Shoreline Response Challenges following the Deep Water Horizon Incident

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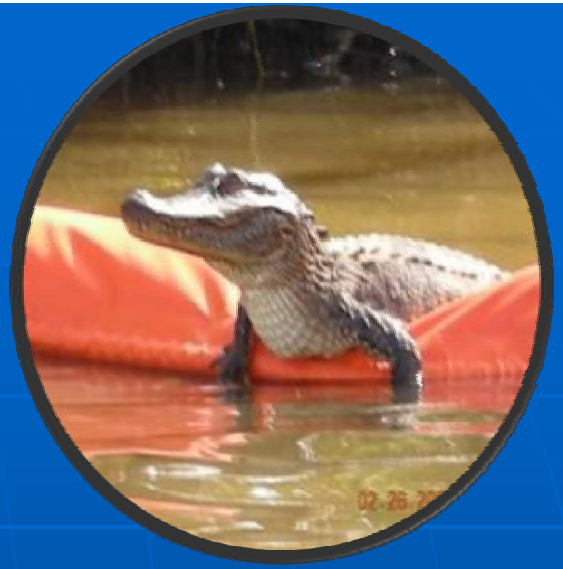
Disclaimer

The opinions expressed in this presentation are those of the author alone and do not represent statements, positions or opinions of Polaris Applied Sciences, Inc., BP, or any other entity or agency involved with the Deepwater Horizon response operation.

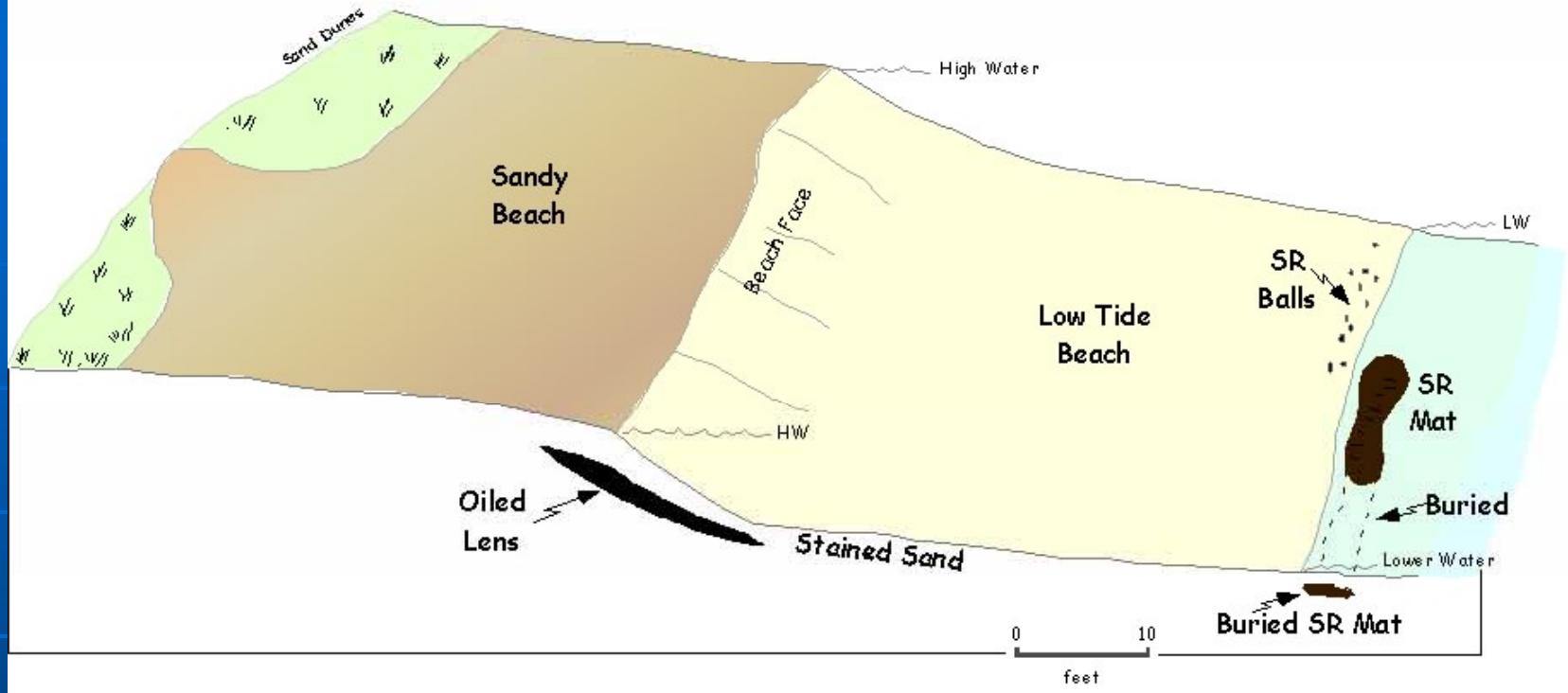
Outline



- key shoreline response elements
- Operations Support – STRs
- Operations Support – SCAT Ops Liaison
- Treatment inspections
- Treatment of amenity sand beaches

Key Elements

- Time and space challenges
- Chronic phase lasted 6 months until the well was sealed – oil was buried
- Operating area extended over 2000 miles along the coast
- Repetitively surveyed over 4,000 miles of shoreline



Oiling: SR Mats at LITZ (some partly buried)

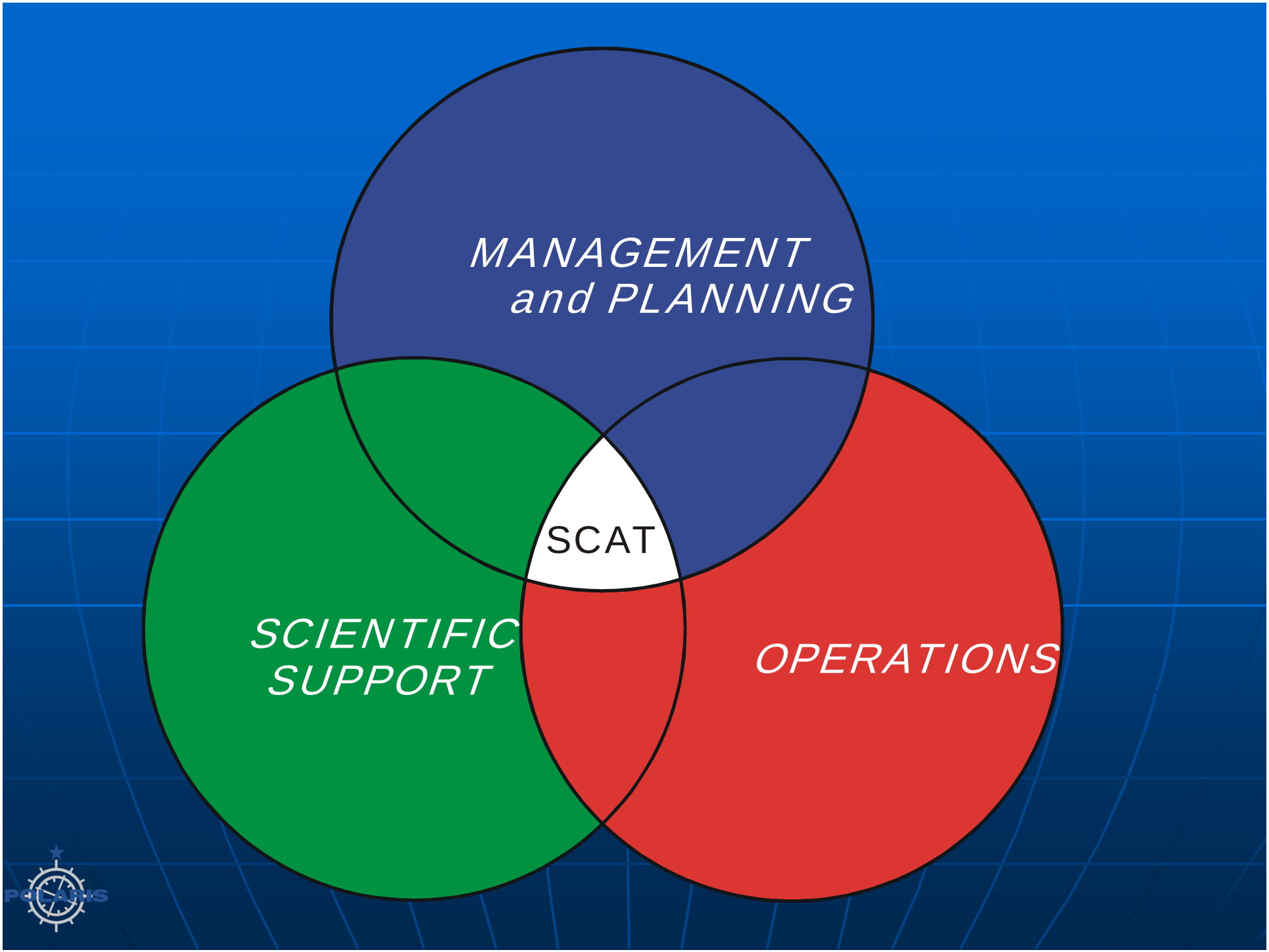
Buried Oil Lens
Thickness - 4 to 8 inches
Length - 50 to 200 yards
Width - 3 to 20 yards

Clean Sand Overburden - .75 to 2.5 feet

The Objective of a SCAT Survey/Program

The primary purpose of SCAT (Shoreline Cleanup Assessment Technique) is to provide:

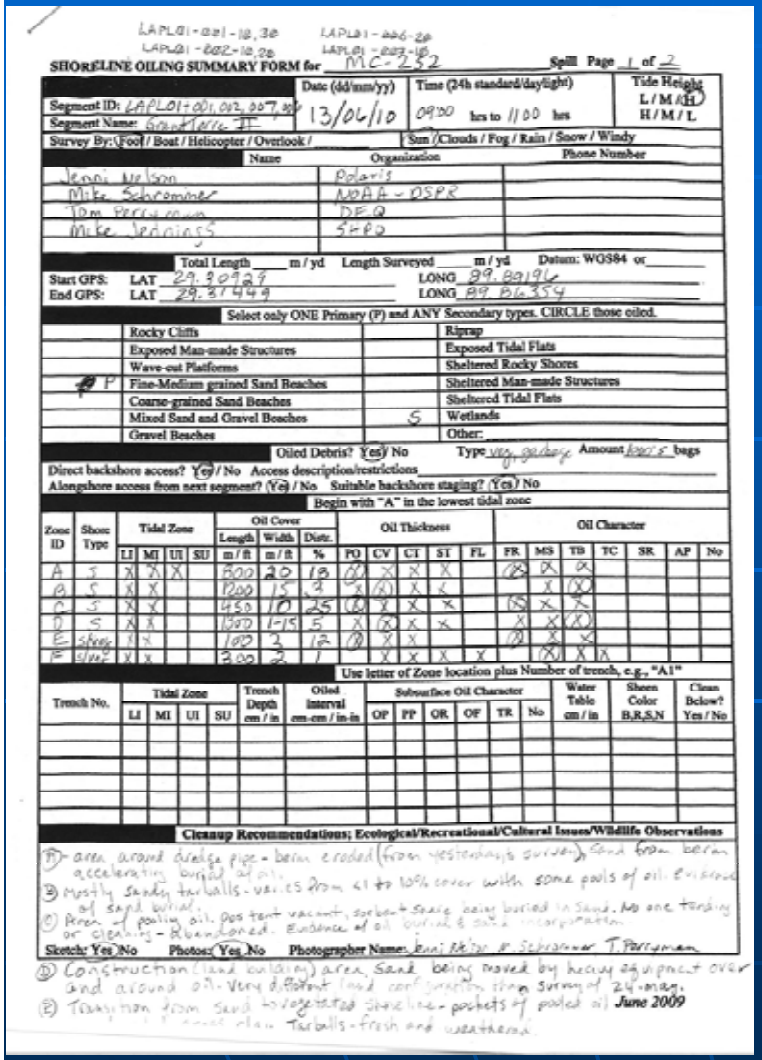
DECISION SUPPORT FOR SHORELINE TREATMENT PLANNING AND RESPONSE OPERATIONS


MANAGEMENT
and PLANNING
SCAT
SCIENTIFIC
SUPPORT
OPERATIONS

The Four SCAT Principles

- A systematic survey of all shorelines in the affected area
- Division of the coast into segments
- Use of a standard set of terms and definitions for documentation
- A team of interagency personnel to represent land ownership, land use, management or trustee interests

SCAT Field Data



LAPL01-001-10,30 LAPL01-006-20
LAPL01-002-10,20 LAPL01-007-10

SHORELINE OILING SUMMARY FORM for MC-252 Spill Page 1 of 2

	Date (dd/mm/yy)	Time (24h standard/daylight)	Tide Height L/MA/H H/M/L
Segment ID: LAPL01-001,002,007,006	13/06/10	0900 hrs to 1100 hrs	
Segment Name: Grand Terre II			

Survey By: (Foot / Boat / Helicopter / Overlook /) Sun / Clouds / Fog / Rain / Snow / Windy

Name	Organization	Phone Number
Jenni Nelson	Polaris	
Mike Schroeder	NOAA - OSPR	
Tom Perry-man	DEQ	
Mike Jennings	SHPO	

Total Length ____ m / yd Length Surveyed ____ m / yd Datum: WGS84 or ____

Start GPS: LAT 29.30929 LONG 89.89196
End GPS: LAT 29.31449 LONG 89.86354

Select only ONE Primary (P) and ANY Secondary types. CIRCLE those oiled.

	Rocky Cliffs		Riprap
	Exposed Man-made Structures		Exposed Tidal Flats
	Wave-cut Platforms		Sheltered Rocky Shores
P	Fine-Medium grained Sand Beaches		Sheltered Man-made Structures
	Course-grained Sand Beaches		Sheltered Tidal Flats
	Mixed Sand and Gravel Beaches	S	Wetlands
	Gravel Beaches		Other:

Oiled Debris? (Yes) No Type veg. debris Amount few's bags

Direct backshore access? (Yes) / No Access description/restrictions ____

Alongshore access from next segment? (Yes) / No Suitable backshore staging? (Yes) No

Begin with "A" in the lowest tidal zone

Zone ID	Shore Type	Tidal Zone LI	MI	UI	SU	Oil Cover Length m / ft	Width m / ft	Distr. %	Oil Thickness PO	CV	CT	ST	FL	Oil Character FR	MS	TB	TC	SR	AP	No
A	S	X	X	X		800	20	10	(X)	X	X	X		(X)	X	X				
B	S	X	X			1200	15	2	X	(X)	X	X			X	(X)				
C	S	X	X			450	10	25	(X)	X	X	X		(X)	X	X				
D	S	X	X			1300	1-15	5	X	(X)	X	X		X	X	(X)				
E	Shell	X	X			100	3	12	(X)	X	X			(X)	X	X				
F	S/Mud	X	X			300	2	1		X	X	X	X		(X)	X	X			

Use letter of Zone location plus Number of trench, e.g., "A1"

Trench No.	Tidal Zone LI	MI	UI	SU	Trench Depth cm / in	Oiled Interval cm-cm / in-in	Subsurface Oil Character OP	PP	OR	OF	TR	No	Water Table cm / in	Sheen Color B,R,S,N	Clean Below? Yes / No

Cleanup Recommendations; Ecological/Recreational/Cultural Issues/Wildlife Observations

A) area around dredge pipe - berm eroded (from yesterday's surveys) sand from berm accelerating burial of pipe.
B) Mostly sandy tarballs - varies from <1 to 10% cover with some pools of oil. Evidence of sand burial.
C) Area of pooling oil. pos tent vacant, sorbent boom being buried in sand. No one working or cleaning - Abandoned. Evidence of oil burial & sand incorporation.
D) Construction (sand building) area. Sand being moved by heavy equipment over and around oil. Very different land configuration than survey of 24-may.
E) Transition from sand to vegetated shoreline - pockets of pooled oil. June 2009
F) mixed plain Tarballs - fresh and weathered

Sketch: Yes No Photos: Yes No Photographer Name: Jenni Nelson, M. Schroeder, T. Perryman

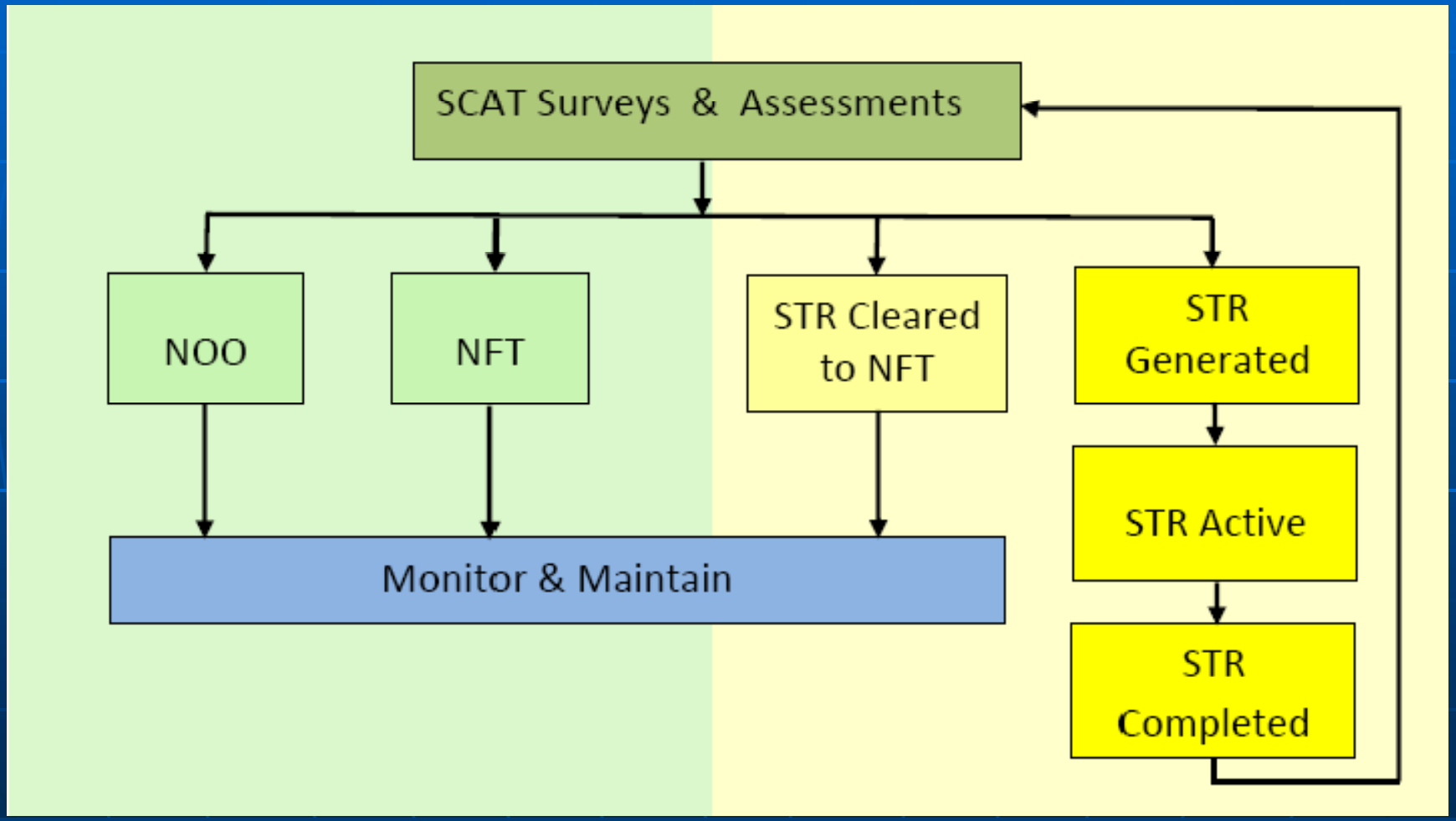
SCAT survey data shows that there is either:

NO OBSERVED OIL (NOO)

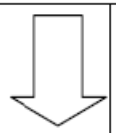
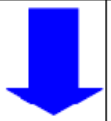
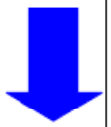
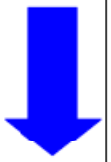
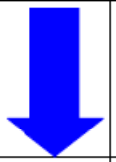
Oil is present but is below the agreed treatment standards = NO FURTHER TREATMENT required (NFT)

Oil is present and is above the agreed treatment standards so that a SHORELINE TREATMENT RECOMMENDATION (STR) is generated

SCAT Cycle

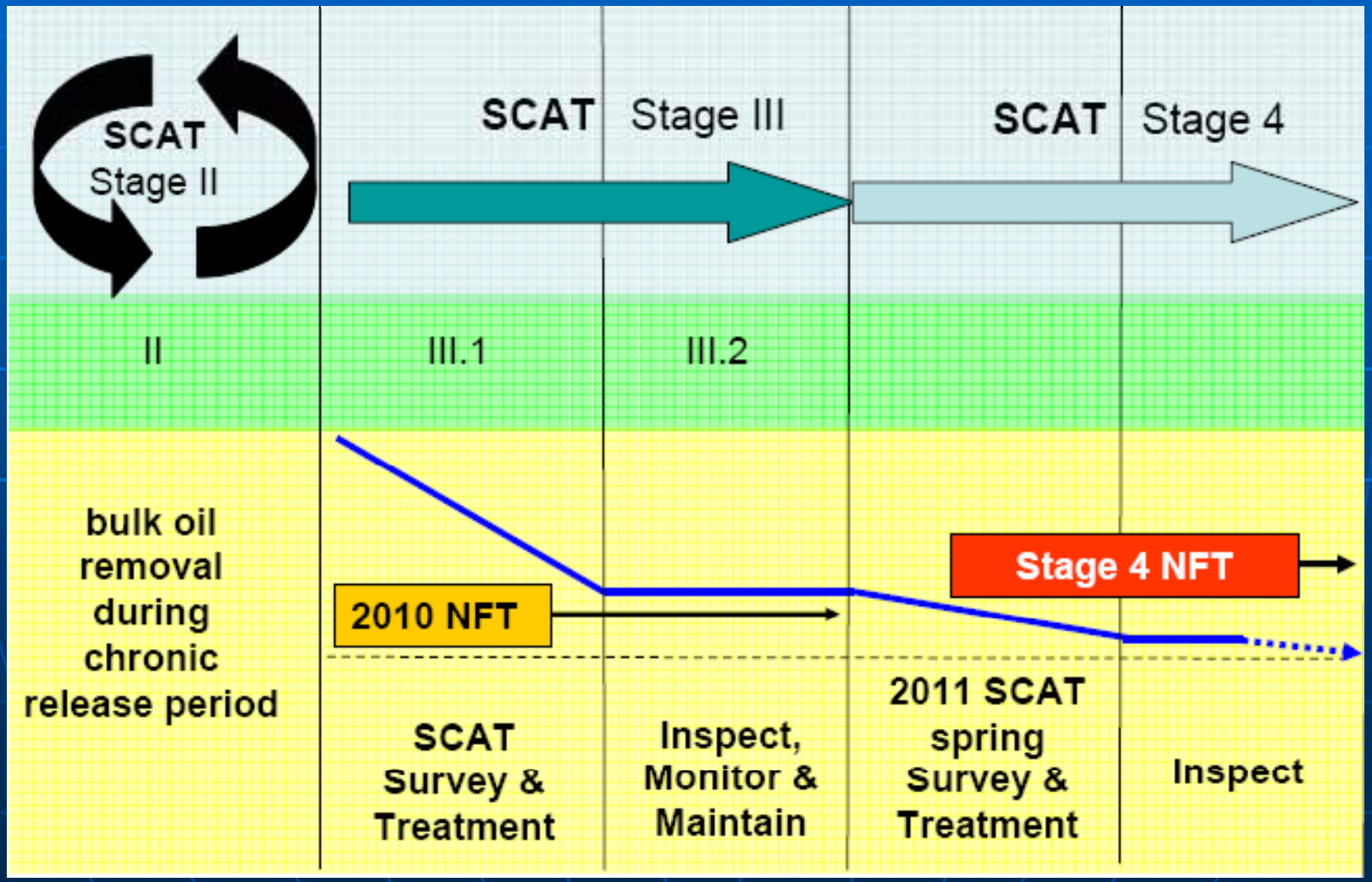

SCAT Surveys & Assessments
NOO
NFT
STR Cleared to NFT
STR Generated
STR Active
STR Completed
Monitor & Maintain

Stage III.1 Completion Process

1		**UC** – Determine that the threat of new oiling from the source has sufficiently diminished for Stage III to begin.
2		**SCAT** – Conduct aerial videotape survey of shoreline in the affected area to establish baseline and priority areas.
3		**SCAT** – Conduct ground survey (foot – boat)
4		**SCAT** – • Generate Shoreline Treatment Recommendation (STR) Reports for segments that require further treatment - *go to Step 5*. • Generate Shoreline Inspection Report (SIR) for segments with no observed oil (NOO) or no further treatment (NFT) recommended. ○ NOO segments will be deemed complete. ○ If NFT is recommended, proceed to Step 9.
5		**OPS** – Undertake cleanup in segments as recommended by the STR.
6		**OPS** – Report that shoreline treatment recommendations have been completed in a segment.
7		**SCAT** – Conduct ground inspection of segment with the land owner/ manager to document that sufficient treatment has been completed. • If further treatment is recommended, return to Step 5 • If NFT is recommended, proceed to Step 8.
8		**SCAT** – Submit SIR for segment that either NOO or NFT is recommended. • NOO segments will be deemed complete. • If NFT is recommended, proceed to Step 9.
9		**SCAT** – Transfer segments with observed oil remaining to "Maintenance and Monitoring" status. (STAGE III.2)

2010-2011 SCAT Activities

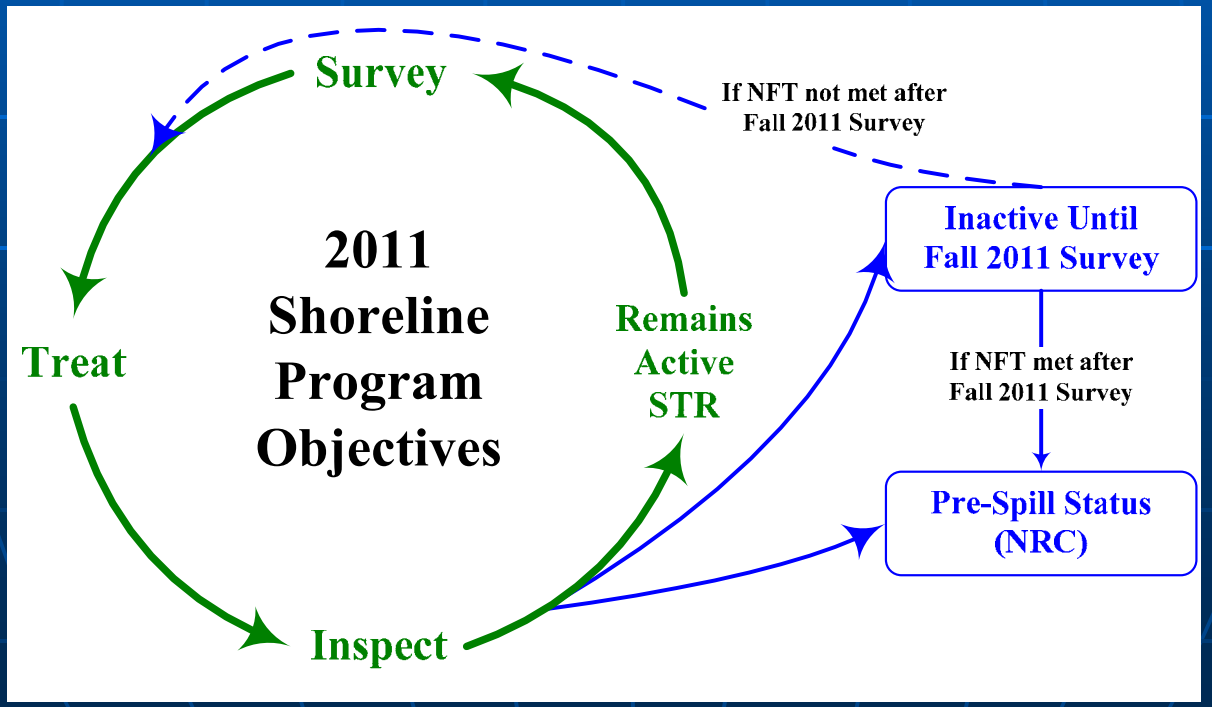
A sequence of stages

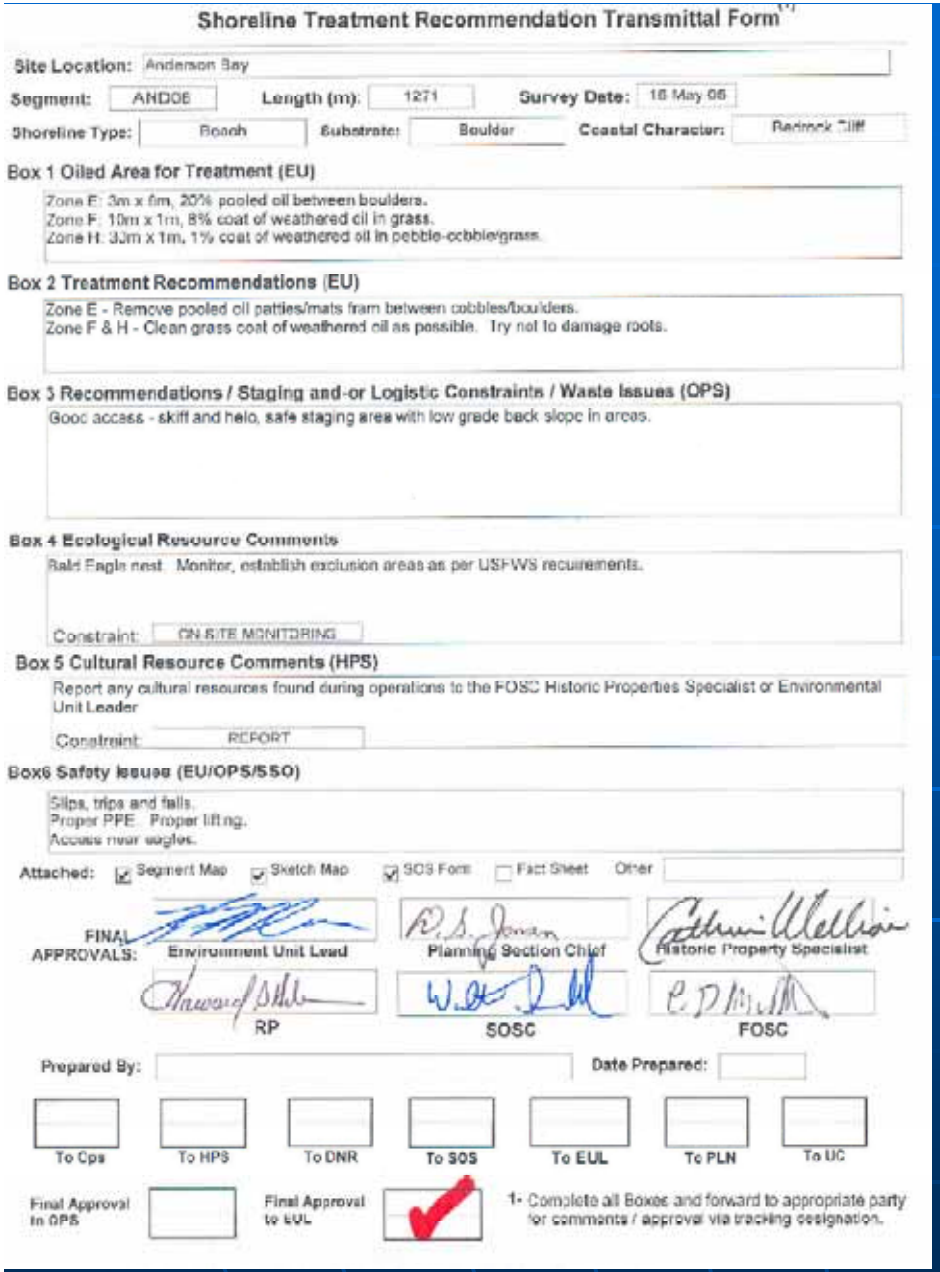


2010-2011 SCAT Activities

In reality a sequence of repetitive activities

- Survey
- Treat (cleanup)
- Inspect





Shoreline Treatment Recommendation Transmittal Form

Site Location: Anderson Bay

Segment: ANDOE | Length (m): 1271 | Survey Date: 16 May 06

Shoreline Type: Beach | Substrate: Boulder | Coastal Character: Bedrock Cliff

Box 1 Oiled Area for Treatment (EU)

Zone E: 3m x 6m, 20% pooled oil between boulders.
Zone F: 10m x 1m, 8% coat of weathered oil in grass.
Zone H: 3Jm x 1m, 1% coat of weathered oil in pebble-cobble/grass.

Box 2 Treatment Recommendations (EU)

Zone E - Remove pooled oil patties/mats from between cobbles/boulders.
Zone F & H - Clean grass coat of weathered oil as possible. Try not to damage roots.

Box 3 Recommendations / Staging and-or Logistic Constraints / Waste Issues (OPS)

Good access - skiff and helo, safe staging area with low grade back slope in areas.

Box 4 Ecological Resource Comments

Bald Eagle nest. Monitor, establish exclusion areas as per USFWS requirements.

Constraint: ON SITE MONITORING

Box 5 Cultural Resource Comments (HPS)

Report any cultural resources found during operations to the FOSC Historic Properties Specialist or Environmental Unit Leader

Constraint: REPORT

Box6 Safety Issues (EU/OPS/SSO)

Slips, trips and falls.
Proper PPE. Proper lifting.
Access near eagles.

Attached: ☑ Segment Map ☑ Sketch Map ☑ SCS Form ☐ Fact Sheet Other

FINAL APPROVALS: Environment Unit Lead | Planning Section Chief | Historic Property Specialist

RP | SOSC | FOSC

Prepared By: | Date Prepared:

To Cps	To HPS	To DNR	To SOS	To EUL	To PLN	To UC

Final Approval to OPS | Final Approval to EUL ✓

1- Complete all Boxes and forward to appropriate party for comments / approval via tracking designation.

STR Form

- generation of the form includes Section 7 and Section 106 reviews as well as FOSC, SOSC and RP approval
- this form is a "**Permission to Work**" for Operations and is part of the ICS 204 process

Shoreline Treatment Recommendations – MC 252

- Sand Beach Treatment Working Group (TWG)
- Marsh/Mangrove TWG
- Man-Made Solid/Rip Rap TWG
- The three TWG reports are attached to the ***"MC 252 SCAT - Shoreline Treatment Implementation Framework"*** which is the agreed survey/treatment program for each state

Deepwater Horizon MC252

Shoreline Treatment Recommendation Operational Permit to Work

STR Local Name: **Racoon Island** STR #: **169** Survey Date: **31-Aug-2010**

Segment Name	Start LAT	Start LONG	End LAT	End LONG	Length (m)
LATB03 - 001-10	29.05531	-90.937548	29.052366	-90.95155	2224
LATB03 - 002-10	29.049715	-90.917152	29.053877	-90.935894	8051
LATB03 - 060-10	29.06217	-90.94728	29.06812	-90.95683	2593

Total Length: 12868 meters

Location: Racoon Island (main island and western spit)

Shoreline Type: Fine- to medium-grained sand beach

Sheltered tidal flats
Riprap

Oiled Area For Treatment:

Zone A: 180 m x 2 m of 2% distribution of Surface Residue (SR) in the upper intertidal zone on the NW back side of the island
Zone B and C: 2.5 km x 4 m band of 1-3% distribution of Surface Residue Balls and Patties in the upper and supratidal zone all along the Gulf beach
Zone D: Small patch (5 m x 1 m) of 30% distribution Surface Residue on the eastern end of the beach
Zone E: Patch (25 m x 0.5 m) of 40% distribution of Surface Residue
Zone F: Patch (30 m x 1 m) of 20% distribution of Surface Residue on the western end of the spit

Cleanup Recommendation:

Manual Removal of patches of surface oil residue that are stranded in the supratidal zone, including SR "balls" and "patties" and oiled beach wrack. Strictly minimize removal of clean sand. Focus on areas with larger and heavier accumulations of oil. No mechanical equipment to be used on the island. No foot traffic or equipment in dune or marsh areas; do not disturb any vegetation. Do not disturb or remove beach wrack that is not oiled. Do not enter or work in the area landward of the dune fencing unless specifically authorized and accompanied by a LDWF biologist.

Cleanup teams should be deployed in clusters to work a specific area, rather than be spread over large lengths of beach. These clusters should work systematically from one end of the island to the other. Following the completion of cleanup operations, staging areas should be restored to natural or pre-existing conditions.

Guidelines for No Further Treatment will be no oil >1% distribution of Surface Residues.

Staging and Logistics:

Access is very restricted because of the large nesting colony and other contraints. Therefore, access to and work on the island can only be done under the direct supervision of the La Department of Wildlife and Fisheries staff. Contact Cassidy Lejune 337-864-1312 or Todd Baker 225-281-2066 to schedule work on the island. Access will be very restricted, therefore there will need to be careful planning for logistics and operations on the island.

Ecological Concerns:

Racoon Island is part of the Isle Denieres Barrier Islands Refuge managed by the Louisiana Department of Wildlife and Fisheries. Numerous nesting birds and migratory shorebirds occur on the islands in this area. Piping plover, a federally listed species, occurs in the area. The sand beach is Designated Critical Habitat for wintering piping plover under the US Endangered Species Act. Follow the threatened and endangered species BMPs specific to this site, including the attached guidance for avoiding nesting birds and migratory shorebirds during shoreline clean up on sand beaches.

Cultural / Historical Concerns:

Follow the attached Cultural Resource BMPs specific to this STR.

Safety Concerns:

Follow all established safety plans.

Operations Support – SCAT Ops Liaison

- communication between SCAT (EU-Planning) and Operations is relatively straight forward on most spills
- as scale increases so Span Of Control requires an adjustment
- SCAT Ops Liaison set up on the MC 252 to bridge the widening communications gap

Treatment Inspections

- Typically, SCAT teams inspect with land owners/managers to ensure that treatment recommendations have been met and a segment can go to an NOO or an NFT status (“Maintain and Monitor”)
- On MC 252, this is for a 2010 NFT condition, to be followed by a “winter M&M”, and a “Spring 2011 SCAT” resurvey – not unlike “Exxon Valdez” 1990-1992

M/V Selendang Ayu

Segment Inspection Report

Segment ID: TWP-01

Date of Survey: 22 Apr 05

Time of Survey: 1430

Tide Stage:

Weather:

SCAT Team ( ) Members

If no further treatment is required, each UC rep sign below.

Name		Signature
Ruth Yender	FOSC rep	
Crosby for Engles	SOSC rep	
Jami Nelson	RP rep	

Inspection Completed Along Entire Segment? YES / NO

Treatment Endpoint Criteria:

Very light oil, widely scattered tar spots.

Is treatment or further treatment required? (circle one)

YES - define below specific treatment action(s) and specific locations within the segment where required. Provide sketches, maps, GPS coordinates to OPS.

NO - each UC rep sign appropriate signature box above

Comments: NFT

land owner / manager comment box

FOSC_____ SOSC_____ RP_____

Shoreline Inspection Report (SIR)

UC Reps signatures

"An NFT with a small amount of oil that was below the end-point criteria"

SAND BEACH ISSUES

Sand beaches are the “easiest” shore type to clean yet they pose the biggest problems today in the Gulf of Mexico !!

- To treat or not to treat ?
- When is enough and what is feasible?
- How to minimize morphodynamic impacts ?

Shoreline Survey Data
18 July 2010

LOUISIANA

Shoreline Habitat	Total Surveyed	Heavy	Moderate	Light	Very Light	Trace (<1%)	NOO	Oiled as of Last Survey
Beach	161	24.6	12.5	33	22.8	10	58.1	102.9
Marsh	1356.1	38.5	71.6	70.7	62.8	0	1112.4	243.6
Other	84.5	2.3	2.9	4.6	5	0.9	68.7	15.8
Totals	1601.6	65.3	87	108.4	90.7	10.9	1239.2	362.4

ALABAMA - MISSISSIPPI - FLORIDA

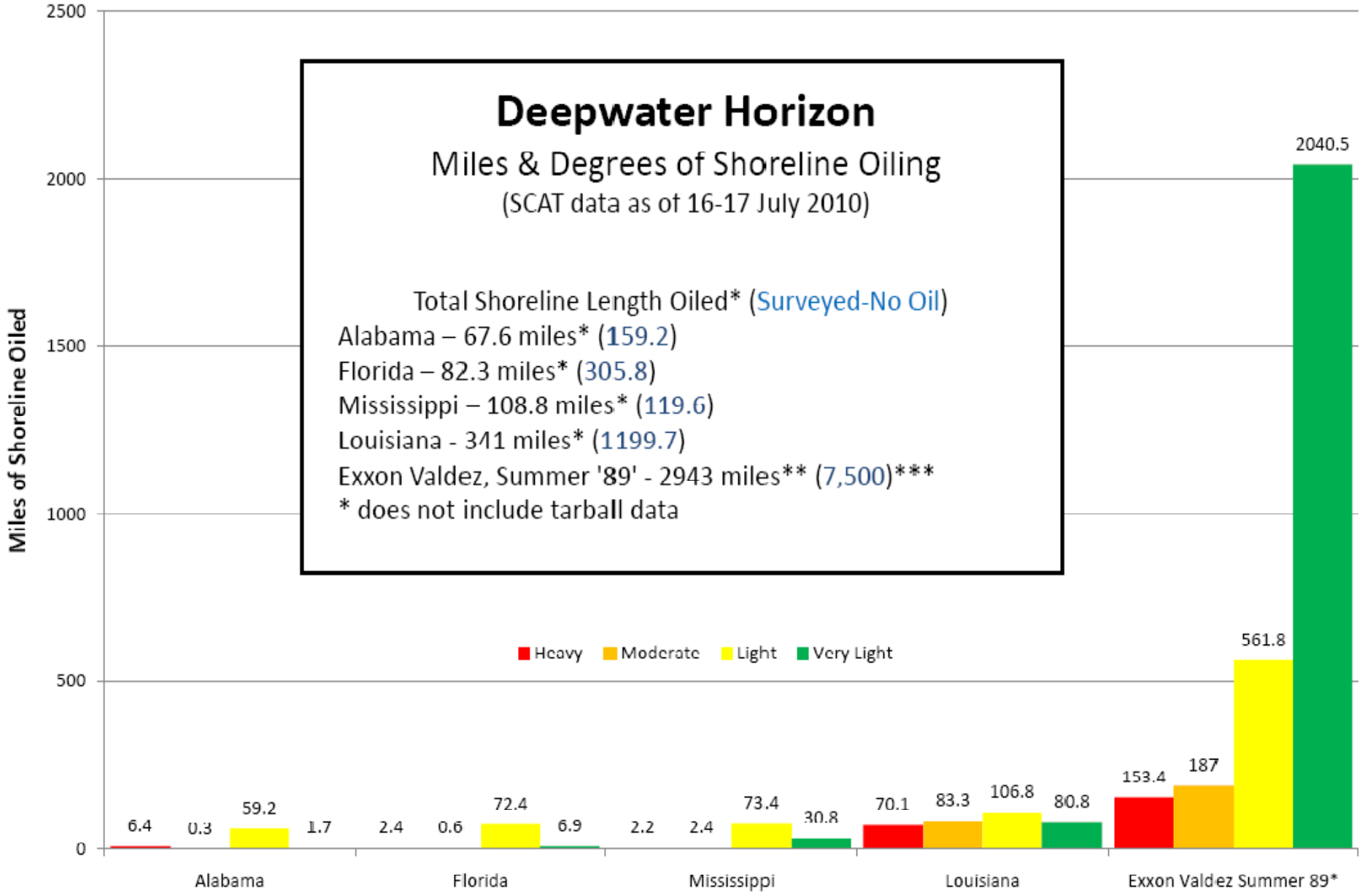
Beach	542.7	12.4	2.6	190.7	27.5	3.0	306.4	236.3
Marsh	188.1	0.0	0.0	8.0	1.9	0.4	177.8	10.3
Other	127.6	0.4	0.6	10.5	8.8	0.0	107.2	20.4
Totals	858.4	12.8	3.3	209.2	38.2	3.4	591.5	267.0

COMBINED	2460.0	78.1	90.3	317.6	128.9	14.3	1830.7	629.4

(miles)

Louisiana coastline ~ 7,700 miles: ~ 5% oiled

heavy + moderate marsh = ~ 1.5%



**Neff, J.M., E.H Owens, S.W. Stoker, and D.M. McCormick. 1995. Shoreline oiling conditions in Prince William Sound following the *Exxon Valdez* oil spill. In: Wells, P.G., J.N. Butler, and J.S. Hughes, eds. *Exxon Valdez* Oil Spill: Fate and Effects in Alaskan Waters, ASTM STP 1219. American Society for Testing and Materials. Philadelphia, PA, pp. 312-346.

*** Personal communication, Dr. Ed Owens, Polaris, June 2010

SAND BEACH TREATMENT OPTIONS

- Manual removal - shovels, rakes, sifters
- Mechanical removal - small scrapers, sifters
- In situ treatment - mixing, sediment relocation
- Ex situ treatment – washing, oxidation, thermal

SAND BEACH ISSUES

How to....

- clean when beaches in daily use ?
- treat stained sands ?
- treat buried oil ?
- deal with nearshore submerged oil ?

SAND BEACH ISSUES – 1

How to clean when beaches in daily use?

- Night operations
- Remove as soon as oil washes ashore

Operations Constraints – for example

- No mechanical techniques allowed in some areas
- No disturbance below 18” (yet oil present down to 24-26”)

SAND BEACH ISSUES - 2

How to treat stained sands ?

- **Sediment relocation to water line**
  - Rapid and high volume
  - no loss of sand
  - Non invasive (no footprint)
- **Sand treatment machines**
  - Rapid and high volume
  - No loss of sand
  - Machines for sand transfer and beach footprint

SAND BEACH ISSUES - 3

Buried oil in dynamic sand beaches ?

- **Location of subsurface oil:**
  - Pits, trenches, mechanical, augurs
  - thousands of pins flags
- **Scale of the Problem**
  - About **600,000 – 700,000** cubic yards treated on ~12 miles of Fourchon-Grand Isle-Grand Terre beaches in LA
  - Some 30+ miles of subsurface oil on high use amenity Gulf states beaches

SAND BEACH ISSUES - 4

How to deal with nearshore submerged oil ?

- First have to find it – “snorkel SCAT”
- Poor visibility in LA
- Vacuums, snares, ?, ?

At the End of the Day…

… it is not the shore type nor the amount of oil that really matters !

The driving forces behind the decision process for sand beaches are public use and public perception.

Anywhere people live on the coast there are high use amenity sand beaches!!!