NATIONAL SHORELINE CLEAN-UP ASSESSMENT TECHNIQUE (SCAT) GUIDANCE MANUAL -KENYA-

Prepared for:
Ministry of Petroleum and Mining
Kenya Petroleum Technical Assistance Project (KEPTAP)

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NOTE:

The Kenya national framework for hydrocarbon release prevention, preparedness and response capacity uses the term "hydrocarbon" to refer to crude oil, natural gas, and any product derived from the fractional distillation and refining of crude oil (both liquid and gas phase) and the term "oil" to refer to liquid hydrocarbons. This National SCAT Guidance Manual is design to be used as part of the national framework, including the Kenya National Contingency Plan (NCP) for marine and navigable waters (Marine NCP) and the NCP for onshore areas (Onshore NCP). This guidance manual will assist responders tasked with the assessment, delineation, and documentation of oiled shorelines (marine and lake), river and stream banks, and land areas. The procedures in the guide provide an internationally accepted practice for tracking clean-up progress and completion. Users may include national to local government personnel as well as representatives from industry.

This manual is intended to be used in conjunction with the Marine-NCP or Onshore-NCP and with other spill contingency plans relevant to a specific spill location.

The manual is divided into four sections:

- Part One describes the role of SCAT in a spill response organization and how SCAT supports the response.
- Part Two describes the SCAT process and provides the spill Incident Management Team (IMT) with key information and material to understand how SCAT is integrated into the response effort.
- Part Three provides IMT members and SCAT personnel with the information needed to implement SCAT activities during a spill emergency response.
- Part Four provides national guidelines on how to describe and document shoreline oiling conditions during the response.

A Tools Section is provided as an attachment with checklists, forms, and reference guides to be used during a response.

Key information from sources that reflect the latest developments in using SCAT worldwide are included in this manual:

- Environment and Climate Change Canada (ECCC) SCAT Manual (3rd Edition, 2018)
- SCAT Annex of the NW Area Plan, USA (issued by the SCAT Technical Workgroup in 2014)
- National Oceanic and Atmospheric Administration, USA (NOAA) Shoreline Assessment Manual [PDF, 14 MB] updated August 2013
- Tools and experience from years of SCAT implementation through
  - POLARIS Applied Sciences, Inc.
  - Owens Coastal Consultants
  - EML Mapping Ltd.

KENYA NATIONAL SHORELINE CLEAN-UP ASSESSMENT TECHNIQUE (SCAT) GUIDANCE MANUAL

Produced for KEPTAP, as part of the national framework for onshore and offshore hydrocarbon escape prevention, preparedness and response capacity, under Contract
by
Polaris Applied Sciences, Inc.

January 2020

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Abbreviations and Acronyms

CESG	Cleanup Endpoints Stakeholder Group
EFH	Essential Fish Habitat
EU	Environmental Unit
EUL	Environmental Unit Leader
FTP	file transfer protocol
GIS	Geographic Information System
GPS	Global Positioning System
IAP	Incident Action Plan
ICS	Incident Command System
ICP	Incident Command Post
IMT	Incident Management Team
JSA	Job Safety Analysis
KMA	Kenya Maritime Authority
NCP	National Contingency Plan
NEMA	National Environmental Management Authority
NEB	net environmental benefit
NFT	no further treatment
NOO	no oil observed
OP	operational period
OPS	Operation Section
PDA	personal digital assistant
PIST	Pre-Inspection Survey Transmittal
PPE	personal protective equipment
PSC	Planning Section Chief
QA/QC	quality assurance/quality control
RP	responsible party
RPIC	Responsible Party Incident Commander
RRT	Regional Response Team
SCAT	shoreline cleanup assessment technique
SIR	shoreline (or segment or STR) inspection report
SOS	shoreline oiling summary
SRP	shoreline response program
STAG	Shoreline Treatment Advisory Group
STR	shoreline treatment recommendation
SU	Situation Unit
UC	Unified Command

Initial Steps for SCAT Rollout

On Call-out

- ☐ Obtain spill specific information: spill location, product(s) spilled, geographic extent of affected area, safety concerns, contact call-back numbers, and location of Command Post.
- ☐ Mobilize SCAT Coordinator, Field Lead, and Database/GIS team members.
- ☐ Deploy to site with appropriate PPE and SCAT gear (*see checklist pg. 35*).
- ☐ Access RP oil spill response plan and determine spill segmentation, if needed.

On arrival at Command Post

- ☐ Check-in with Environmental Unit (or Planning Section if no EU) and liaise with lead agencies for planned SCAT activities.
- ☐ Obtain Spill-specific Safety Plan and briefing for field activities.
- ☐ Conduct initial aerial assessment to define extent downstream for surveys and operations.

Post-Initial Assessment

- ☐ Establish base mapping to include geographic segmentation aligned with operational divisions (coordinate with Situation Unit if in place).
- ☐ Establish work space and coordinate resource requirements with Logistics.
- ☐ Provide map showing extent, degree, and character of oiling (or other spilled material) on river banks or shorelines and priority protection, containment, and cleanup locations.
- ☐ Draft initial general Shoreline Treatment Recommendation (STR), with constraints as appropriate, in coordination with the EUL. Route to Planning Section Chief for approvals and issuance to Operations.
- ☐ Draft incident-specific SCAT Plan to define SCAT teams, organization, field deployment plan, shoreline types, treatment techniques, and phases of clean-up:
    - Phase 1: bulk oil or product removal with cleanup targets by habitat or shore type;
    - Phase 2: polishing phase with treatment completion criteria by habitat or shore type;
    - Phase 3: monitoring natural attenuation.
- ☐ Maintain SCAT Group log (ICS 214)

Revision Log

Date	Revision	Comments
August 2019	0	Guide development through the Technical Committee with Polaris Applied Sciences, Inc.
December 2019	0.1	Comments and edits suggested by the Technical Committee addressed by Polaris Applied Sciences, Inc.
January 2020	0.2	Final version to be presented to stakeholders and implemented in 2020

Part 1: Organization and Management

During a spill response, the shoreline cleanup assessment technique (SCAT) is conducted as part of the Shoreline Response Program (SRP) coordinated under the Incident Command System (ICS). SCAT resides within the Environmental Unit (EU), under the Planning Section (Figure 1). A key role of the SCAT team is to support the response operations by communicating directly with the Operations personnel; this ensures that both teams understand each other's roles and requirements and enables each team to provide input to the others decisions.

SCAT Team Roles and Responsibilities

Figures 1 and 2 show organizational charts for small and large spills, respectively. An example of SCAT organization (command and field) is outlined in Table 1. Roles and responsibilities for each position are described in the following section. Checklists for each role are provided in SECTION 5: TOOLS.

Figure 1 Small spill organizational chart (from NWACP 2014)

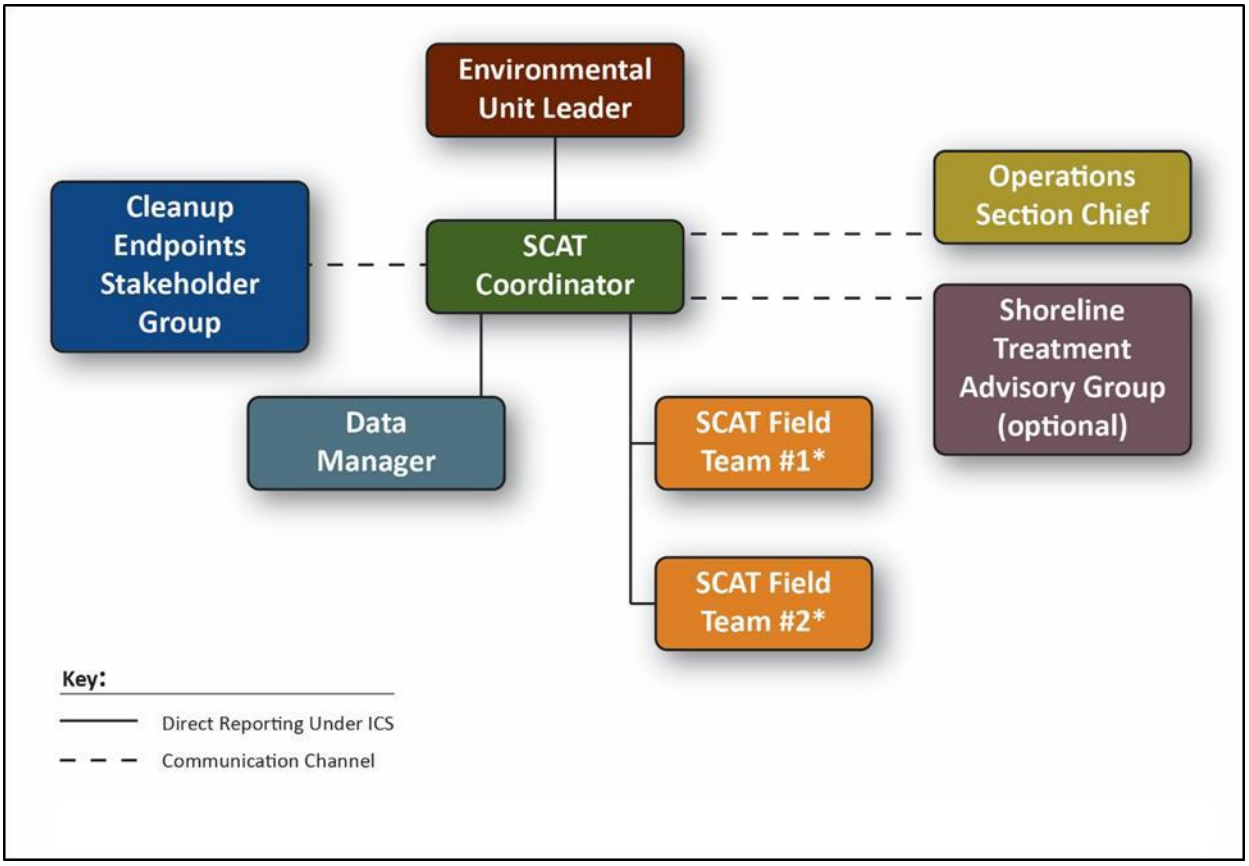


Figure 2 Large spill organizational chart (from NWACP 2014)

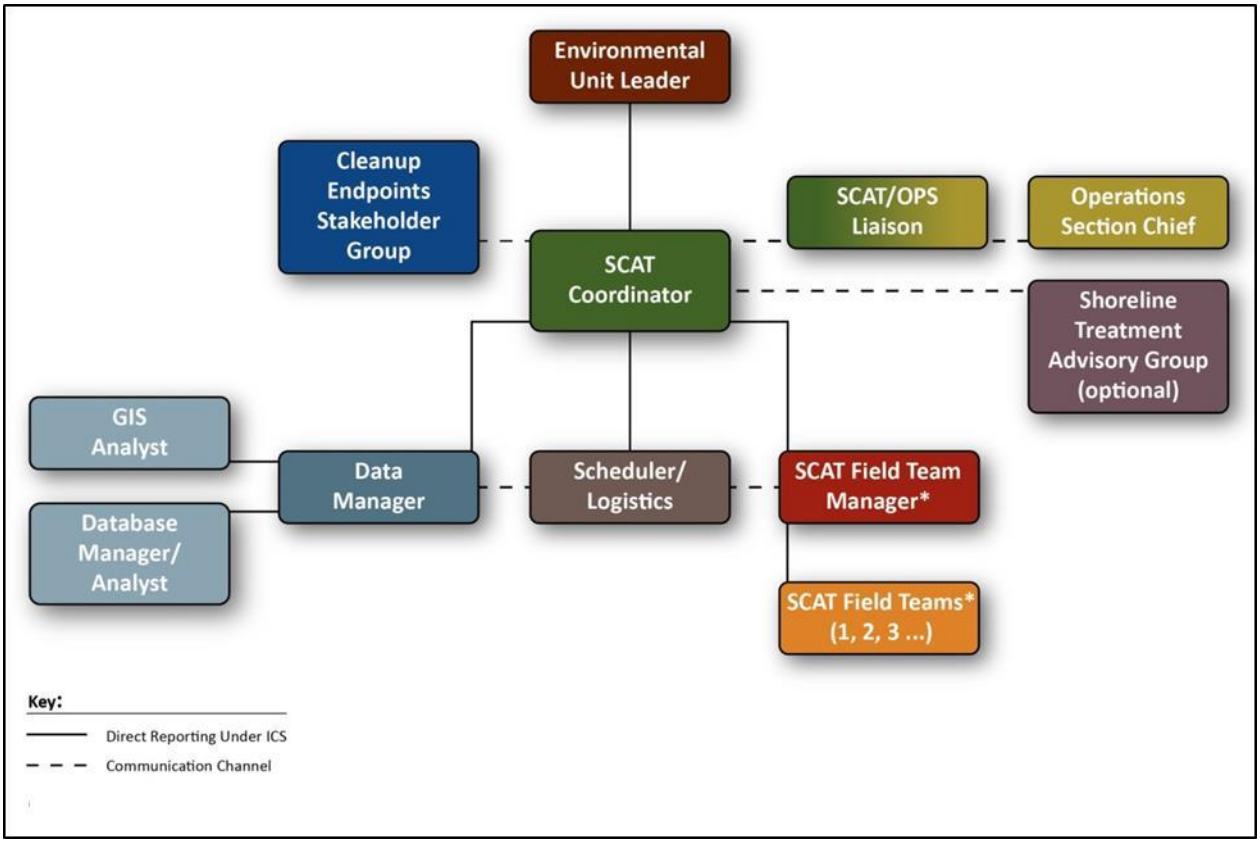


Table 1 Example of SCAT organization

SCAT Command Organization	
Command Post	SCAT Coordinator SCAT Data Manager / Data Entry Archeologist/Cultural Specialist
Field Team Organization	
Initial Aerial Reconnaissance (overflight) and Aerial Surveys	KMA RP
SCAT Team 1	KMA NEMA RP County Gov't reps
SCAT Team 2	KMA NEMA RP County Gov't reps
SCAT Team 3	KMA NEMA RP County Gov't reps

SCAT Coordinator

The SCAT Coordinator is in charge of the SCAT operations. The SCAT Coordinator reports directly to the Environment Unit Leader, but must maintain a close working relationship with the Operations Section, resource agencies, and other affected parties. In the field, SCAT teams may receive priorities and technical directions from the SCAT Coordinator via the SCAT Field Team Manager.

SCAT Field Teams

SCAT Field Team members will be assigned for each team (plus vessel/aircraft operators as needed), ideally with the following representation (one or more roles may be combined, or not be applicable):

- OSR Lead Agency (e.g., KMA for marine and navigable waters)
- NEMA
- RP
- County Government

Specific area information and site considerations are available from personnel at the EOC, including:

- OSR Lead Agency
- County government and/or oversight organization
- Government representative for ecological constraints
- Archeologist or cultural resource specialists who can advise on precautions and constraints to protect cultural resources, if needed

SCAT Data Manager

The SCAT Data Manager is responsible for receiving, reviewing, and storing all SCAT field data, and for the production of maps and tables as needed. The SCAT Data Manager may request the assignment of a SCAT Documentation specialist if the workload demands it.

SCAT Schedule

Efforts should be made to minimize personnel substitutions and select team members who can stay with the SCAT operations, or to have a systematic schedule of alternates; people who see conditions change through time have a better frame of reference for assessing the success of cleanup operations.

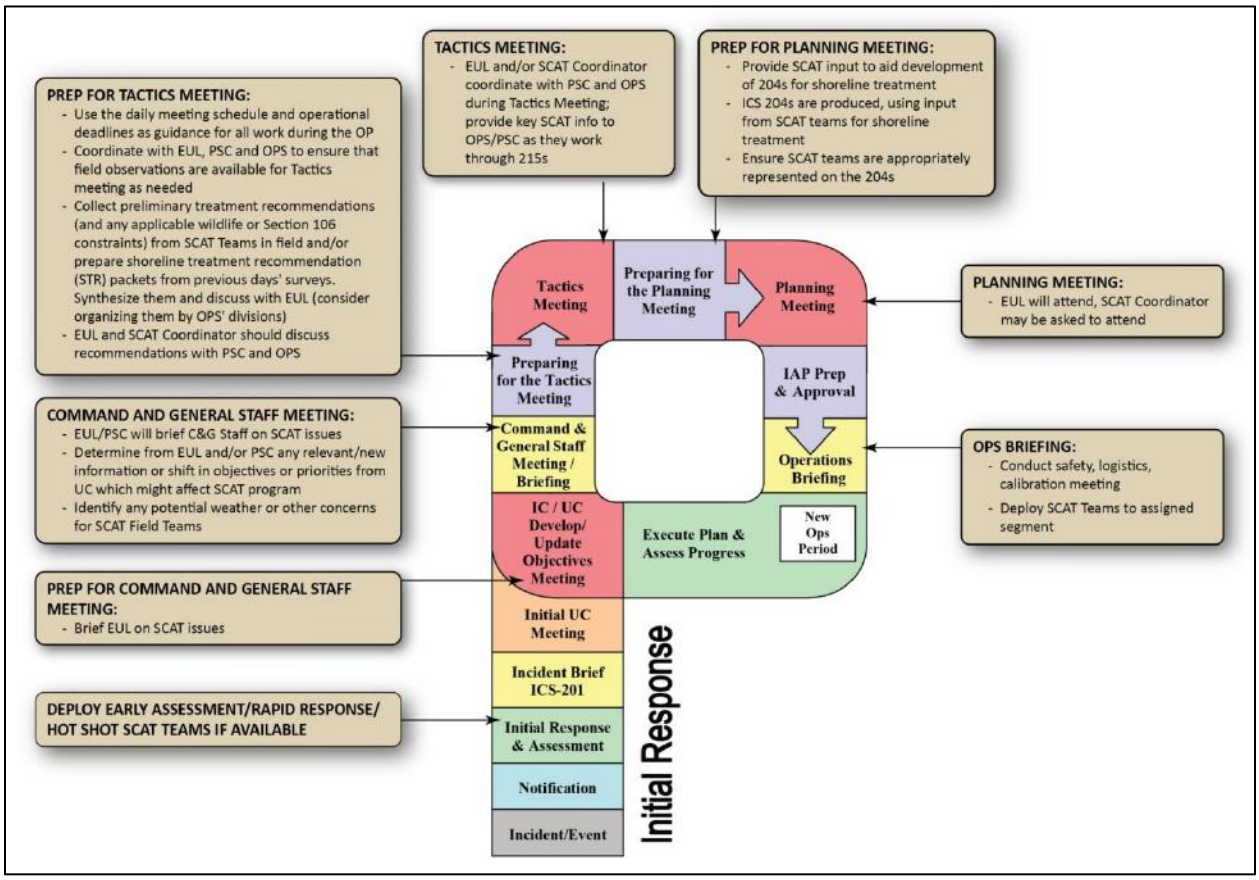
Team Priority

Areas where significant recoverable oiling has been noted or are of specific ecological importance will be prioritized to maximize recovery opportunities and to reduce overall impacts. The schedule for SCAT Field Teams will be defined daily and be reflected in the ICS 204 forms included in the response Incident Action Plan (IAP).

Integrating SCAT with ICS Planning

Information generated by SCAT is critical to spill response and is used throughout the planning and operational process (Figure 3). The SCAT team generates ICS forms to support the emergency management process. Table 2 summarizes the ICS forms generated by the SCAT team during the planning and operational process.

Figure 3 SCAT in the initial Planning Phase (from NWACP 2014)



The IMT generates, approves and facilitates the implementation of an Incident Action Plan (IAP) daily, at the end of each cycle shown in Figure 3. The SCAT Coordinator synthesizes the field data into reports used by the EU and Planning Section to support the daily IAP. A Shoreline Treatment Recommendation (STR) form is generated by the SCAT team for each section of shoreline that has oil conditions which exceed the treatment criteria (Table 2). The information and recommendations in the STRs are reviewed by the Planning Section and the STRs are implemented by the Operations Section. SCAT supports the response objectives and mandates of the response operations, as directed and managed by the Unified Command (UC).

Table 2 ICS forms generated by the SCAT team

ICS Forms	Purpose
ICS-234	Proposed STRs are reviewed by the Operations Section Chief (OSC) who considers and documents the various strategies and options that are available and then selects the most appropriate one(s). The STRs generated by the SCAT team and the daily SCAT field missions are summarized in the Work Analysis Matrix or ICS-234 form
ICS-215	The Operational Planning Worksheet or ICS-215 is used by the Operations Section Chief in preparing for the next Operational Period. The ICS-215 is used to outline shoreline response work assignments (STRs) and resource requirements for the next Operational Period. Separately, all SCAT field activities and resources (including personnel and equipment) are included in an ICS-215 form.
ICS-204	Once strategies and required resources are presented at the Tactics Meeting and approved at the Planning Meeting, SCAT field activities and STRs become assignments for the next operational period. All assignments are included in the Incident Action Plan (IAP) using the Field Task Assignment or ICS-204 form.
ICS-232	The SCAT team must be aware of any resource at risk, identified in the Resources at Risk summary form or ICS-232 RR, and support keeping the form updated with any field observations regarding: environmentally-sensitive areas, wildlife, archeological, cultural and socio-economic issues.

Part 2: Shoreline Cleanup and Assessment Technique (SCAT)

The Shoreline Cleanup and Assessment Technique (SCAT) is an integral component of a spill response that provides real time information and recommendations for shoreline operations. SCAT surveys begin early in the response to assess initial shoreline conditions, and ideally continue throughout the response working in advance of shoreline cleanup to determine extent of shoreline impact, cleanup effectiveness, and eventually, to conduct final evaluations of shorelines to demonstrate treatment completion criteria is achieved.

Purpose

SCAT teams survey the affected area to provide geo-referenced documentation on impacted shoreline, river bank, or land conditions, as well as site specific sensitivities to oil and to treatment options, using standardized methods and terminology. The data and information generated by the SCAT surveys are compiled on a segment-by-segment basis, are crucial to the decision process, and are the foundation for planning the operational stages of the shoreline response, cleanup, and sign-off.

Decision Support

The SCAT Group typically is part of the Environmental Unit in the spill management organization (Figure 1) and provides technical and environmental advice as part of decision support for shoreline treatment planning and response operations from Day 1 to the last inspection irrespective of the size of a spill or the size of the area affected by the impact.

Operations Support

SCAT managers and team leads interact directly with Operations managers and field supervisors to explain the treatment recommendations and cleanup targets as defined on the Shoreline Treatment Recommendation (STR) forms (see Part 5, Forms) and to ensure that the field operations understand any environmental, cultural, safety, or other constraints that may be applicable to cleanup along specific segments.

County/Local Participation

The participation of Lead Agency (e.g., KMA or NEMA), and County government and/or Local representatives is a key element of the SCAT program as this joint team comprises representation of the Unified Command. County/local participation includes an appropriate level of involvement with the impacted shorelines and provides concurrence that sufficient treatment has been accomplished.

Project Closure

SCAT teams, in concert with RP, Lead Agency, and County government and/or Local representatives, inspect treated areas after cleanup has been completed to demonstrate treatment goals have been achieved. Cleanup goals, or targets, must be approved by Unified Command and typically are defined for the types of shorelines affected, product spilled, and resources at risk through a consultation process with RP, Lead Agency, County or Local, and environmental professionals. The SCAT group documents cleanup completion on a segment under an STR on STR Inspection Report (SIR) forms (Forms - Part 5).

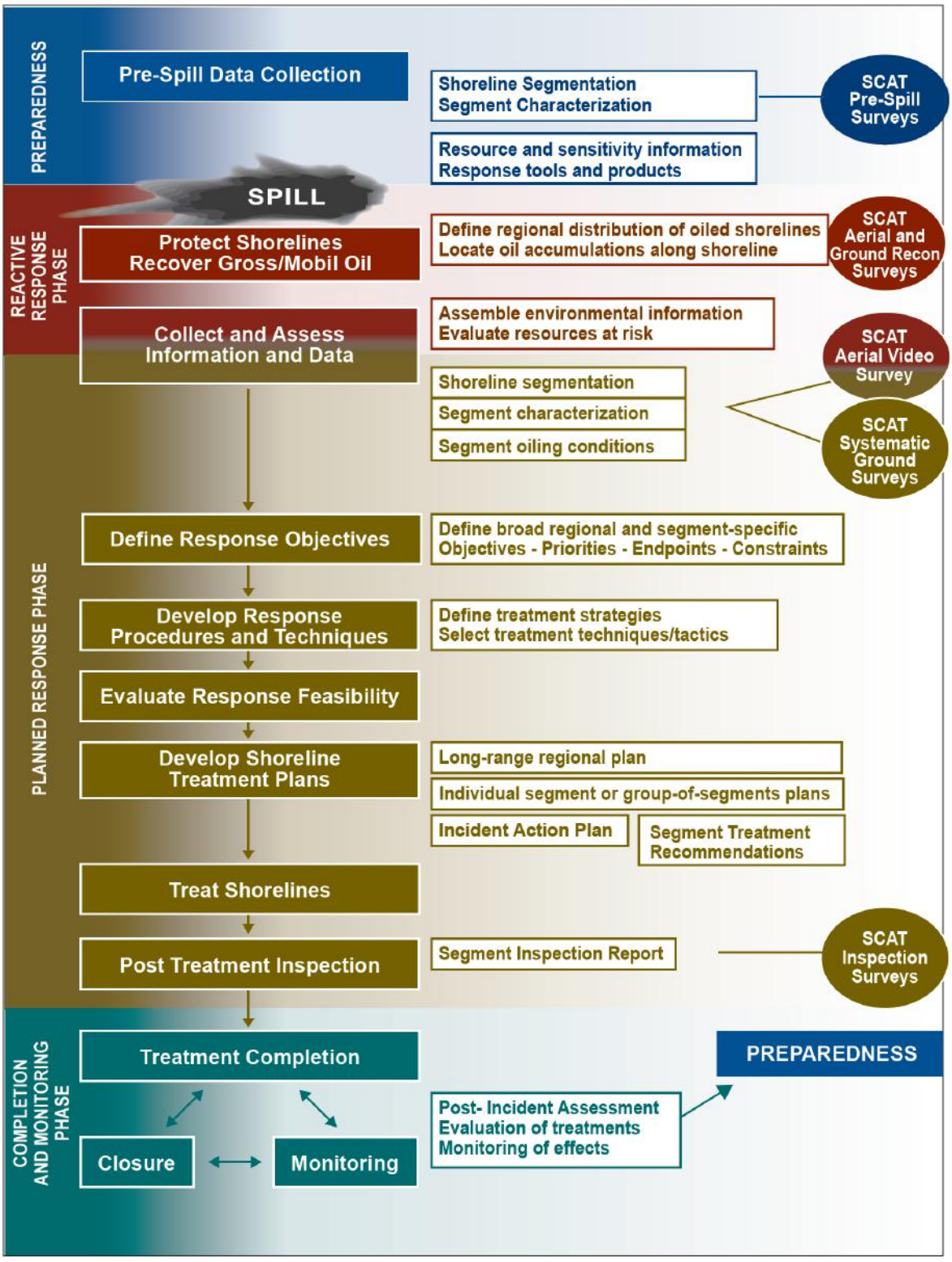
SCAT Objectives

The objective of the SCAT survey is to collect and document real-time georeferenced data on the extent and degree of oiling (or other material) and shoreline conditions in a rapid, accurate, and systematic way. SCAT activities will vary depending on the stage of the response (Table 3). Figure 4 provides an overview of the SCAT process.

Table 3 SCAT activities and objectives during different stages of spill response

ACTIVITIES	OBJECTIVES
INITIAL or REACTIVE RESPONSE PHASE (24-48 hrs)	
Aerial and/or ground reconnaissance surveys define the regional scale of the shoreline oiling (or other impacts) and define the overall character of the affected areas.	This information is used to develop a general response plan and to recommend shoreline protection and cleanup priorities.
PLANNING or DECISION PHASE (48+ hrs)	
Ground-based surveys document shoreline character and oiling conditions within segments that is entered into the SCAT data base.	These data are used to establish treatment priorities and treatment completion criteria and to recommend treatment options (strategies and tactics). Treatment actions are described using a Shoreline Treatment Recommendation (STR) form for each segment to be treated and is reviewed and approved by the spill management team.
OPERATIONAL or TREATMENT PHASE (48+ hrs)	
Site visits to provide operational support to cleanup managers and supervisors. Can include pre-inspection surveys prior to formal post-treatment inspection surveys.	SCAT teams discuss progress and issues associated with the treatment recommendations and treatment completion criteria.
INSPECTION or CLOSURE PHASE (72+ hrs)	
Ground-based segment surveys document shoreline character and oiling conditions and determine whether the treatment completion criteria is achieved.	These post-treatment inspections provide closure so that operations teams can redeploy resources from a treated segment. The results of a segment survey are recorded on a Shoreline, Segment or STR Inspection Report (SIR) form.

Figure 4 SCAT Process Flow Chart

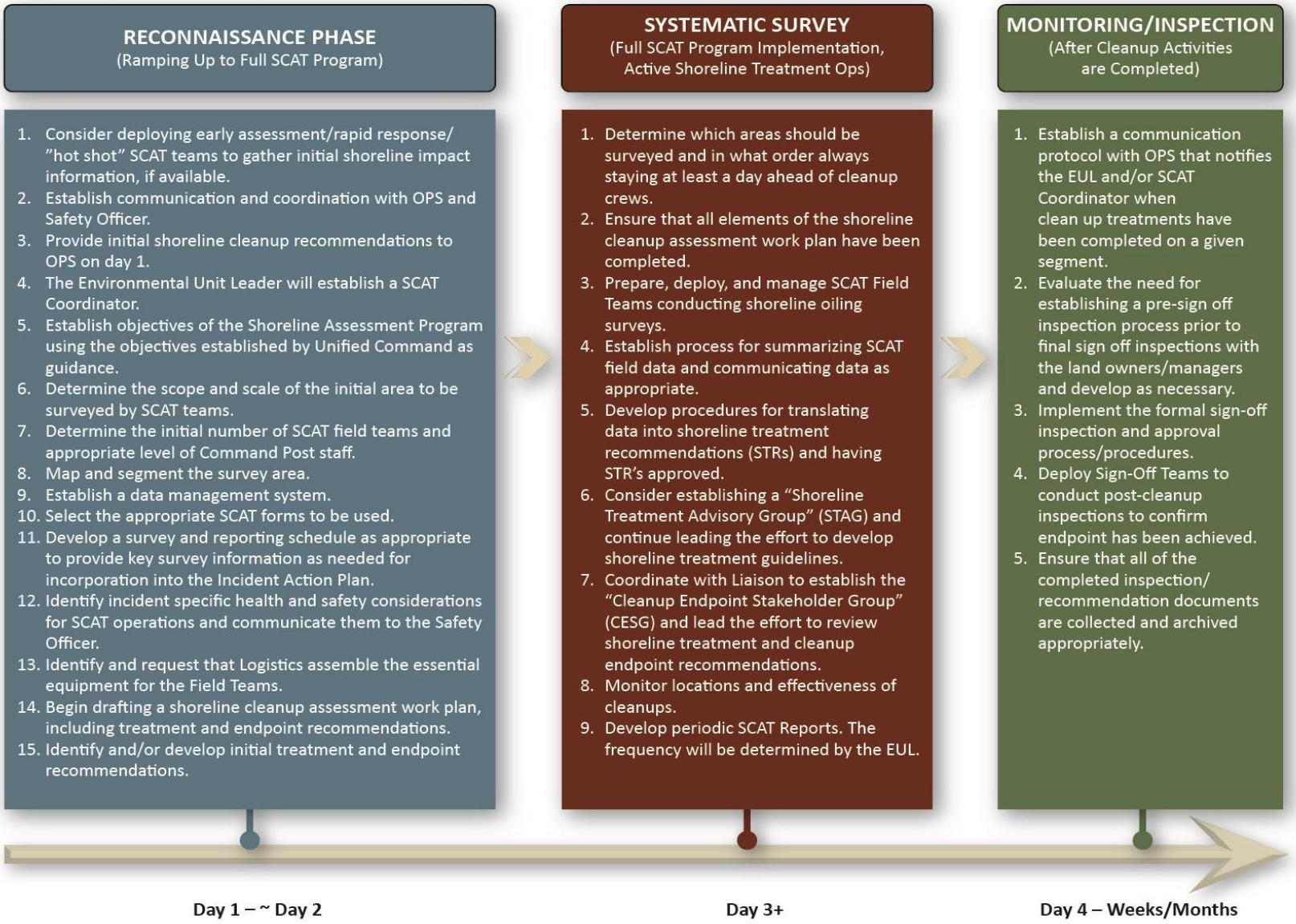


Part 3: Implementing SCAT

SCAT activities and specific objectives vary during the evolution of a spill response (Figure 5). The basic sequence of steps in the SCAT process involves:

- an **aerial survey** (for all but small areas) and that may be done, in part, with drones to scale the problem and enable an appropriate number of SCAT teams to be deployed,
- a **ground survey** (SCAT Field Teams),
- **documentation of the oiling conditions** using Shoreline Oiling Summary (SOS) forms that are based on a set of standard oiling terms and definitions,
- an **assessment** of the overall oiling conditions and the development of a proposed shoreline treatment strategy that includes recommending **treatment** , and **operational priorities**,
- the development of **Shoreline Treatment Recommendation (STR)** forms for review and approval by the spill management team,
- **discussions with operations personnel** to ensure that they understand the objectives of the treatment program and any environmental constraints to prevent additional damage that might result from field operations ,
- **inspection** surveys with regional and/or local representatives to ensure that the treatment objectives have been met, and
- completion of a **STR Inspection Report (SIR)** form to recommend to the spill management team that no further treatment is necessary.

Figure 5 SCAT workflow and milestones (from NWACP 2014)



Identify Resources at Risk

A range of information is recorded in addition to the location and character of the oil. This information includes the physical characteristics of the shoreline and any ecological, natural, cultural and human use resources that may be affected by oil or potential treatment activities. The inclusion of experts in these fields on the SCAT team, such as wildlife observers or archaeologists, can help accurately observe and document these resources.

Identify Factors that may Assist or Constrain Operations

As an element of operations support, the SCAT teams record factors that may assist or constrain operations to provide an accurate picture of a segment in which operations will carry out the proposed treatment activities. These factors include access points, staging areas, environmental and safety concerns, and any other key operational items to assist planners and operations.

Recommend Treatment Tactics

On the basis of the field observations, the SCAT team recommends appropriate treatment options for an oiled segment. An essential element of these recommendations is the development of **treatment completion criteria** by the spill management team (Section 4 – Cleanup and Treatment Completion Recommendations). The treatment completion criteria is based on the goals and objectives of the shoreline treatment program and should be established as soon as is practical so that the SCAT teams can provide recommendations appropriate to achieving those goals.

The spill management team also provides guidelines regarding which treatment tactics can be used to treat shorelines and what constraints may apply. RP Oil Spill Contingency Plans (OSCP) should include matrices of types of shorelines (or river banks) and examples of applicable cleanup techniques.

Inspect and Evaluate the Treatment Activities

An important role of the SCAT program is to ensure that the objectives and goals (treatment completion criteria) established by the spill management team are achieved. SCAT teams work in the field with Operations to ensure that these treatment completion criteria, as well as any tactical constraints that may apply, are understood.

SCAT Teams

SCAT teams collect the data needed to develop a shoreline cleanup plan that maximizes the recovery of oiled habitats and resources, while minimizing the risk of injury from cleanup efforts.

The team's responsibilities include:

- evaluating oil type and condition,
- factoring in shoreline types and local processes that affect oil behavior and cleanup methods,
- identifying environmentally and culturally sensitive resources,
- determining need for treatment,
- recommending treatment methods and completion criteria, and
- placing constraints on treatment if necessary, due to safety, ecological, economic, or cultural concerns.

Throughout the SCAT work, the team must give consideration to:

- potential for human exposure, by direct contact or through ingestion (drinking water or harvested resources),
- extent and duration of environmental impacts if the oil is not removed,
- natural removal rates,
- potential for remobilized oil to affect other sensitive resources, and
- likelihood that cleanup may cause greater harm than the oil alone.

Part 4: SCAT Field Observations

Standard Shoreline Oiling Summary (SOS) Form

The standard Shoreline Oiling Summary (SOS) form is the basic form from which adaptations may be developed. The most commonly used SCAT forms include standard SOS, Wetlands and Mangrove (for marine spills), and River and Stream (for inland spills). This section describes the information and data that are entered on a typical Marine Shoreline Oiling Summary form and the standard terms and definitions that have been developed.

- ☞ Terms and examples of shoreline characteristics, features, and attributes are provided in Part 5 – River and Marine Shoreline Terms and Definitions.
- ☞ SOS forms for streams and lakes are provided in Part 5 – Forms.

MARINE (SOS) FORM Incident: SCAT Example Page 1 of 2

1.GENERAL INFORMATION	Date (dd/mmm/yyyy)	Time (24h standard/daylight)	Tide Height (m)
	10/SEP/2019	13:45 to 15:00	Low: 1.2 High: 2.5
Segment ID: A-SHS-001	Segment Name: Port of Shela		(H / M / L) - (R / F / LS / HS)
Ops Division: A	Survey Type: SOS	STR:	

Survey By: Foot X ATV__ Boat__ Helicopter__ Other _____ Weather: Sun / Clouds / Fog / Rain / Snow / Windy / Calm

2. SURVEY TEAM	Name	Organization	Name	Organization
Team Number	Adamu Mwangi	KP	Alamin Aluna	County
	Ashura Maina	NEMA		
	Ahmed Kamau	KWS		

3. SEGMENT	Total Length: 940 meters	Length Surveyed: 940 meters	Datum: WGS84

Survey Start GPS:	WP: RS-001	LAT: 2°18' 21.5"S	LONG: 40°54' 41.58"E
Survey End GPS:	WP: RS-002	LAT: 2°17' 39.81"S	LONG: 40°54' 57.39"E

4a. SHORELINE TYPE : *Indicate only ONE Primary(dominant) type and ALL Secondary types. CIRCLE those OILED*

BEDROCK: Cliff_____ Ramp_____ Platform_____
MAN-MADE: Solid_____ Permeable_____
Description:
ESI Shoreline Type (primary) 3A (secondary) 10D

Sediment BEACH: Sand P Mixed____ Pebble/Cobble____ Boulder_____
Sediment FLAT: Mud____ Sand P Mixed___ Pebble/Cobble/Boulder____
WETLAND:_____ Description:_____
OTHER: vegetated bank around Fordhani House

4b. COASTAL/BACKSHORE CHARACTER *Indicate only ONE Primary (P) and ANY Secondary (S) types.*

Cliff/Hill:____ ht. 1.5 m.
Sloped: >(5°) (15°) (30°)

Flat/Lowland:____ Beach: P Dune: S Inlet/Channel:____ Delta:____ Lagoon:____ Marsh/Wetland:____
Man-Made: ____ Primary Substrate type: Sand Forested / Vegetated - Secondary (mainly in Zone A)

5. OPERATIONAL FEATURES	Oiled Debris? Yes / No	Type:	Amount: (bags/trucks)
Direct backshore access? Yes / No	Alongshore access from next segment? Yes / No		Suitable for backshore staging? Yes / No
Access Description / Restrictions: Boat access next to the Peponi Hotel			Current Dominated Channel? Yes / No

6. SURFACE OILING DESCRIPTION:
Use letters A-Z, Indicate 100% overlapping oil zones in different tidal zones by numbering them (e.g. A1, A2)

Zone ID	WP # Start	WP # End	Substrate Type(s) or ESI Code	Tidal Zone				Oil Cover: Area		Oil Cover: Distribution		Oil Cover: Size		Oil Thickness					Oil Character							
				LI	MI	UI	SU	Length (m)	Width (m)	Dist % (> 1)	Number per unit area	Avg Size (cm)	Large Size (cm)	TO	CV	CT	ST	FL	FR	MS	TB	PT	TC	SR	AP	NO
A1	1	2	3A	X				400	5	1								X						X		
A2	1	2	3A		X			400	10	5			2				X				X			X		
B1	3	4	3A	X				540	5	1								X						X		
B2	3	4	3A		X			540	10	5																X

7. SUBSURFACE OILING CONDITIONS: *Format: Indicate Zone ID in Pit #, e.g., A-1, B-2, B-3, (use only number if not in zone e.g. 4 , 5)*

Pit #	WP #	Substrate Type Surface/Subsurface	Tidal Zone				Pit Depth (cm)	Oiled Interval (cm-cm)	Subsurface Oil Character								Water Table (cm)	Sheen Color B,R,S,N	Clean Below Yes / No
			LI	MI	UI	SU			AP	OP	PP	OR	OF	TR	NO	%			
A1-1	1	Sand / Sand	X				30	-							X		20		
A1-1	1	Sand / Sand	X				30	-							X		20		
A2-2	1	Sand / Sand		X			40	5-15					X				35	R	Yes
B1-1	3	Sand / Sand	X				30	-							X		20		
B2-1	3	Sand / Sand		X			40	5-15					X				35	R	Yes

8. COMMENTS: Cleanup Recommendations; Ecological/Recreational/Cultural/Economic Issues; Wildlife Observations; Other Descriptions

Zone A starts at the Fordhani House. Zone B ends at the Port of Shela (HIGH cultural sensitivity). Lamu is a UNESCO Heritage Site. Look out for birds, elephants, crocodiles, hippos.

Sketch / Map: Yes / No Photos/Video: Yes / No Numbers: (265 - 274) Photographer Name: Ahmed Kamau

Figure 6 Example of Marine Shoreline Oiling Summary form

INSTRUCTIONS

Boxes 1 – 3 – GENERAL SURVEY INFORMATION

Complete boxes 1, 2 and 3.

Boxes 4 – 5 – SHORELINE TYPE AND OPERATIONAL FEATURES

The Shoreline Type (Box 4A) is that portion of the shoreline in which oil is stranded. The information on Coastal/Backshore Character and Operational Features (Box 4B, 5) is important for planning and operations in terms of access and staging; see Sediments and ESI Shoreline Types in the SCAT Reference Guides Section).

Box 4A: Select only one primary (P) shoreline type that best describes where the oil is located and any number of other secondary (S) types that apply to the segment.

Box 4B: Select as appropriate.

Box 5: Note any access or staging information that might be useful for the segment.

Box 6 – SURFACE OILING DESCRIPTION

If No Surface Oil Is Present:

- check the NO box in "**Oil Character**"

If Surface Oil Is Present:

STEP 1

Decide if the segment has relatively uniform alongshore and across-shore oiling conditions:

- if YES, then go to STEP 2:
- if NO, then (a) subdivide the segment into as many alongshore ***Sub-Segments*** and/or across-shore ***Zones*** as necessary for an accurate description, then (b) go to STEP 2. Use a separate form for each sub-segment.

STEP 2

Determine Width of Oil Band and Distribution of Oil According to the Following Criteria:

- **Oil Width -** Represents the average across-shore (perpendicular to the water line) dimension of the oiled area or band in the shoreline segment. If multiple bands or areas occur across shore, width represents the sum of their widths (*these widths can be modified to reflect local conditions*).

  Note: enter average width on the form (e.g., 1.5 m) or in tablet and avoid category break values (0.5 m, 3 m, and 6 m).

  For data management purposes, oiled band width can be categorized into the following groups as shown in Table 4:

Table 4 Oiled band categories

Width Group	Width of Oiled Band	
	Small Tidal Range (<2m) and Lakes	Large Tidal Range (>2m)
Wide	> 2 m	> 6 m
Medium	1 - 2 m	3 - 6 m
Narrow	0.3 – 1 m	0.5 – 3 m
Very Narrow	< 0.3 m	< 0.5 m

- **Oil Distribution (DIST) -** Represents the percent of the surface within a band or area covered by oil. In the event of multiple bands, distribution refers to the term that best represents the oil conditions for the segment (Figure 6).

TRACE (TR)	***< 1%***
SPORADIC (SP)	***1 – 10%***
PATCHY (PT)	***11 – 50%***
BROKEN (BR)	***51 – 90%***
CONTINUOUS (CN)	***91 – 100%***

Note: enter exact percentage (e.g., 60%) and avoid category break values (1%, 10%, 50%, and 90%).

The above two parameters are combined in the Initial Surface Oil Cover Matrix to determine the Initial Surface Oil Cover category (SCAT Data Manager).

STEP 3

Determine Oil Thickness According to the Following Criteria:

- **Oil Thickness -** Refers to the average or dominant oil thickness within a band or area.
  - **TO** ***THICK or POOLED OIL*** – generally consists of fresh oil or mousse accumulations > 1.0 cm thick.
  - **CV** ***COVER*** – **≤** 1.0 cm and > 0.1 cm thick.
  - **CT** ***COAT*** – **≤** 0.1 cm and > 0.01 cm thick coating, can be scratched off with fingernail on coarse sediments or bedrock.
  - **ST** ***STAIN*** – **≤** 0.01 cm; cannot be scratched off easily on coarse sediments/bedrock
  - **FL** ***FILM*** – transparent or translucent film or sheen.

Further assessment of the oil is made by noting the character and elevation (location) of the oil within the shore or riverbank zone.

- **Oil Character/Debris Type**
  - **FR** ***FRESH*** — unweathered, low viscosity oil.
  - **MS** ***MOUSSE*** — emulsified oil (oil and water mixture) existing as patches or accumulations, or within interstitial spaces.
  - **TB** ***TAR BALLS or MOUSSE PATTIES*** — discrete balls or patties on a beach or adhered to rock or coarse-sediment shoreline. Diameters are generally <0.1 m (balls) and 1.0 m to 0.1 m (patties).
  - **TC** ***TAR*** — weathered Coat or Cover (Oil Thickness) of tarry, almost solid consistency.
  - **SR** ***SURFACE OIL RESIDUE*** — Consists of non-cohesive, oiled, surface sediments, either as continuous patches or in coarse-sediment interstices.
  - **AP** ***ASPHALT PAVEMENT*** — cohesive mixture of oil and sediments.
  - **NO** ***NO OIL*** observed.
  - **DB** ***DEBRIS*** — can consist of logs, vegetation, rubbish or general debris; includes spill response items (sorbents, boom, snares):
    - **LG = *logs***

- **VG = *vegetation***
- **RB = *rubbish, garbage*** (man-made materials)

➢ ***Intertidal Zones*** (note in Boxes 6 & 7 on the form for surface and subsurface oil)

SU **Supratidal Zone** — *the area above the mean high tide that occasionally experience wave activity. Also known as the splash zone.*

UI **Upper Intertidal Zone** — the upper approximate one third of the intertidal zone.

MI **Mid Intertidal Zone** — the middle approximate one third of the intertidal zone.

LI **Lower Intertidal Zone** — the lower approximate one third of the intertidal zone.

STEP 4

Draw sketch map(s) to locate sub-segments, zones, and oiled areas. Take photographs or videos.

Box 7- SUBSURFACE OILING

STEP 5

Decide if the segment has relatively uniform alongshore and across-shore subsurface oiling conditions:

- if YES, then go to STEP 2
- if NO, then (a) subdivide the segment into as many alongshore ***sub-segments*** and/or across-shore ***zones*** as are necessary for an accurate description, then (b) go to STEP 2. Note: as needed, use a separate form for each sub-segment.

STEP 6

Define the location (Surface Oil Zone), Trench/Pit Depth, Oiled Zone Depth, Oil Character, and Substrate Type(s) for each trench or pit

- **Sheen Color**:
  - **B** ***Brown***
  - **R** ***Rainbow***
  - **S** ***Silver***
  - **N** ***No Oil observed***
- **Subsurface Oil Character/Relative Oil Concentration**:
  Refers to a qualitative description of the degree of oil-filled pore spaces.

AP ***ASPHALT PAVEMENT*** — cohesive mixture of weathered oil and sediment situated completely below a surface sediment layer(s) (thickness should be noted during observation).

OP ***OIL-FILLED PORES*** — pore spaces in the sediment matrix are completely filled with oil. Often characterized by oil flowing out of the sediments when disturbed.

PP ***PARTIALLY-FILLED PORES*** — pore spaces filled with oil, but generally does not flow out when exposed or disturbed.

OR/C ***OIL RESIDUE – COVER*** (>0.1 – 1.0 cm) **or *COAT*** (0.01 – 0.1 cm) of oil residue on sediments and/or some pore spaces partially filled with oil. Can be scratched off easily with fingernail on coarse sediments or bedrock.

OR/S ***OIL RESIDUE – STAIN*** (< 0.01 cm) or film oil residue on the sediment surfaces. Non-cohesive. Cannot be scratched off easily on coarse sediments or bedrock.

TR ***TRACE*** — discontinuous film or spots of oil on sediments, or an odor or tackiness with no visible evidence of oil.

NO ***NO OIL*** — no visible or apparent evidence of oil.

Box 8 - COMMENTS

Add comments on cleanup recommendations, ecological, recreational, cultural, economic issues, and /or constraints and wildlife observations.

Locate pits or trenches on sketch maps. Take photographs or videos.

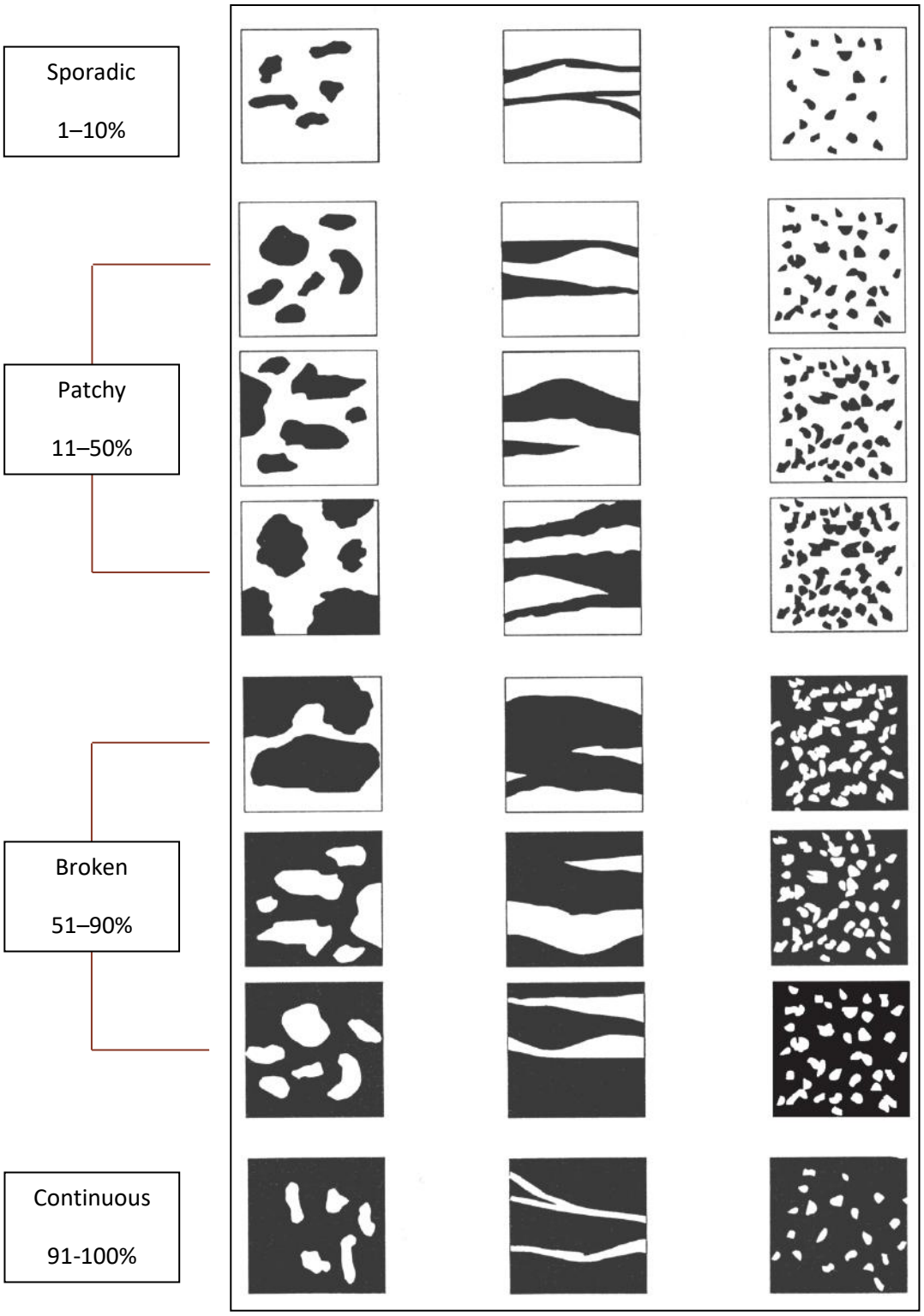


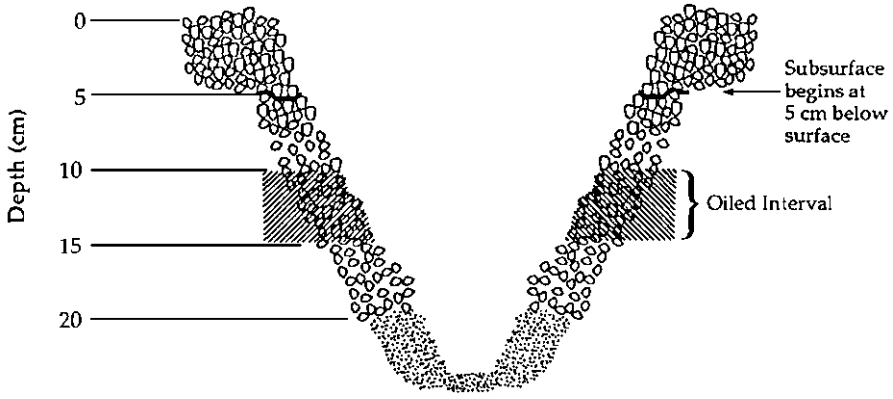
Figure 7 Visual aid to estimate surface oil distribution

Subsurface Oil Definitions

The following definitions have been developed to address potential problems associated with differentiating between what is considered surface and subsurface oil for oil character categories such as interstitial MS, surface SR, AP, subsurface OP and OR that begins at the surface, etc.:

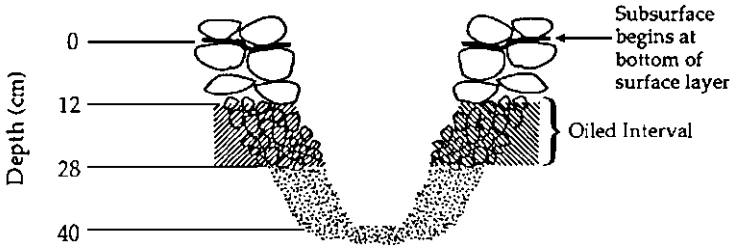
Fine Sediments (Pebble, Gravel, Sand, Mud)

The subsurface begins at 5 cm in oiled sands. In a pit which has continuous oiled sands from the surface down to 20 cm, the upper 5 cm is classified as surface oil and the remainder as subsurface oil. The oiled interval is recorded as 0 to 20 cm. In the following example the oiled interval is 10 – 15 cm.



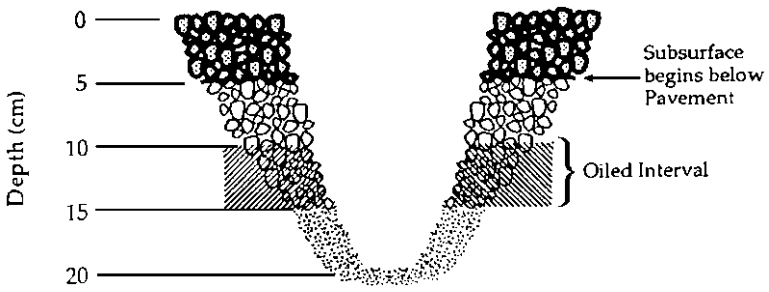
Coarse Sediments (Cobble, Boulder)

The subsurface begins where the top layer of cobbles or boulders contact the underlying layer of sediments.



Asphalt Pavement

Where AP exists on the surface, the subsurface begins at the bottom of the pavement, irrespective of pavement thickness.



Standard terms and definitions

The Substrate Type (Boxes 6 and 7) are defined as follows:

R	*Bedrock outcrops*
B	*Boulder (> 256 mm diameter)*
C	*Cobble (64 – 256 mm diameter)*
P	*Pebble (4 – 64 mm diameter)*
G	*Granule (2 – 4 mm diameter)*
S	*Sand (0.06 – 2 mm diameter)*
M	*Mud/Silt (< 0.06 mm diameter)*
A	*Anthropogenic/Manmade*

Survey Maps (Field Sketches, Annotated Satellite Imagery)

A survey map, either a field sketch or annotated aerial or satellite imagery, is created for each segment when it is surveyed. Survey maps identify the physical layout of the shoreline and the location of the oil, samples, pits, and photographs. (Note: Within a segment it is also valuable to locate areas of buried oil or product by flags or stakes so that operation crews can easily locate areas to be treated).

A field sketch (Figure 7), or annotated GoogleEarth or aerial imagery, is an illustration that highlights oiled (or affected) areas, characterizes surface and subsurface oiling, and provides operational and logistical information. Aerial photographs or small-scale maps can be traced to create a base map for the sketches in order to enhance their accuracy and scale. Printing imagery from programs such as Google Earth® and sketching on these images can work as an effective map as long as all pertinent information is still included. If only a portion of the segment is sketched or several sketch maps are drawn for a site, include a sketch location map to indicate how the sketches match or overlap.

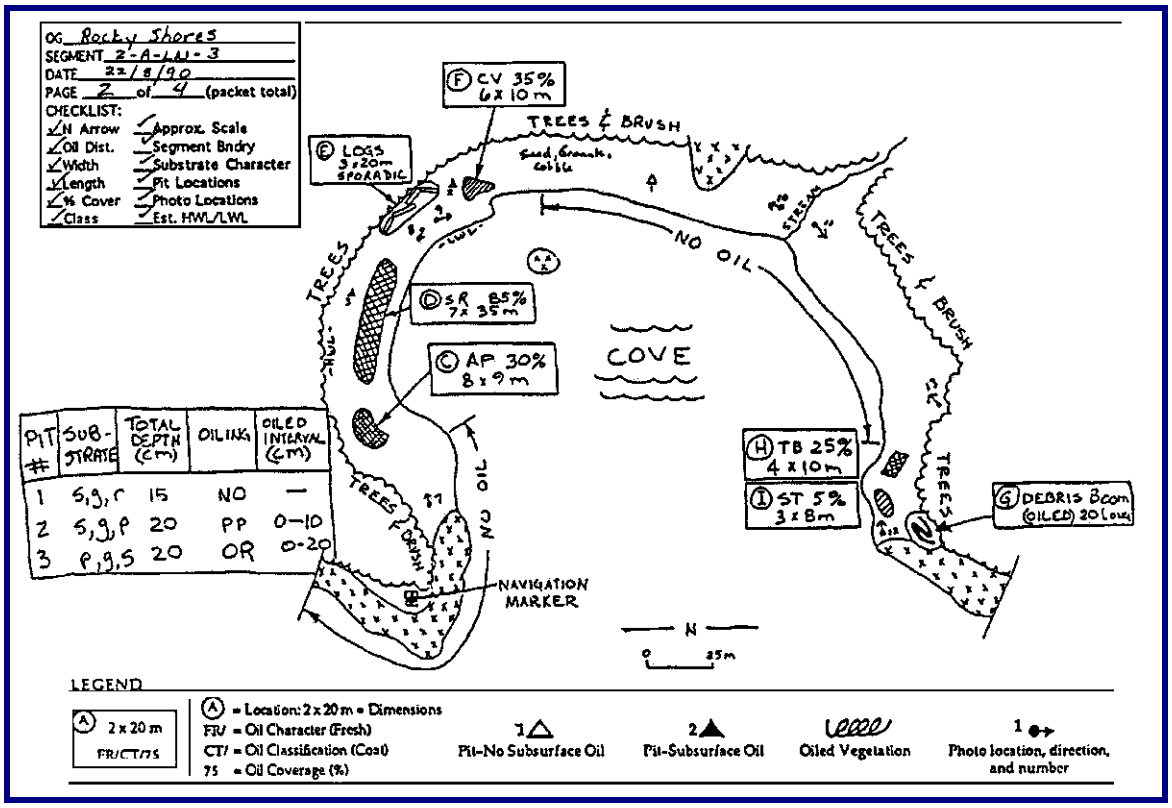


Figure 8 Example of a field sketch

Summary information can be drawn on digital photographs (Figure 8) which can be annotated with oiling zones, pits, access constraints and other information. Although these can be an extremely valuable visual tool for operations they should not replace the survey or sketch map.

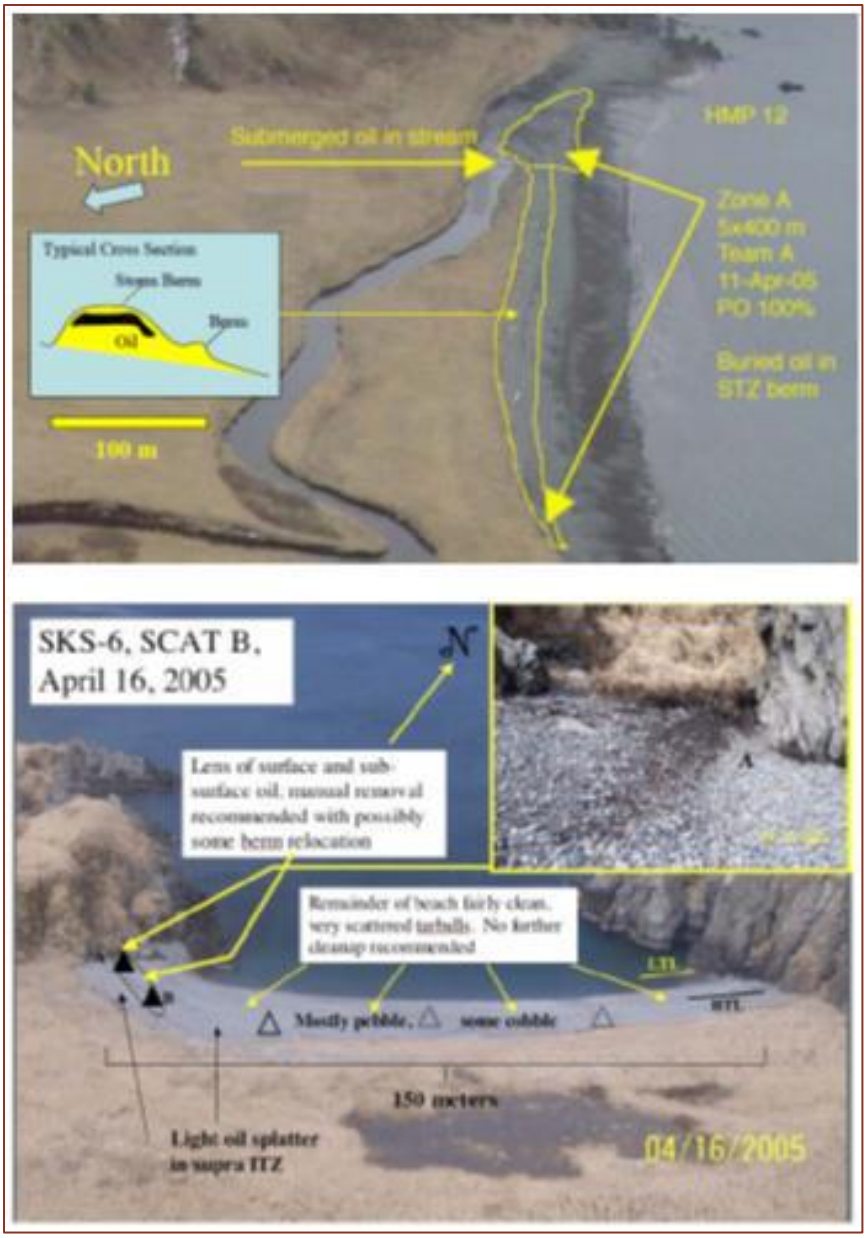


Figure 9 Examples of information summarized on digital photographs

Photographs

The widespread availability and use of digital cameras makes taking, organizing and storing photographs and video easy and a key component of any SCAT survey. Combining digital photographs and video with software that can match the photographs to a GPS track line allows the ability to stamp the geographic position of the photographer onto the photograph.

A critical procedure at the end of each field survey is to give the GPS and digital camera(s) used by the field team to the Data Manager for download. This allows all photographs to be georeferenced through the GPS/camera time codes. DO NOT "AVERAGE" the GPS track. **Use one official camera per SCAT team**

and ensure it has good GPS fixes (and/or synchronize with a field GPS unit that is carried alongside the camera).

Command Post Data Management and Results

Field Documentation and Information Transfer

Field documentation on oiling conditions may be captured on electronic tablets set-up for SCAT data collection and/or field notebooks in conjunction with GPS tracks, waypoints, and photographs. Field observations may be entered direct into the SCAT database when using tablets or otherwise are provided to the data manager using standardized forms. Examples include the shoreline oiling summary (SOS) and shoreline treatment recommendation (STR) forms found in SECTION 5: Forms. These forms may need to be modified for spilled materials if other than oil.

Aerial Surveys

Completed field documents (notes, sketches, videos and photos) from aerial reconnaissance teams are to be provided by the team members and inspected by the Data Manager for QA/QC the same day to ensure that any necessary revisions are made prior to the surveys of the next day.

Ground Surveys

The SCAT Field Team Manager and each of the Field Teams are responsible for ensuring that the following tasks and field documentation are completed.

- Complete SOS Form
- Complete STR Form (if necessary)
- Sketch(es) or annotated imagery of the segment if oil is observed
- GPS coordinates of survey start and stop locations, oiled zones, and key site features
- Digital photographs and log including date, time, and location if oil is observed

The completed field documentation (SOSs, STRs, sketches and photos) from the ground survey teams are to be provided to the Field Team Manager (or Data Manager). This documentation must be reviewed at the command post for QA/QC on the same day as the survey to ensure that any necessary revisions are made prior to the surveys of the next day.

All GPS units and digital cameras will be surrendered to SCAT Data Manager immediately upon return to the Command Post for downloading. The Data Manager will ensure that device times are synchronized and that all waypoints, tracklogs, and digital pictures are erased from each device prior to being redeployed the next day with Field Teams.

In order to facilitate planning, the Team Members will notify the SCAT Field Team Manager on a daily basis if any segments are identified that will require Operations mobilization.

Data Management

QA/QC

The SCAT Data Manager receives and logs incoming SCAT field forms, sketches, and other information (photographs, video, etc.) and reviews the field information. The review involves a checking to make sure that all sections of the forms have been completed and that the information appears reasonable and consistent. Any questions regarding missing information or apparent inconsistencies are discussed with the field team members before the next field assignment. After the quality control is complete, forms are copied and distributed as needed and key information is transferred to tables or computer data files.

Data Outputs

The types of data, graphics, and tables that will be generated from the SCAT database may include:

- Maps of shoreline segments and soil/sediment types
- Oiling conditions
- Surface oil volumes, changes in volume through time
- SCAT field survey status
- Treatment recommendations
- Cleanup treatment status
- Lengths of oiled shoreline (by oil category and/or shoreline type)
- Lengths treated (by oil category and/or treatment method)
- Area surveyed

Record Keeping

Original SCAT field forms, sketches, and other information (photos, videotapes, etc.) and data, graphics, and tables generated during the incident will be provided by the SCAT Data Manager to the Documentation Section for retention. Only copies of these records will be distributed for use by stakeholders (i.e. RP, NEMA, and other relevant government agencies.).

Cleanup and Treatment Completion Recommendations

All spills have a point at which active cleanup and removal gives way to the natural degradation of the oil. In many cases, this termination point is developed through a process lead by the SCAT Coordinator (Cleanup Treatment Completion Criteria Stakeholder Group) and formalized by the Unified Command. In most cases, the treatment completion will be assumed to have been reached when worker safety would be compromised or the remaining oil presents less of a risk to the community or the resources than the treatment methods available.

After the Operations Division Supervisor or Shoreline Supervisor considers that cleanup in a segment has been completed, the segment will be inspected by a Sign-Off team which will (a) determine

whether the cleanup criteria have been met and (b) make a recommendation to the Unified Command regarding that segment. The team will use the treatment completion criteria (see examples outlined in Table 4) to make this determination. At the time of the inspection, the land manager or representative will accompany the team and a Segment Inspection Report (SIR) form will be completed. The Land Manager or representative may add notes in the "COMMENTS" text block on the SIR.

If the SCAT team (in consultation with the land manager) determines that no oil is present in the segment or that the cleanup has met the treatment completion criteria, then the members of the SCAT team representing the UC will sign the SIR and forward a No Further Action recommendation to the UC for approval. Note that a determination that treatment completion have been reached does not indicate that the segment is necessarily recovered or restored; which should be evaluated and determined by the Kenya Environmental Management Authority (NEMA).

If the SCAT team determines that a segment fails to meet the cleanup criteria the team will indicate this on the SIR. They will specify where work is still required in order for the segment to pass inspection and will forward the form to the Operations Section Chief via the SCAT Coordinator and the EUL.

The SCAT signoff process is intended to be a consensus-based team assessment. If, however, the team members are not in agreement regarding whether or not the endpoint criteria are met, then a sheet listing the reasons for disagreement is attached to the SIR and forwarded to the UC for resolution.

Table 5 Example of guidelines for selecting cleanup methods and treatment completion criteria (modified from Whelan et al 2014)

Basis for Treatment	Applicable Habitats	Treatment Methods	Example Primary[1] Treatment Completion Criteria	Guidelines for NFT[2] Determination
Protection of Public Health and Safety	- High public use areas - Residential areas - Groundwater supplies	- Whatever needed to remove threats: excavate, cut, flush, remove/replace	- No visible oil - No detectable oil (sight or smell)	- When oil residues are no longer a threat to human health and safety - Falls below threshold odor or exposure limits
Protection of Sensitive Resources and Habitats	Wetlands, bird-nesting areas, T&E species habitat, wildlife refuges, national parks, other protected areas	- Gross oil removal using vacuum, skimming, manual removal using walking boards in soft substrates - Passive recovery of sheens	- No free-floating black oil or mousse on the water surface - No accessible oiled debris - No oil in sediments that are used for nesting, hibernating grubbing for food	- Usually determined by resource manager or land manager experts - Case studies that show habitat damage from aggressive treatment - Particular sensitivity of a species or habitat - Inability to replace habitat
Removing Aesthetic Impacts in High-use Areas	- Hard substrates such as bedrock, gravel, seawalls, riprap - Beaches - Vegetation - Debris	- Wipe, high-pressure, high-temperature flush, cut, remove/ replace	- No visible oil - No more than 20% Stain or Coat	- Less aggressive removal during seasonal low-use periods could allow natural processes to work - Consider how long before the oil weathers - Public information campaign concerning remaining staining required
Removing Contact Hazard (both humans and wildlife)	- Hard substrates such as seawalls, riprap, bedrock - Vegetation - Debris - Soil	- Wipe, flush, cut, sorbent barriers, remove/replace	- No longer rubs off on contact - No oil that rubs off on sorbents	- Consider how long before the oil will weather to a non-sticky Stain or Coat - Avoid excessive vegetation removal -Falls below known limits for hazards - Public information campaign concerning remaining staining required

Basis for Treatment	Applicable Habitats	Treatment Methods	Example Primary[1] Treatment Completion Criteria	Guidelines for NFT[2] Determination
Mitigating Persistent Sheens	- Rivers, streams, other flowing water bodies - Lakes, ponds, other standing water bodies - Seasonally flooded wetlands	- Actively remove the major sources of sheens (excavate, dredge, flush, cut, remove/ replace) - Passively contain/recover sheens with booms and sorbents	- No longer generates sheens that affect sensitive resources - No longer releases black oil or mousse during flushing operations - No longer generates black oil or mousse during high-water events	In low-use areas: - Consider seasonal use and processes (e.g., flooding) that speed natural removal In high-use areas: - Education on considerations between aggressive removal and chronic sheens - Site specific studies to assess receptor risk
Mitigating Intermittent Sheens (triggered by rainfall, temperature changes, etc.)	- Rivers, streams, other flowing water bodies - Lakes, ponds, other standing water bodies - Seasonally flooded wetlands	- Actively remove the major sources of sheens (excavate, dredge, flush, cut, remove/ replace) - Passively contain/recover sheens with booms and sorbents	- No longer generates sheens that affect sensitive resources	In low-use areas: - Education on considerations between aggressive removal and chronic sheens In high-use areas: - Education on considerations between aggressive removal and chronic sheens - Site specific studies to assess receptor risk
Mitigating Sediment/Soil Contamination	- Upland soils - River/lake bed sediments - Wetland sediments	- Actively remove gross contamination (excavate, dredge, remove/replace) - Passively contain/ recover remobilized oil with booms and sorbents - In-situ techniques such as aeration, tilling, phytoremediation, adding nutrients	- No visual oil greater than Stain or Coat - Does not release black oil when disturbed - Agriculture or pasture for human use may need a ppm target to determine treatment completion	- High risk of erosion or excessive sedimentation - Unacceptable changes in surface topography - Avoid excessive change in sediment/soil quality, e.g., organic matter content, grain size - Potential permanent change to the habitat type e.g., wetland to open water

1 Secondary treatment completion criteria should include **"Or, as low as reasonably practicable considering net environmental benefit."**

2 No Further Treatment

Health and Safety

The Site Safety Plan prepared by the Site Safety Officer addresses the principal safety and health hazards from boat and water operations and shoreline assessment and cleanup operations. The site safety plan covers training, equipment safety, protective clothing and equipment, decontamination, and first aid and medical evacuation procedures to be used during the response. A generic Job Safety Analysis (JSA) is provided in Figure 9.

Specific safety considerations for SCAT operations include the following:

- Follow the Site Safety Plan
- Attend daily safety tailgate meetings regarding SCAT work
- Wear personal protective equipment
- Use personal flotation devices when transiting across water and review safe boating practices
- Watch for slips, trips, and falls
- Wear hearing protection when designated
- Watch for heat / cold stress
- Avoid interaction with wildlife
- Protect hands
- Operate equipment according to instructions
- Practice good housekeeping in work areas

Example of a General JSA for SCAT Operations

SCAT — GENERAL (w/BOAT TRANSIT) (w/out BOAT TRANSIT) Circle One

SITE SPECIFIC JSA

JOB SAFETY ANALYSIS	TEAM LEAD: TEAM NUMBER:	LOCATION:	DATE:

Instructions: 1) First, complete sequence of job steps from start to finish (column 1 only). Limit basic steps to 10-15. 2) Then for each job step, list the hazards and control measures (columns 2 and 3). 3) Get proper reviews & signoffs (can be electronic).

SPECIFIC JOB TASK/WORK ACTIVITY:

REQUIRED PERSONAL PROTECTIVE EQUIPMENT:

	Eye Protection		Head Protection (Hat)		Hand Protection		Hot weather protection (Sunscreen/Skin protection/Insect repellent)		Foot Protection
	Rain Gear		Personal Flotation Device		Walking Stick		Cold weather protection (Gloves/Hat/Clothing layers)		OTHER PPE: Cross Contamination Prevention Nitrile Gloves ☐ Wipe/Wash ☐

SEQUENCE OF BASIC JOB STEPS (Col. 1) ***List task steps from start to finish (limit to 10 - 15 steps)***	**POTENTIAL HAZARDS (Col. 2)** ***Examples: caught in machinery, cuts, back strain, slips/falls, struck by, elec. shock, fire, chemical exposure, etc.***	**CONTROL MEASURES (Col. 3)** ***Hierarchy: elimination, substitution, re-engineering, warning signs & systems, training/procedures, & PPE***	
1. Transfers: Dock to boat. Boat to dock.	Falling overboard; Slips, Trips and Falls; Pinch Points; Wind exposure; poor dock/pier condition. Abrupt boat handling; bumping dock or bank too hard on approach; excessive current and/or direction; insecure ladders/brows.	Approved PFD must be worn at all times, Follow direction of vessel Captain and crew at all times, Maintain three point hold on boat at all times (i.e., two hands, one foot), Keep hands and feet clear of pinch points, motors, and other moving equipment.	Sign:
2. Transfers (*dry*): Boat to shore. Shore to boat.	Falling overboard; Slips, Trips and Falls; Pinch Points; excessive bow to ground height; insecure ladders/brows.	Approved PFD must be worn at all times, Follow direction of vessel Captain and crew at all times, Maintain three point hold on boat at all times (i.e., two hands, one foot), Keep hands and feet clear of pinch points, motors, and other moving equipment, hand personal equipment to crew; if needed ensure approved ladders/brows are properly secured.	Sign:

SEQUENCE OF BASIC JOB STEPS (Col. 1) ***List task steps from start to finish (limit to 10 - 15 steps)***	**POTENTIAL HAZARDS (Col. 2)** ***Examples: caught in machinery, cuts, back strain, slips/falls, struck by, elec. shock, fire, chemical exposure, etc.***	**CONTROL MEASURES (Col. 3)** ***Hierarchy: elimination, substitution, re-engineering, warning signs & systems, training/procedures, & PPE***	
3. Transfers (*wading*): Boat to shore. Shore to boat.	Falling overboard; Slips, Trips and Falls; Pinch Points; Rip tides and dangerous currents; Sun/Wind exposure; Cold water exposure; Dangerous marine life; dangerous wave height and/or direction; insecure ladders/brows.	Approved PFD must be worn at all times, Follow direction of vessel Captain and crew at all times, Maintain three point hold on boat at all times (i.e., two hands, one foot), Keep hands and feet clear of pinch points, motors, and other moving equipment, keep alert for dangerous marine life, a dedicated spotter must be present until all personnel are safely ashore; watch for tripping and entanglement hazards; ensure approved ladders are properly secured. **When wading from vessel to shore:** Team must assess distance and conditions as a group then come to a consensus decision to proceed. Water must be no more than 50cm deep, waves must be less than 30cm. Teams must proceed in close proximity to each other to render help to one another if needed. PPE must be worn as to prevent all members from getting wet. When wading, move feet in a sweeping motion to prevent stepping on aquatic life or other underwater hazards. <u>At no time will feet be bare during wading.</u> If work boots are removed, reef walkers, diver boots, etc. must be used to protect feet.	Sign:
4. Transfers: Boat to boat.	Falling overboard; Slips, Trips and Falls; Pinch Points; Uneven elevations; Wind exposure; dangerous wave height and/or direction; insecure ladders/brows.	Approved PFD must be worn at all times, Follow direction of vessel Captain and crew at all times, Maintain three point hold on boat at all times (i.e., two hands, one foot), Keep hands and feet clear of pinch points, motors, and other moving equipment, hand personal equipment to crew, help each other to board.	Sign:
5. Transits:	Falling overboard, Slips, Trips and Falls, Pinch Points, Mechanical – Motor, Weather - Sudden Storms, Fog. Grounding; striking submerged objects.	Approved PFD must be worn at all times, Follow direction of vessel Captain and crew at all times, When working outside cabin, Wear proper foul-weather PPE if working outside of cabin, personnel remain seated on permanently affixed seat inside cabin while vessel is in-transit. Maintain three point hold on boat at all times (i.e., two hands, one foot), ensure all equipment is securely stowed. Keep hands and feet inside boat until docked and secured, Keep hands and feet away from motors or other moving equipment. Maintain radio communications. Keep alert for changes in weather. Seek shelter if adverse weather threatens.	Sign:
6. Transportation to and from beach by automobile or foot	Heavy traffic and pedestrian congestion around roadways. Congested beaches.	Drive the speed limit. Pay attention - do not drive and talk on radio or cell phone. Watch for potentially dangerous situations.	Sign:

SEQUENCE OF BASIC JOB STEPS (Col. 1) ***List task steps from start to finish (limit to 10 - 15 steps)***	**POTENTIAL HAZARDS (Col. 2)** ***Examples: caught in machinery, cuts, back strain, slips/falls, struck by, elec. shock, fire, chemical exposure, etc.***	**CONTROL MEASURES (Col. 3)** ***Hierarchy: elimination, substitution, re-engineering, warning signs & systems, training/procedures, & PPE***	
7. Loading and Unloading UTV from trailer	Other vehicles in parking lot or loading area Equipment Failure (i.e. Trailer Hitch coming off ball) Back strain or pinch point when lifting /lowering ramps especially that don't have spring assist. Inadvertent movement of trailer during loading or unloading UTV.	Use spotters as appropriate Hooking trailer to vehicle • Insure ball size is appropriate for hitch • Use spotter to back vehicle into position • Open coupler, place over ball (must completely cover ball), close coupler device • Insert locking safety pin • Verify safety chains crossed and provide sufficient slack for turns but not dragging • Conduct a Jack Test on the hitch – once trailer is hooked to vehicle crank jack leg down until up force is placed on hitch and ball and the hitch does not pop off the ball. Once verification is done, jack stand all the way up to ensure proper ground clearance while trailering. Use proper lifting technique and lift from the end of the ramp to get the most leverage; keep hands and fingers clear of hasp and lock pin slot. When necessary, two people are required to raise or lower ramps. Ensure UTV is properly secured on trailer using ratchet Straps at approved tie off points. Drivers should visually inspect trailer prior to UTVs driving on or off the trailer. Trailer/truck wheels properly chocked. Have proper PPE for Hooking up trailer and securing UTV. (i.e., abrasion gloves).	Sign:
8. Transportation to and from area by UTV	Congested site / survey area (workers/public). Other vehicle or heavy equipment traffic near site. Soft terrain. Wildlife. Accumulation of CO within enclosed UTV.	Do not exceed the speed limit. As appropriate, slow down for specific road conditions. Maintain safe distance between your vehicle and other vehicles while underway. Pay attention – do not drive and talk on radio or cell phone. Watch for potentially dangerous situations – verify depths of breaches before crossing. UTV's must be operated in a manner so as to minimize disturbance to all wildlife and wetlands. Do not idle UTV while enclosure is in place.	Sign:

SEQUENCE OF BASIC JOB STEPS (Col. 1) ***List task steps from start to finish (limit to 10 - 15 steps)***	**POTENTIAL HAZARDS (Col. 2)** ***Examples: caught in machinery, cuts, back strain, slips/falls, struck by, elec. shock, fire, chemical exposure, etc.***	**CONTROL MEASURES (Col. 3)** ***Hierarchy: elimination, substitution, re-engineering, warning signs & systems, training/procedures, & PPE***	
9. Subsurface investigation of segment. [This step involves digging pits with shovel].	Back injuries. Foot injuries. Abrasions, blisters to hands (e.g., shoveling).	Always use proper digging technique - Use your legs. Wear proper footwear (boots with ankle support, puncture proof, etc). Wear proper PPE for the task (e.g., gloves).	Sign:
10. Subsurface Investigation Using Heavy Machinery w/Auger	Head Injuries. Foot injuries. Caught in Machinery. Struck by equipment. Elevated noise levels.	Except for the operator and spotter, workers should not be near the auger when it is operating. Remain a safe distance of 10 meters in each direction (cones set up) from the auger when auger is running. Keep safe distance until operator shuts down auger and gives the all clear for investigation When inspecting pits, do not get underneath boom arm. If team decides that auger needs to go deeper, then team vacates the 10 m perimeter and process starts over	Sign:
11. Conduct general hazard assessment of area to be surveyed. [Discuss hazards with team before the start of bank/shore assessment].	Weather: Sudden Storms, fog; exposure to hot or cold weather conditions. Trash (broken glass, etc.), Sharps (hypodermic needles), Chemical Totes/Containers Slips, trips and falls – uneven surfaces – sink holes Quick sand type at water's edge Fatigue. Injury while isolated. Potential dehydration (even in cold weather). Wildlife, Insects, Aquatic life that wash up on the beach. Muscle strains.	Keep alert for changes in the weather and adhere to Inclement Weather Plan. Wear proper clothing for conditions. Stay away from / do not handle Scan area for trip hazards and eliminate or avoid area. Use of proper body positioning. Wear proper boots for task. Watch footing, be aware of surroundings, min. two points of contact when removing boots. Take breaks as needed or as condition warrant. Work in pairs (two person teams). Rehydrate, at least 500ml water an hour during active field work. Avoid all wildlife. Use insect repellents. Try to use unscented soaps, laundry detergents, deodorants, perfumes, etc. Avoid disturbance to shore or river banks, watch where you step, wear the appropriate gloves.	Sign:

Recent Additions to the SCAT Process

Several developments in SCAT implementation have evolved over the past few years, some or all of which may be appropriate for specific spill conditions. The SCAT Coordinator should evaluate the need and benefit of using the following adaptions and implement where and as appropriate.

Drones

Unmanned Aerial Systems (UAS or "drones") can be used to augment SCAT team visual observations. UAS must be flown by certified pilots and within airspace restrictions as defined for a spill area. For SCAT work, UAS are most effective when deployed to survey areas with difficult or unsafe access. Compiled imagery from programmed grid overflights can be used to develop high resolution aerial mosaics for Operations with detailed oil location information.

Canines

K9 SCAT was implemented in a formal manner during spill response in Canada in 2016-2017. Dogs trained specifically to locate and signal presence of oil are part of a K9 SCAT team, together with a SCAT Team Lead and the dog handler. The K9 SCAT team can be deployed to conduct Wide Area Search surveys to detect and/or clear areas with No Detectable Oil. K9 SCAT teams would not be appropriate in areas with obvious surface oil. K9 SCAT also can be used for oil delineation surveys particularly for buried oil, thereby reducing the need for extensive exploratory pits, trenches, or boreholes and allowing SCAT teams to focus on specific target locations. K9 SCAT teams can be used for to reconfirm target cleanup locations before Operations implement an STR and post-cleanup to clear areas as part of Shoreline Inspection Report (SIR) surveys. (*see http://www.k9scat.com and API Technical Report 1149-4, 2016*)

Sunken Oil SCAT

A methodology for systematic surveys, documentation, and management of oil conditions in cases where oil has sunk to the bottom of a river, lake, or the seabed has been developed in Canada through Environment and Climate Change Canada. The uSCAT Guide (Underwater Seabed Cleanup Assessment Technique for Sunken Oil) outlines a standardized procedure and process for the detection, assessment and documentation of sunken oil. The Guide assumes that uSCAT will be managed as a component of SCAT. As such, the uSCAT Guide is consistent with the SCAT process and procedures that would be applied in Kenya if needed. Snorkel SCAT, SCUBA SCAT, and other variations to detect, delineate, and characterize oil (or other heavy products) on bottom sediments should follow general SCAT principles when needed for a particular spill scenario.

SCAT-Ops Liaison

On large or complex cleanup incidents, the role of SCAT-Ops Liaison ensures that all levels of field operations fully understand the recommendations, objectives and constraints of the Shoreline Treatment Recommendations (STRs), so that any questions and concerns can be addressed directly. The SCAT-Ops Liaison reports to the SCAT Coordinator and typically deploys to the field with Operations cleanup supervisors to ensure a shared understanding of STRs, endpoints and operational constraints.

Attachment : Tools

Checklists for SCAT Field Work

The following checklists should be reviewed by each field team.

Field Equipment Checklist

The following is a checklist of equipment that can be used by the field teams.

All team members

- ☑ Dress for the weather & walking on the shores
- ☑ High-visibility vest or coat required
- ☑ Personal flotation device (PFD)/exposure suit, floater suit/floater coat
- ☑ Other PPE per Safety Plan
- ☑ Rain gear, insect repellent, sun glasses, sun screen, hat, water
- ☑ Rubber boots, non-skid soles
- ☑ Gloves and liners - waterproof, work type, high quality

SCAT toolkits (1 per team)

- ☑ GPS (plus download cable and extra batteries)
- ☑ Digital camera (extra batteries) (**NOTE**: An appropriate **digital field tablet** may replace the need for a separate GPS and digital camera)
- ☑ Rangefinder
- ☑ Tape measure (for pits and scale)
- ☑ Shovel (field, collapsible or small)
- ☑ Waterproof paper for field forms and sketch maps, field notebooks (waterproof)
- ☑ Office supplies – pencils, waterproof markers, rulers, paperclips, clipboard
- ☑ Segment maps and base sketch maps (if available), topographical or nautical charts of area
- ☑ Compass
- ☑ Maps of area to be surveyed showing local names, segments, and other features (if available)
- ☑ First aid kit
- ☑ Water
- ☑ Day pack (waterproof)
- ☑ For remote areas: EPIRB (Emergency Position Indication Radio Beacon) and survival equipment (hunter's survival kit or better)

Steps in On-Site Data Collection

- ☑ Reconnoitre the site to gain an overview perspective
- ☑ Define segment (sub-segment and zones) boundaries
- ☑ Describe shoreline type and character within the segment
- ☑ Describe surface oiling conditions
- ☑ Describe subsurface oiling conditions
- ☑ Draw sketch or map
- ☑ Take photos or video

- ☑ Review forms and discuss major observations with team

Field Data Checklist

The following data are considered essential for a successful SCAT shoreline field survey:

- ☑ Shoreline Oiling Summary Form or other appropriate Standard Oiling Form (Attachment)
- ☑ General survey and shoreline characteristic information
- ☑ Surface and subsurface oiling
- ☑ Comments and treatment recommendations
- ☑ Survey Map, either a field sketch or annotated aerial or satellite imagery
    - Locations of surface and subsurface oiling (pits)
    - Access, staging, operational and safety concerns
    - Scale, north arrow, coordinates
    - Photographs
    - General shoreline/backshore characteristics
- ☑ General oil zone and detailed oil zone photos with scale
- ☑ Pit photos with scale
- ☑ Access points, identifying features and any other operational points of interest

SCAT Team Role Checklists

SCAT Coordinator

- ☑ Conducts reconnaissance to determine scope of shoreline oiling issues
- ☑ Integrates field observations and Shoreline Response Plan with existing RP and ACP, GRPs and/or pre-spill SCAT segments and related geodatabases (see Figure 9)
- ☑ Develops a survey and reporting schedule to produce survey results in time for incorporation into the Incident Action Plans
- ☑ Sets SCAT field objectives
- ☑ Serves as the primary point of contact for all SCAT activities
- ☑ Coordinates development of treatment recommendations and cleanup endpoints for Command approval, possibly with the assistance of a Shoreline Treatment Advisory Group (see below) Leads the evaluation of treatment methods and cleanup endpoints and modifies them as necessary
- ☑ Works with Operations Section on implementation of cleanup method recommendations
- ☑ Attends tactics meetings as appropriate to help provide SCAT input into IAP development
- ☑ Briefs the IMT on issues raised by SCAT, particularly where cleanup methods must be modified to increase effectiveness or decrease impacts
- ☑ Coordinates with other members of the response effort with concerns on shoreline assessment to optimize data sharing, including team assessing overall damage on resources
- ☑ Integrates cleanup concerns of the various resource agencies and managers into the decision-making process, possibly through a Cleanup Endpoint Stakeholder Group

SCAT Field Manager (may be combined with SCAT Coordinator)

- ☑ Serves as the primary point of contact for all SCAT field-based activities
- ☑ Develops daily assignments for each team
- ☑ Assigns SCAT teams to meet SCAT field objectives
- ☑ Ensures that teams use proper terminology and apply guidelines uniformly
- ☑ Ensures that all teams have the necessary representation and all members have the necessary training, equipment and transportation.
- ☑ Helps the team reach consensus and reports dissenting opinions when consensus is not reached to SCAT Coordinator
- ☑ Conducts briefings with SCAT team members as needed
- ☑ Ensures adequate data is collected and communicated
- ☑ Communicates physical location of SCAT teams to OPS, SO & others
- ☑ Verifies that all SCAT field teams return at the end of the day
- ☑ Receives reports from field teams and synthesizes them into a daily summary for SCAT Coordinator

SCAT Field Team Leader

- ☑ Participate in shoreline assessment surveys to document shoreline character and oil types
- ☑ Act as team leader for an interagency field team
- ☑ Ensure that the team is briefed on and follows the safety plan (daily JSA)

- ☑ Decide on survey procedures and explain the objectives of the survey at each site
- ☑ Ensure that the team reaches consensus on the oiling observations
- ☑ Complete the Shoreline Oiling Summary form and take representative photographs of the site and the oiling conditions
- ☑ Take GPS way points of oiled locations
- ☑ Develop shoreline treatment recommendations and inspect shorelines after cleanup to ensure that they meat end point criteria
- ☑ Provide all forms, photographs and GPS tracks each day to the Data Manager upon completion of the survey

SCAT Data Manager

- ☑ Ensures dataflow meets OPS and Planning needs
- ☑ Provides SCAT data entry forms and field manuals to field teams
- ☑ Reviews daily SCAT forms for completeness and consistency
- ☑ Enters or supervises the entry of daily SCAT data
- ☑ Conducts data QA/QC; identify common data problems and train SCAT members how to prevent future problems
- ☑ Generates daily summary reports, maps, and data summaries
- ☑ Maintains an archive of all SCAT data, forms, photographs, GPS data, etc.

Scheduler / Logistics Coordinator – Optional

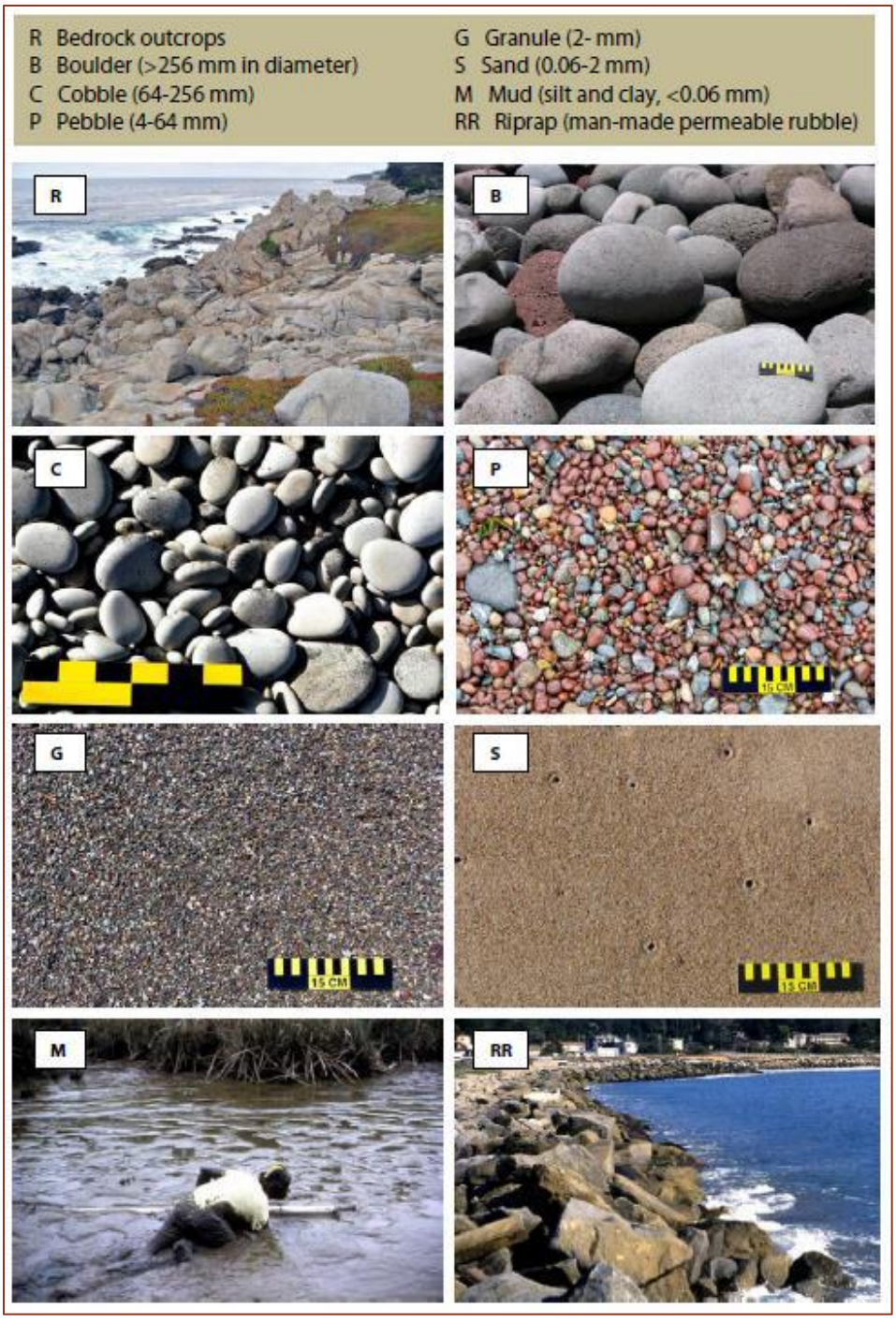
- ☑ Works with Data Manager, SCAT Coordinator, and SCAT Field Team Manager to determine where SCAT Field Teams should deploy.
- ☑ Submits requests for field supplies, equipment, personnel, and transportation through the Logistics Unit
- ☑ Develops and maintains a SCAT Calendar.
- ☑ Ensures property access agreements are obtained and adhered to

SCAT GIS Analyst

- ☑ Works with Data Manager, SCAT Coordinator, and SCAT Field Team Leaders to ensure data (GPS) downloads are complete and any maps produced can be reviewed.
- ☑ Assists team leads to load segment waypoints into GPS units as reference for field locations
- ☑ Provide maps for field teams (segments, previous survey results, transects, waypoints for special features)
- ☑ Maintain display of segment oiling summary maps, segment status and progress maps, and others as required
- ☑ May work in coordination with SIT Unit and Ops to provide updates on SCAT survey activities in conjunction with treatment

SCAT Reference Guides

Shoreline Sediments Types



Sediment Types (from NOAA, 2013)

ESI Shoreline Types Habitats (NOAA)

ESI No.	Estuarine	Lacustrine	Riverine
1A	Exposed rocky shores	Exposed rocky shores	Exposed rocky banks
1B	Exposed, solid man-made structures	Exposed, solid man-made structures	Exposed, solid man-made structures
1C	Exposed rocky cliffs	Exposed rocky cliffs	Exposed rocky cliffs
2A	Exposed wave-cut platforms in bedrock, mud, or clay	Shelving bedrock shores	Rocky shoals; bedrock ledges
2B	Exposed scarps and steep slopes in clay		
3A	Fine- to medium-grained sand beaches		
3B	Scarps and steep slopes in sand	Eroding scarps in unconsolidated sediments	Exposed, eroding banks in unconsolidated sediments
4	Coarse-grained sand beaches	Sand beaches	Sandy bars and gently sloping banks
5	Mixed sand and gravel beaches	Mixed sand and gravel beaches	Mixed sand and gravel bars and gently sloping banks
6A	Gravel beaches	Gravel Beaches (granules and pebbles)*	Gravel bars and gently sloping banks
6B	Riprap Gravel Beaches (cobbles and boulders)*	Riprap	Riprap
6C*	Riprap, man-made erosion control structures		
7	Exposed tidal flats	Exposed tidal flats	
8A	Sheltered scarps in bedrock, mud, or clay Sheltered rocky shores (impermeable)*	Sheltered scarps in bedrock, mud, or clay	
8B	Sheltered, solid man-made structures Sheltered rocky shores (permeable)*	Sheltered, solid man-made structures	Sheltered, solid man-made structures
8C	Sheltered riprap	Sheltered riprap	Sheltered riprap
8D	Sheltered rocky rubble shores		
8E	Peat shorelines		
8F	Rias		Vegetated, steeply-sloping bluffs, Rias
9A	Sheltered tidal flats	Sheltered sand/mud flats	
9B	Vegetated low banks	Vegetated low banks	Vegetated low banks
9C	Hypersaline tidal flats		
10A	Salt- and brackish-water marshes		
10B	Freshwater marshes	Freshwater marshes	Freshwater marshes
10C	Swamps	Swamps	Swamps
10D	Scrub-shrub wetlands; Mangroves	Scrub-shrub wetlands	Scrub-shrub wetlands

ESI No.	PALUSTRINE*
10B	Grassy
10C	Reeds
10D	Woody (shrubs/trees)

* Palustrine environment ESI codes are assigned based on the United States National Wetland Inventory (NWI) habitat classification system.

The classification scheme is based on an understanding of the physical and biological character of the shoreline environment, in addition to substrate type and grain size. Relationships among physical processes, substrate type, and associated biota produce specific geomorphic/ecologic shoreline types, sediment transport patterns, and predictable patterns in oil behavior and biological impact. The concepts relating natural factors to the relative sensitivity of coastline, mostly developed in the estuarine setting, were slightly modified for lakes and rivers. The sensitivity ranking is controlled by the following factors:

1. Relative exposure to wave, current, and tidal energy
2. Shoreline slope
3. Substrate type (grain size, mobility, penetration and/or burial, and trafficability)
4. Biological productivity and sensitivity

Example Descriptive Freshwater Habitats

Sand Gravel Beach

Emergent sandbar

Deep Marsh Annual

Deep Marsh Perennial

Floodplain Forest

Open Water

Rooted Floating Aquatics

Sedge Meadow

Shallow Marsh Annual

Shallow Marsh Perennial

Submerged Aquatic Vegetation

Wet Meadow

ESI Shoreline Examples

1. Exposed Rocky Shores

2. Exposed Rocky Platforms

3. Fine-grained Sand Beaches

4. Coarse-grained Sand Beaches

5. Mixed Sand and Gravel Beaches

6a. Gravel Beaches

6b. Riprap Structures

7. Exposed Tidal Flats

8a. Sheltered Rocky Shores

8b. Sheltered Artificial Structures

9. Sheltered Tidal Flats

10a. Salt to Brackish Marshes

10b. Freshwater Marshes

10c. Swamps

10d. Mangroves

Treatment Options for Shorelines Habitats

(see additional matrices in NOAA API 1994, and NOAA 1993)

Table 11. MEDIUM OILS: Summary of relative environmental impact from response methods for spills in shoreline habitats.

Response Method	SHORELINE HABITAT							
	Bedrock	Man-Made	Sand	Vegetated Shores	Sand and Gravel	Gravel	Mud	Wetlands
PHYSICAL RESPONSE METHODS	1,2,8*	1,8	3,4	9	5	6	7,9	10
Natural Recovery	A	B	B	B	B	B	A	A
Booming	–	–	–	–	–	–	–	–
Skimming	–	–	–	–	–	–	–	–
Barriers/Berms	–	–	–	–	–	–	–	–
Physical Herding	–	–	–	–	–	–	–	–
Manual Oil Removal/Cleaning	B	B	A	B	A	B	C	C
Mechanical Oil Removal	–	–	B	C	B	C	D	D
Sorbents	A	A	A	B	A	A	A	A
Vacuum	B	B	B	B	B	B	B	B
Debris Removal	A	A	A	B	A	A	B	B
Sediment Reworking	–	–	B	D	B	B	D	D
Vegetation Removal	–	–	–	B	–	–	–	C
In-Situ Burning	B	B	B	B	B	B	C	B
Flooding	B	B	A	A	A	A	A	A
Low-Pressure, Cold-Water Flushing	A	A	B	A	A	A	C	A
High-Pressure, Cold-Water Flushing	B	A	D	C	C	B	D	D
Low-Pressure, Hot-Water Flushing	B	B	C	D	C	C	C	D
High-Pressure, Hot-Water Flushing	C	B	D	D	D	D	D	D
Steam Cleaning	D	C	–	–	D	D	–	–
Sand Blasting	D	C	–	–	–	–	–	–
CHEMICAL RESPONSE METHODS								
Dispersants	–	–	–	–	–	–	–	–
Emulsion Treating Agents	–	–	–	–	–	–	–	–
Visco-Elastic Agents	–	–	–	–	–	–	–	–
Herding Agents	–	–	–	–	–	–	–	–
Solidifiers	B	B	B	D	B	B	C	D
Chemical Shoreline Pretreatment	I	I	I	I	I	I	I	I
Shoreline Cleaning Agents	B	B	B	I	B	B	D	I
BIOLOGICAL RESPONSE METHODS								
Nutrient Enrichment	C	C	B	B	B	B	I	I
Natural Microbe Seeding	I	I	I	I	I	I	I	I

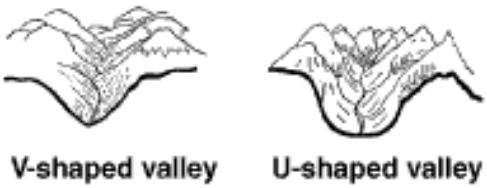
*Key to ESI codes in Table 5 on page 12.
The following categories are used to compare the relative environmental impact of each response method f
or habitat for each oil type, using the following definitions:
A = May cause the least adverse habitat impact.
B = May cause some adverse habitat impact.
C = May cause significant adverse habitat impact.
D = May cause the most adverse habitat impact.
I = Insufficient Information - impact or effectiveness of the method could not be evaluated at this time.
-" = Not applicable for this oil type.

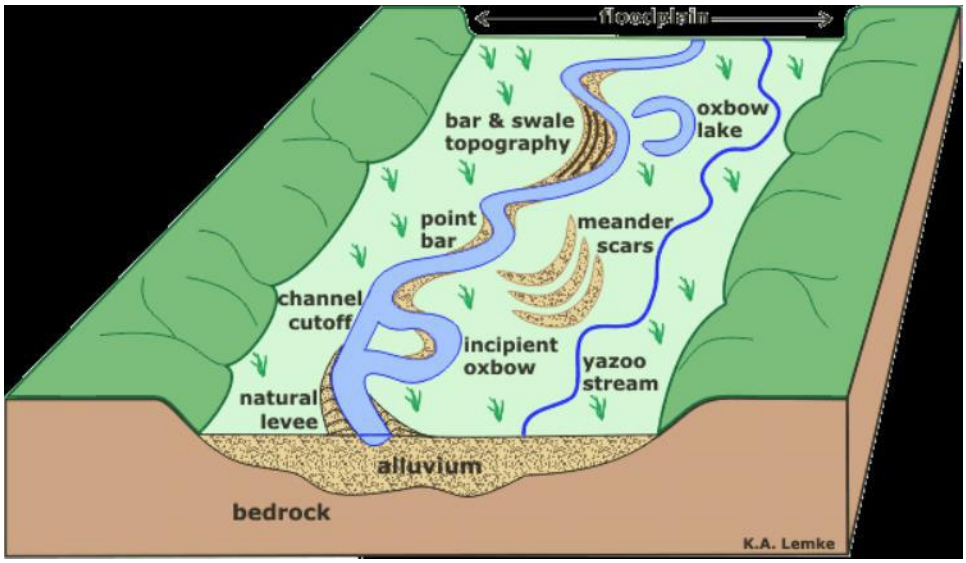
River Terms and Definitions

(From Owens 2013)

Valley Form (setting - general overall character)

- V-Shaped (River formed)
- U-Shaped
- Rift Valley
- Canyon/Ravine (Steep-sided)
- Gully (for smaller streams)
- Flood Plain

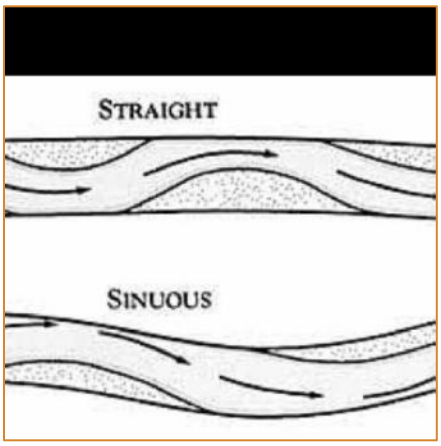




Channel Pattern (geomorphological classification of the river)

Single Channel

- Straight
- Sinuous
- Meander



Sinuosity is calculated as the length of the stream divided by the length of the valley. A perfectly straight river would have a meander ratio of 1 (it would be the same length as its valley), whereas the higher this ratio is above 1, the more the river meanders.

The sinuosity index has been used to separate single channel rivers into three general classes:

- straight (SI < 1.05),
- sinuous (SI = 1.05-1.5), and
- meandering (SI > 1.5).

Multiple Channel (connected)

- Slough
- Anastomosed (or anabranching)
- Braided

- Both are multi-threaded channels.
- The terms are not mutually exclusive – anastamosed channels can be braided

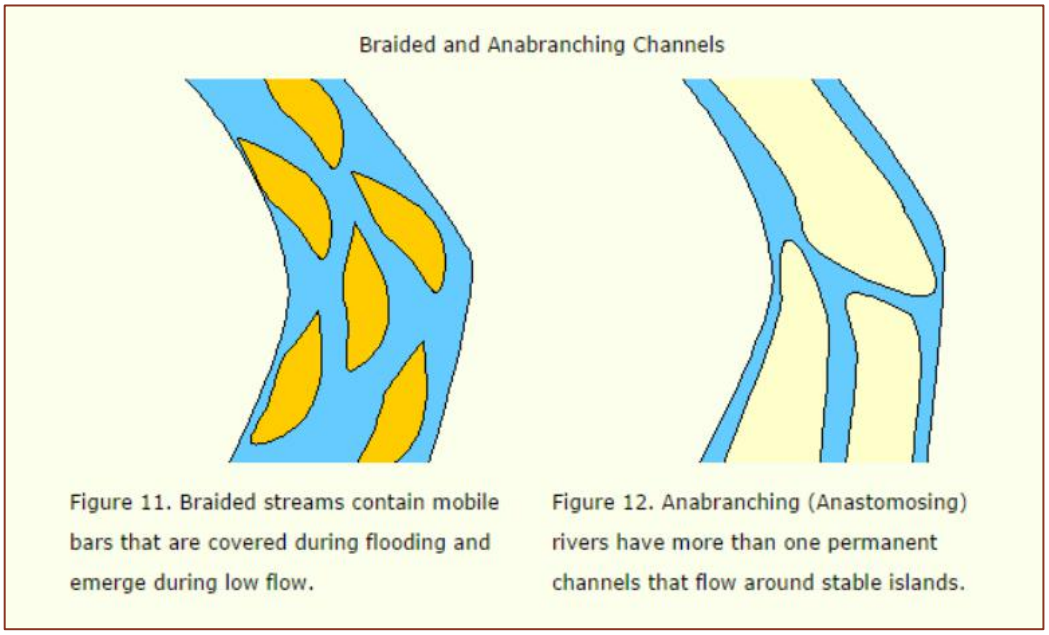


Figure 11. Braided streams contain mobile bars that are covered during flooding and emerge during low flow.

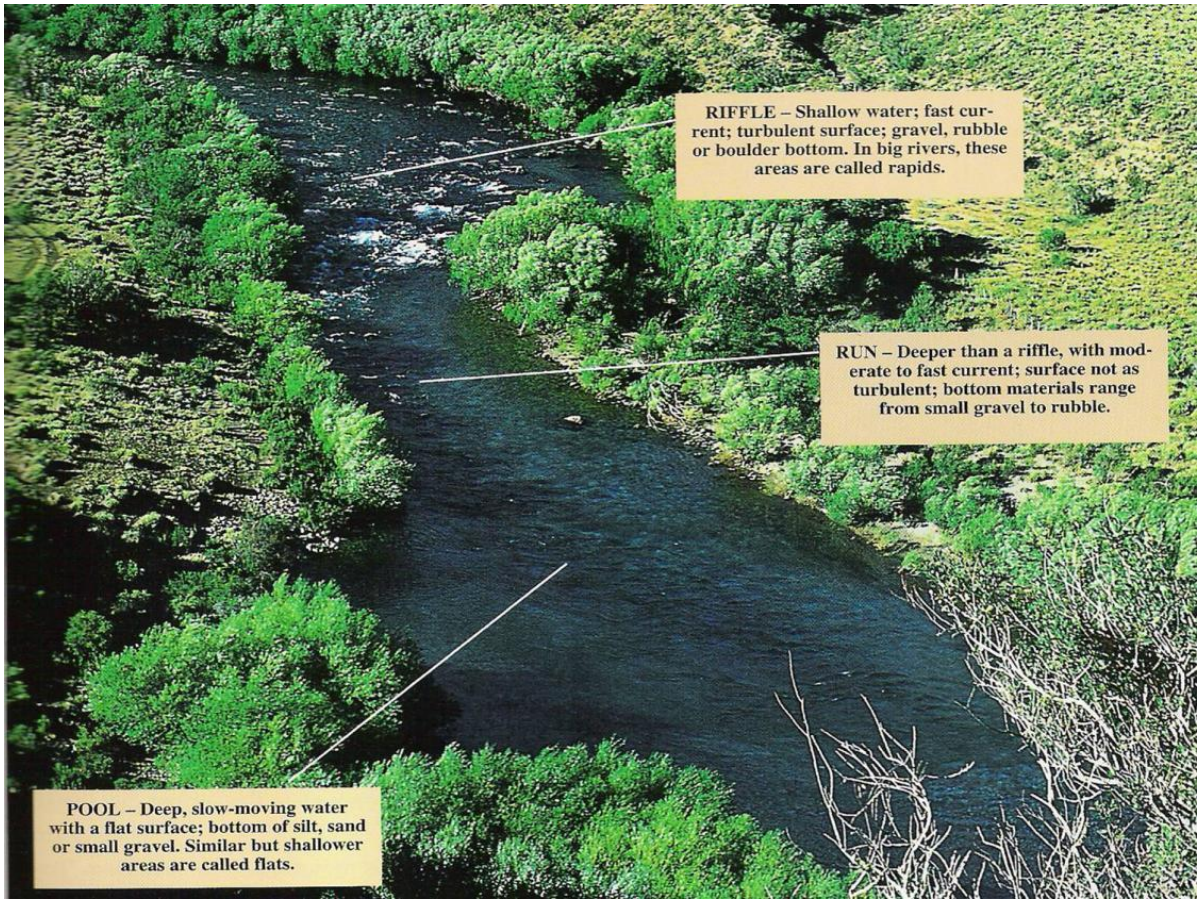
Figure 12. Anabranching (Anastomosing) rivers have more than one permanent channels that flow around stable islands.

Source: http://w3.salemstate.edu/~lhanson/gls210/gls210_streams2.htm

Channel Form (classification of channel water flow character)

- Cascade (water falls) or step - involves a vertical water drop. Can result from bedrock outcrops (fall) or a line of interlocking boulders or cobbles across a channel (step).
- Rapids - fast, turbulent flow section of channel with intermittent white water
- Riffle - a section of shallow water without the turbulence that causes breaking waves (whitewater)

- Glide or Run - has swift water with little or no surface agitation or turbulence.
- Pool - has low flow or standing water.



(from http://www.njflyfishing.com/)

Classification of Kenya's wetlands and their components

Formation	System	Sub-system	Hydrology	Description
Natural	Coastal and Marine	Marine	Subtidal	Shallow marine waters
				Marine aquatic beds
				Coral reefs
			Intertidal	Rocky marine shores
				Sand/shingle beaches
		Estuarine	Subtidal	Estuarine waters
			Intertidal	Intertidal mudflats
				Salt marshes
				Mangrove/tidal forests
		Lacustrine/palustrine	Permanent/seasonal	Brackish/saline lagoons
				Coastal fresh lagoons
	Inland	Riverine	Perennial	Permanent rivers/streams
				Inland deltas
				Intermittent rivers/ streams
			Intermittent	Floodplain wetlands
		Lacustrine	Permanent	Permanent freshwater lakes
			Seasonal	Seasonal freshwater lakes
			Permanent/seasonal	Permanent/seasonal saline lakes and marshes
		Palustrine	Permanent	Permanent freshwater ponds and marshes
				Open peat bogs, fens
				Shrub dominated swamps
				Freshwater swamp forests
				Peat swamp forests
			Seasonal	Freshwater springs, oases
				Seasonal freshwater marshes
		Geothermal		Geothermal wetlands
Human-made		Aquaculture		Fish, shrimp ponds
		Agriculture		Farm ponds, small tanks
				Irrigated land, rice fields
				Seasonally flooded arable land
		Salt exploitation		Salt pans, salines
		Urban and industrial		Reservoirs, barrages
				Gravel pits
				Sewage treatment plants

(from MEMR, 2012, Kenya Wetlands Atlas)

Freshwater Environments Definition

In freshwater environments, the shoreline zones are defined in relation to seasonal or annual water levels and swash zones.

Table 6 Freshwater Environments Definition

TIME INUNDATED	MARINE	LAKE – POND	RIVER – STREAM
RARELY	**BACKSHORE**: terrestrial vegetation zone above the limit of marine processes	**BACKSHORE***: terrestrial vegetation zone above the limit of lake processes	**BACKSHORE***: terrestrial vegetation zone above the ***active floodplain***
PERIODICALLY	**SUPRATIDAL:** above Mean High Water (MHW): salt tolerant species, inundated during spring tides and/or storms	**SUPRASWASH:** continuous terrestrial vegetation, inundated during seiche events and/or storms	**SUPRACHANNEL:** ***active flood plain*** between the bankfull ***level*** and the ***backshore***, continuous terrestrial vegetation, inundated during high discharge events
REGULARLY	**INTERTIDAL ZONE**: between Mean Low Water (MLW) and MHW: alternately exposed and inundated during each tidal cycle	**SWASH ZONE**: inundated for extended periods of time	**ACTIVE CHANNEL ZONE:** between the ***bankfull level and channel margin**** (waterline); alternately exposed and inundated as discharge varies
ALWAYS	**SUBTIDAL**: below MLW: almost always under underwater	**LITTORAL**: almost always underwater	**CHANNEL**: almost always underwater
* In aquatic environments, the "Backshore" is above the limit of water (marine, lake or river) processes and only is subject to rare or catastrophic hydrological events. For riverine environments, backshore is defined as the terraces and uplands above the 'active floodplain'. Long-term operational staging should use the backshore zone. Short-term staging can utilize the floodplain/supra-swash zone bearing in mind that this zone may be inundated rapidly during a high-water level event.			
** The channel margin is the land/water edge of the real time channel and can change with water flow variations.			

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Part 5: Forms

Pre-spill SCAT Survey Form

Pre-Spill SCAT segment survey form (page 1)

1 GENERAL INFORMATION

Area:_____ Location: _____ Segment:_____

Survey Date:_____ Survey Time: _____ Tide Level:_____ m

Observer Name:_____ Weather/Wind Conditions: _____

Participants:_____

2 PHYSICAL CHARACTER

Segment Length:_____ m

Width (intertidal):_____ m

Width (backshore):_____ m

POTENTIAL OIL BEHAVIOR:

natural alongshore movement barrier: yes / no

man-made alongshore barrier: yes / no

natural bay or embayment: yes / no

tidal inlet or channel: yes / no

tidal lagoon or estuary: yes /1R

sand shoreline/potential for burial: yes / no

overwash into lagoon or marsh: yes / no

pebble-cobble shoreline/penetration potential: yes / no

riprap, boulder shoreline/penetration-remobilization potential: yes / no

marsh-wetland/potential for oiling meadow area: yes / no

other:

SUBSTRATE TYPE (from list below)	*LITZ	*UITZ	*SU
Bedrock Cliff/Ramp: Man-Made Solid			
Bedrock Platform			
Fine- to Med.-Grained Sand Beach			
Coarse-grained Sand Beach			
Mixed Sand, Pebble, Cobble Beach			
Pebble-Cobble Beach			
Boulder/Riprap			
Mud Flat			
Sand Flat			
Man-Made Impermeable (Wharf, pilings)			
Wetlands			

* SU = supratidal; UITZ = upper intertidal; LITZ = lower intertidal zone

COASTAL CHARACTER

____cliff	____tidal inlet	____marsh
____platform	____beach	____overwash
____man made	____delta	____scree/talus
____estuary	____dune	
____channel	____flats	

3 RESOURCE ISSUES:

	Primary Resource(s) at Risk	*Response Constraints*
Environmental		
Cultural		
Human Use/ Economic		

4 OPERATIONAL CHARACTERISTICS

Surrounding Human Use Activities (if any): Natural / Agricultural / Commercial / Residential / Recreational

Potential nearby access: fixed-wing_____; helo.pad/landing_____; boat landing_____; ATV_____

Access constraints/limitations:_____

Describe the amount of pre-impact debris pickup/relocation work? ____(light / moderate / heavy)____ No. of bags? _____ (estimate # of bags)

remote: yes / no	nearshore shoals/reefs: yes / no / ?	narrow intertidal zone: yes / no
staging areas: yes / no	exposed coast: yes / no	shore zone suitable for machinery: yes / no / ?
road access: yes / no / ?	strong currents: yes / no	backshore cliff yes / no
alongshore access: yes / no / ?	wetlands: yes / no / ?	high tidal range: yes /no

Comments:

5 OPERATIONAL SAFETY CONSIDERATIONS

Note Safety Constraints Beyond Normal — or N/A:

(form revision: August 2012) Page 1 of 2

Pre-Spill SCAT segment survey form (page 2)

GENERAL INFORMATION Survey Date:_____

Area:_____ Location:_____ Segment:_____

6 RESPONSE GOALS

SEGMENT PROTECTION OBJECTIVES:

_____ **Prevent contact with shore or resource(s) at risk**
_____ **Minimize contact**
_____Prevent oil movement to adjacent segment(s)
_____Contain stranded oil
_____Prevent oil transport into inlet, estuary, or channel
_____Other:

SEGMENT PROTECTION STRATEGIES:

_____Contain/recover oil on water
_____Alter direction of movement of oil on water
_____Prevent oil movement (landward) on flooding tides
_____Trap/contain and collect oil at the shoreline
_____Prevent remobilization of stranded oil
_____Prevent overwash into the backshore or a lagoon
_____Pre-impact shoreline debris removal
_____Other:

SHORELINE CLEANUP/TREATMENT OBJECTIVES:

_____**Allow natural recovery**
_____**Restore shore to pre-oiling condition**
_____**Accelerate natural recovery**
_____Restore with minimal removal of material
_____Minimize oil remobilization
_____Minimize damage to dune, marsh, or peat bog
_____Other:

SHORELINE CLEANUP/TREATMENT STRATEGIES:

_____Monitor
_____Act quickly to remove stranded oil before burial
_____Remove bulk oil only
_____Minimize waste generation using *in-situ* treatment methods
_____Manual techniques preferred
_____Salt-marsh fringe/meadow treatment strategies
_____Man-made backshore riprap treatment techniques
_____Other:

7 METHODS ---------- *(check all that are appropriate and feasible)* ----------

(mark "?" if possibly useful; mark "X" if not recommended or inappropriate)

POTENTIAL PROTECTION OPTIONS:

____1. Nearshore containment/recovery
____2. Nearshore redirection (away)
____3. Nearshore redirection (towards)
____4. Exclusion boom
____5. Shoreline (intertidal) protection boom
____6. Shoreline barrier/berm
____7. Contact barrier
____8. Channel boom/barrier

POTENTIAL CLEANUP/TREATMENT OPTIONS:

____1. Natural recovery
____2. Flooding
____3. Low-pressure, cold wash
____4. Low-pressure, hot/warm wash
____5. High-pressure, cold wash
____6. High-pressure, hot/warm wash
____7. Steam cleaning
____8. Sandblasting
____9. Manual removal
____10. Vacuums
____11. Mechanical removal
____12. Vegetation removal
____13. Passive sorbent
____14. Tilling/Aeration
____15. Surf washing/Sediment reworking
____16. Burning
____17. Dispersants
____18. Shoreline cleaners
____19. Solidifiers
____20. Bioremediation/Nutrient enrichment

8 OPERATIONAL ISSUES

SPILL SITE ACCESS: (Enter "No" or "Yes")

To/From:	Trucks	Heavy Equip.	2X4 P/U	Backhoes	ATVs	> 50 ft. Vessel	< 15 ft. Runabouts
Staging Area/ Backshore							
Intertidal							
Subtidal Water							

HEAVY EQUIPMENT USE FEASIBILITY: (Enter "Good", "Fair", "Poor", or "No" based on ability to operate)

	Grader	Bulldozer	Front-end Loader	Backhoe	Bobcat	4x4 P/U	ATVs
Access Alongshore							
Bearing Capacity							
Beach Slope/Width							

Maximum Distance to Temporary Storage from Cleanup Site? _____ (metres)

9 COMMENTS

10 VISUALS

SKETCH Attached: yes_____ no_____; PHOTOS Attached: yes_____ no_____; roll #_____; frames_____ to_____

VIDEO: yes_____ no_____; tape #_____; Minutes_____ to_____; Storage location_____

Page 2 of 2

Marine (tropical) SOS Form

MARINE TROPICAL (SOS) FORM (ver. Moz) **Incident:**_____ **Page**_____ **of** _____

1.GENERAL INFORMATION	**Date** (dd/mmm/yyyy)	**Time** (24h standard/daylight) _____:_____ to _____:_____	**Tide Height (m)** Low:_____ High:_____ (H / M / L) - (R / F /LS / HS)
Segment ID:	**Segment Name:**		
Ops Zone:	**Survey Type:**	**STR:**	
Survey By: Foot __ ATV__ Boat__ Helicopter__ Other _____		Weather: Sun / Clouds / Fog / Rain / Windy / Calm	

2. SURVEY TEAM	Name	Organization	Name	Organization
Team Number				

3. SEGMENT	Total Length: meters	Length Surveyed: meters	Datum:
Survey Start GPS:	WP:	LAT:	LONG:
Survey End GPS:	WP:	LAT:	LONG:

4a. SHORELINE TYPE : *Indicate only ONE Primary(dominant) type and ALL Secondary types. CIRCLE those OILED*

BEDROCK: Cliff_____ Ramp_____ Platform_____ MAN-MADE: Solid_____ Permeable_____ Description:_____	Sediment BEACH: Sand____ Mixed____ Pebble/Cobble____ Boulder_____ Sediment FLAT: Mud____ Sand ___ Mixed___ Pebble/Cobble/Boulder____ WETLAND:_____ Description:_____
ESI Shoreline Type (primary) _____ (secondary) _____	OTHER:_____

4b. COASTAL/BACKSHORE CHARACTER *Indicate only ONE Primary (P) and ANY Secondary (S) types.*

Cliff/Hill:____ ht._____ m. Sloped: > (5^0) (15^0) (30^o)	Flat/Lowland:____ Beach:____ Dune:____ Inlet/Channel:____ Delta:____ Lagoon:____ Marsh/Wetland:____ Man-Made: ___._____ Primary Substrate type:_____ Forested / Vegetated: _____

5. OPERATIONAL FEATURES	Oiled Debris? Yes / No	Type:	Amount: (bags/trucks)
Direct backshore access? Yes / No	Alongshore access from next segment? Yes / No		Suitable for backshore staging? Yes / No
Access Description / Restrictions:			Current Dominated Channel? Yes / No

6. OILING DESCRIPTION: *Use letters A-Z, Indicate 100% overlapping oil zones in different tidal zones by numbering them (e.g. A1, A2)*

Zone ID	WP # Start	WP # End	Substrate Type(s) or ESI Code	Tidal Zone				Oil Cover						Oil Thickness					Oil Character							
								Area		Distribution		Size														
				LI	MI	UI	SU	Length (m)	Width (m)	Dist % (>1)	or Number per unit area	Avg Size (cm)	Large Size (cm)	TO	CV	CT	ST	FL	FR	MS	TB	PT	TC	SR	AP	NO

7. SUBSURFACE OILING CONDITIONS: *Format: Indicate Zone ID in Pit #, e.g., A-1, B-2, B-3, (use only number if not in zone e.g. 4 , 5)*

Pit #	WP #	Substrate Type Surface/Subsurface	Tidal Zone				Pit Depth (cm)	Oiled Interval (cm-cm)	Subsurface Oil Character								Water Table (cm)	Sheen Color B,R,S,N	Clean Below Yes / No
			LI	MI	UI	SU			AP	OP	PP	OR	OF	TR	NO	%			
		/						-											
		/						-											
		/						-											
		/						-											
		/						-											
		/						-											

8. COMMENTS: Cleanup Recommendations; Ecological/Recreational/Cultural/Economic Issues; Wildlife Observations; Other Descriptions

**Use supplemental river SOS form for additional oiling zones, pits, and comments/sketches.*

Sketch / Map: Yes / No Photos/Video: Yes / No Numbers: (-) Photographer Name:

Mangroves Oiling Summary Form

MANGROVE OILING SUMMARY FORM for _____spill Page ___of___

1 GENERAL INFORMATION	Date (dd/mm/yy)	Time (24hr):	Tide Height (m/ft)
Segment ID:			
Ops. Division:		Daylight:___hrs to___hrs	Rising/falling
Survey by: foot/ ATV/ Boat/ Helo/ Overlook Others		Sun/ Cloud/ Rain/ Windy/ Calm	

2 SURVEY TEAM #_____	Team members: Name, Organisation, Contact Phone Number		

3 SEGMENT	Total Length (m)_____	Length Surveyed (m)_____	Datum:_____
Start GPS	Lat:_____° _____min	Long:_____° _____min	Area (m^2)
End GPS	Lat:_____° _____min	Long:_____° _____min	

4A SHORE FEATURE	Consider ONLY the location of the mangroves		
◻ Delta	◻ Lagoon	◻ Estuary	◻ Delta
◻ Fringe	◻ Estuarine Lagoon	◻ Estuarine Delta	

4B MANGROVE TYPE	Select only ONE oiled primary (P) type and any secondary (S)	
◻ Overwash	◻ Riverine	◻ Hammock
◻ Fringing	◻ Basin	◻ Scrub

4C ROOT TYPES	☐ Stilt Roots	☐ Pneumatophores	☐ Buttress Roots
			

4D BACKSHORE CHARACTER	Select only ONE oiled Primary (P) type and any Secondary (S) types		
◻ Beach	◻ Delta	◻ Tidal Inlet	◻ Wetland
◻ Barrier Beach	◻ Dune	◻ Channel	◻ Others_____

5 OPERATIONAL FEATURES		Suitable backshore or alongshore staging Y / N	
Direct backshore access	Y / N	Surface bearing capacity suitable for:	
Alongshore access from next segment	Y / N	personnel / marsh / vehicles / other_____	
Access restriction	Y / N	If YES – add note in Comment Box 8	*(Circle only those applicable)*

6 SURFACE OILING CONDITIONS — Enter Oil on Substrate versus Oil on Vegetation on different lines, using (S) or (V) after the Zone ID. Indicate the position of each ZONE on the cross-section below.

OIL ZONE ID	TIDAL ZONE				OIL COVER			OIL THICKNESS					OIL CHARACTER								OILED PLANT PARTS
					Length	Width	Dist.														
					m	m	%														All B T S L *Base, trunk, stem, leaf
	LI	MI	UI	SU				TO	CV	CT	ST	FL	FR	MS	TB	TP	TC	SR	AP	NO	

7 SUBSURFACE OILING CONDITIONS	Is subsurface oil present Y / N
IF 'Y', describe in Comment Section (box 8) and indicate location in cross-section	

8 COMMENTS	Cleanup recommendation ecological / recreational / cultural / economic issues & constrains / wildlife
Approx Total Oiled Area _____km^2	
Show: High tide level (HTL) Low tide level (LTL) Surface oil (SO) Subsurface oil (SSO) Key vegetation zones Scale	Supratidal zone | Intertidal zone

Inland Water SOS (Rivers / Streams / Lakes) Form

RIVER BANK (SOS) FORM (ver. 15Feb13) **Incident:**_____ **Page**_____ **of**_____

1.GENERAL INFORMATION		**Date** (dd/mmm/yyyy)	**Time** (24h standard/daylight) _____:_____ to _____:_____	**Water Level** Low / Mean / Bankfull / Overbank Falling / Steady / Rising
Segment ID:	**Bank:** L / R	**Segment Name:**		
Ops Division:		**Survey Type:**	**STR:**	
Survey By: Foot __ ATV__ Boat__ Helicopter__ Other _____		Weather: Sun / Clouds / Fog / Rain / Snow / Windy / Calm		

2. SURVEY TEAM	Name	Organization	Name	Organization
Team Number				

3. SEGMENT	Total Length: meters	Length Surveyed: meters	Datum:
Survey Start GPS: WP:	LAT:	LONG:	
Survey End GPS: WP:	LAT:	LONG:	

4a. RIVER BANK TYPE : *Indicate only ONE Primary(dominant) type and ALL Secondary types. CIRCLE those OILED*

BEDROCK: Cliff_____ Ramp_____ Shelf_____ MAN-MADE: Solid_____ Permeable_____ Description:_____	UNCONSOLIDATED: Clay____ Mud____ Sand____ Mixed Fine____ Shell ____ Mixed Coarse ____ Pebble-Cobble____ Boulder ___ Rubble____ Marsh/Swamp____ Peat/Organics _____ Wooded ____ Vegetated ____ Other: _____ Undercut Bank (Y / N)
ESI Code (primary) _____ (secondary) _____	

4b. OVERBANK / BACKSHORE TYPE : *Indicate only ONE Primary (P) and ANY Secondary (S) types.*

Cliff/Bluff:____ ht._____ m. Sloped: > (5°) (15°) (30°)	Flat/Lowland/Field_____ Dune_____ Inlet/Channel____ Delta____ Lagoon____ Marsh/Wetland____ Man-Made____:_____ Other:_____ Wooded / Vegetated?

4c. RIVER VALLEY CHARACTER : *Circle or select as appropriate.*

Channel Width: < 10 m 10-100 m >100 m estimate _____ m Water Depth: < 1 m 1-5 m >5 m estimate _____ m	Shoal(s) Present: Y / N Point Bar Present: Y / N Bar-Shoal substrate: silt /sand/mixed/cobble/boulder/bedrock/debris

CHANNEL FORM: Cascade ____ Rapids ____ Pool ____ Riffle ____ Glide ____ Jam ____ Other:_____

RIVER FORM: Straight ____ Meander _____ Anastamosed_____ Braided _____ Other: _____

VALLEY FORM: Canyon _____ Confined or Leveed Channel _____ Flood Plain Valley ____ Other: _____

5. OPERATIONAL FEATURES	Oiled Debris? Yes / No	Type:	Amount: (bags/trucks)
Direct backshore access? Yes / No	Alongshore access from next segment? Yes / No		Suitable for backshore staging? Yes / No
Access Description / Restrictions:			Current Dominated Channel? Yes / No

6. OILING DESCRIPTION: *Indicate 100% overlapping oil zones in different river bank zones by numbering them (e.g. A1, A2)*

Zone ID	WP # Start	WP # End	Substrate Type(s) or ESI Code	River Bank Zone				Oil Cover: Area		Oil Cover: Distribution		Oil Cover: Size		Oil Thickness					Oil Character							
				MS	LB	UB	OB	Length (m)	Width (m)	Dist % (>1)	Number per unit area	Avg Size (cm)	Large Size (cm)	TO	CV	CT	ST	FL	FR	MS	TB	PT	TC	SR	AP	NO

7. SUBSURFACE OILING CONDITIONS: *Format: Indicate Zone ID in Pit #, e.g., A-1, B-2, B-3, (use only number if not in zone e.g. 4 , 5)*

Pit #	WP #	Substrate Type Surface/Subsurface	River Bank Zone				Pit Depth (cm)	Oiled Interval (cm-cm)	Subsurface Oil Character								Water Table (cm)	Sheen Color B,R,S,N	Clean Below Yes / No
			MS	LB	UB	OB			AP	OP	PP	OR	OF	TR	NO	%			
		/						-											
		/						-											
		/						-											
		/						-											

8. COMMENTS: Cleanup Recommendations; Ecological/Recreational/Cultural/Economic Issues; Wildlife Observations; Other Descriptions

**Use supplemental river SOS form for additional oiling zones, pits, and comments/sketches.*

Sketch / Map: Yes / No Photos/Video: Yes / No Numbers: (-) Photographer Name:

Shoreline Treatment Recommendation (STR) Template

INCIDENT NAME

Shoreline Treatment Recommendation **STR# ___**

Operational Permit to Work

Segment: Survey Date:

Start Latitude: **End Lat:**

Start Longitude: **End Long:** **Length (m):** _____

Shoreline Type: *Primary* _____ *Secondary* _____

Oiled Areas for Treatment:

Auto entry directly populated from data base of:
Zone: Shoreline Type, L x W, Oil % Dist, Oil Character, Oil Thickness, Oiling Category
e.g. Zone A: Salt marsh, 200 m x 1 m, 10% Fresh oil, pooled, Oiling Category: Heavy

Cleanup Recommendations:

(Use standard terms and definitions from a Word document or populate database with these standard statements)

Staging and/or Logistics Constraints/Waste Issues:

Ecological Concerns:

Cultural / Historical Concerns:

Safety Concerns:

Attachments: ☐ Segment Map ☐ Sketch ☐ SCAT Form ☐ Fact Sheet ☐ Other

Prepared by: _____ Date Prepared: _____

Date					
Time					
	to SOSC	to Land Mgr	to SHPO	to EU Leader	to _____

Final Approval _____ _____ _____ **Submitted to OPS** _____

State OSC Rep Federal OSC Rep EU Leader

** When Treatment is completed, send a Segment Completion Report to SCAT **

Segment Inspection Report (SIR) Form

SEGMENT INSPECTION REPORT

INCIDENT NAME

LOCATION	Segment ID
Geographic Name	
Operations Division	

Date of Survey _____

Time of Survey _____

Tide Stage _____

Weather _____

Inspection Completed Along Entire Segment?

YES NO

SCAT Team ( ) Members

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

Name		Signature
_____	RP rep.	_____
_____	Lead Agency rep.	_____
_____	County Gov. rep.	_____
_____	Other rep.	_____

Treatment Endpoint Criteria:

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 FURTHER TREATMENT required - each UC rep sign appropriate signature box above

Comments: