in PWS before spill, is this still the case?)

Replacement of Displaced Resources *(USFS)*
- Cabin Construction
- Trail Construction
- Boat Moorings

Survey of Recreation user perceptions *(KEFJ)*

4

COASTAL HABITAT RESTORATION WORKSHOP 10/25/90

CONFIDENTIAL
DRAFT

INITIAL DRAFT (not even proof-read!)

In Attendance:
Sandy Rabinowitch, DOI
Martha Fox, EPA
Stephan Bugbee, EPA
Malin Babcock, NOAA
Tom Dean, Coastal Resources Assoc.
Mike Stekoll, UA
Charles Peterson, UNC
Dave Gibbons, USFS
Brian Ross, EPA
Art Weiner, DNR
Andy Hooten, UAF
Ray Highsmith, UAF
Ken Rice, USFS
John F. Karinen, NOAA/NMFS
Linda Comerci, EPA
Richard Meganck, EPA Contractor
Jim Bodkin, USFWS
Kirsten Ballard, EPA
Kim Sundberg, ADFG
Mike Mitchell, Preston Thorgrimson
Bob Spies, AMS/UCLLM(?)
David Cantillon, NOAA/NMFS
Mark Brodersen, ADEC
John Strand, NOAA/NMFS

The Session was divided into two parts. The morning session discussed damages noted to date, the afternoon session discussed restoration proposals on the table.

FUCUS:

Mike Seckel presented the data for Mike Foster.

Fucus was studied in Herring Bay over the summer of 1990. Oiled areas in general were in worse "fucus shape" than unoiled control areas. Oiled areas include areas where residue remains and/or treatment of one sort or another took place (records are incomplete for treatment types, esp. in 1989). Observed in oiled areas were fewer plants and fewer

fertile plants. What seems to compound the recovery of the fucus in the oiled areas is the lack of shade by older plants, thereby increasing desiccation and hence survival of younger plants.

Grazers were not factored into the "recovery equation" used in 1990. It was assumed that since there were fewer grazers due to cleanup, that they would not pose a significant recovery problem for Fucus.

Two experiments were conducted for restoration of Fucus. Seeded plates were set out, and bags of Fucus were anchored to the substratum. Neither experiments were considered successful. None of the seeded plate plants survived. Few of the innoculum bags provided surviving plants. Bare surface as opposed to oily residue, was more successful.

Plants are can reproduce after about 3 years of age. Less Fucus is present in Herring Bay, and that that is present is immature, as compared to control sites.

Oil has been noted to have effects on the ability of eggs to fertilize.

CRITICAL FAUNA

15 pairs of study sites were set up in Herring Bay in 1990. The presence and absence of fauna were noted (in Fucus plots as well). Differences in the numbers of organisms in oiled vs. control plots are the results of oil. Cleaning appears to have benefited barnacles.

Areas were set up with predator excluding fences (no cover) and cages (covered). Exclosures without algae lost limpets to predation (birds?).

EELGRASS

Some dead polychetes were noted in oiled and control areas. Some infauna were noted with sub-lethal effects in the form of lesions (polychetes). Oil has been noted in sediments to 20 meter's depth in protected bays.

Less death and destruction of starfish, squid, octopi etc. was noted in 1990 as compared to 1989. Damage to eelgrass has not been noted, except in isolated cases of heavy equipment damage.

NOAA Air Water II and III

III- Caged Mussel Deployment

25 sites inside and outside of PWS were selected for study. Mussels from clean areas in southeast Alaska were deployed in cages in oiled areas. After a certain period of time, the mussels were collected and measured for hydrocarbons. 1990 data is unavailable. 1989 data showed bioaccumulation of hydrocarbons in some of the samples.

III- Hydrocarbons in Sediments

27 sites were studied in 1989 and '90. Hydrocarbons were detected in one location at 100 meters depth. 7 sites showed contamination at 20 meters. Meiofaunal and infaunal samples were taken, no data is available yet.

In a related exercise, hydrocarbons in water and mussels were studied. 20 sites were sampled in 1989, 18 sites in 1990. The results are not in.

NOAA- REMOTE SENSING TECHNIQUE

3 sites were examined using CASI airborne remote sensing imagery. This technique compares several hundred bands of spectral light which can be used to detect fucus and other algae and can be used to compare with beach transect data. All areas examined showed less algal cover than control beaches. Th images were then ground truthed. This technique offers much higher resolution than satellite imagery.. 3 dimensional models can be done with topographical and overlay.

Afternoon session-RESTORATION PORPOSALS:

Beach Ryegrass- Stoney Wright

Some areas visited would benefit from repair/planting of Beach Ryegrass. 6 sites were visited, and 3 were recommended for restoration work. Funding needs to be expanded so more sites can be visited and evaluated. The group felt that areas which were damaged under the permit process should be restored under that process (e.g. the helipad on Block Island that Exxon built). Areas damaged otherwise, should be included in the restoration.

Marshes-EPA

Natural recovery is slow in these saltwater tidal marshes, therefore restoration is beneficial. Unfortunately, NRDA studies were not performed on salt marshes and little quantitative data is available regarding damages. Less than 1% of the impacted shoreline is salt marsh, and less than half

have been damaged. The value of these few areas has not been established.

The group thought that since there was little quantitative damage data regarding marshes, the value had not been determined and the area(s) involved did not seem to justify the expense in the proposal. EPA proposed re-writing the proposal for re-submission. The detailed proposal should address and inventory damage.

Other concerns were the impact on donor marshes. Seed propagation was suggested as a feasibility study. Many seeds were collected and technology exists so that they can be propagated.

FWS expressed concern that if the marshes are re-planted, that they might create an "attractive nuisance", drawing wildlife into areas which still contain oil.

MUSSELS and SEDIMENTS-NOAA

A feasibility/monitoring study is proposed for placement of mussels on impacted beaches (on the sediment, rather than in the water of the bay) and natural recovery monitoring. More information is needed regarding damages for restoration of mussel habitat. Questions to be answered are : will a certain level of hydrocarbons inhibit recruitment; is there damage; what are the effects on spat and larvae, etc.

Concern regarding this proposal were that it too closely matches Air Water III and that it might duplicate what's already being done, and that clams might be a better indicator of hydrocarbons in the sediments since they live in the sediments. The group gave it's tentative approval so long as the study does not duplicate what is already being done, and that it should concentrate on natural recovery.

FUCUS-Mike Foster

A survey to find out what needs to be restored using CASI imaging is proposed. Growth rates, differences between oiled and control areas needs to be measured, best restoration techniques need to be assessed, and the 3 factors of fucus growth need to be examined (surface, slope, aspect).

The group seemed to favor such a study.

Air Water III-NOAA

The need to track contamination out of the environment (re-oiling) continues. Data from 1990 is not in yet (hydrocarbon levels in mussels). If hydrocarbons are found in mussels in 1990, using mussel cages to track the complete history of the distribution and fate of the oil can be done. It was pointed out that it would be important to continue evaluating sites outside of PWS. The caged mussel technique may prove extremely valuable in the "how clean is clean" debate on the "dirty dozen" beaches.

The group favored continuation of Air Water III.

Air Water II-NOAA

1989 samples, and 1990 samples are still being worked up. Oil is being found in ocean floor sediments. The fact that oil contamination is being found indicates a further pathway for oil contamination to enter the food chain. It was recommended to use ADEC's sediment traps to correlate and justify continuance (since NOAA's data has not been analyzed yet).

EELGRASS -Tom Dean

Continued monitoring of the species that use these areas should continue because of sub-lethal effects and possible impacts on Dolly Varden Char juveniles. Mr. Dean felt that overall there was little damage to the populations that use these areas and there are few feasible techniques to restore eelgrass to justify a restoration project. If monitoring can continue under restoration, (if not continued under DA), this should be done.

IN SUMMARY:

Beach Rye Grass- Cut up the proposal to restore those areas that do not fall under the permit process.

Marsh Study- Lots of concern, the proposal should be rewritten. Current damages need to be documented and marshes need to be identified for PWS. The Net Environmental Cost Benefit needs to be determined.

Eelgrass/intertidal areas- Parts need to be re-written for restoration with no overlap.

Air Water II- Continue. DEC sediment trap work needs to be worked in with no overlap.

Air Water III- Should be continued with a linkage to the "dirty dozen" beaches.

COASTAL HABITAT RESTORATION WORKSHOP 10/25/90

CONFIDENTIAL
DRAFT

INITIAL DRAFT (not even proof-read!)

In Attendance:
Sandy Rabinowitch, DOI
Martha Fox, EPA
Stephan Bugbee, EPA
Malin Babcock, NOAA
Tom Dean, Coastal Resources Assoc.
Mike Stekoll, UA
Charles Peterson, UNC
Dave Gibbons, USFS
Brian Ross, EPA
Art Weiner, DNR
Andy Hooten, UAF
Ray Highsmith, UAF
Ken Rice, USFS
John F. Karinen, NOAA/NMFS
Linda Comerci, EPA
Richard Meganck, EPA Contractor
Jim Bodkin, USFWS
Kirsten Ballard, EPA
Kim Sundberg, ADFG
Mike Mitchell, Preston Thorgrimson
Bob Spies, AMS/UCLLM(?)
David Cantillon, NOAA/NMFS
Mark Brodersen, ADEC
John Strand, NOAA/NMFS

The Session was divided into two parts. The morning session discussed damages noted to date, the afternoon session discussed restoration proposals on the table.

FUCUS:

Mike Seckel presented the data for Mike Foster.

Fucus was studied in Herring Bay over the summer of 1990. Oiled areas in general were in worse "fucus shape" than unoiled control areas. Oiled areas include areas where residue remains and/or treatment of one sort or another took place (records are incomplete for treatment types, esp. in 1989). Observed in oiled areas were fewer plants and fewer

fertile plants. What seems to compound the recovery of the fucus in the oiled areas is the lack of shade by older plants, thereby increasing desiccation and hence survival of younger plants.

Grazers were not factored into the "recovery equation" used in 1990. It was assumed that since there were fewer grazers due to cleanup, that they would not pose a significant recovery problem for Fucus.

Two experiments were conducted for restoration of Fucus. Seeded plates were set out, and bags of Fucus were anchored to the substratum. Neither experiments were considered successful. None of the seeded plate plants survived. Few of the innoculum bags provided surviving plants. Bare surface as opposed to oily residue, was more successful.

Plants are can reproduce after about 3 years of age. Less Fucus is present in Herring Bay, and that that is present is immature, as compared to control sites.

Oil has been noted to have effects on the ability of eggs to fertilize.

CRITICAL FAUNA

15 pairs of study sites were set up in Herring Bay in 1990. The presence and absence of fauna were noted (in Fucus plots as well). Differences in the numbers of organisms in oiled vs. control plots are the results of oil. Cleaning appears to have benefited barnacles.

Areas were set up with predator excluding fences (no cover) and cages (covered). Exclosures without algae lost limpets to predation (birds?).

EELGRASS

Some dead polychetes were noted in oiled and control areas. Some infauna were noted with sub-lethal effects in the form of lesions (polychetes). Oil has been noted in sediments to 20 meter's depth in protected bays.

Less death and destruction of starfish, squid, octopi etc. was noted in 1990 as compared to 1989. Damage to eelgrass has not been noted, except in isolated cases of heavy equipment damage.

NOAA Air Water II and III

III- Caged Mussel Deployment

25 sites inside and outside of PWS were selected for study. Mussels from clean areas in southeast Alaska were deployed in cages in oiled areas. After a certain period of time, the mussels were collected and measured for hydrocarbons. 1990 data is unavailable. 1989 data showed bioaccumulation of hydrocarbons in some of the samples.

III- Hydrocarbons in Sediments

27 sites were studied in 1989 and '90. Hydrocarbons were detected in one location at 100 meters depth. 7 sites showed contamination at 20 meters. Meiofaunal and infaunal samples were taken, no data is available yet.

In a related exercise, hydrocarbons in water and mussels were studied. 20 sites were sampled in 1989, 18 sites in 1990. The results are not in.

NOAA- REMOTE SENSING TECHNIQUE

3 sites were examined using CASI airborne remote sensing imagery. This technique compares several hundred bands of spectral light which can be used to detect fucus and other algae and can be used to compare with beach transect data. All areas examined showed less algal cover than control beaches. Th images were then ground truthed. This technique offers much higher resolution than satellite imagery.. 3 dimensional models can be done with topographical and overlay.

Afternoon session-RESTORATION PORPOSALS:

Beach Ryegrass- Stoney Wright

Some areas visited would benefit from repair/planting of Beach Ryegrass. 6 sites were visited, and 3 were recommended for restoration work. Funding needs to be expanded so more sites can be visited and evaluated. The group felt that areas which were damaged under the permit process should be restored under that process (e.g. the helipad on Block Island that Exxon built). Areas damaged otherwise, should be included in the restoration.

Marshes-EPA

Natural recovery is slow in these saltwater tidal marshes, therefore restoration is beneficial. Unfortunately, NRDA studies were not performed on salt marshes and little quantitative data is available regarding damages. Less than 1% of the impacted shoreline is salt marsh, and less than half

have been damaged. The value of these few areas has not been established.

The group thought that since there was little quantitative damage data regarding marshes, the value had not been determined and the area(s) involved did not seem to justify the expense in the proposal. EPA proposed re-writing the proposal for re-submission. The detailed proposal should address and inventory damage.

Other concerns were the impact on donor marshes. Seed propagation was suggested as a feasibility study. Many seeds were collected and technology exists so that they can be propagated.

FWS expressed concern that if the marshes are re-planted, that they might create an "attractive nuisance", drawing wildlife into areas which still contain oil.

MUSSELS and SEDIMENTS-NOAA

A feasibility/monitoring study is proposed for placement of mussels on impacted beaches (on the sediment, rather than in the water of the bay) and natural recovery monitoring. More information is needed regarding damages for restoration of mussel habitat. Questions to be answered are : will a certain level of hydrocarbons inhibit recruitment; is there damage; what are the effects on spat and larvae, etc.

Concern regarding this proposal were that it too closely matches Air Water III and that it might duplicate what's already being done, and that clams might be a better indicator of hydrocarbons in the sediments since they live in the sediments. The group gave it's tentative approval so long as the study does not duplicate what is already being done, and that it should concentrate on natural recovery.

FUCUS-Mike Foster

A survey to find out what needs to be restored using CASI imaging is proposed. Growth rates, differences between oiled and control areas needs to be measured, best restoration techniques need to be assessed, and the 3 factors of fucus growth need to be examined (surface, slope, aspect).

The group seemed to favor such a study.

Air Water III-NOAA

The need to track contamination out of the environment (re-oiling) continues. Data from 1990 is not in yet (hydrocarbon levels in mussels). If hydrocarbons are found in mussels in 1990, using mussel cages to track the complete history of the distribution and fate of the oil can be done. It was pointed out that it would be important to continue evaluating sites outside of PWS. The caged mussel technique may prove extremely valuable in the "how clean is clean" debate on the "dirty dozen" beaches.

The group favored continuation of Air Water III.

Air Water II-NOAA

1989 samples, and 1990 samples are still being worked up. Oil is being found in ocean floor sediments. The fact that oil contamination is being found indicates a further pathway for oil contamination to enter the food chain. It was recommended to use ADEC's sediment traps to correlate and justify continuance (since NOAA's data has not been analyzed yet).

EELGRASS -Tom Dean

Continued monitoring of the species that use these areas should continue because of sub-lethal effects and possible impacts on Dolly Varden Char juveniles. Mr. Dean felt that overall there was little damage to the populations that use these areas and there are few feasible techniques to restore eelgrass to justify a restoration project. If monitoring can continue under restoration, (if not continued under DA), this should be done.

IN SUMMARY:

Beach Rye Grass- Cut up the proposal to restore those areas that do not fall under the permit process.

Marsh Study- Lots of concern, the proposal should be rewritten. Current damages need to be documented and marshes need to be identified for PWS. The Net Environmental Cost Benefit needs to be determined.

Eelgrass/intertidal areas- Parts need to be re-written for restoration with no overlap.

Air Water II- Continue. DEC sediment trap work needs to be worked in with no overlap.

Air Water III- Should be continued with a linkage to the "dirty dozen" beaches.