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STATE OF ALASKA

WALTER J. HICKEL, GOVERNOR

DEPT. OF ENVIRONMENTAL CONSERVATION

DIVISION OF SPILL PREVENTION AND RESPONSE
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Telephone: 465-5250
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March 20, 1992

Ms. Ginny Faye
Senator Cotten's Office
P. O. Box V, Capitol, Rm 11
Juneau, AK 99811

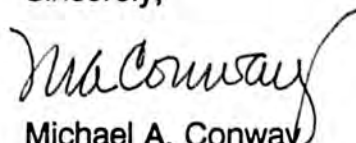
Dear Ms. Faye:

Thank you for scheduling a joint briefing for the legislature on the Spring 1992 Exxon Valdez clean-up operation. I understand the briefing is set for 10:30 a.m., on April 14.

The briefing will be done by Commissioner Sandor, Admiral Ciancaglini (U.S. Coast Guard, FOSC), and David Kennedy (NOAA Scientific Support Coordinator). Exxon will have a representative available to answer questions.

Enclosed are copies of draft documents which provide you an idea of the information to be presented at the joint legislative briefing.

Sincerely,


Michael A. Conway
Director

MAC/sjn (SPAR-faye.104)

Enclosure: As stated

cc: Janice Adair, Acting Director, Division of Administrative Services

MEMORANDUM

STATE OF ALASKA

Department of Environmental Conservation

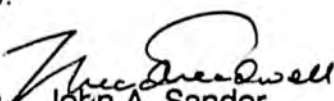
TO: The Honorable
Senator Sam Cotten
Chairman, Senate Oil and
Gas Committee

DATE: April 14, 1992

FILE NO: SPAR-cleanup.mem

THRU:

TELEPHONE NO: 465-5000

FROM: 
John A. Sandor
Commissioner

SUBJECT: Exxon Valdez oil spill 1992
cleanup operations

Those joining me to brief the Legislature on the 1992 shoreline survey and cleanup activity for the Exxon Valdez oil spill will be:

- Rear Admiral David Ciancaglini, Federal On-Scene Coordinator
- Dr. Rober Pavia, NOAA's Chief Scientific Support Coordinator and advisor to the Federal On-Scene Coordinator

Also attending the briefing this morning who are available to answer questions are:

- Simon Mawson, ADEC Regional Administrator, Pipeline Corridor Region and State's On-Scene Coordinator
- Commander Dennis Maguire, Deputy Federal On-Scene Coordinator
- Mead Treadwell, Deputy Commissioner, ADEC
- Michael Conway, ADEC Director, Spill Prevention and Response Division
- Joseph Talbott, NOAA Exxon Valdez Project Manager
- Robert Forgit, Federal On-Scene Coordinator's Office
- Chipper Loggie, Exxon Alaska Operations Planning Manager
- Jim Sheenan, Exxon Advisor

Thank you for the opportunity to brief the Legislature on this matter.

MAC/rr

INTRODUCTION - COMMISSIONER SANDOR (5 MIN)

BRIEFING TO ALERT YOU OF THE UPCOMING END OF THE CLEANUP.

COMMENTS TODAY WILL BE CONFINED TO THE CLEANUP.

RESTORATION AND HOW RESTORATION FUNDS WILL BE ALLOCATED WILL BE ADDRESSED AT A SEPARATE BRIEFING.

That briefing will be conducted by ADEC...

CLEANUP NEARLY COMPLETE BASED ON 1991 CONDITIONS.

Prior to the 1991 cleanup, less than 1% of the spill-impacted shorelines had evidence of oil

Residual oil still exists in some locations, but what remains is weathered and does not pose a threat to the environment

The cleanup's success is due in large part to the efforts of FOSC, SOSC and Exxon, assisted by nature

SHORELINES MUCH IMPROVED AND RECOVERY UNDERWAY.

The improvement in shoreline conditions is evident

Dave Kennedy of NOAA will discuss current conditions

COMMERCIAL FISHING HARVESTS ARE AT OR EXCEED PRE-SPILL LEVELS.

Very successful 1990 and 1991 commercial fish harvests in PWS

1992 SHORELINE ACTIVITIES SCHEDULED FOR MAY 15 - JUNE 15.

1992 shoreline activities have been agreed to by FOSC, SOSC & Exxon

Portions of 64 subdivisions have been jointly identified for the survey

Low intrusion manual cleanup will be performed as needed at the time of the survey

Admiral Ciancaglini will address the 1992 survey and cleanup plans

EXPECT SURVEY TO CONFIRM CLEANUP PHASE IS COMPLETE.

Cleanup has been successful in removing oil that might be harmful

Further removal would cause more harm than good

Combination of cleanup and resilience of nature is resulting in a rapid recovery

Federal and State standards for ending the cleanup effort will likely be reached this summer

Admiral Ciancaglini and I will discuss the process of concluding the cleanup

USCG/EXXON INVOLVEMENT STOPS WITH END OF CLEANUP.

Parties have worked well together and done a good job

USCG/DEC/Exxon worked closely together under difficult circumstances to accomplish the cleanup

Throughout the cleanup, work recommendations were developed via a joint review process with input from all interested parties

Consensus reached on essentially all work

The system evolved and improved over time

USCG/Exxon involvement stops with the successful completion of the cleanup

We should recognize the unprecedented efforts of all involved in the cleanup

The initial response has mitigated the impact of the spill on our environment

INTRODUCE DAVE KENNEDY

Dave Kennedy of the National Oceanic and Atmospheric Administration has worked on the scientific aspects of the spill since
He will update you on current conditions

CURRENT CONDITIONS - DAVE KENNEDY (15 MIN)

RECOVERY IS PROGRESSING IN ALL AREAS IMPACTED BY SPILL.

NOAA study shows significant recovery in all areas
Recovery rates vary throughout the spill area but recovery is evident on even those areas which had been most severely impacted
Recovery is well advanced compared to our experience with other spills
Due to the nature of PWS and the cleanup effort

OVERALL WATER QUALITY NOT AFFECTED BY THE SPILL.

Water column chemical analysis in 1989 revealed hydrocarbon concentrations at background levels shortly after the spill

SUBSISTENCE FOODS SAFE TO EAT

Oil Spill Health Task Force studies indicate that hydrocarbon concentrations found in traditional subsistence foods collected in areas impacted by the spill cannot be distinguished from those found in samples collected at unoiled sites

COMMERCIAL FISHING ACTIVITY RETURNED TO PRE-SPILL LEVELS IN 1990.

Very successful commercial harvests in 1990 and 1991
1991 seine herring harvest (11,923 tons) was second largest on record and the largest herring harvest in a decade
1991 pink salmon harvest (more than 37 million fish) was the second largest on record and 30% higher than the record pre-spill catch.
1990 record of 44 million salmon eclipsed previous record of 29.2 million

NO RESTRICTIONS ON USE OF SHORELINES IMPACTED BY SPILL.

Remaining oil is not deterring recolonization
Shoreline aesthetics much improved (less visible oil with each passing year)
Human and wildlife use of impacted areas is returning to pre-spill levels (could use figures on tourism/recreational use)

LITTLE OIL REMAINS ON THE SHORELINES.

1991 survey focused on locations where remaining oil was anticipated
The survey identified only 120 locations, or 20% of 585 surveyed, where treatment was judged to be beneficial by the FOSC
An additional 27 locations were resurveyed or had work done at the request of the SOSC
Following the 1991 cleanup it was determined that 64 subdivisions should be reexamined in the spring of 1992

SMALL POCKETS OF SUBSURFACE OIL REMAIN IN HARDEST HIT AREAS.

The sites with subsurface oil are limited to portions of Prince William Sound
Pockets of subsurface oil are getting smaller and more discontinuous each year

REMAINING OIL POSES LITTLE THREAT TO ENVIRONMENT OR HUMAN HEALTH

Remaining oil is scattered and discontinuous

Oil is essentially immobile

Small, infrequent, highly localized sheens may occur if subsurface oil pockets are disturbed by wave action or physical intrusion

Resulting sheens are highly weathered and have no significant impact on the environment

Toxicity is significantly reduced due to weathering and lack of mechanism for exposure

The remaining oil is not hindering natural recovery

CONCLUSION

As a result of natural processes augmented by three summers of cleanup activity, all areas impacted by the 1989 spill are in an advanced state of recovery

INTRODUCE ADMIRAL CIANCAGLINI

SPRING SURVEY - ADMIRAL CIANCAGLINI (10 MIN)

FOSC WILL CONTINUE TO DIRECT THE ASSESSMENT AND CLEANUP EFFORT.

The spill response continues under federal direction

The joint processes we have developed over the last three years continue to be effective

Cleanup costs expected to be less than \$5 million

Payment will come from settlement funds

REASSESS KEY AREAS PRIOR TO END OF CLEANUP PHASE (MAP).

Based on last year's conditions, we've identified the areas which should be reassessed prior to terminating the cleanup phase

Please refer to the map in the handout package

Note that only a few of the hardest hit areas still require assessment

We are looking at specific locations within the segments

FOSC, SOSC & EXXON JOINTLY IDENTIFIED PORTIONS OF 64 SUBDIVISIONS TO ASSESS FOLLOWING 1991 CLEANUP.

Only specific sites in the subdivisions will be visited

Exxon role is that of a technical advisor/consultant to FOSC

SURVEY WILL BE CONDUCTED 15 MAY - 15 JUNE.

This will allow sufficient time to survey and cleanup any remaining troublesome spots

TWO VESSEL BASED 11 PERSON TEAMS, PLUS 1 HELICOPTER.

Very experienced personnel from prior years

USCG, ADEC, NOAA, land manager, biologist, oil geomorphologist, Exxon, photographer, and two cleanup workers

CLEANUP DECISIONS WILL BE MADE JOINTLY ON THE SHORELINES.

The process will be simplified this year

The survey team will make on-site cleanup decisions as the survey is conducted

THE SURVEY AND CLEANUP WILL BE ACCOMPLISHED SIMULTANEOUSLY.

The two cleanup workers on each team will be able to deal with the situations we expect to encounter as they are directed by the survey team

LOW INTRUSION MANUAL CLEANUP ONLY.

No environmental or cost benefit from removal or mechanical work

No bioremediation expected because of advanced oil weathering

END-OF-CLEANUP FACTORS-ADMIRAL CIANCAGLINI (5 MIN)

INTRODUCTION

This will be the last summer of cleanup

You should be familiar with the criteria used to make this decision

NO MORE OIL ON THE WATER OR LIKELY TO REACH THE WATER.

There has been no oil on the water since 1989, with the exception of small, localized sheens typically associated with cleanup work

The small amount of remaining oil is widely scattered, highly weathered and generally immobile

FURTHER REMOVAL WOULD CAUSE MORE HARM THAN GOOD.

This concept, often referred to as net environmental benefit, is very important

In general, we have reached the point where the damage done by removal far exceeds the benefit

CLEANUP WOULD BE EXCESSIVELY COSTLY COMPARED TO BENEFIT.

With the cleanup costs being paid from the settlement, cost effectiveness continues to be a concern

ATTAINMENT OF ABOVE EXPECTED THIS SUMMER.

Based on our experience over the last few years, we expect the shoreline survey to confirm that the cleanup has been successful

Coast Guard/Exxon involvement stop with the end of the cleanup

COMMISSIONER SANDOR WILL CONCLUDE OUR REMARKS

CONCLUSION - COMMISSIONER SANDOR (5 MIN)

THE CLEANUP IS COMING TO A SUCCESSFUL CONCLUSION.

As Dave Kennedy and Admiral Ciancaglini have said, this has been an unprecedented cleanup effort

STATE REQUIREMENTS FOR END-OF-CLEANUP ARE SIMILAR TO FEDERAL REQUIREMENTS.

The state uses a net environmental benefit criteria

Cleanup is complete if the cleanup activities would result in greater environmental damage than the discharge itself

ALL SOSC WORK REQUESTED IN 1991 WAS COMPLETED.

Last year, working closely with us, the FOSC was able to accommodate all additional requests from the State

I expect this will again be accomplished in 1992, so that both Federal and State requirements for cessation of the cleanup will be met

STATE AGREES THAT AFTER 1992 ACTIVITIES, SHORELINE CONDITIONS WILL BE SUCH THAT THE CLEANUP PHASE IS OVER.

Our assessment is that these requirements will be met by June 15, 1992

DEC has a program in place to monitor certain sites over time

UPON COMPLETION, USCG AND EXXON INVOLVEMENT WILL END.

Their involvement is limited to the cleanup

They have agreed to joint development of a publication and video which will summarize the cleanup and current conditions

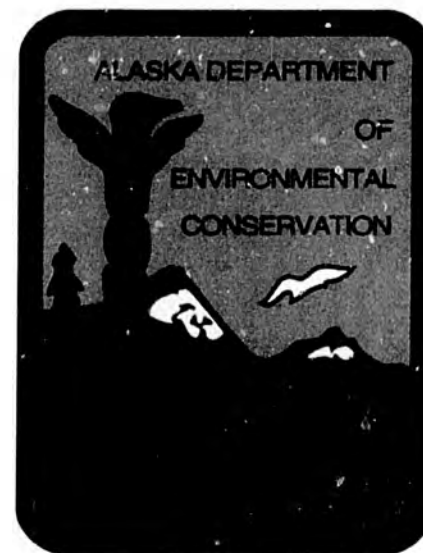
We will provide them to you after the cleanup ends

AT THIS TIME, WE WOULD GLADLY ADDRESS ANY QUESTIONS YOU MIGHT HAVE ABOUT THE CLEANUP OR CURRENT CONDITIONS

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3/5/92

EXXON VALDEZ CLEANUP BRIEFING



APRIL 14, 1992

**EXXON VALDEZ CLEANUP BRIEFING
APRIL 14, 1992
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**EXXON VALDEZ CLEANUP BRIEFING
APRIL 14, 1992**

INTRODUCTION - COMMISSIONER SANDOR (ADEC)

PURPOSE

- o BRIEFING TO ALERT YOU OF THE UPCOMING END OF THE CLEANUP
- o COMMENTS TODAY WILL BE CONFINED TO THE CLEANUP
- o RESTORATION AND HOW RESTORATION FUNDS WILL BE ALLOCATED WILL BE ADDRESSED AT A SEPARATE BRIEFING
- o FEDERAL AND STATE RESTORATION TRUSTEES WILL CONDUCT STUDIES AND IMPLEMENT ANY ACTIVITIES NECESSARY TO RESTORE THE ENVIRONMENT

CONDITIONS

- o CLEANUP NEARLY COMPLETE BASED ON 1991 CONDITIONS
- o SHORELINES MUCH IMPROVED AND RECOVERY UNDERWAY
 - FOR EXAMPLE, COMMERCIAL FISHING HARVESTS ARE AT OR EXCEED PRE-SPILL LEVELS

1992 ACTIVITIES

- o 1992 SHORELINE ASSESSMENT SCHEDULED FOR MAY 15 - JUNE 15
- o EXPECT SURVEY AND CLEANUP ACTIVITY WILL SERVE AS A BASIS TO DETERMINE THE COMPLETION OF THE CLEANUP PHASE
- o USCG/EXXON INVOLVEMENT STOPS WITH THE 1992 CLEANUP
- o RESTORATION STUDIES UNDERWAY

EXXON VALDEZ CLEANUP BRIEFING
APRIL 14, 1992

CURRENT CONDITIONS - DOCTOR PAVIA (NOAA)

- o RECOVERY IS PROGRESSING IN ALL AREAS IMPACTED BY SPILL
- o OVERALL WATER QUALITY NOT AFFECTED BY THE SPILL
- o SUBSISTENCE FOODS GENERALLY SAFE TO EAT
- o COMMERCIAL FISHING ACTIVITY RETURNED TO PRE-SPILL LEVELS
- o NO RESTRICTIONS ON USE OF SHORELINES IMPACTED BY SPILL
- o LITTLE OIL REMAINS ON THE SHORELINES
- o SMALL POCKETS OF SUBSURFACE OIL REMAIN IN HARDEST HIT AREAS
- o REMAINING OIL POSES LIMITED THREAT TO ENVIRONMENT OR HUMAN HEALTH

**EXXON VALDEZ CLEANUP BRIEFING
APRIL 14, 1992**

SPRING SURVEY - ADMIRAL CIANCAGLINI (USCG)

- o FOSC WILL CONTINUE TO DIRECT THE ASSESSMENT AND CLEANUP EFFORT
- o REASSESS KEY AREAS PRIOR TO END OF CLEANUP PHASE (MAP)
- o FOSC, SOSC & EXXON JOINTLY IDENTIFIED PORTIONS OF 64 SUBDIVISIONS TO ASSESS FOLLOWING 1991 CLEANUP
- o SURVEY WILL BE CONDUCTED 15 MAY - 15 JUNE
- o TWO VESSEL BASED 11 PERSON TEAMS, PLUS 1 HELICOPTER
- o CLEANUP DECISIONS WILL BE MADE JOINTLY ON THE SHORELINES
- o SURVEY AND CLEANUP WILL BE ACCOMPLISHED SIMULTANEOUSLY
- o LOW INTRUSION MANUAL CLEANUP ONLY

**EXXON VALDEZ CLEANUP BRIEFING
APRIL 14, 1992**

FEDERAL CLEANUP STANDARDS - ADMIRAL CIANCAGLINI

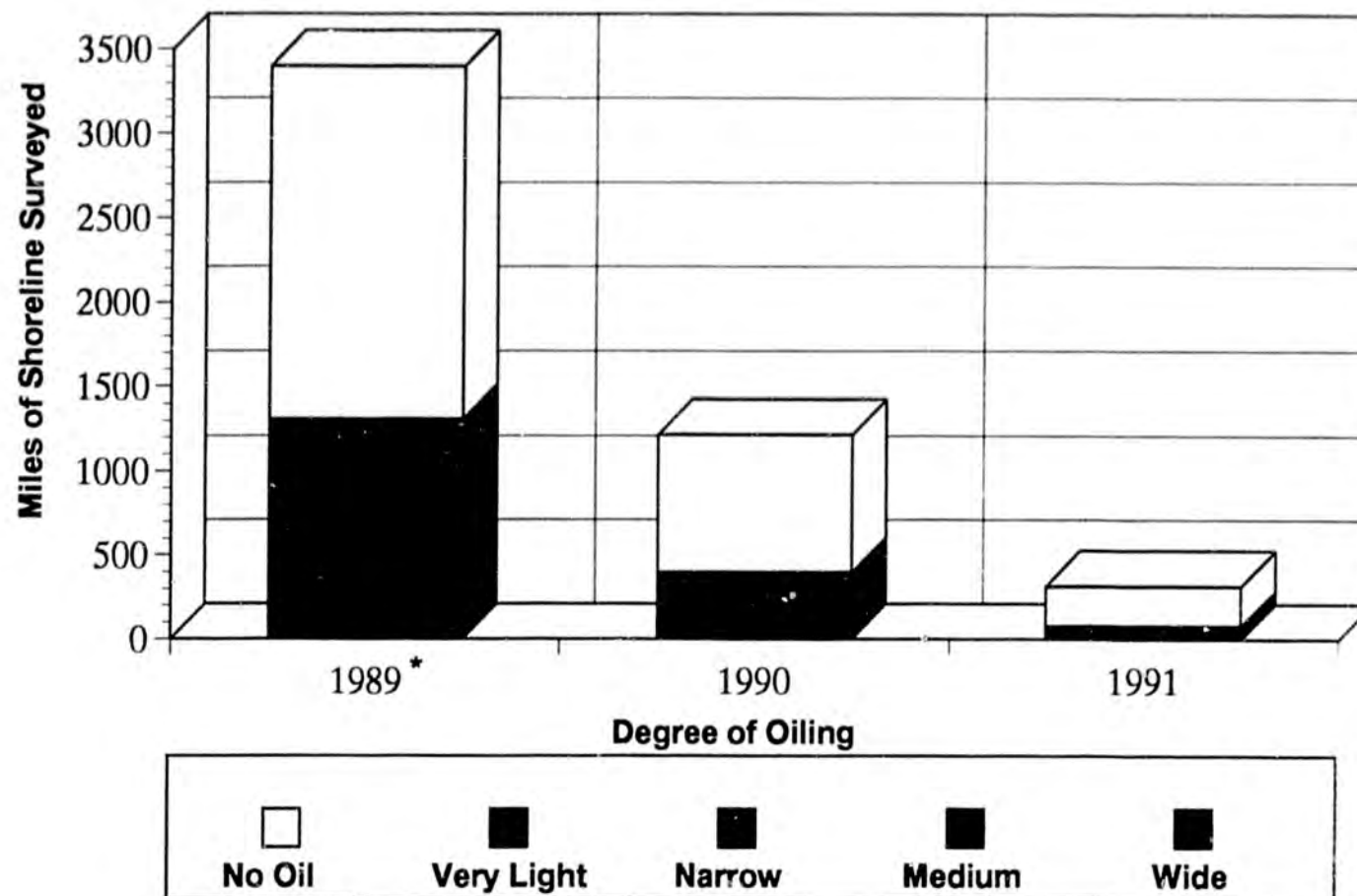
- o NO MORE OIL ON THE WATER OR LIKELY TO REACH THE WATER
- o FURTHER REMOVAL WOULD CAUSE MORE HARM THAN GOOD
- o CLEANUP WOULD BE EXCESSIVELY COSTLY COMPARED TO BENEFIT
- o ATTAINMENT OF ABOVE EXPECTED THIS SUMMER

**EXXON VALDEZ CLEANUP BRIEFING
APRIL 14, 1992**

CONCLUSION - COMMISSIONER SANDOR

- o THE CLEANUP PHASE IS COMING TO A SUCCESSFUL CONCLUSION
- o STATE REQUIREMENTS FOR END-OF-CLEANUP ARE SIMILAR TO FEDERAL REQUIREMENTS
- o ALL SOSC WORK REQUESTED IN 1991 WAS COMPLETED
- o STATE EXPECTS THAT AFTER 1992 ACTIVITIES, SHORELINE CONDITIONS WILL BE SUCH THAT THE CLEANUP PHASE IS OVER
- o UPON COMPLETION, USCG AND EXXON INVOLVEMENT WILL END
 - MUTUAL WORK ON PUBLICATION AND VIDEO WILL CONTINUE
- o FEDERAL AND STATE RESTORATION TRUSTEES WILL CONTINUE TO TAKE WHATEVER ACTIONS THEY DEEM APPROPRIATE TO RESTORE THE ENVIRONMENT

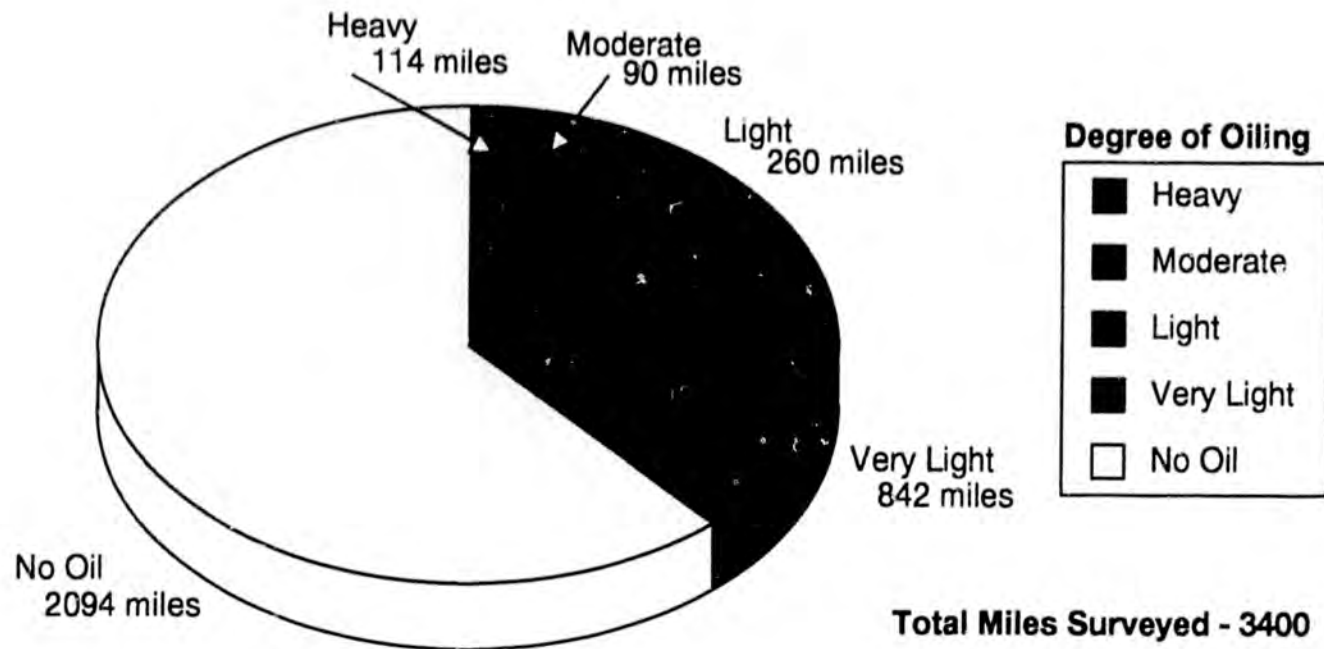
A Comparison of Shoreline Oiling in Miles 1989, 1990, 1991



* 1989 data was categorized as follows:

No Oil Very Light Light Moderate Heavy
 These categories are not directly comparable to those used in 1990 and 1991.

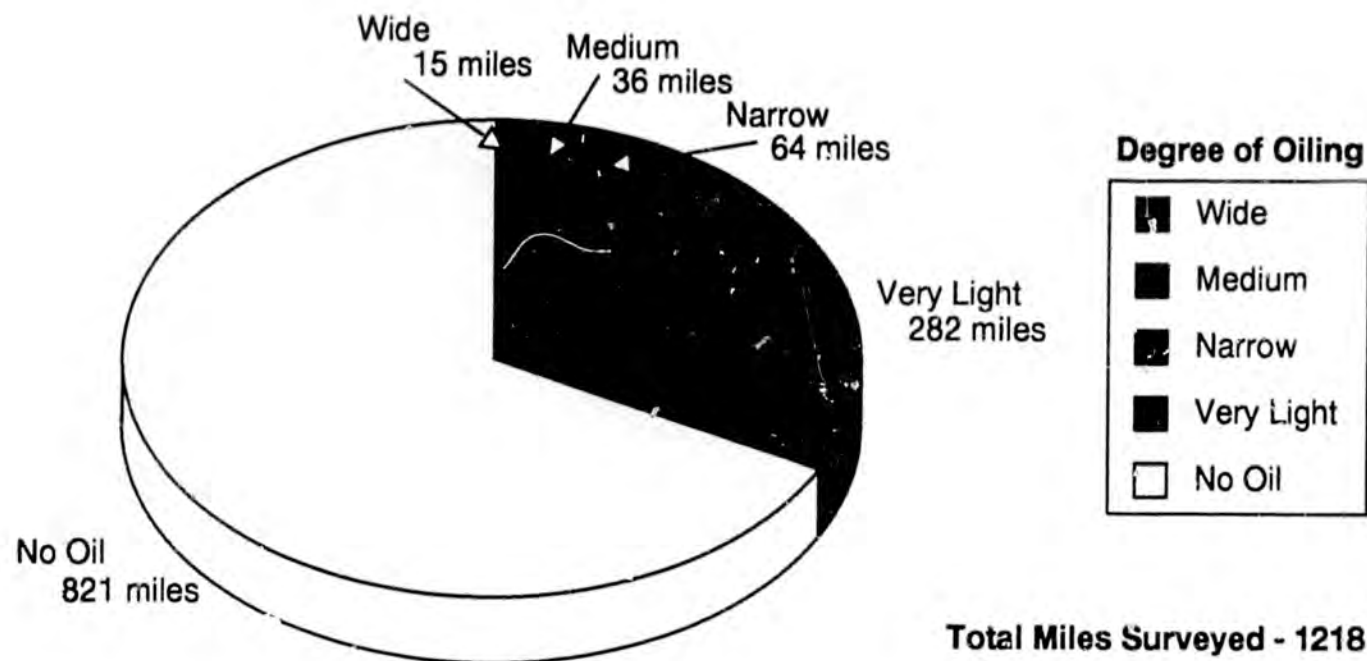
Degree of Shoreline Oiling in Miles 1989 Survey



Degree of Oiling	Beach Width Affected	Total Miles
Heavy	> 6 Meters	114
Moderate	3-6 Meters	90
Light	< 3 Meters	260
Very Light	any width with < 10% cover	842
No Oil		2094
Total Surveyed		3400

Based on Shoreline Cleanup Assessment Team survey (SCAT).

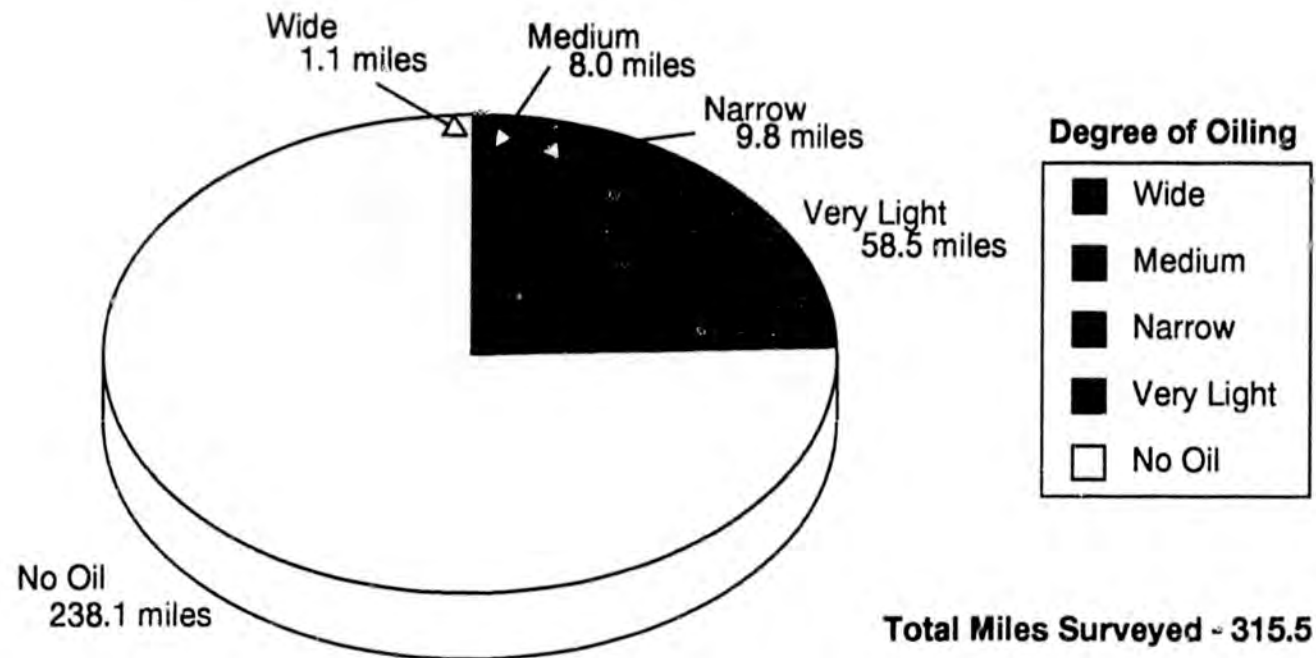
Degree of Shoreline Oiling in Miles 1990 Survey



Degree of Oiling	Beach Width Affected		% Oil Cover	Total Miles
Wide	or	> 6 Meters	and > 50%	15
Medium		> 6 Meters	and < 50%	36
		3-6 Meters	and > 10%	
Narrow		< 3 Meters	and > 10%	64
Very Light		Any Amount	< 10%	282
No Oil				821
Total Surveyed				1218

Based on Spring Shoreline Assessment (SSAT).

Degree of Shoreline Oiling in Miles 1991 Survey



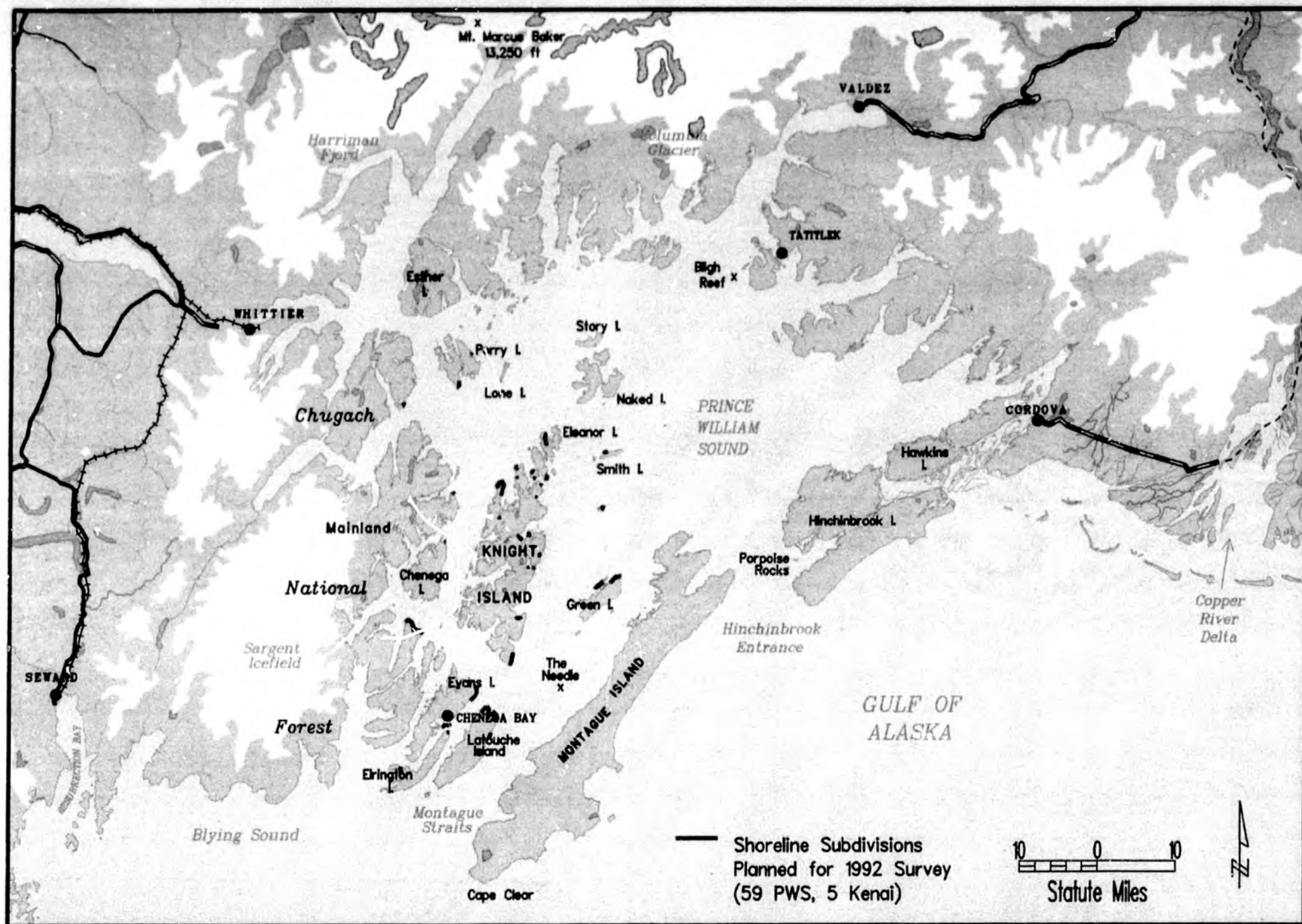
Degree of Oiling	Beach Width Affected		% Oil Cover	Total Miles
Wide	or	> 6 Meters	and > 50%	1.1
Medium		> 6 Meters	and < 50%	8.0
Narrow		3-6 Meters	and > 10%	9.8
Very Light		< 3 Meters	and > 10%	58.5
No Oil		Any Amount	< 10%	238.1
Total Surveyed				315.5

Based on May Shoreline Assessment Program (MAYSAP).

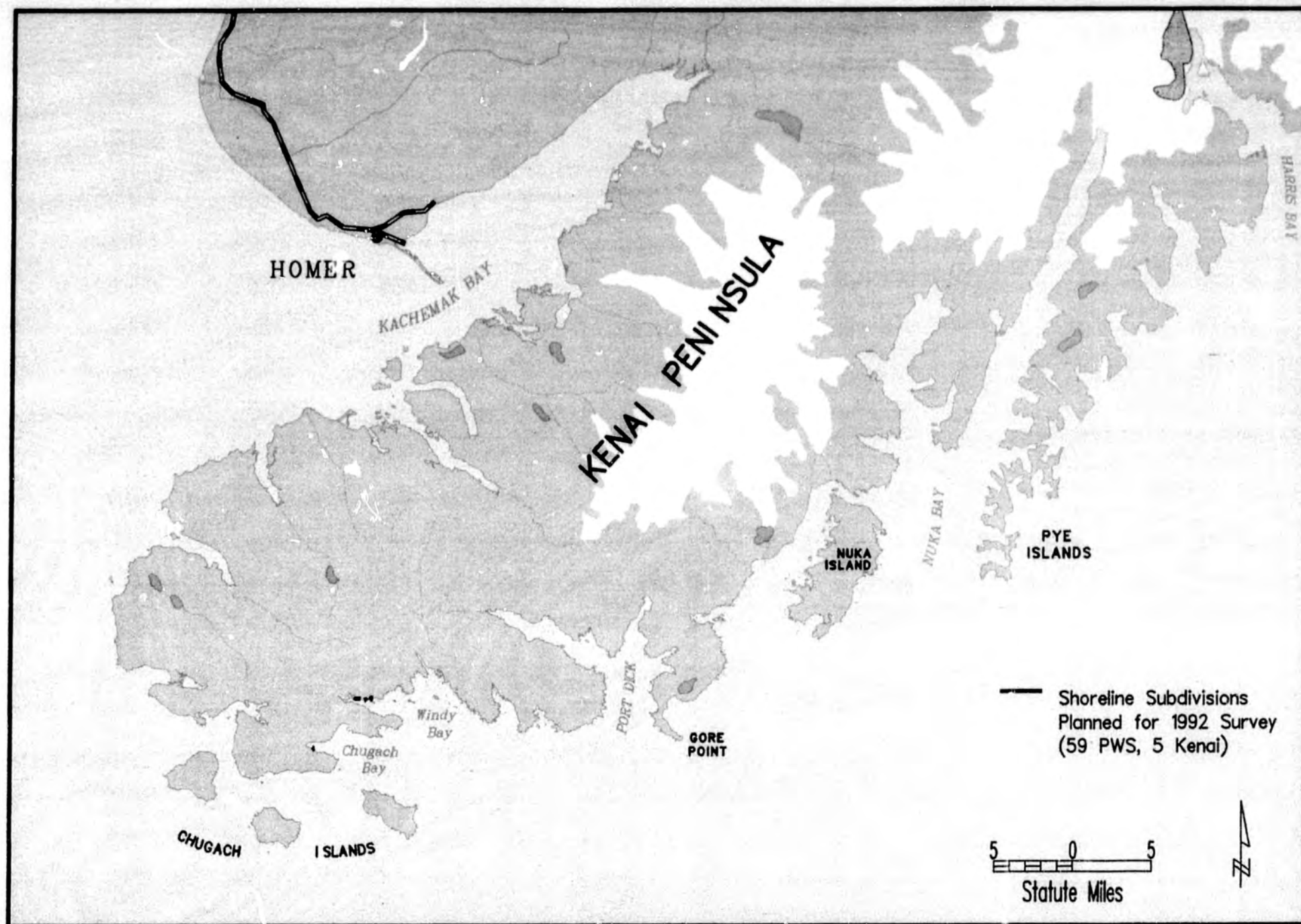
1992 SUBDIVISIONS TO BE SURVEYED

<u>Location</u>	<u>Number of Subdivisions</u>
Prince William Sound	
Knight Island	21
Latouche Island	11
Evans Island	9
Green Island	3
Other	14
Total Prince William Sound	59
Kenai Peninsula	
Windy Bay	4
Chugach Bay	1
Total	64

<u>Land Manager</u>	<u>Number of Subdivisions</u>
U. S. Forest Service	26
Chenega Village Corporation	25
Chugach Alaska Corporation	8
Port Graham Native Corporation	5
Total	64



1992 PLANNED SHORELINE SURVEY LOCATIONS



1992 PLANNED SHORELINE SURVEY LOCATIONS

1992 SURVEY TEAM MAKEUP

Each team will be comprised of:

USCG

ADEC

NOAA

Exxon

Land manager

Oil geomorphologist

Biologist

Two cleanup workers

Photographer

COST PROJECTION
\$K

	Estimated Cost
Organization/Personnel	1,000
Vessels/Aircraft/Other Resources	1,100
Facilities	300
Miscellaneous	<u>1,100</u>
TOTAL	3,500

SUBSISTENCE FOOD TASK FORCE REPORTS

Introduction and Summary

The Oil Spill Health Task Force (OSHTF) determined that subsistence foods are safe to eat, based on sampling programs conducted by the Alaska Department of Fish & Game and the National Oceanic & Atmospheric Administration in conjunction with Exxon. Reports showing the locations where samples were collected were provided to communities, city governments, village councils and village corporations as appropriate. Excerpts from the reports follow.

Summary of Shellfish Test Results

The Oil Spill Health Task Force has recommended that people not use shellfish such as clams from beaches that are obviously contaminated with oil. You should continue to use appearance, smell and taste as reliable indicators of safety and wholesomeness of subsistence foods. If the foods appear clean by these methods, they are safe from the standpoint of oil contamination. You should continue to be cautious about eating clams or mussels collected from beaches not tested for PSP (Paralytic Shellfish Poisoning). The U.S. Food and Drug Administration (FDA) study concluded that the risk of getting cancer from eating shellfish from even the most contaminated site (Windy Bay) is extremely low.

Explanation of Fish Tests and Summary of Results

Tests were done both in 1989 and 1990 on salmon, trout, halibut, and other bottom fish. Study results on all edible fish flesh samples showed extremely low levels of contamination, most around 1 part per billion or less. Toxicological experts concluded that all fish were safe to eat. A detailed risk analysis performed by the U.S. Food and Drug Administration (FDA) concluded that the risk of getting cancer from eating fish collected from the spill area in 1989 was so low that it could not be calculated.

SUBSISTENCE FOOD TASK FORCE REPORTS (continued)

Deer and Ducks

Muscle and livers from 16 deer and 19 ducks tested for oil contamination showed levels from non-detectable to 125 parts per billion. These levels do not present a health risk.

Marine Mammals

Forty one seals and sea lions were collected in 1989 and 1990 to test for hydrocarbon contamination. All tests showed levels of contamination well below any levels considered to be unsafe for people to eat.

VALDEZ CLEANUP BRIEFING

FOSC LOGO

ADEC LOGO

APRIL 10, 1992

ENCLOSURE (1)

VALDEZ CLEANUP BRIEFING

APRIL 10, 1992

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- Spring Survey
- End-of Cleanup Factors
- Conclusion

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- 1991 Spring Survey Results
- 1992 Survey maps
- 1992 Subdivisions to be surveyed
- 1992 Survey team makeup
- 1992 Cost projection
- Scientific studies supporting comments
- Subsistence food task force
- Alaskan Fisheries Two Years After the Spill October 1991 Update
- Two Years After - Conditions in Prince William Sound & the Gulf of Alaska

VALDEZ CLEANUP BRIEFING

APRIL 10, 1992

INTRODUCTION - COMMISSIONER SANDOR

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VALDEZ CLEANUP BRIEFING

APRIL 10, 1992

CURRENT CONDITIONS - DAVE KENNEDY

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END-OF-CLEANUP FACTORS - ADMIRAL CIANCAGLINI

- o NO MORE OIL ON THE WATER OR LIKELY TO REACH THE WATER.
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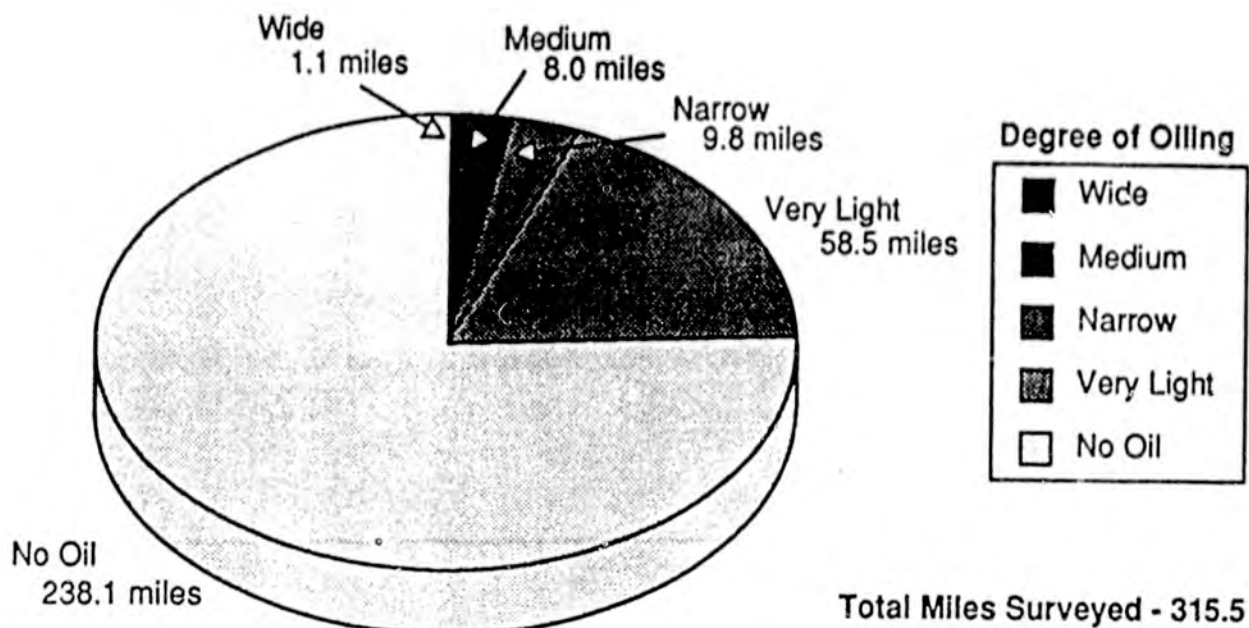
VALDEZ CLEANUP BRIEFING

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CONCLUSION - COMMISSIONER SANDOR

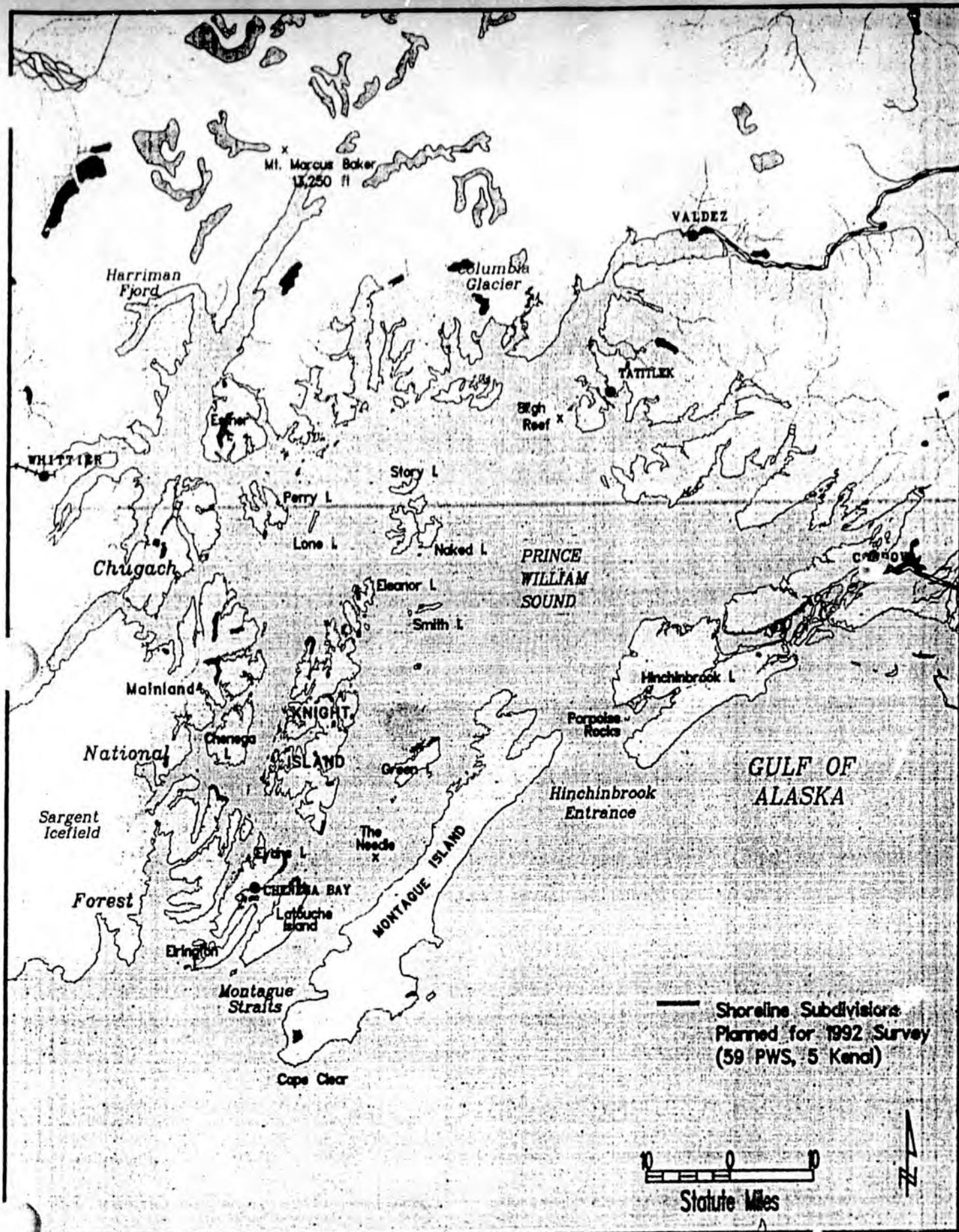
- o THE CLEANUP IS COMING TO A SUCCESSFUL CONCLUSION.**
- o STATE REQUIREMENTS FOR END-OF-CLEANUP ARE SIMILAR TO FEDERAL REQUIREMENTS.**
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- o STATE AGREES THAT AFTER 1992 ACTIVITIES, SHORELINE CONDITIONS WILL BE SUCH THAT THE CLEANUP PHASE IS OVER.**
- o UPON COMPLETION, USCG AND EXXON INVOLVEMENT WILL END.**
 - MUTUAL WORK ON PUBLICATION AND VIDEO WILL CONTINUE**

Degree of Shoreline Oiling In Miles 1991 Survey

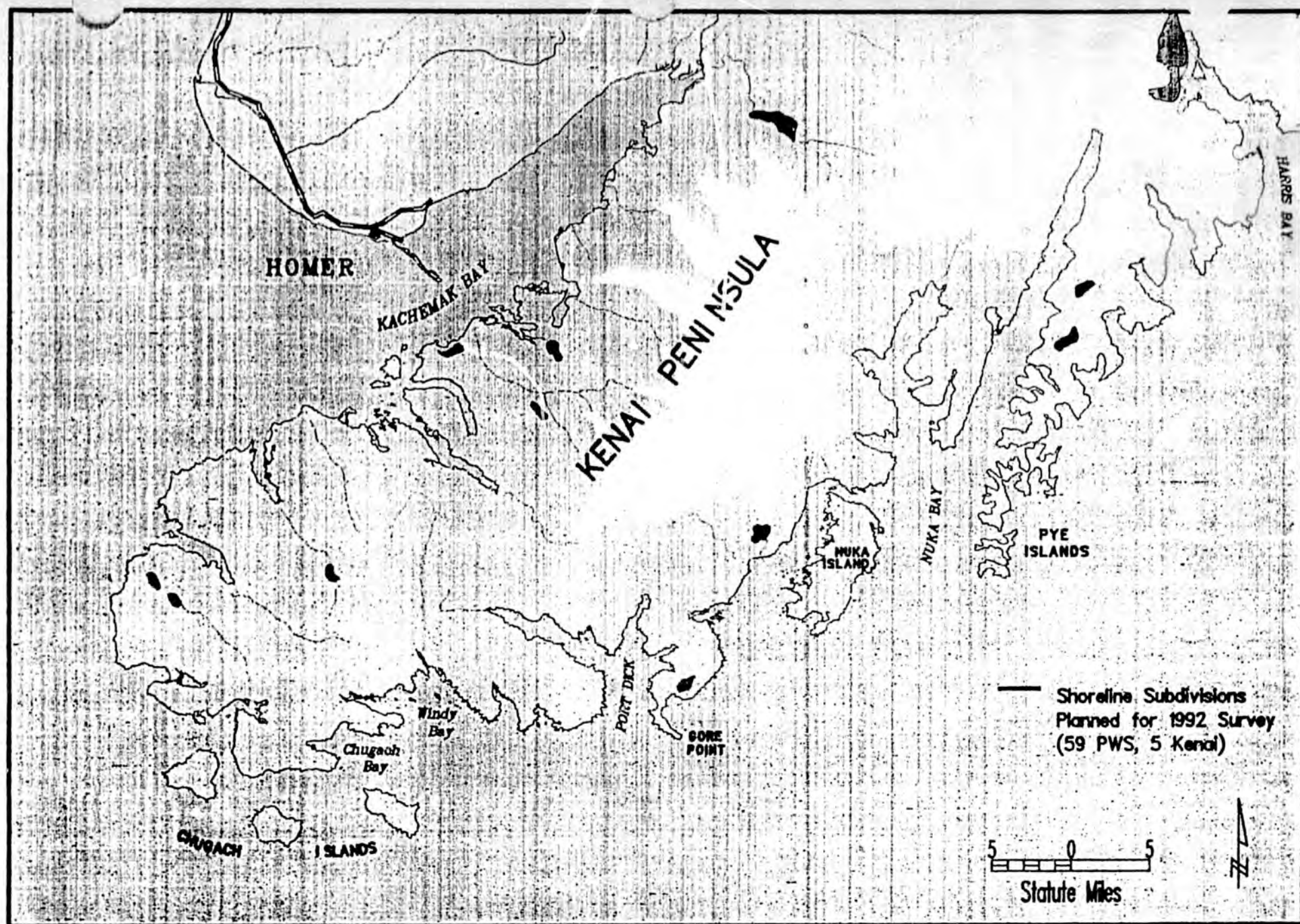


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1992 PLANNED SHORELINE SURVEY LOCATIONS



1992 PLANNED SHORELINE SURVEY LOCATIONS

1992 ASSESSMENT SUBDIVISION LIST									
SUBDIVISION #	LAND MANAGER							SUBDIVISION #	LAND MANAGER
KN-0005B	CAC	GHUGACH ALASKA TOTAL 8						ER-020B	NFS
KN-0011A	CAC							GR-101B	NFS
KN-0135A	CAC							GR-103B	NFS
KN-0135B	CAC							GR-103C	NFS
KN-0136A	CAC							IN-033A	NFS
KN-0213B	CAC							KN-0111A	NFS
KN-0213C	CAC							KN-0113A	NFS
KN-0702A	CAC							KN-0129A	NFS
BP-004A	CVC	CHENEGA TOTAL 25						KN-0129B	NFS
CH-009B	CVC							KN-0132B	NFS
EB-011A	CVC							KN-0209A	NFS
EV-21A	CVC							KN-0211B	NFS
EV-23A	CVC							KN-0300A	NFS
EV-036A	CVC							KN-0408A	NFS
EV-037A	CVC							KN-0500A	NFS
EV-039A	CVC							KN-0500B	NFS
EV-50C	CVC							PR-008C	NFS
EV-51A	CVC							PR-016A	NFS
EV-53B	CVC							SE-041A	NFS
EV-53D	CVC							SM-006B	NFS
KN-0405A	CVC							CB-004B	PG
KN-0701B	CVC							WB-001A	PG
LA-015B	CVC							WB-002B	PG
LA-015C	CVC							WB-002D	PG
LA-015D	CVC							WB-002E	PG
LA-015E	CVC								
LA-018A	CVC							TOTAL 64	
LA-019A	CVC								
LA-020B	CVC								
LA-020C	CVC								
LA-020D	CVC								
LA-021A	CVC								
LA-31B	CVC								
AE-005A	NFS	NATIONAL FOREST SERVICE TOTAL 26							
AE-005B	NFS								
DI-062A	NFS								
DI-067A	NFS								
EL-054A	NFS								
ER-011A	NFS								

1992 SURVEY TEAM MAKEUP

Each team will be comprised of:

- USCG
- ADEC
- NOAA
- Exxon
- Land manager
- Oil geomorphologist
- Biologist
- Two cleanup workers
- Photographer.

COST PROJECTION

To be provided by Exxon in mid-March

legpackage

SCIENTIFIC STUDIES

NOAA input needed

SUBSISTENCE FOOD TASK FORCE REPORTS

Introduction and Summary

The Oil Spill Health Task Force (OSHTF) determined that subsistence foods are safe to eat, based on sampling programs conducted by the Alaska Department of Fish & Game and the National Oceanic & Atmospheric Administration in conjunction with Exxon. Reports showing the locations where samples were collected were provided to communities, city governments, village councils and village corporations as appropriate. Quotes from the reports follow.

Summary of Shellfish Test Results

The Oil Spill Health Task Force has recommended that people not use shellfish such as clams from beaches that are obviously contaminated with oil. You should continue to use appearance, smell and taste as reliable indicators of safety and wholesomeness of subsistence foods. If the foods appear clean by these methods, they are safe from the standpoint of oil contamination. You should continue to be cautious about eating clams or mussels collected from beaches not tested for PSP (Paralytic Shellfish Poisoning). The U.S. Food and Drug Administration (FDA) study concluded that the risk of getting cancer from eating shellfish from even the most contaminated site (Windy Bay) is extremely low.

Explanation of Fish Tests and Summary of Results

Tests were done both in 1989 and 1990 on salmon, trout, halibut, and other bottom fish. ... Study results on all edible fish flesh samples showed extremely low levels of contamination, most around 1 part per billion or less. Toxicological experts concluded that all fish were safe to eat. A detailed risk analysis performed by the U.S. Food and Drug Administration (FDA) concluded that the risk of getting cancer from eating fish collected from the spill area in 1989 was so low that it could not be calculated.

Deer and Ducks

Muscle and livers from 16 deer and 19 ducks tested for oil contamination showed levels from non-detectable (nd) to 125 parts per billion. These levels do not present a health risk.

Marine Mammals

Forty one seals and sea lions were collected in 1989 and 1990 to test for hydrocarbon contamination. ... All tests showed levels of contamination well below any levels considered to be unsafe for people to eat.

For more information, call or write the oil spill coordinator at the Division of Subsistence, Alaska Department of Fish and Game, 333 Raspberry Road, Anchorage, AK 99518 (907) 276-2358.

EXXON VALDEZ OIL SPILL RESPONSE
Report to the Commissioner

Alaska Department of Environmental Conservation
Exxon Valdez Oil Spill Response Center
Ernest Piper, State On-Scene Coordinator

February 15, 1992

1.0 PROLOGUE

This report attempts to analyze the principal issues faced by the State of Alaska and this department on the *T/V Exxon Valdez* oil spill response from October 1990 through January 1992. It also attempts to explain where we succeeded and where we did not.

In many respects, the principal issues of this period were procedural and regulatory, as opposed to technical or scientific. The regulatory relationships between government and spiller, the procedural precedents that were being established, and the scope of state authority in large oil spills in many cases overshadowed the relatively straightforward technical issues of how, when, where, and why to recover oil.

The stakes were extremely high for all parties, not just for the state. As a result, negotiations and strategic positioning were often difficult and contentious.

Usually, during an oil spill response this department is called upon to address the strictly technical facets of oil spill response: locating the pollution, monitoring or directing a response, establishing and maintaining a proper chain of evidence, etc.

Throughout this response, this office has, in addition, been a center of diplomatic negotiations, media relations, risk communication, rumor control, scientific analysis, litigation support, and a whole range of public policy and public safety issues that swamped the small towns and villages of Prince William Sound, lower Cook Inlet, and the western Gulf of Alaska.

In the 15 months from the end of the 1990 summer field season, we have attempted to bring the response to a logical, complete, and technically supportable conclusion. We have also attempted to finish projects and reports so that they do not stand alone, but serve as foundation for future efforts by this department.

Where we have been successful, it is by the hard work and commitment of the hundreds of public employees and thousands of Alaskans who lived and worked with the spill and the response since 1989. I am especially grateful to the people of the spill region for their patience and support.

The staff of this office, the department and its sister agencies maintained a tenacious commitment to doing what was right, rather than what was expedient or what was bureaucratically safe. Beyond the politics and the pictures of the oil spill that made it into the news, there were hundreds of public servants trying very hard, every day, to do what was right.

2.0 EXECUTIVE SUMMARY

The Exxon Valdez Oil Spill Response Center established six principal goals for the 1991 season:

- Complete treatment to both federal and state requirements;
- Establish clear precedents and justifications for state treatment decisions and requirements;
- Increase coordination and cooperation with federal agencies, especially the U.S. Coast Guard;
- Better inform and involve the public in the decision-making process;
- Establish a monitoring program, with emphasis on sites at which the practical limit of cleanup had been reached;
- Establish procedures by which useful information could be transferred to permanent spill response staff for use in future spills.

Following are the principal ways in which the OSRC reached the goals:

- Surveyed 577 (an additional 11 were reviewed later) subdivisions;
- Identified 148 sites for treatment, including more than 50 based on specific state requirements above those established by the federal government;
- Conducted additional assessment and cleanup operations with state workers throughout late July and August. This was "finish" work designed to eliminate lightly contaminated areas from future contaminated site designations.
- ADEC, ADF&G, and ADNR prepared State Response Plan: Guidelines and Requirements, which codified state policies and requirements for cleanup.
- At the state's request, members of local communities were included in the spring survey (MAYSAP), with funding and other support through the Local Response Program.
- The use of fertilizers (or "bioremediation") was refined and better targeted. State-sponsored research and analysis helped ensure that state requirements for removal were met before fertilizers were applied.
- State survey teams and science staff initiated and completed detailed maps of sites where subsurface oiling remains. Exxon later joined this effort and helped better define these sites for future monitoring.

- ADEC/OSRC science staff completed shoreline survey project started in March 1989. This three-year effort is the basis for the long-term monitoring programs at contaminated sites.
- State identified subdivisions for a an FOSC-sanctioned 1992 spring survey that will include at least 61 sites;
- State acquired more than \$2 million in spill-related equipment and material from Exxon for \$699,000. The equipment will likely be distributed to responders and other agencies to increase the state's readiness and ability to respond to future spills.

The state's 1991 field effort was aggressive, thorough, and efficient. Good planning and negotiating over the winter of 1990-91 allowed the state to coordinate smoothly with the U.S. Coast Guard and to direct specific state activities with a minimum of delay or discussion.

The OSRC plans to complete all science, data management, and 1991 shoreline monitoring projects by April 15, 1992. After that date, the spring survey team will be merged fully into the Division of Spill Prevention and Response. Completion date for all Exxon Valdez response work is planned for June 30, 1992.

3.0 PRINCIPAL ISSUES AT THE END OF THE 1990 SEASON

The 1990 field season was a transition period for the Exxon Valdez oil spill response. By mid-summer of 1990, the emergency first response was largely over, and the shoreline cleanup was entering a phase much more like systematic, contaminated site remediation.

The emergency response structure is designed to favor quick decisions over slow deliberation. It requires that all parties be prepared to make compromises (and in some cases, sacrifices) to make sure that the most important public and environmental health and safety goals are achieved.

In 1989, all energy went into getting the gross contamination out of the water and off the beaches. The most realistic goal was to stabilize the problem rather than solve it completely. In some areas we achieved that goal; in others, we did not.¹

In 1990 we still had serious problems throughout the area, but 1989 cleanup and a winter of natural weathering provided conditions that allowed the spill response group to take a more systematic approach to setting priorities and allocating resources. Under these circumstances, it was natural that state and federal governments, with differing levels of

¹At one end of the spectrum, beaches such as SM005 (Smith Island) and EL052 (Northwest Bay, Eleanor Island) were in relatively stable shape entering the winter of 1989-90, while the northern Latouche Island segments were still bleeding oil.

regulatory and resource management responsibilities, would assign different levels of priority to the same problems.

3.1 INTEGRATION OF STATE AND FEDERAL GOALS

The system for making decisions and executing work orders was built around the assumption that all parties were still in emergency first response. Under those conditions, federal and state goals were largely the same, and most federal action covered most state concerns.

By the middle of 1990, we were approaching the point at which the state was going to require different techniques or more complete cleanup than that normally required under federal guidelines. The system of "joint response" agreed upon in 1989 by ADEC's commissioner, Dennis Kelso, and Admiral Paul Yost, the Coast Guard commandant at the time, was no longer fully meeting the state's needs.

Issues such as when to use fertilizers (bioremediation), what shorelines to clean, how completely to clean them, and field authority to direct Exxon crews were becoming more prominent and difficult.

Exxon was, with the federal government's approval, using fertilizers more extensively -- and instead of -- other techniques; federal guidelines allowed crews to leave behind more oil to weather, while the state wanted it removed; field crews were working off federal work orders only, so Exxon and Coast Guard supervisors would not usually do more work at a site when requested to by the state monitor.

As a result, state officials felt that many state concerns were left unattended in 1990. They felt it was necessary to make changes in the system over the 1990-91 winter so that both federal and state goals could be fully met in the most efficient way.

In addition, state officials were concerned with the growing influence of Exxon over the decisions and the action taken in the field. Exxon had become more than a consultant to the governments or a contractor undertaking cleanup orders; the company, by its presence on key decision-making groups and its use of the official record, began to take on a quasi-governmental status. Exxon's opinions were increasingly treated as if they were rendered by an impartial third party, as opposed to a negligent spiller voluntarily cooperating in a massive government pollution control and abatement action.

State officials were concerned that the "joint" response system was giving Exxon opportunities to limit its eventual liability for its actions.

3.2 THE TECHNICAL ADVISORY GROUP

The Technical Advisory Group (TAG) was the forum for making cleanup recommendations

to the Federal On-Scene Coordinator (FOSC) in 1990 and 1991. It was the successor to the Interagency Shoreline Cleanup Committee (ISCC) used in 1989.

The ISCC system included a wide range of technical and community groups. The TAG, instituted by the FOSC after 1989-90 technical meetings, included only principal state and federal agencies and Exxon. Meetings were closed to the public by decision of the FOSC. Theoretically, communities communicated to the TAG through either the state or by comments to the FOSC. However, the TAG system was a departure from the broad-based, open-access system of the ISCC. The public did not like it, and the state urged, without success, to have the proceedings opened.

The state did not view the lack of public access as a fatal flaw in the TAG system and participated in the process. To its credit, the TAG put a narrow choke point on decision-making, which increased accountability, forced state and federal spill managers to bring unified positions to the table, and streamlined the process.

However, by midsummer of 1990, the TAG was evolving into a system in which the state had little, if any control. The state participated in the TAG, but the TAG's recommendations more closely followed the federal government's preferred strategy.

Theoretically, this did not present a problem because federal law does not pre-empt a state from enacting stricter cleanup standards, as long as those standards do not conflict with federal law, and as long as state-directed activities do not interfere with the federal government's.

In practice, however, the TAG recommendations and the FOSC decisions that followed presented a real threat of cutting off the state's ability to order or undertake supplementary work.

First, the TAG was consistently described by the FOSC and Exxon as a strictly technical body, a group of scientists and engineers making the best, most practical, most environmentally sound cleanup decision possible. It was also portrayed as a body that made recommendation by consensus, and that all decisions would likely result in what was described as the optimal "net environmental benefit".²

Consider the implications those premises held for future state action outside of federal-directed activities:

- a) If the TAG rendered the best technical recommendation possible, then any non-TAG action was less than the best technical recommendation possible;
- b) If a TAG recommendation was designed to achieve the optimal "net environmental benefit", then any non-TAG action would likely result in

²RADM D.E. Ciancaglini, press release, July 17, 1990.

something less than an optimal "net environmental benefit";

- c) If "consensus" is indeed one of the agreed-upon rules of the joint TAG, then by its presence on and participation in the TAG, the state agrees with all the TAG's recommendations.

This was an extremely disadvantageous position for the state to be in. State regulations (like federal regulations) generally require cleanup to continue until the technical capabilities for cleanup are exhausted, or until the cleanup begins to cause more harm than leaving the oil in place.

This raised the troubling possibility that should the state actually order Exxon to do additional removal or take other supplementary action sometime in the future, our ability to enforce was tied directly to a federal decision over which we had limited control. Exxon could invoke the TAG and:

- a) Question the technical basis of the state's order;
- b) Portray the state's order as unsupported by regulation;
- c) Attack the state's order as a reversal of an earlier position agreed upon by all parties.

This could lead to delay, confusion, and little or no additional work done at the necessary shorelines.

Further, it could have raised serious implications for Exxon's liability for civil or criminal damages. "Mitigation of damages" is one of the core tests in oil spill response legal disputes: Did the responsible party make every reasonable effort to mitigate damages? Did the government interfere with the responsible party's efforts to mitigate damages? Did the government actually cause further damage by some order or requirement?

Given that this was likely to be the biggest oil spill civil damage dispute in history, and given the state's stake in the result, I was very uncomfortable with the structure of the TAG, the role of Exxon on the TAG, and the premises behind the TAG's recommendations. Clarification of the state's role on the TAG was one of our principal targets for action in 1991.

3.3 NET ENVIRONMENTAL BENEFIT

The TAG, theoretically, produced only the decisions that were likely to produce a "net environmental benefit." This term took on mantra-like status with NOAA, the Coast Guard, and Exxon by 1990.³ It was, supposedly, the guiding principle of all cleanup decisions. It was, unfortunately, a gross simplification.

³To this day, when corresponding with me, Exxon officials not only mention the term, but frequently capitalize it as well.

It was also entering the lexicon of the spill almost as a regulatory citation, and steering the decision-making process away from a multi-layered analysis of what actions the governments should take when faced with a massive public policy problem.

The term emerged in midsummer 1990 from a NOAA report on the feasibility of building some kind of rock-washing device.⁴ The state argued, in its comments on the draft report, that NOAA was putting too much weight on intertidal biology in deciding whether such disruptive work did more harm than good. NOAA largely ignored the comments, yet listed the State of Alaska as a joint author of the report, which implied consensus.

The state maintained (and still does), that the equation to determine "harm" had to include more variables, so that public policy considerations stood alongside biological considerations; further, the state argued, the weight of a given variable may change from shoreline to shoreline, depending on what the area was used for. In short, the state favored a more flexible cleanup policy that was based on resource uses, not primarily on a biological or geological profile.

Those non-scientific variables were more critical for the state than the federal government, simply because the state had more -- and more complex -- land and resource management responsibilities than the federal government.⁵ When the TAG put these variables into its cleanup equation, it turned the discussion into a public policy decision, not a scientific or technical one.

Which raised, for the state, a very serious question about Exxon's role, influence, and access in the TAG. It was one thing for state experts to sit down with Exxon engineers and federal biologists to reach a consensus about whether a hot water hose was going to remove oil from a beach; it was quite another thing to try and reach a consensus on whether the public policy consequences of the treatment were worth employing it.

The TAG was not a technical body -- it was a public policy group; the decisions were not about "net environmental benefit" -- they were about how public lands and resources were to be protected or managed. And Exxon, with a voting seat⁶ on this public policy committee, had more access than the general public, and had the ability to water-down government decisions or steer them towards policies that best served Exxon's corporate or legal interests.

⁴NOAA. 1990. *Excavation and Rock Washing Treatment Technology Net Environmental Benefit Analysis*. (NOAA Hazardous Materials Response Branch, Seattle, WA.)

⁵For example, the federal government has no special statutory interest or responsibility in the management of state parks; the state government has authority over the health and management of the salmon fisheries in the spill area; the state leases setnet and mariculture sites, where the federal government does not.

⁶Actually, Exxon served as the chair of this group, designated by the FOSC.

For example, the state argued that removing the oil quickly meant that normal use (and full value) of the areas would return more quickly. The intertidal communities would reestablish themselves fairly quickly, despite initial impacts, and the beach profiles would not be irrevocably changed or damaged.⁷

The federal government, which did not share the state's responsibility to manage those uses or protect those values, felt that it was acceptable to leave more oil to weather naturally. This was not an invalid position, of course; it simply did not fully reflect the state's needs.

Exxon, which strongly opposed excavation, tilling, and other intrusive measures, favored the use of fertilizers instead. This was cheaper and less difficult than removal. This, too, was not an invalid position; it was simply not the one the state government preferred in many cases.

So, with the federal government and Exxon in general agreement -- on policy, not just technical aspects of removal and bioremediation -- fertilizers became the treatment of choice in 1990.

As a practical matter, this meant that the administrative record was being steered away from support of state policies, and that the technical record was being built as a defense against potential state action in the future.

By mid-summer of 1990, it was obvious to us that the premises behind the TAG and "net environmental benefit" were flawed, and that unless we did something about it, we ran the risk of limiting the state's options to require cleanup.

Moreover, by allowing the administrative and technical record to continue in the direction it was headed, the state was exposing itself to potential enforcement problems on cleanups far beyond the Exxon Valdez response.

Exxon's role in the decision should have been limited to reviewing the governments' cleanup decisions and telling us if the company had the technical capability to carry out the order.

But in fact, Exxon -- using the "net environmental benefit" test -- changed the focus of the discussion. Instead of arguing whether they could physically perform the work required

⁷Indeed, later field data show support for this hypothesis:

- Exxon USA. Owens, E., et al. 1991. *Berm Relocation 1991 Field Study Results*. Volume 1. (Exxon Co., USA, Alaska Operations, Anchorage, AK.)
- NOAA. Michel, J., Hayes, M.O. 1991. *Geomorphological Controls on the Persistence of Shoreline Contamination from the Exxon Valdez Oil Spill*. (NOAA Hazardous Materials Response Branch, Seattle, WA.)

by the governments, they turned it into a discussion about whether the work was necessary at all according to Exxon's preferred interpretation of the regulations. Exxon could not only question the state's decision, the company had an exclusive access to the decision-makers, as well as a vote against them.

The TAG was not really a voting body, of course. Cleanup decisions did not truly come down to a show of hands and majority rule. It was, however, a body in which the state's position could be isolated, its technical position could be discredited, and its authority could be diluted or neutralized.

As stated before, the state's cleanup policies were influenced strongly by state regulatory responsibilities not shared with the federal government. If Exxon did not want to deal with a stricter state recommendation, it could ally itself in the TAG with NOAA, invoke the federal government's policy of using "net environmental benefit" as the principal test, and claim the state's position was not the TAG consensus. More important, since the state's position was not the TAG consensus, Exxon would claim that the state's position was therefore technically unsound. Remember, the federal government and Exxon insisted that the TAG used a strictly impartial, strictly scientific, peer review kind of process.

With this kind of group decision-making dynamic in place, the state's representatives to the TAG were working at an extreme disadvantage. The concept of a "joint" response proposed in 1989 by Coast Guard Commandant Admiral Paul Yost was a good idea proposed in good faith. Unfortunately, the institutions that evolved from that concept were limiting and eroding state enforcement powers.

I have discussed the "net environmental benefit" question at length elsewhere in the report. In practical terms, an unscrupulous spiller looking to confuse an issue, avoid responsibility, or otherwise avoid taking a state-ordered action could draw on Exxon Valdez precedents by arguing that the state had to conduct a "net environmental benefit" analysis, or include the spiller in a committee that gave power-sharing and decision-making authority to the spiller.

The spill bureaucracy was a creation of this particular incident, and it included other precedents that held the potential for eroding existing government authority to enforce pollution control requirements. There was a constant, heavy-handed pressure from both Exxon and the federal government to do everything "jointly." This is not the same thing as doing things cooperatively, or working together; this meant literally accepting as the state's position whatever the group (which, remember, included the federal government and a private corporation) decided by consensus.

I found this patently bizarre: Why would one expect the federal and state governments to agree on everything, especially when they had different management responsibilities? Why would anyone expect that when making major public policy decisions, the state government should give an equal vote to the company that spilled the oil? What if the

group came up with a decision that, if accepted by the state, would eliminate our lawful option to require additional treatment at a site when the federal government was done?

Like the "consensus" issue in the TAG, this issue of "joint" endorsement of all FOSC or NOAA decisions and positions was seriously straining relations through 1990.

It was also unprecedented in national spill response policy. It is interesting that with a few exceptions, most of the major issues and policy questions were debated in the TAG and other creations of the Exxon Valdez response bureaucracy -- not in the Regional Response Team, where the state had more clearly established powers and the spiller had none.⁸

If a similar incident occurs in the future, the state would be well advised to stick more closely to the RRT as a decision-making and dispute resolution group. The emphasis on forcing consensus and endorsing activities jointly with a spiller -- and even federal agencies -- can hurt the state on several levels. The lesson from the Exxon Valdez is obvious, to me.

In terms of public communication, it sent a confusing and unsettling message. When the public attended an operations steering committee meeting and saw Exxon's Otto Harrison sitting on an equal footing with the governments' two chief cleanup directors, the casual observer would have every reason to question whether the governments were in charge of a major environmental enforcement action.⁹

On a legal level, this "joint" arrangement struck me as extremely dangerous. The TAG, the NEBA report, the reports from the "joint" surveys -- none of these completely and accurately portrayed the state's scientific or public policy decisions. Even with the numerous state disclaimer letters and memoranda in the record, the record could give a judge or jury an impression of inconsistency or confusion in the state's claims.

The size, complexity and intensity of the spill response required the creation of standard operating procedures and discipline in carrying them out. The TAG and other institutional

⁸Perhaps the biggest issue that came before the RRT was on the use of fertilizers, or bioremediation. In the Alaska RRT, the state had what amounted to a veto vote over the use of new techniques such as bioremediation.

⁹During the winter of 1990-91, Deputy SOSC Colleen Burgh and I suggested that the 1991 ops steering meetings be called something else, such as the Federal On-Scene Coordinator's briefing, so that there was a clear message that the government was "in charge." Nothing came of the suggestion. Interestingly, at the March 1991 biennial International Oil Spill Conference, the Coast Guard's chief public information officer presented a paper about the importance of using events such as briefings and public meetings to show the FOSC as the lead officer in charge. (See USCG. Meldt, R.M. 1991. "Public Perceptions in Spill Response". 1991 International Oil Spill Conference Proceedings. (American Petroleum Institute, Washington, DC.)

procedures helped the organization and execution of extremely complicated and often dangerous tasks.

However, like all bureaucracies, this one tended to become inflexible. Like all bureaucracies, middle management, left to its own devices, eventually began to put the process above actual results. Fulfillment of procedural goals often obscured the mission, and became a mission in itself.¹⁰

In addition, the fact that we were making up the spill procedures as we went along worked to Exxon's advantage. As I have pointed out elsewhere, Exxon was able to establish for itself a quasigovernmental status, which allowed company management to institutionalize its point of view in the public record and the governments' system of regulatory enforcement.

The chaos of the first year, the enormity of the problem, and the unprecedented nature of the cleanup effort were, collectively, the cause of this problem.

In late July 1990, in an attempt to deal with this problem, then-ADEC Commissioner Dennis Kelso, Attorney General Douglas Baily, SOSC Randy Bayliss and a representative from the Governor's Office met with the new Commandant of the U.S. Coast Guard, Admiral William Kime. The state presented these arguments formally, suggested a new guideline for the use of fertilizers, and informed the federal government about the state's plans to undertake independent action to supplement federal response, if necessary.

The meeting produced no meeting of the minds. However, the Commandant said the Coast Guard expected Exxon to return in 1991. With this assurance, ADEC and sister agencies began planning a new course of action designed to make sure state concerns and requirements were fully met during the 1991 cleanup.

4.0 DEVELOPMENT OF THE 1991 PROGRAM

In October 1990, the state's spill managers began drafting a 1991 plan based on state requirements. The idea was to build a case for the state's land and resource management decisions, clarify the state's participation in the "joint" response, and remove Exxon from the quasi-governmental role it had been able to assume in the decision-making process.

¹⁰The best example was in 1989, when the agencies expended billions of computer megabytes and hours of staff time tracking "miles of beach treated" instead of concentrating on qualitative measurement of the response's progress. On a field level, the process-above-mission problems continued into 1991, when field supervisors put more emphasis on "filling the work order" and less on determining whether the shoreline was properly cleaned up. This was not always the case; there were many occasions on which field supervisors ordered crews to work beyond the paper order. But in 1989 and especially in 1990, the problem of supervisors being slaves to the paperwork and the process was endemic. The notebooks of our field monitors are filled with examples.

Ultimately, the goals of the plan were to protect the state's options and authority, minimize misunderstanding and controversy, and to get better results on the shorelines in 1991.

In November 1990, the state released the "1991 State Response Plan: Policies, Requirements, Guidelines" for public comment. (The final plan appears as Appendix >) The draft plan was not intended as new regulation, but rather as a clear and readable statement about how and why the state would enforce existing regulation on this unique spill response effort.

The plan explained the legal and technical basis for state cleanup decisions. It described established shoreline uses and explained the priority system for determining what should be treated in 1991.

4.1 THE TAG

The plan explained that the TAG was a forum for our agencies to explain what action the spiller should take based on the state's priorities and requirements. Under federal law, the FOSC has the option of cleanup up to a state standard that may be stricter than the federal standard.

If the TAG recommendation to the FOSC met the state requirement, so much the better. If it did not, we retained the option of requiring the spiller to do more. The state plan explained that the state treated the TAG as a public policy forum, not a strictly a technical decision-making body. The TAG recommendation did not necessarily reflect the state's position, and we retained the right to order the spiller to conduct cleanup to state standards as well.

Exxon was very concerned about this policy. Two of its top managers on the spill expressed their dismay to me, and once again implied that the state was somehow departing from established spill response principles. The Coast Guard, however, eventually supported the state's position when it became clear that we were not trying to usurp federal authority or alter a system in place under existing federal regulation.

4.2 STATE CLEANUP REQUIREMENTS

The plan listed the statutory and regulatory authority held by the state to establish more stringent cleanup requirements when state lands and resources were affected by the pollution, or when a use of a given area was largely a matter of state or local concern.

4.3 WORK ORDERS

In 1989 and 1990, only one work order -- the FOSC work order -- was the basis for work in the field. This often left our field monitors at a disadvantage. With no state work order to guide more extensive cleanup at a site, the monitors could not require the crew on-site

to do more. The state decided to write its own work orders before going into the federal TAG discussions, so that monitors in the field had a reference point to guide more extensive work, if necessary.

4.4 "NET ENVIRONMENTAL BENEFIT"

The NOAA/Exxon interpretation of "harm" did not extend much farther than the discrete shoreline ecological system. The state's definition of harm put additional weight on the uses of the area and the value of the resource. This was the basis of our position that short-term harm to intertidal communities is acceptable if it helps allow normal use of the area more quickly.

The state did not and would not propose to do cleanup that would benefit tourism or recreation at the expense of the long-term health of the environment -- indeed, the sociological and economic reasons the Sound is valuable to the public are rooted in the health and cleanliness of the environment. However, the state did -- and should -- view the cleanup as an activity designed to improve the health of the environment and benefit the users of the resources.

For the state representatives, the net benefit of cleanup could be judged only when the Sound and the Gulf of Alaska were viewed as an area of environmental resources and uses -- not just resources. The term "net environmental benefit" represented, in our view, an arbitrary and incomplete analysis.

4.5 TREATMENT TECHNIQUES

In February 1990, all the parties agreed that the least intrusive method of treatment is preferable, unless that least intrusive method isn't doing the job.¹¹ Once again, we ran into differences in interpretation about the relative effectiveness of various techniques.

It was really a debate about what rate of cleanup was acceptable. Once again, since NOAA had no regulatory interest in a speedy cleanup, its recommendations put an emphasis on passive treatments (such as fertilizers) or no treatment (natural weathering).¹² The state, with specific and important regulatory and resource

¹¹Exxon USA. 1991. Summary of February, 1991 Joint Technical Group Meeting. Newport Beach, CA.

¹²NOAA's position on hot-water, high-pressure washing is a reflection of its institutional bias. Assuming there were no pressing public health or safety issue, by this logic, oil spills should be left to natural forces as much as possible. Theoretically, this is not an indefensible position. However, most areas affected by oil spills have many uses associated with them, uses that are impaired or prevented by the presence of the oil. Society prefers a clean shoreline to a dirty one, particularly when the polluted shoreline interferes with the public's use or enjoyment of that shoreline. For a more complete discussion of these positions, see:

• NOAA. Houghton, J.P. et al. 1991. *Evaluation of the Condition of Intertidal Biota in Prince*

management interests, favored techniques that did the job more quickly.

The state plan detailed a state policy that favored techniques that provided swift, sure results (removal) over those whose results were less swift and less measurable (fertilizers).

As it turned out, the plan worked as a springboard for fruitful and substantive discussions with other parties on the response.

By sorting specific state issues separately, the Coast Guard was able to direct its federal response without setting new precedents or conflicting with established federal procedures nationwide. The state, meanwhile, was able to design whatever independent strategies were necessary to ensure that state requirements were met.

OSRC staff in January and February 1991 traveled to eight spill-area communities for public meetings on the state plan. The public was able to comment in writing, as well, and several substantial changes in the final plan were made based on that comment.¹³

In summary, the plan described a course of action that was both cooperative and independent. It showed us ready to work with the Coast Guard to reach mutual goals, and ready to take state-directed action if necessary.

The document gave discussions a focus and minimized the potential for potentially damaging misunderstandings and miscommunications. Relations with the Coast Guard improved, and Exxon subsequently expressed its intention to fulfill both state and federal government requirements.¹⁴

5.0 1991 FIELD SEASON

The 1991 field season consisted of a spring shoreline survey, cleanup through July 15,

William Sound Following the Exxon Valdez Oil Spill and Subsequent Shoreline Treatment. (NOAA Report HMRB91-1. Seattle, WA.)

- ADEC. Piper, E. April 11, 1991. Memo to: Distribution.
- ADEC. Gibeaut, J. February 8, 1991. Letter to: Mearns, A. NOAA.
- ADF&G. Kuwada, M. January 30, 1991. Memo to: Piper, E. ADEC.

¹³The biggest problem, the public felt, was that the draft plan appeared to rank resource uses (i.e., commercial fishing above subsistence). This was not the intention of the plan, but we made substantial changes in Section 4.0, Resource and Oiling Categories, in an effort to meet the public's concerns.

¹⁴Exxon always said it would complete cleanup to federal standards, or that it would comply with the orders of the Federal On-Scene Coordinator. Company officials carefully avoided making similar statements about orders from the State On-Scene Coordinator. Finally, early in 1990, on a direct question in a TAG meeting, Andy Teal said Exxon would, indeed, comply with all state requirements as well.

and supplemental survey and cleanup by state personnel in July and August. Exxon also undertook a July-August bioremediation program approved by the FOSC.

5.1 MAY SHORELINE ASSESSMENT PROGRAM (MAYSAP)

In September 1990 OSRC staff began preparing the draft list of shoreline segments to be included in the spring 1991 survey.

The process was fairly simple: Staff took the entire list of shoreline segments, then deleted those that had been completed to the state's satisfaction, or those described as "no oil observed" in all previous surveys back to 1989.

The actual work was tedious and time-consuming, because OSRC staff repeatedly checked and double-checked data base information against field notebooks, videotape and photograph records, daily shoreline activity reports (DSAs), other agency information, and public observations.

The result was a list of over 600 shoreline subdivisions in PWS and the Gulf of Alaska regions. The state released the list for public comment in November 1990. There were a small number of additions and deletions based on public and local government comments, but the total stayed at or near the original number.

During December 1990 and January 1991, OSRC staff worked with Exxon and the Coast Guard to come up with a single, integrated list of survey sites. Exxon provided information that allowed us to target subdivisions (as opposed to whole segments) whenever possible. The state also agreed to give its field monitors the authority to reduce the scope of a segment survey if conditions warranted it.

The final list of 588 subdivisions was adopted on March 8, 1991 and approved by the FOSC. It is important to note that the final joint list was based on the initial state compilation of November 1990, with a few minor changes based on information from Exxon and the Coast Guard.

The MAYSAP plan was approved by the state and federal coordinators in early March. It provided for six teams of 11-12 people each, five teams on vessels and one helicopter-based team operating out of Anchorage. The helicopter team targeted anadromous streams.

Each team included a state and federal monitor (sometimes there were two federal officials, one from NOAA and one from the Coast Guard), an Exxon representative, a geologist and a biologist under contract to Exxon, a representative of the relevant land manager, a representative from a spill-area community, and support staff. The support included one or two contract laborers who were to pick up debris or obvious patches of

easily recovered asphalt or tar.¹⁵

State representatives to the TAG did not feel it was necessary to include a biologist, since the observations of birds, intertidal creatures, vegetation, etc. were not part of a qualitative analysis of biological activity or recovery.¹⁶ A biologist could be helpful in identifying what types of animals and vegetation existed at a given site, but absent a comprehensive study plan, such observations had limited utility. However, the Exxon biologist -- and the type and use of the observations -- became parts of another effort by Exxon to use the public record for its own purposes.

Simply observing "X" number of birds produces little more than scientific non sequitur. An absence/presence tells you only that there's a bird and it is alive; it tells you nothing about the health of the creature or the normalcy of its nesting or mating, and so on. Creature counts are numbers drifting aimlessly in scientific space unless they are compared with baseline data. The state saw no scientific value in these simple counts, and questioned the need to include such information on reporting forms designed to deal with very different kinds of information.

The biological observations, however, seemed especially important to Exxon, and the reason became fairly obvious as time went on.

Exxon later produced a video news release based on the biologist's numeration of birds, mammals, and other species.¹⁷ The company's public relations staff also called newspaper reporters and other media outlets with the numbers, offering to have a biologist speak to the reporter.¹⁸ In many cases, Exxon implied or stated that the physical observations of various numbers of animals showed that the Sound and the Gulf were either recovered or on the way to recovery.¹⁹

In addition, the comments from Exxon field surveyors on official MAYSAP reports followed a familiar pattern, with frequently matching terminology such as "abundant," "diverse" and "thriving biota." Frequently, the "thriving biota" were the basis for a field recommendation

¹⁵A more detailed discussion of the MAYSAP, including copies of the forms, schedules, etc., is in Exxon's *General Operations Plan* (May, 1991), approved by the FOSC and SOSC in June, 1991.

¹⁶Mark Kuwada, ADF&G, commenting at a February, 1991, TAG meeting in Anchorage.

¹⁷See "Exxon's Claim of Healed Sound is Misleading, Official Says", by T.A. Badger, *The Associated Press*, May 22, 1991.

¹⁸David Futch of The Anchorage Times called me in late May to ask me for comment on the biological recovery issue. He said Karsten Rodvik of Exxon had called him, offering to arrange an interview with one of the Exxon contract biologists participating in the MAYSAP.

¹⁹Badger, T.A. May 21, 1991.

of "no further treatment" by Exxon field surveyors, even when the oiling was in the upper intertidal or supratidal zone, and when cleanup operations would come nowhere near the animal and plant habitat of the mid- or lower intertidal zones.²⁰

From a technical standpoint, this was a further example of the truncated analysis in the controversial NEBA report: The beaches were primarily viewed as biological communities, not as areas which had a complex and overlapping pattern of human and animal use. Viewed in that context, the "thriving biota" comments are understandable and unremarkable.

However, viewed as a part of the regulatory process, it is much more interesting.

Throughout the spill, Exxon -- with extensive manpower, computer and other technical resources beyond those of the governments -- produced the documents and forms that became a part of the official record. Further, as a charter member of the TAG group, the Exxon corporation began to take on a quasi-official, subgovernmental status. Exxon was making recommendations about the effectiveness and the desirability of treatment techniques; it was offering comment on the health of fisheries, the recovery of the environment, the ability of people to use the areas according to previously established patterns.

These comments and judgments were included in the official record; indeed, when Exxon produced its 1991 operating plan, nowhere did it say that the document was produced and written by Exxon, nor did the final plan reflect the fact that the governments did not agree with the value judgments and conclusions reached by Exxon.²¹ A member of the public picking up such a plan could easily assume the imprimatur of the government on such language. From the standpoint of litigation, a judge or juror could become confused by a cleanup plan that received government approval -- but with language that conflicted directly with government damage claims.

Exxon's expertise was formidable; its willingness to stick with the project was admirable; its technical advice was frequently valuable. However, I fear that at stages in the spill response, the public could have been left with the perception that government was being led, rather than leading.²²

²⁰See 1991 MaySAP field report forms for shoreline subdivisions: KN0702B and GR103A.

²¹While the FOSC distanced the federal government from the language in the plan, he did not have the language removed, despite a specific state request to do so. See:

- Exxon USA. 1991. *General Operations Plan*.
- ADEC. Piper, E. June 3, 1991. Letter to: FOSC.

²²It was often more than just perception. The federal government allowed Exxon to be the official chair of the TAG. This curious arrangement left Exxon -- a private company accountable to its shareholders, not the public -- as head of the group that made complex public policy recommendations

The official record, including that of the MAYSAP, will reflect that. The comments provided by the biologists, and the way in which Exxon employed them, were part of an attempt to steer cleanup decisions away from the multidimensional analysis employed by the state, and back to the biology-based "net environmental benefit."²³

Again, this should hardly come as a surprise. Exxon had a vested financial and legal interest in the treatment decisions and the way they were characterized, and so it would be rational for a corporation to try to influence the process to its benefit. It is also natural and reasonable to expect that a corporation would use its public relations office to present such a favorable view.

Exxon did this in a variety of ways, such as the video news release mentioned above. The corporation also had three biologists who made observations that were packaged in slick publications and distributed to the media. The public is used to this kind of corporate communication, and rightly see it as separate from whatever the "official" position of the governments may be.²⁴

But the MAYSAP's biologist field reports -- and the cleanup recommendations that cited the biologist's comments -- came in a package very unlike the usual offering of corporate PR.

What is remarkable is that Exxon was able to exert this influence from within the system itself, almost as an official government-sanctioned partner. And indeed, the MAYSAP field reports, with biologist comments reflecting "diverse," "abundant," and "thriving" biological communities will be the paperwork reviewed by judges, jurors, and historians in the future.

For all of Exxon's technical jargon and sanctimonious invocations about cleanup decisions requiring hard scientific support, the company allowed its field representatives to litter the technical record with speculative and scientifically unsupported conclusions.

and interpretations of regulation to the government's top spill official. This was more reason why the state felt it important to clarify its role in the TAG and the rest of the spill structure in 1991.

²³Exxon never gave up on trying to make biology -- specifically, intertidal recolonization -- the foundation for all cleanup decisions. In spring, 1991, Exxon called state and federal officials to its corporate offices for a meeting with Dr. Jennifer Baker, one of the three British scientists contracted by Exxon to collect anecdotal information for company monographs on the subject of biological recovery. At this meeting, Exxon attempted again to use the Baker observations as the basis for determining "net environmental benefit."

²⁴Exxon's public relations experts were skillful at giving the observations of the three biologists a veneer of scientific impartiality. The company put the trio's observations in a colorful, high-quality monograph and released it in San Diego during the biennial International Oil Spill Conference. It was not a part of the conference's proceedings -- indeed, none of the information had been subjected to peer review or accepted for publication by a professional journal -- but the press reported the information as if it were a paper presented at the conference.

The comments of the Exxon representatives were remarkably similar. Of the 577 subdivisions reviewed in MAYSAP, Exxon field representatives described the biological community on 147 subdivisions as "healthy," thriving," "abundant," or "diverse."²⁵

The frequency and similarity of the comments create a semantic comic opera when sung aloud. At AE002, "mussels, fucus and other biota appear healthy," according to the Exxon rep, who was not a biologist. At AE005, there was a "healthy resurgence of biota."²⁶ At BA002, a different Exxon rep commented on the "prolific biota." At CU004, it was the mussels, rather than the biota in general, that were "prolific." But not to worry: At DI063, the biota theme returns with "plentiful" as the adjective of choice. At ER002 and ER007, the Exxon rep reported "abundant and healthy biota," although next door at ER008, where apparently there were some new adjectives, the biota was "dense."

Occasionally the comments and the observations would fail to match. AS005, in the Kodiak region, was "a healthy looking shoreline," even though it was an exposed, high energy shoreline that is, due to natural conditions, a poor candidate for biological growth. Similarly, at PR002A, a different Exxon rep reported "abundant biota" and recommended no cleanup, even though the biologist on the team noted that the biological community was sparse, as one might expect on a high energy shoreline.

Once again, it is hardly remarkable that Exxon would attempt to convince the governments that only minimal cleanup should be required. What is both remarkable and troubling is that this rousing chorus of health, diversity and robust recovery has become part of the official record, and it was placed on the table in the TAG as if it were fact.

None of the Exxon field representatives was trained in biology, coastal ecology, or a related field, and none was therefore qualified to make the statements on the MAYSAP form. Their comments were useless, from a technical standpoint.

The observations of the biologists were somewhat helpful, but they hardly qualified as hard science. Taken together, these observations might seem to the untrained eye -- the eye of a judge or juror, for example -- as a definitive scientific statement of the area's relative health following the spill. Was the distribution of the biota similar to what it was before? Were opportunistic species altering the usual progression of recruitment? Were the mussels in the dense bed free of hydrocarbon contamination? Absent a properly designed study, the observations could help little in seeking answers to these questions.

²⁵As the reports started coming in we saw amazing similarities in terms, adjective combinations, and phrases. Eventually, when the comments were all entered in our data base, we did a search using key words. I rather doubt it is coincidence that more than 25 percent of the reporting forms included nearly identical sets of descriptive terms.

²⁶The Coast Guard reps occasionally sung along. At AE004, Exxon's rep found no reason to mention the biological activity. Not to worry: the Coast Guard man advised against "trampling in the diverse biota."

In short, Exxon was allowed to build a long and detailed paper record that it could present in the supposedly "technical" TAG discussions -- or some time later in court. I did not appreciate the fact that Exxon was being allowed to arrange information so that it could use the official record to either avoid cleanup, buttress some defense, or reduce its liability. This was one more example of the way that the spill's bureaucratic system worked to Exxon's advantage. The federal government was either unaware of this or unconcerned.

The quirks of the national spill response structure provided the opening. Technically, Exxon -- as the responsible party -- had the right to conduct the spill response under government monitoring. The MAYSAP, which was financed and organized by the corporation, was technically an Exxon activity in which the governments were participating. Therefore, if Exxon insisted on making room for a biologist of its choosing, the governments were hard-pressed to say "no."

More important (and more practically), this was hardly an issue that warranted a confrontation, which might have delayed cleanup or caused other problems on the shoreline. The survey was covering the sites we wanted it to cover; it included the state and community monitors we wanted to be included; it would deal with the issues we felt were important. However, the "biologist issue" was a clear indication of what arguments Exxon would present when the TAG met to discuss treatment at specific shorelines.

It also serves as a lesson for the state and federal governments about how important it is for environmental regulators to maintain a professional distance from industry when engaging in cooperative activities such as this. While we were able to re-establish this kind of relationship on a number of fronts (the TAG, for example) in 1991, we were not able to keep Exxon from using the MAYSAP public record to "spin" the process its way.

The state had five principal goals of the MAYSAP:

- Identify areas for treatment;
- Make a preliminary treatment recommendation for those sites;
- Identify and describe areas of significant subsurface oiling;
- Complete simple pickup operations with contract workers whenever possible.
- Make sure that spill-area communities had eyes, ears, and a voice in how the survey went and what would be recommended.

The MAYSAP provided us the opportunity to do all except the proper subsurface oil location and mapping. Both Exxon and the federal government did not want to extend the survey to this level of detail. The state, on the other hand, felt this was an integral part of the survey: Failing to accurately document and describe all the pollution conditions would give the public an unrealistic and incomplete view of the status of publicly-held resources.

If we were unable to clean up subsurface concentrations, then we felt it important to locate and map them, monitor them through time, and provide the public or the landowner with that information.

State monitors did some subsurface surveys during the regular MAYSAP: on some teams, conditions and personalities combined so that some of the work could be done within the Exxon-designed survey. The state also deployed first two, then a single vessel, to complete subsurface surveys, do quality-assurance checks on the MAYSAP crews, and respond to special situations as necessary.

The state vessel also allowed the Department of Natural Resources and the Department of Fish and Game to spend extra time at sites of special importance.²⁷

The MAYSAP began on schedule the week of April 22, beginning with orientation for the crews, and ended ahead of schedule in most areas by the last week in May. In general, the survey went well and the state was able to accomplish its goals. Due to the experience of the teams, the settling of controversial issues beforehand, and the logistical ability of the state to do extra or site-specific work on its own vessel, the survey went safely and smoothly.

The state's representatives on the MAYSAP teams were instructed to make treatment recommendations based on observed conditions and the state's specific cleanup requirements. Those recommendations then went to the ADF&G, ADNR and ADEC supervisors in Anchorage who factored in other variables (such as logistics) and wrote a unified state work order based on the MAYSAP survey.

While ADEC was the lead agency dealing with the federal government and Exxon, it was critical for all state agencies to come up with a unified recommendation. For that reason, the state's spill managers either added an extra agency rep to certain teams, or delegated all state field authority to a single representative from the agency with the principal management authority at the site.

ADNR used extra reps at designated recreation sites, parks, or other state lands with a history of human use, or at sites that held special land management value (such as leased economic sites). ADF&G was the principal state representative on a special, helicopter-based survey team that concentrated on anadromous streams.

With few exceptions, this plan worked well. It is natural for agencies to have differences of opinion or priority from time to time, but all agencies recognized the importance of settling differences away from the federal-Exxon-state table. The result was a solid, single state position, which projected authority, ensured consistency, and promoted efficiency.

²⁷The State Vessel Report appears as an appendix to this document.

Local community representatives also made sure that when they had criticism of a state position, they came to us first. In cases where they did not agree with the final state position or a given state statute or regulation, they let us know, but did not try to press their case at the federal level. The state appreciated the cooperation of the public in this regard.

In summary, the state's participation in the MAYSAP was marked by professionalism under difficult circumstances, credibility in technical treatment decisions, independence, cooperation, public access, and field safety. We met our goals and set the stage for an effective cleanup season.

5.2 1991 SHORELINE CLEANUP OPERATIONS

By the end of the MAYSAP, state agency specialists had a clear sense of what the field conditions were, and more important, there was more certainty about the best way to deal with the problems.

In 1989, the problems were fairly obvious, as were the means of treatment: There were large quantities of fresh oil and emulsion throughout the area, and it had to be contained and collected by whatever seemed to work.

What worked, greatly simplified, was a combination of hydraulic force (hoses, flushing systems, Omnibooms, etc.), conventional containment and absorbent equipment (boom of various types), and large applications of manpower. The principal differences of opinions were whether there was enough of all three, whether they were being combined in the right balance, and whether they were going to the right areas, at the right time, and for the right length of time.²⁸ (The issues of solvents and fertilizers emerged late that summer, but they received greater discussion in the winter of 1989-90 and the 1990 field season.)

In 1990, there were the same discussions about whether enough attention was getting to the right areas and whether the techniques were applied thoroughly and with sufficient vigor. However, there was a sharp and unresolved division of opinion about the relative benefits of active and passive treatment.

This carried over to the 1991 season. However, the state's general opinion about the potential negative effects of aggressive effort gained more support over time.

In mid-winter of 1990-91, the analyses suggested that beaches were much more resilient than previously supposed, and that the natural forces at work in the Gulf and Prince William Sound were strong enough to restore altered beaches to their original profiles

²⁸See, ADEC. 1991. Dale Gardner videotape #91DWG001V (Evidence ID#12092). Treatment activity on segments LA018A and LA015C - D, June 25 through July 1, 1991.

relatively quickly.²⁹

This new scientific information, coupled with the state resource management policies described in the 1991 State Response Plan, supported the state's preferred approach to cleanup: Hit the problem hard, hit it early, and remove as much as you can as quickly as you can.³⁰ State representatives felt more assured that they could argue for -- and get -- more aggressive treatment. Passive treatment would leave the area polluted for a longer period, thereby disrupting the established use of an area longer than necessary.

From the state's perspective, this also argued against the increasing reliance on fertilizers. (Bioremediation receives a complete discussion later in this section.) In 1991, the departments decided, the state would require removal whenever practical, and we would not accept fertilizers as a substitute for swifter, more certain methods of cleanup.

The character of the remaining oil was not a major issue. The most toxic of the compounds in the crude oil had by this time been dispersed in the air and water, broken down into less harmful compounds, or degraded entirely.

The surface oiling consisted primarily of asphalt, friable weathered oil residue, and mousse in protected or sheltered areas (such as boulder fields). The subsurface oiling consisted of intermittent areas of sediments saturated to varying degrees, at varying depths. Determining treatment was a relatively straightforward exercise: Pick up the asphalts, remove the most heavily saturated sediments, expose and break up the lighter concentrations. The state wrote work orders accordingly.

5.2.1 WORK SUMMARY

Shoreline cleanup officially began in the second week of May at Seal Island (SE41A) and ended July 14 in Prince William Sound. Exxon's contract crews handled 148 federal and state work orders, the bulk of them in Prince William Sound.

However, actual shoreline cleanup, in one form or another, began in late April and extended right through August 30. In addition to the Exxon/VECO vessel-based squads that worked late May through mid-July, there were several other cleanup work groups in the field at various times.

²⁹ Owens. 1991.
Michel and Hayes. 1991.

³⁰State monitors believe that had more aggressive work been done in 1990 (and at certain sites in 1989), much less work would have been necessary in 1991. A quantitative comparison of effort among several sites polluted heavily in 1989 provides some support for the thesis, although a more qualitative analysis would be necessary to confirm it. (See ADEC. Ghormley, W. October 28, 1991. Memo to: Piper, E. ADEC.)

Shoreline treatment began with the MAYSAP, as contract workers did limited pickup at 238 sites during the surveys. The one- or two-member contract labor team was not supposed to replace full-scale cleanup operations, but it seemed logical to have cleanup capability during the survey. Small patches of easily recovered

Table 5.1 1991 Shoreline Treatment Work Summary	
Total Subdivisions Surveyed in MaySAP	588
Exxon-Recommended NTR ^(a)	526
State-Recommended NTR	432
TAG-Approved NTR	486
Manual Treatment - PWS	126
Manual Treatment - Kenai Region	14
Manual Treatment - Kodiak Region	6
Mechanical Treatment - PWS	12
Mechanical Treatment - Kenai Region	0
Mechanical Treatment - Kodiak Region	0
Total Subdivisions Treated with Fertilizer	98

(a) No Treatment Recommended (NTR) refers to the field recommendations from the MaySAP surveyors.

material (asphalt or other surface oiling conditions) were the targets.

This worked to varying degrees of success, largely depending on the oiling conditions of an area and the individual initiative of the workers or the crew chief. However, the sheer number of sites that got some early attention tends to suggest that the MAYSAP pickup was an efficient way to get work done early. A simple, limited oiling problem that might not justify the deployment of a full cleanup squad later could be addressed quickly and efficiently during the survey.

Exxon hired the Chenega Corporation to do a similar type of manual cleanup operation during May, although it was unrelated to the MAYSAP. A crew went out from Chenega on a daily basis to do manual work at sites close to the village, on or adjacent to corporation lands, or other areas of special concern to the community.

Exxon reported that Chenega crews collected more than 30 tons of oiled sediments and material, an amount roughly equal to 5 percent of the total collected by all parties in 1991. This, too, likely reduced the summer workload and allowed the vessel-based crews to concentrate on more difficult problems.

Two other cleanup programs -- Exxon's July and August fertilizer operation and the state assessment vessel work -- are addressed in separate sections of this report.

In a total of xxx actual site visits by various crews (some sites received more than one visit), more than 650 tons of oiled material was removed from shorelines in 1991.

With one exception (SE41A), state and federal work orders were completed at 145 sites by Exxon contract crews. A total of 145 received manual work, 12 received mechanical treatment, and 98 were treated with fertilizers.

5.2.2 WORK ORDERS

In 1990, the state representatives would confer on a recommended treatment program for a given site, then bring it to the Technical Advisory Group, which would relay a recommendation to the FOSC, who would issue a work order to Exxon.

In 1991, as discussed before, it was clear that we had reached the point at which the state could begin issuing supplemental work orders to address specific state requirements beyond those of the federal government.

To expedite matters, we decided to issue state work orders through the FOSC. Where possible, he could include the state requirements in his work order; where he could not, the state would forward its work order to Exxon with the federal order. That way, Exxon could plan its logistics so that both orders could be completed in a single site visit, thereby reducing environmental disruption, overall cost, and risks to worker safety.

Exxon did not appear eager to embrace the concept of state and federal work orders, but eventually, the company made an effort to do additional, state-directed work informally. When the state had accumulated almost 50 work orders separate from the federal government, Exxon began dispatching small crews to the additional sites when possible.

The state work consisted almost entirely of what we termed "finish work." It was simple pickup of obvious oiled sediments that the FOSC and NOAA felt were too small or too weathered to warrant cleanup under federal guidelines.

To increase efficiency and reduce potential conflicts, the FOSC began adding state work requests to FOSC work orders. In effect, in 1991 the FOSC ordered cleanup in most cases to the limits of state law. The state work order system allowed the FOSC to cooperate with state requests without altering existing federal cleanup policies nationwide.

5.2.3. MECHANICAL CLEANUP

At 10 of the xxx sites receiving treatment in 1991, we ordered the use of backhoes, tractors, or other heavy equipment to increase both the area treated and the amount of material that could be recovered.

Both Exxon and NOAA resisted the use of the equipment, arguing against the cost, the ecological disruption, and the logistical problems. We felt otherwise, arguing that the cost was minimal compared to previous mechanical efforts, the ecological disruption was short-term, and that Exxon had shown an extraordinary ability to carry out much more dangerous and complicated logistical tasks.

Without equipment, it would have been impossible to conduct any meaningful treatment at the dozen sites. Overall, the mechanical effort was worth it, in terms of results, but the program could have been more effective if Exxon field supervisors had been more cooperative. Exxon's policy on mechanical work was inconsistent, and its field supervisors were needlessly rigid in their application of the treatment.³¹

The discussions about mechanical treatment in 1991 had a technical veneer.³² I found the debate wearisome and the positions occasionally disingenuous. To demonstrate that the oil spill wasn't really so devastating, Exxon's officials would on one day marvel at the recolonization and growth of the intertidal community so soon after the spill. To avoid treatment, especially mechanical treatment, Exxon would on another day paint a gloomy picture of the fate of the intertidal community should mechanical equipment disturb it. During the same meeting that Exxon and NOAA would argue against disrupting intertidal organisms with a backhoe, they would enthusiastically advocate spraying the same creatures with a noxious combination of ammonia, butoxyethanol, and other chemicals

³¹The most curious incident of the summer occurred when, after all parties had agreed that mechanical work to recover heavily oiled sediments deep in KN405 (Point Helen, Knight Island) was impractical, Exxon volunteered to do extensive berm relocation. This really didn't address the major problem at Point Helen, but if Exxon wanted to deploy mechanical equipment to do some good, we weren't going to stand in their way. The Exxon proposal included a clumsy disclaimer that said the company thought the work was necessary but that it wasn't technically justified. I never pressed them for a further explanation. (See Exxon correspondence to FOSC, July, 1991.)

Once the equipment was in the field, Exxon supervisors could be rigid to the point of ineffectiveness. At LA18 (Sleepy Bay, Latouche Island) in mid-July, Exxon supervisors refused to till on an incoming tide (which was by far the most effective method) because it wasn't specified on the work order. They also refused to continue excavation of heavily oiled (OP sediments) that were exposed by tilling because the lens extended outside the general boundaries of the work order. (See Dale Gardner's field notes, June 25 - July 4, 1991.)

³²On another occasion, Exxon supervisors refused to dig some survey pits with the backhoe in the upper intertidal zone at KN405 and LA018A, citing general ecological concerns (See Dale Gardner field notes, June 25, 1991.) The same piece of equipment was allowed by Exxon to dig in the upper intertidal at KN209 a few days later. (See Marianne Profita. Field Notebook No. 12, July 7 - 15, 1991.)

that could injure or kill them.

There were few mysteries about the use of mechanical equipment. On the downside, it is loud and disruptive; it can kill snails and other inhabitants of the intertidal zone; it turns the beach over; it looks bad for a while; it presents problems in containing and recovering oil. On the upside, it helps get rid of the pollution; most medium- to high-energy shorelines will return to their earlier profile; the noise and disruption is short-lived; recruitment and recolonization of the intertidal community is likely within an acceptable period.

There are other, more subtle considerations on a site-by-site basis: All beaches do not recover at an equal rate; small amounts of oil do not merit the use of heavy equipment; some buried oil is stable enough that it is acceptable to leave it alone.

But the point is, there is no blanket biological argument against using mechanical equipment to clean up shorelines polluted by crude oil. The "intrusiveness" debate was peppered with inconsistencies, incomplete analyses, and flip-flops.

There was a large measure of subjectivity -- on all sides -- when it came to the efficiency and effects of so-called intrusive cleaning methods. I fear, however, that the literature and the official correspondence from Exxon and NOAA over the course of the spill will lead other states and other agencies to routinely reject the use of intrusive cleaning. Based on what I have seen in the published literature and the press, bioremediation is good³³, hot water washing is bad, and perhaps the best thing to do in an oil spill is leave it alone.³⁴

The fact is, all methods are intrusive to some degree. The discussion about whether to use or reject intrusive cleaning should begin with an examination of the site, its uses, its conditions, and its sensitivity -- not on the method to be employed. Exxon and NOAA did the reverse when it came to judging mechanical treatment after the summer of 1989.

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- ³³
- Houghton, et al. 1991.
 - Chianelli, R.R., et al. 1991. "Bioremediation Technology Development and Application to the Alaskan Oil Spill". *1991 International Oil Spill Conference Proceedings*. (American Petroleum Institute, Washington, DC.)
 - Ladousse, A. and Tramier, B. 1991. "Results of 12 Years of Research in Spilled Oil Bioremediation: Inipol EAP22". *1991 International Oil Spill Conference Proceedings*. (American Petroleum Institute, Washington, DC.)
 - Satchell, M. and Carpenter, B. "A Disaster That Wasn't". *US News and World Report*. September 18, 1989.
 - Lancaster, J. "Weighing the Gain in Oil Spill Cures". *The Washington Post*. April 22, 1991.

³⁴Houghton, et al. 1991.

5.2.4 BIOREMEDIATION

The state approved application of fertilizers in 1991, as long as doses remained relatively small (1989 and 1990 levels), and as long as fertilization was not used as a substitute for more certain cleanup methods. Unlike 1990, in 1991 neither the state nor the federal government allowed fertilization as a primary treatment.

At Exxon's request and urging, the state approved application at 58 sites. Exxon volunteered to make second and third applications of fertilizers at 58 sites during late July and August.

Bioremediation was at once the most widely used -- and misused -- term of the response. A description of its use in 1991 must begin with a general discussion of what bioremediation is -- and isn't.

Bioremediation is the general term to describe any use of biotechnology to mitigate the effects of a hazardous substance spill. Nationally, bioremediation has been used for at least a decade. Generally, it has been used to counter the effects of pollution in groundwater, or to break down hydrocarbons or other chemical compounds at contaminated land sites.

The Environmental Protection Agency and the National Environmental Technology Application Corporation (NETAC) have been working on a national strategy to increase the use of biotechnology in hazardous substance cleanup and to reduce hazardous waste generated in industrial processes.

The State of Alaska is a working member of subcommittees to the EPA's Bioremediation Action Committee. OSRC and other department staff have been working with EPA and the State of Texas to develop guidelines for bioremediation use in oil spill response. Alex Viteri of the department's Southeast Regional Office is one of the principal authors of the draft national protocols for screening bioremediation products. Both of these national projects have been funded by or based in the Exxon Valdez Oil Spill Response Center.

Based in part on our experience in this spill response, bioremediation is clearly an exciting area for innovation and use in Alaska. Its most promising applications appear to be in cases where the process can be closely monitored and controlled. Setting up a microenvironment or closed remediation system allows engineers to optimize nutrients, microbial activity, temperature, and other critical factors over a sustained period.

The use of bioremediation in open, dynamic systems -- such as a shoreline in a remote area -- is much more problematic. External factors such as tides, weather, animal and human activity, groundwater runoff, percolation, etc. make it difficult to optimize bioremediation or measure its results.

For all the scientific study and technical jargon, bioremediation in the Exxon Valdez spill response was pretty basic: We spread or sprayed modified and "stock" fertilizers on beaches. We did little, if anything, to control the external factors that could reduce or enhance the effectiveness of the fertilizers to increase microbial activity.

Based on the data available to all parties in the winter of 1990-91, most people felt confident that the fertilizers were doing something.

However, scientists from around the country were unable to agree how much, and how fast, the fertilizer helped accelerate natural degradation. More important, some scientists (including the state's researchers at the University of Alaska Fairbanks) questioned whether the heavily weathered, asphaltine compounds remaining in 1991 were good candidates for microbial degradation. The more easily degraded hydrocarbons break down more quickly, and as time goes by, the theory goes, the remaining compounds become more and more resistant to degradation. In other words, the rate -- whatever that rate may be -- is not constant over time.

Faced with this uncertainty, the state decided that in 1991 fertilizers were a treatment of last resort. Judged against removal, which provided immediate and measurable results, bioremediation was a less certain treatment. Our 1991 policy was, therefore, a "why not?" issue for the state. If it might help, why not allow it to be applied after all other treatment is done?

Two issues that did not receive a great deal of examination in 1991 were the short-term toxicity of the fertilizers, and any broad ecological effects associated with fertilizer application.

The toxicity question was sufficiently answered by the state's independent reviewers. Essentially, in the doses administered during the program, levels of ammonia and nitrates appeared to remain below established levels of toxicity, and the persistence of the chemicals was short-lived.

Broader ecological effects have not been investigated to any meaningful degree -- another reason why the state took a conservative position, relative to Exxon and the federal government, on fertilizer use. Further, there was virtually no data comparing recovery on fertilized shorelines to those that received no fertilizer. Without such information, a reasonable scientist would not conclude that using fertilizers was definitively superior to other methods at hand.

Yet bioremediation was far and away the media and scientific star of this spill response. Exxon ascribed great power to the microbes. EPA's chief scientist on the project declared it "amazing" at a briefing in early 1990. The media latched onto the hype as well, creating a false impression that we had, indeed, discovered the "silver bullet."

State experts have tentatively concluded that based on what we have seen, fertilizers most likely did a little good and caused no more disruption than other methods in Prince William Sound and the Gulf of Alaska. But the fact is, those who claim great things of the Exxon Valdez bioremediation experiment are amplifying and in some cases overstating a limited scientific record.

The use of fertilizers in 1991 was, I believe, based on a more realistic and rational examination of the technique as we understand it in the Alaska marine environment.

5.2.5 THE EFFECTS OF THE CIVIL CLAIMS SETTLEMENTS

When the governments and Exxon in March agreed on a settlement of civil claims arising from the oil spill, the settlement fund, not Exxon, became the source of funds for government-ordered work. This did not change the department's cleanup requirements in any way. It did, however, raise some issues about accounting and justification of activities.

Exxon, in effect, became the government's contractor for spill cleanup. However, the language of the settlement, the vagaries of federal oil spill law, and the realities of the spill cleanup operation combined to create an entirely new set of relationships among the parties to the cleanup.

This raised questions from the legislature and the public about the cost-efficiency of Exxon's activities, about local hire, in-state contracting, competitive bidding, and other public procurement procedures. If the cleanup costs were now coming from "our money," legislators and the public asked, would the governments suspend or change cleanup policies to save money?

The department made clear, in both press appearances and legislative hearings, that the state's cleanup decisions were based on existing regulation, not a new set of economic circumstances. Further, as soon as the settlement was announced, the OSRC began meeting with federal representatives to devise accounting and cost oversight procedures over Exxon's expenditures.

Questions came up about why we were continuing to employ Exxon at all. Using Exxon, the argument went, was like awarding the spiller a lucrative sole-source contract.

Had I known in September 1990 that in May 1991 we would be operating under the settlement, the state would probably have made some alternative plans for both the spring survey and the 1991 cleanup operations. However, as a practical matter, tearing up all the Exxon contracts and starting from scratch in March could have opened the door to contract challenges and disputes, and reduced cooperation between the state and federal governments. Cleanup could have been delayed, its efficiency reduced, or both.

For all its faults and its strong points, the cleanup decision-making system, logistical planning, and field operations had evolved into a matrix understandable to all parties. It seemed impractical, to me, to throw it all out when it was likely only a few more months of operations lay ahead.

Moreover, there was no guarantee that government management would result in lower costs. The OSRC looked into this and, in the case of aircraft and vessel contracts, discovered that Exxon had obtained better prices and terms than the state could.

In addition, there was a legal justification for continuing to have Exxon continue the cleanup under government direction, regardless of who was paying the bills.

Under both state and federal law, the responsible party has the option of conducting the response as long as it is willing to do so, and able to perform to the governments' satisfaction. In addition, the settlement included language that specifically referred to Exxon's continuing involvement.

Finally, as a practical matter, it is often more helpful to have the responsible party there than to operate without it. In this case, Exxon's ability to efficiently plan and execute complicated logistical actions allowed the governments to concentrate their energy on the substantive matters of policy and regulation.

In March 1991, both the FOSC and I agreed that the 1991 response would cost somewhere around \$35 million. The most recent accounting from Exxon put 1991 costs (through September 1) at about \$43 million.

Even after the first settlement fell through, the governments operated on the assumption that any future settlement, regardless of the amount, would likely include the same provisions for deducting spill response costs from any restoration monies. Therefore, we maintained the same accounting and work order system.

The flow went like this: The FOSC (or SOSC) would issue a work order. Exxon would do a cost estimate, then return to the FOSC a form that summarized the work order and listed the cost estimate. The FOSC would then sign the Exxon form and the work would proceed.

Also on the form was a kind of disclaimer that Exxon would occasionally include. Under the terms of the settlement, if the FOSC or the SOSC ordered work that Exxon felt would not result in a "net environmental benefit," then Exxon would conduct the work under a kind of protest.³⁵

³⁵Exxon produced a work approval form that the FOSC or SOSC was supposed to sign. It included a box for "Exxon comments," in which the company could make its claim that the work requested would not result in a net environmental benefit. There was not a box for the governments to rebut the Exxon

5.2.6 LOCAL RESPONSE PROGRAM STATUS

In September 1989, Gov. Steve Cowper directed the department to design and implement a supplementary cleanup program that used area residents to clean areas most important to their respective communities.

The department had emergency first response agreements with most of the spill-area communities by that time, although they were not designed to reimburse for actual cleanup. The department modified the memoranda of agreement over the fall of 1989 and asked communities for workplans.

The program was completely unprecedented, and the structure did not fit neatly under the statute governing use of the 470 Fund. Communities wanted money up front, which was understandable, since most of the towns are small have neither the revenue base nor the cash flow to finance programs of \$500,000 or more. Communities also wanted limited oversight. Neither was possible under the statute.

After a failed attempt to take the money from a general fund appropriation to the Office of the Governor, the Local Response funding returned to the 470 Fund as the source. Crews worked in the spring and fall of 1990.

Table 5.2 lists the towns involved in the October-November 1990 program and summarizes their activities.

Local Response activity in 1991 consisted of citizen oversight of the 1991 May Shoreline Assessment Program (MAYSAP).

This was rather unusual, in that the state government found itself paying members of the public to participate in the public process itself. It was, literally, paying the public to participate in meetings, observe the government at work, and observe the responsible party at work.

The spiller, Exxon, funded and did the logistical planning for the survey, so the spiller paid for the field expenses of the community representatives. The state paid standard per diem and transportation expenses for local community representatives to attend necessary training and orientation sessions. The state also paid a basic hourly wage (13.17 per hour, the base rate of pay for a shoreline monitor) to the community

assertion -- and even if there were, this would, once again, be forcing the government to rebut some quasi-regulatory standard established by Exxon. The paperwork, of course, went into the public record, and it did not, of course, carry any identification that it was an Exxon document and not a government requirement. I didn't sign these forms because a) there was no reason to, and b) if I did, it might look like the state was approving work that had no environmental benefit and was, therefore, in violation of our own regulations.

representatives, which made the program even more unusual.

While the program was unusual, I felt it reasonable under the circumstances. Public members of the teams, as area residents, had the most at stake in ensuring a proper cleanup; public confidence in government decisions is impossible without public oversight. Yet public oversight was almost impossible without expensive logistical support, safety training, and special access clearance in some cases.

The department felt it important to provide the necessary support, training and access to the public for this critical exercise. Moreover, the department felt it important to make that public access as painless as possible. This was not a one-night meeting; it was a month-long venture in potentially dangerous conditions.

If we truly expected members of the public to devote that much time away from work, personal business, and home, the department felt we should provide proper compensation. The court system pays jurors a daily stipend; the state, in this case, paid a greater stipend, percentage-wise, due to the conditions.

I felt the program worked well; local coordinators felt the program worked.³⁸ Most would seek improvements or alterations if a similar program were instituted elsewhere. The lack of working capital and a cumbersome reimbursement system were an annoyance at best, and a hardship at worst, to all the communities involved.

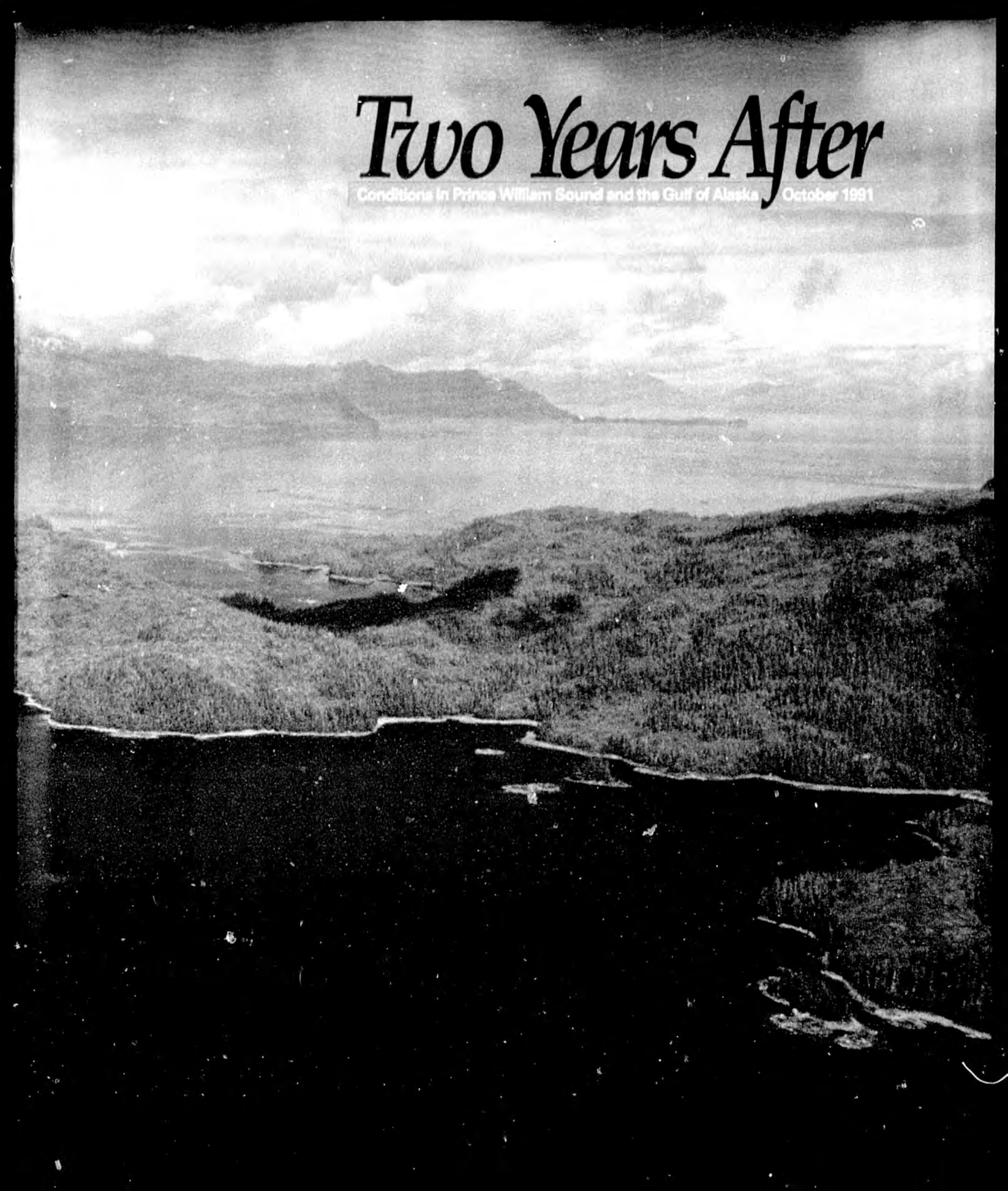
From our end, the program was extremely difficult to manage from a distance. It required intense oversight, which drew field people away from primary response activities. The experience gave us some lessons about how we may deal with certain aspects of the Volunteer Response Corps authorized by the Legislature in 1990.

Trained citizen volunteer responders should probably be limited to well-defined emergency first response tasks, such as deploying and tending boom during an emergency. Site remediation should be undertaken primarily by licensed, bonded contractors, although there are times when a "force accounting" approach through local communities could be more economical.

³⁸PWSCA. Hall, D. August 30, 1991. Letter to: Piper, E. ADEC.

Two Years After

Conditions in Prince William Sound and the Gulf of Alaska October 1991

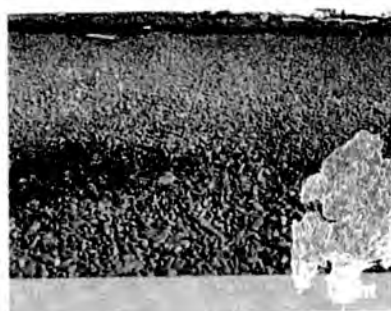


PRINCE
WILLIAM
SOUND

GULF OF ALASKA

Oiling Categories (depicted photographically)

Summer 1989



Summer 1991



Oiling Categories (beach width affected, percentage of surface covered)

Summer 1989

-  **Heavy** (more than 6 meters)
-  **Moderate** (3-6 meters)
-  **Light** (less than 3 meters)
-  **Very Light** (slight evidence of oil)

Summer 1991

-  **Wide** (more than 6 meters, majority [$>50\%$] of surface oiled)
-  **Medium** (more than 6 meters, minority [$<50\%$] of surface oiled; or 3-6 meters, more than 10% of surface oiled)
-  **Narrow** (less than 3 meters, more than 10% of surface oiled)
-  **Very Light** (slight evidence of oil)

Profile of Shoreline Oiling: 1989 vs. 1991

Prince William Sound 3,000 miles of shoreline, 16% oiled in 1989

Summer 1989



Summer 1991



Kenai-Kodiak Region 6,000 miles of shoreline, 14% oiled in 1989

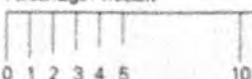
Summer 1989



Summer 1991



Percentage Affected



Prince William Sound and the western Gulf of Alaska — areas impacted by the 1989 Valdez oil spill — are today essentially free of oil. This booklet compares current shoreline conditions with those following the spill.

The US Coast Guard has coordinated three summers of cleanup operations in the area. Although all identified beneficial cleanup is complete, the Coast Guard, the State of Alaska, and Exxon have agreed to reassess the shoreline conditions in the spring of 1992.

Oiling Categories (beach width affected, percentage of surface covered)

Summer 1989

-  **Heavy** (more than 6 meters)
-  **Moderate** (3-6 meters)
-  **Light** (less than 3 meters)
-  **Very Light** (slight evidence of oil)

Summer 1991

-  **Wide** (more than 6 meters, majority [$>50\%$] of surface oiled)
-  **Medium** (more than 6 meters, minority [$<50\%$] of surface oiled; or 3-6 meters, more than 10% of surface oiled)
- Narrow** (less than 3 meters, more than 10% of surface oiled)
- Very Light** (slight evidence of oil)

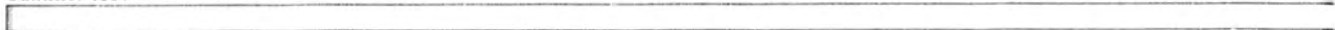
Profile of Shoreline Oiling: 1989 vs. 1991

Prince William Sound 3,000 miles of shoreline, 16% oiled in 1989

Summer 1989



Summer 1991

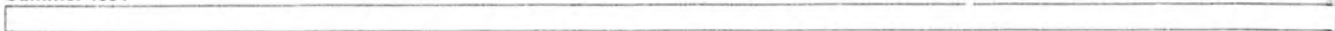


Kenai-Kodiak Region 6,000 miles of shoreline, 14% oiled in 1989

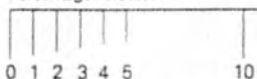
Summer 1989



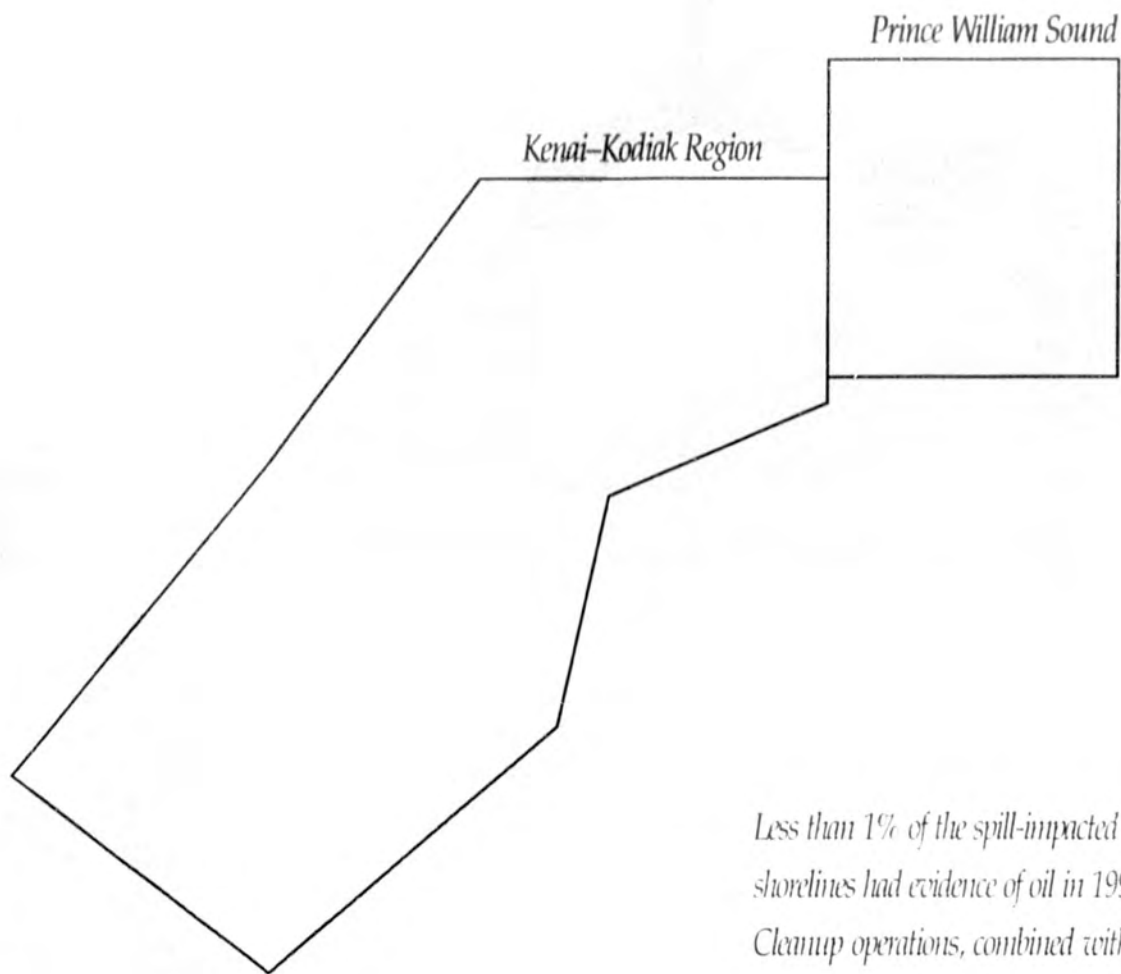
Summer 1991



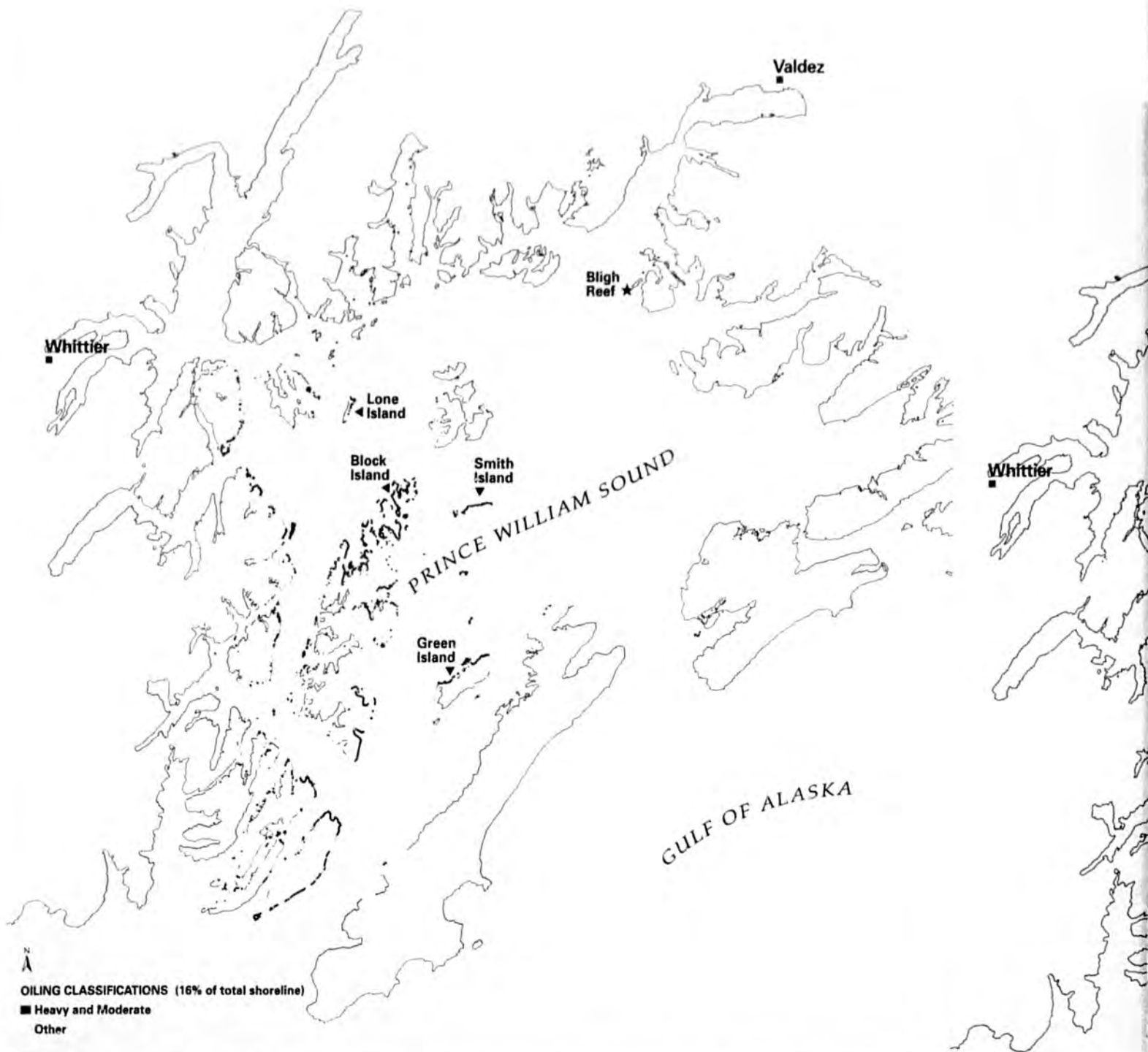
Percentage Affected



50



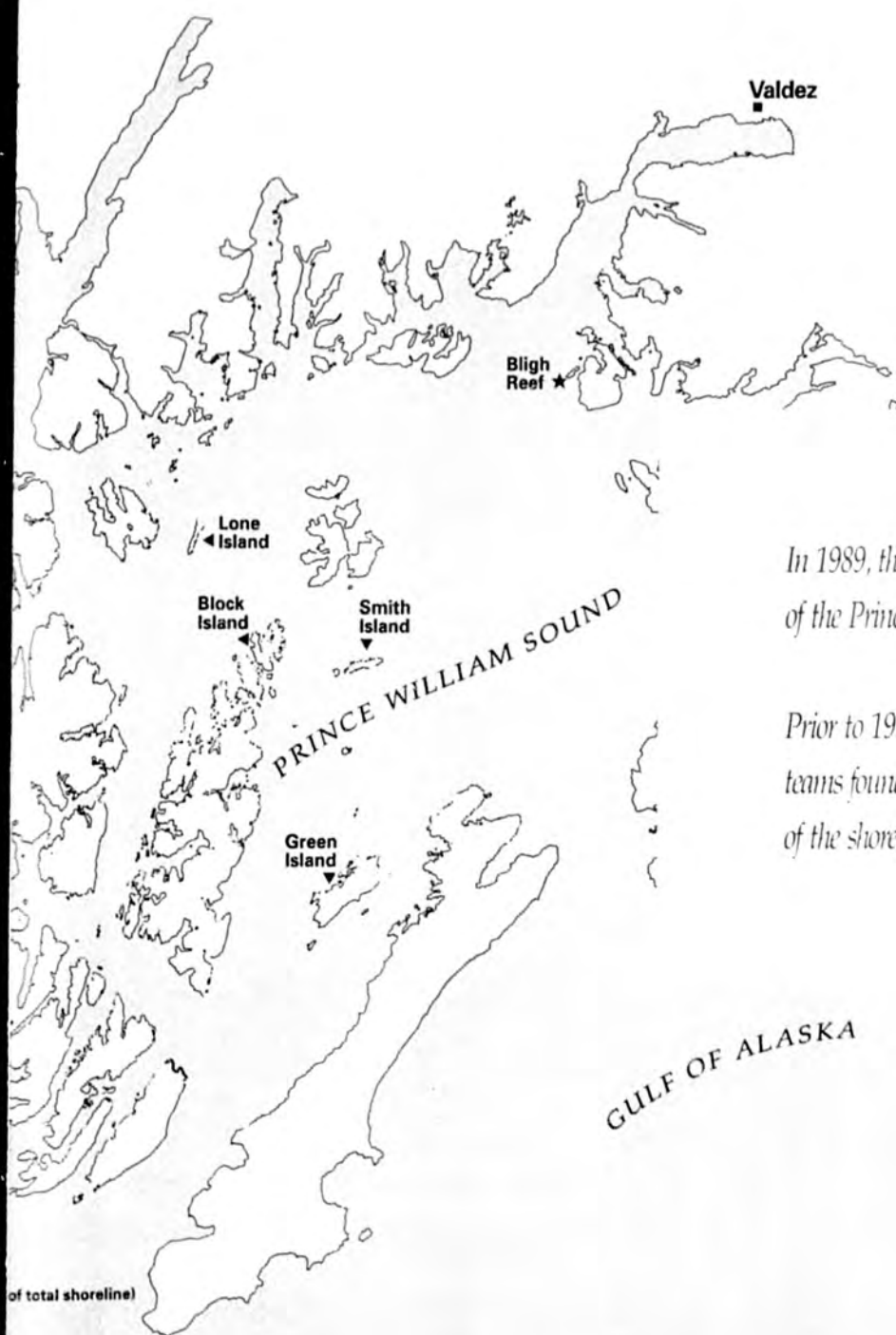
Less than 1% of the spill-impacted shorelines had evidence of oil in 1991. Cleanup operations, combined with natural processes such as wave action and biodegradation, brought about this dramatic improvement.



N
 A
 OILING CLASSIFICATIONS (16% of total shoreline)
 ■ Heavy and Moderate
 □ Other

1989

N
 A
 OILING CLASSIFICATIONS (2%)
 ■ Wide and Medium
 □ Other



In 1989, the Valdez spill impacted 16% of the Prince William Sound shoreline.

Prior to 1991's cleanup efforts, survey teams found traces of oil on only 2% of the shoreline.

Smith Island





In 1989, Vice President Quayle visited the heavily oiled shore on Smith Island during initial cleanup operations. Abundant intertidal growth at the shoreline reflects recovery. Casual observers often mistake the bands of naturally occurring black lichen for oil residue (see inset photo, lower left).

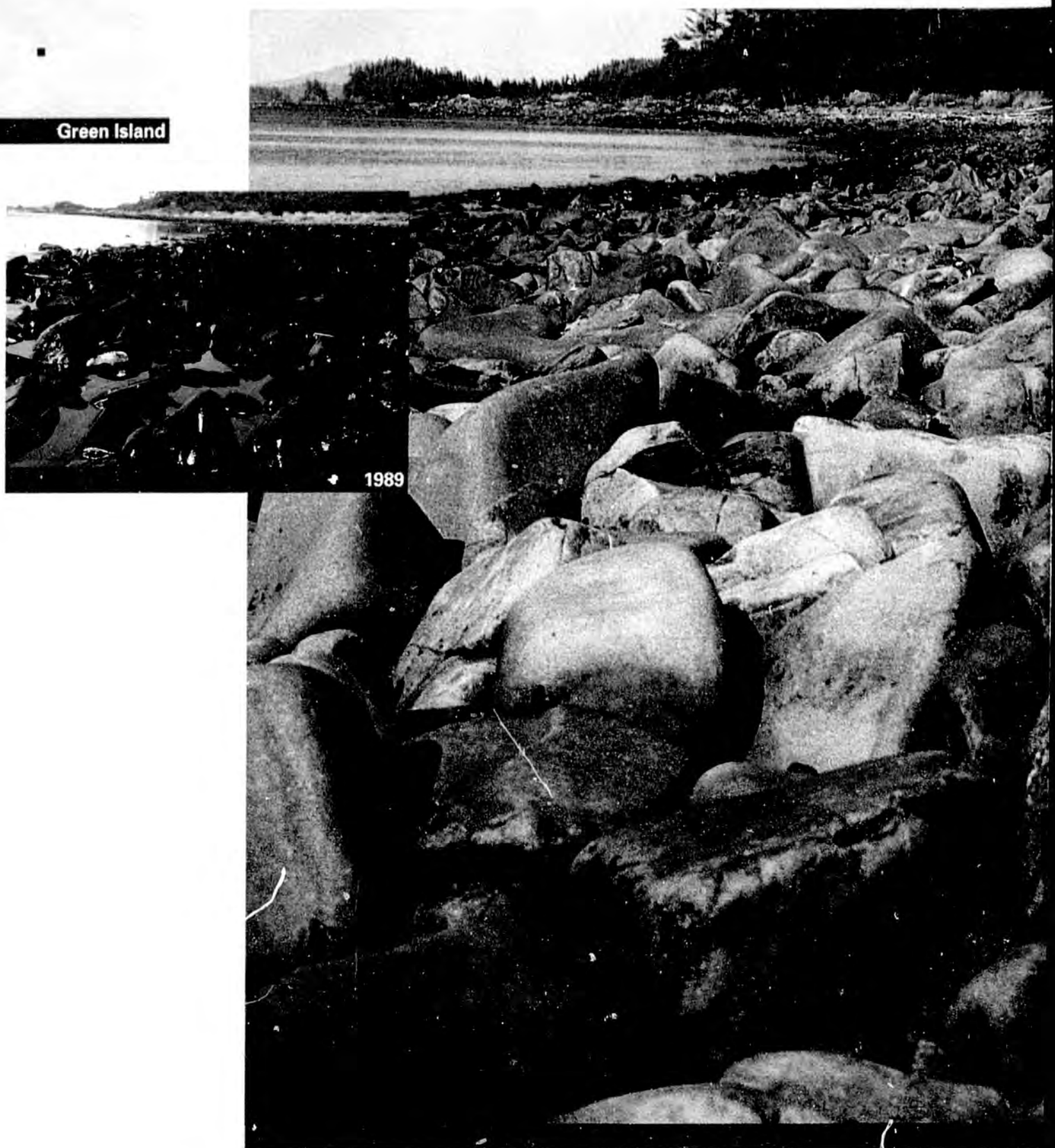
1989 warm water wash,
bioremediation

1990 storm-barr relocation,
bioremediation

1991 surveyed, no treatment
recommended

Cleanup Techniques

Green Island



1989



The pooled oil found on Green Island in 1989 has been removed; the traces that remain are not harmful.

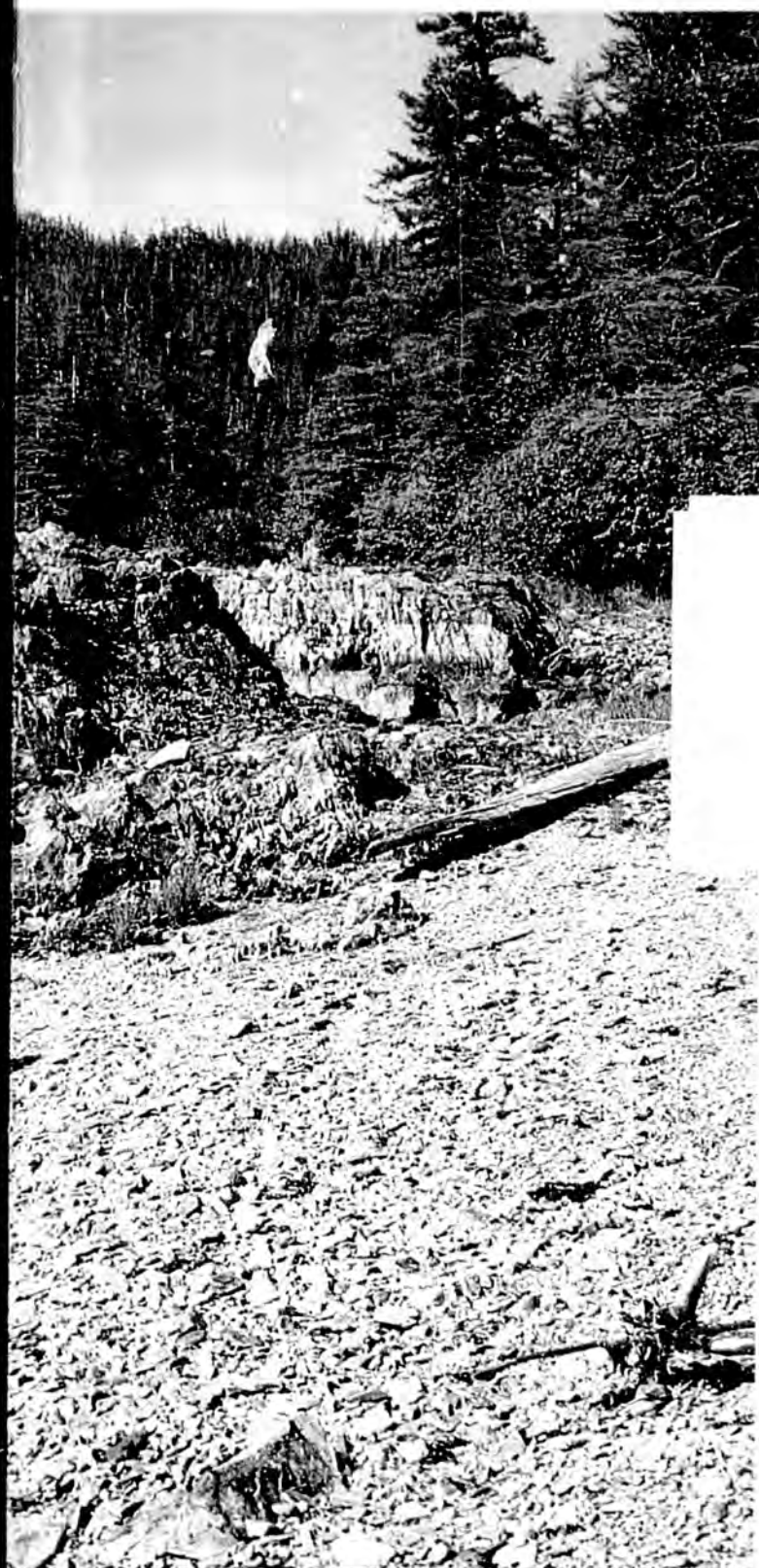
- warm water wash,
bioremediation
- manual pick-up,
bioremediation
- surveyed, no treatment
recommended

1991

Cleanup Techniques

Block Island





Block Island's eastern shoreline was one of the hardest hit beaches in 1989.

1991

warm water wash,
bioremediation
manual pick-up,
bioremediation
manual pick-up,
bioremediation

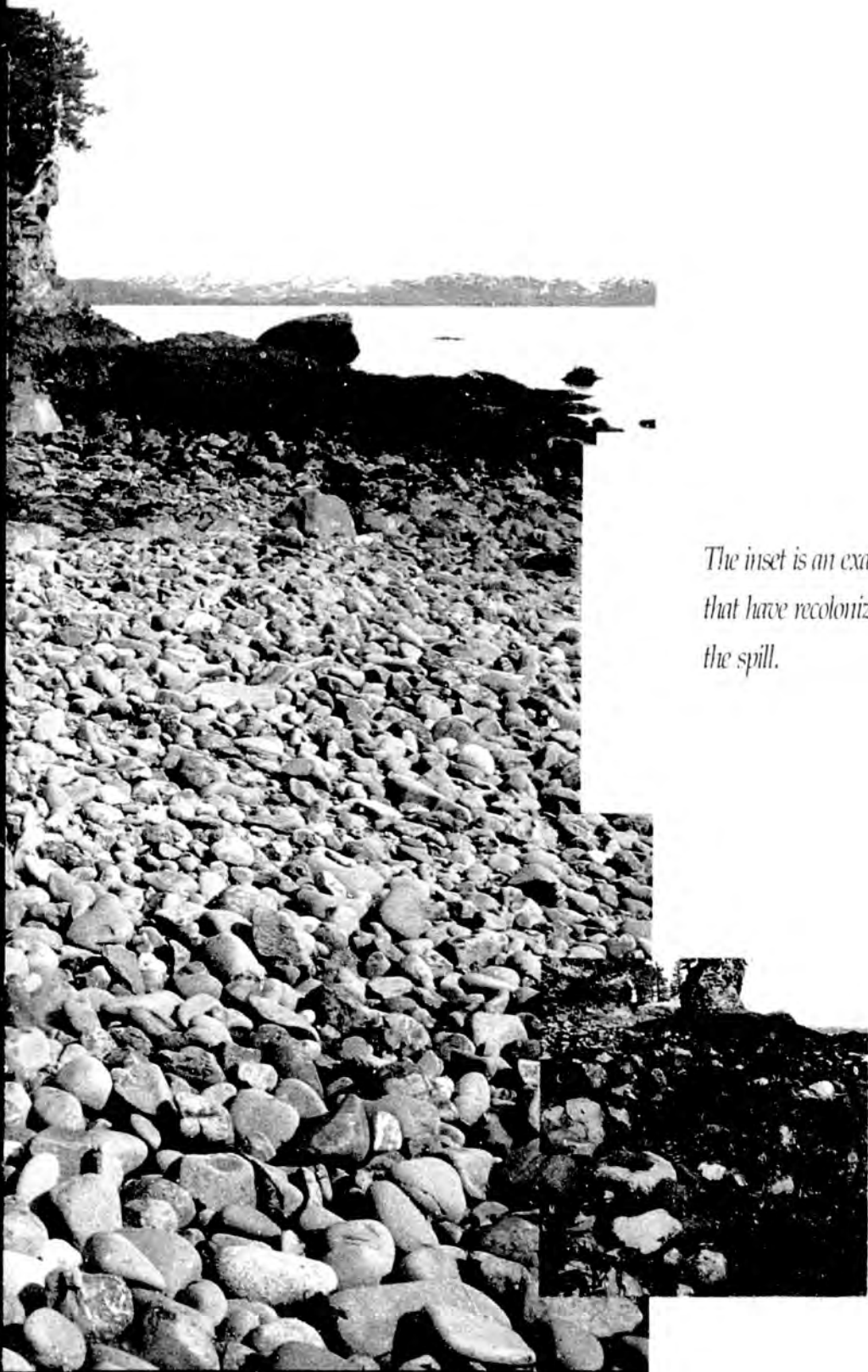
Cleanup Techniques

Lone Island



1989





The inset is an example of the rich biota that have recolonized the shoreline since the spill.

1989 warm water wash,
bioremediation
1990 manual pick-up,
bioremediation
1991 surveyed, no treatment
recommended

1991

Cleanup Techniques



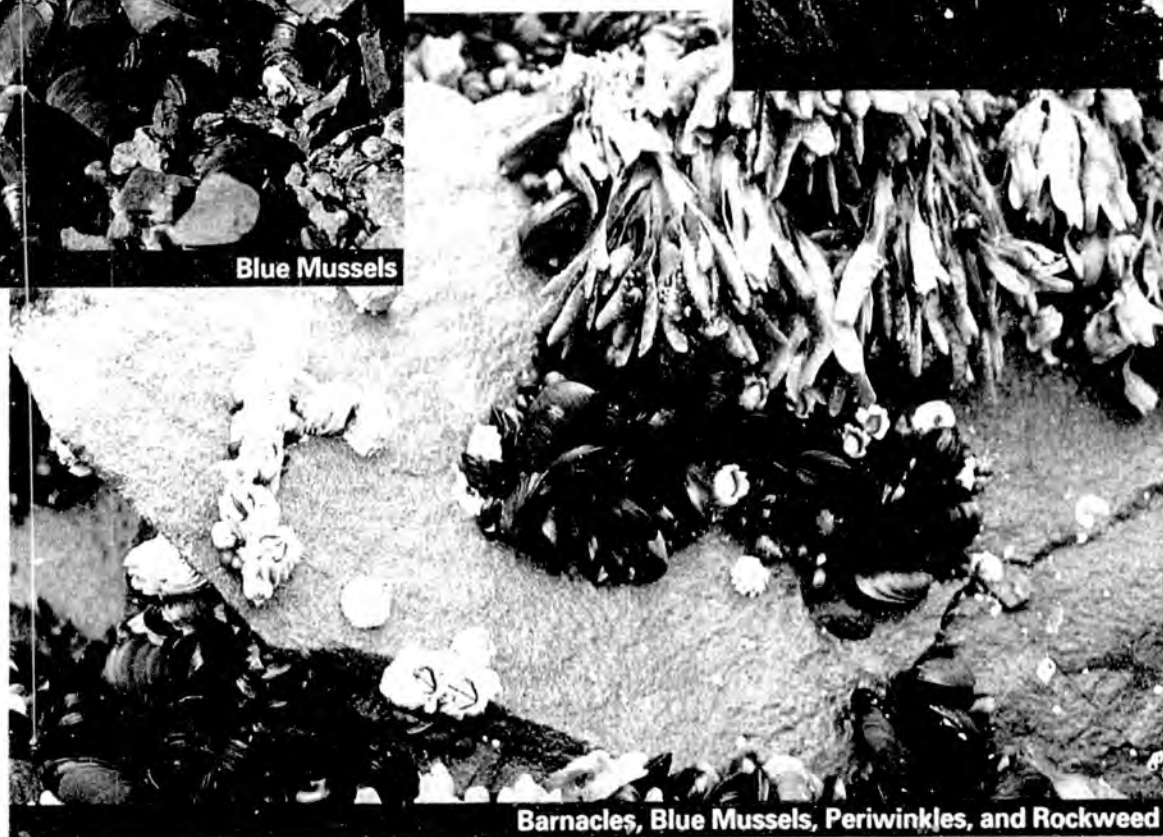
Ochre Sea Star



Leather Star



Blue Mussels



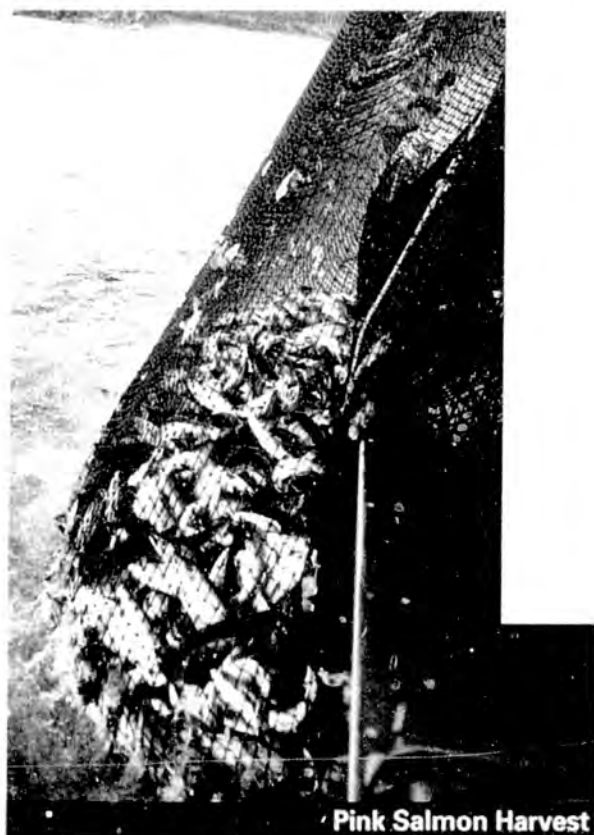
Barnacles, Blue Mussels, Periwinkles, and Rockweed



Pink Salmon

The abundance of intertidal life is evidence that the area's ecosystem has effectively recovered from the spill.

The 1990 and 1991 Prince William Sound pink salmon harvests were the largest and second largest on record. The 1991 seine herring harvest was the largest in ten years and the second largest ever.



Pink Salmon Harvest



Black Oyster Catcher



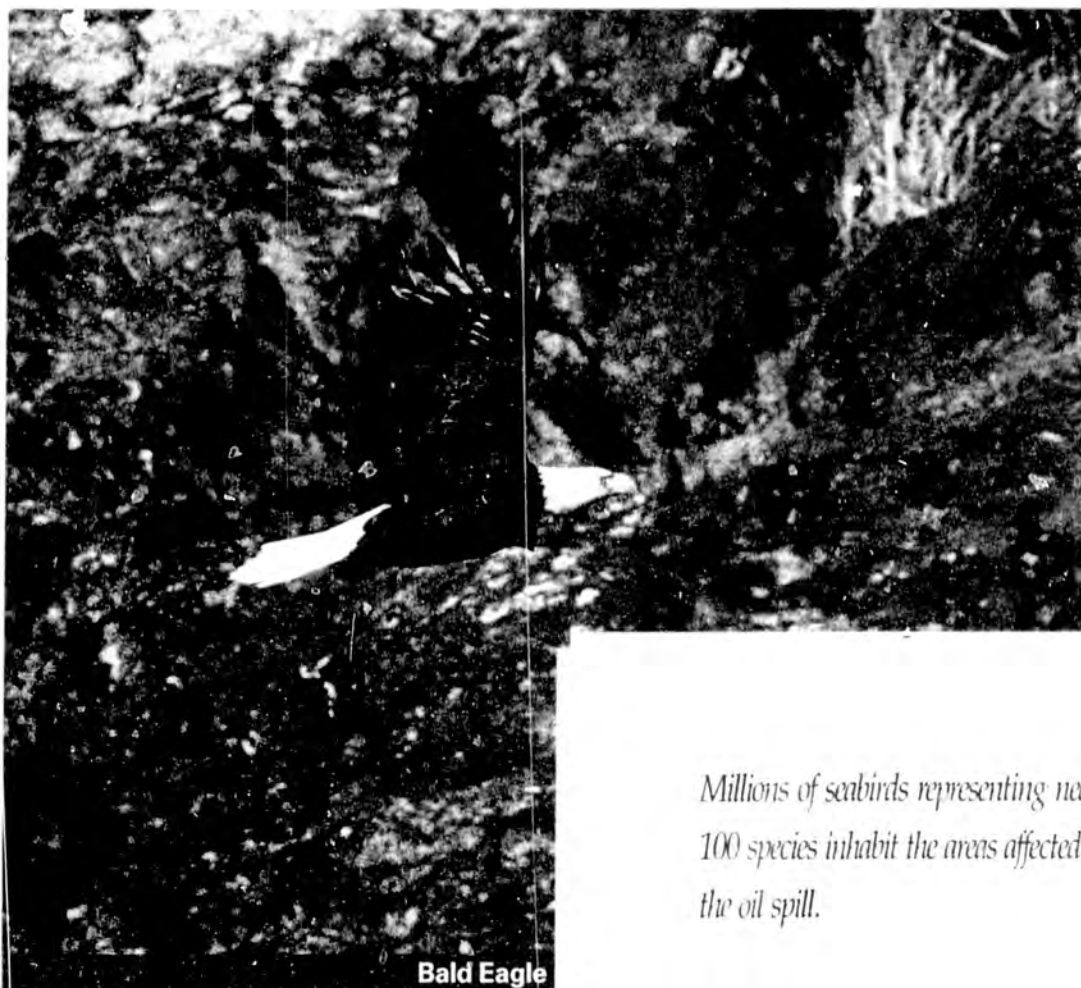
Horned Puffin



Glaucous-winged Gulls



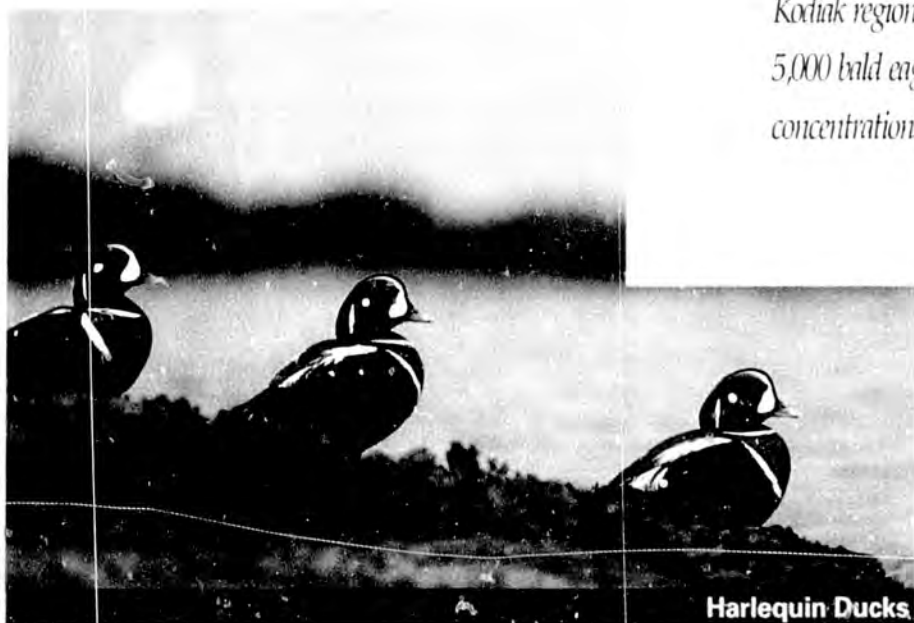
Common Murre



Bald Eagle

Millions of seabirds representing nearly 100 species inhabit the areas affected by the oil spill.

The Prince William Sound and Kenai-Kodiak regions are home to more than 5,000 bald eagles — one of the largest concentrations in the world.



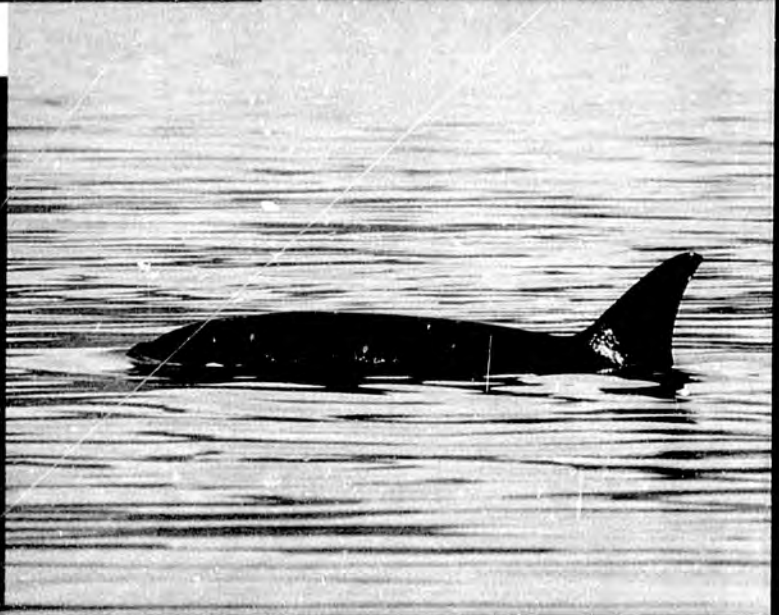
Harlequin Ducks



Steller's Sea Lions



Sea Otters





A variety of marine mammals live in the Sound. Scientists estimate that 100,000 to 200,000 sea otters inhabit Alaska's coast. In 1990 and 1991, scientists visiting the spill area observed thousands of sea otters and pups.

Killer Whales

Cleanup techniques specific to each location were approved by the Coast Guard. The techniques were used individually or in combination to achieve a net environmental benefit.

Cleanup Techniques



Survey teams of representatives from the US Coast Guard, the National Oceanic and Atmospheric Administration, the Alaska Department of Environmental Conservation, Landowner Representatives, and Exxon assessed and documented oiled shorelines for use in determining treatment methods.



Cold Water Washing involves pumping seawater to fire hoses on the shoreline. The oil was flushed down to the waterline where it was trapped by booms and recovered by skimmers. Cold water washing was commonly used in 1989 to remove bulk oil from the shorelines.



Warm Water Washing consists of applying heated seawater (below 140°F) at moderate pressure to mobilize weathered oil. Warm water wash methods were used in 1989 as directed by the Coast Guard in areas where cold water wash or manual removal were not effective in removing bulk oil.



Bioremediation is the application of nutrients

(nitrogen and phosphorus) to the shoreline to accelerate the biodegradation of oil.

Biodegradation occurs when bacteria feed on hydrocarbons, converting them into carbon dioxide and water.



Manual Removal includes the use of shovels,

rakes, sorbents, and hand pickup to clean beach segments of pooled oil, mousse patties, oily fine-grained sediment, and oily debris.

This was the appropriate treatment method in lightly impacted areas and in environmentally sensitive areas.



Storm-berm Relocation involves mechanically exposing

and relocating oiled storm-berm into the tidal zone to allow natural tidal flushing and to enhance biodegradation.

the material deposited above the high tide line during storms.

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