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REGIONAL MARINE POLLUTION EMERGENCY
RESPONSE CENTRE FOR THE MEDITERRANEAN SEA (REMPEC)

CENTRE REGIONAL MEDITERRANEEN POUR L'INTERVENTION
D'URGENCE CONTRE LA POLLUTION MARINE ACCIDENTELLE (REMPEC)

MEDITERRANEAN ACTION PLAN
PLAN D'ACTION POUR LA MEDITERRANEE

Comparative Study and Development of Standard Guidelines on Oiled Shoreline Assessment

Phase I: Comparative Study

Acknowledgements

REMPEC is grateful to Oil Spill Training Company Ltd. (OSTC) for carrying out on behalf of the Centre the Comparative Study on Oiled Shoreline Assessment and to the following organizations who provided specific information and supporting materials for this report:

- International Tanker Owners Pollution Federation Ltd.
- UK Maritime & Coastguard Agency
- Environment Canada

Background

During the REMPEC Focal Points Meeting held in Malta between the 25 and 28 October 2000, the Meeting agreed to the establishment of the Mediterranean Technical Working Group (MTWG) with the objective of facilitating the exchange of technical data and other scientific information on preparedness and response issues to marine pollution emergencies.

The MTWG operates under the instructions of and reports to the Meetings of REMPEC's Focal Points. The Meetings of REMPEC's Focal Points decide also on the item(s) to be considered by the MTWG and establish a list of priorities of the Group.

In this context, in May 2007, the eighth Focal Points Meeting of REMPEC identified the need for the development of "Standard Guidelines on Oiled Shoreline Assessment" and tasked the MTWG to introduce this activity in its programme of work:

.1 to carry out a comparative study of the existing guidelines with a view to compile a list of best practices in the domain in a standard document which would also include standard forms;

.2 to subsequently develop a training programme on shoreline assessment based on existing programmes with a view to provide coastal States affected by a pollution incident with the basic knowledge to undertake on their own, immediately after an oil spill and during the cleanup operations, detailed and complete shoreline surveys.

The Parties also agreed, at the same Meeting, to designate appropriate national entities and/or officials as contact points for the development of "Standard Guidelines on Oiled Shoreline Assessment" and to consider the MTWG as a regional forum through which the Contracting Parties could contribute to the relevant work carried out at a global level.

According to the decision of the 56th Meeting of the Marine Environment Protection Committee (MEPC) of the International Maritime Organization (IMO), the OPRC-HNS Technical Group (TG), will contribute to the work carried out by the MTWG by proposing terms of reference for and revising the comparative study and the draft guidelines developed by the consultant recruited by REMPEC.

At the 7th Meeting of the OPRC-HNS Technical Group, the Group approved the terms of reference submitted in the paper document MEPC/OPRC-HNS/TG7/3/4.

Executive Summary

As agreed by the 8th REMPEC Focal Points Meeting, the Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea (REMPEC) initiated the implementation of the project on Comparative Study and Development of Standard Guidelines on Oiled Shoreline Assessment.

The Centre contracted the Oil Spill Training Company to carry out the project in collaboration with REMPEC and the MTWG. This project has two related phases:

Phase I: Comparative study on existing oiled shoreline assessment guidelines

Phase II: Draft standard guidelines on oiled shoreline assessment

This report addresses Phase I of the project and is based on a desk review of eight published approaches to the assessment of oiled shorelines, recognised at national and international levels. These were developed by the following organizations:

1. National Oceanic and Atmospheric Administration (USA)
2. Environment Canada
3. The Arctic Council
4. CEDRE (France)
5. Maritime & Coastguard Agency (UK)
6. European Commission
7. Australia Maritime Safety Authority
8. Maritime New Zealand

The eight approaches were analysed for similarities and differences using a set of standard elements developed for this purpose. Based on these analyses, a set of recommendations are presented for Phase II of the project.

A feature of this comparative study is the finding that there are substantive similarities between all the approaches covered by this study. This is primarily due to the approaches having been developed from the original Shoreline Cleanup Assessment Team (SCAT) approach of Environment Canada. Issues that lead to various differences between approaches are identified and discussed.

It is emphasised that this project focuses on the Mediterranean Sea region's habitats and on data gathering. It does not address the application of this data to response decision-making.

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Abbreviations

AMOP	Arctic Marine Oilspill Program
AMSA	Australian Maritime Safety Authority
CEDRE	Centre de Documentation, de Recherche et d'Expérimentations sur les Pollutions Accidentelles des Eaux
EPPR	Emergency Prevention, Preparedness and Response (Arctic Council)
EROCIPS	Emergency Response to coastal Oil, Chemical and Inert Pollution from Shipping
ESI	Environmental Sensitivity Index
ICS	Incident Command System
IOSC	International Oil Spill Conference
ITOPF	International Tanker Owners Pollution Federation Ltd.
MCA	Maritime & Coastguard Agency (UK)
MEPC	Marine Environment Protection Committee
MTWG	Mediterranean Technical Working Group
NOAA	National Oceanic and Atmospheric Administration (USA)
NRDA	Natural Resource Damage Assessment
OPRC-HNS	Oil Pollution Preparedness Response & Co-operation – Hazardous Noxious Substances
OSTC	Oil Spill Training Company
REMPEC	Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea
SOP	Standard Operating Procedure
SCAT	Shoreline Cleanup Assessment Team (or Technique)
ToR	Terms of Reference

1 Introduction

As agreed by the 8th REMPEC Focal Points Meeting, the Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea (REMPEC) initiated the implementation of the project on Comparative Study and Development of Standard Guidelines on Oiled Shoreline Assessment.

The Centre contracted the Oil Spill Training Company to carry out the project in collaboration with REMPEC and the MTWG. This project has two related phases:

Phase I: Comparative study on existing oiled shoreline assessment guidelines

Phase II: Draft standard guidelines on oiled shoreline assessment

The objectives of the project are stated as:

The primary objective of the development of the standard guidelines for the Mediterranean region on oiled shoreline assessment based on best practices is to provide any coastal State affected by a pollution incident with the basic knowledge needed to undertake on its own, immediately after an oil spill and during the cleanup operations, detailed and complete shoreline surveys. The activity should focus on the data collection element of the oiled shoreline assessment and not for the data analysis or data applications of the information gathered.

The ultimate objective of this activity is to obtain guidelines prepared at the regional level and recognized at the international level to be used by any Mediterranean State requiring information on oiled shoreline assessment. These guidelines could in a later stage be completed for other regions.

This Report addresses Phase I of the project and is based on a desk review of published approaches to the assessment of oiled shorelines, recognised at national and international levels.

It is emphasised that the project is focussed on the habitats of the Mediterranean Sea regions and its main focus is on data gathering and not the application of this data to response decision-making.

1.1 Report's Outputs

The outputs of this Report address Phase I of the project and are summarised as:

1. A **literature study** of references and documents on the topic of oiled shoreline assessment currently available and used at national and/or international levels;
2. A **detailed description** in table format of the **main references and documents** identified in the literature study;
3. An **analysis of the similarities and differences** based on the information gathered in the description tables developed for this purpose;
4. A set of **recommendations** for Phase II of the project.

2 Literature Study

The project's ToR indicated various approaches and associated references on the topic of oiled shoreline assessment to be used in the comparative study. In addition to these references, REMPEC requested that the European Commission's POLSCALE was also included in the comparative study. Furthermore, a literature review of the following specialised oil spill conference proceedings was undertook in order to provide additional shoreline assessment approaches and identify additional references:

- International Oil Spill Conferences (IOSC)
- Arctic Marine Oilspill Program (AMOP) Technical Seminars
- Interspill Conferences
- Spillcon Conferences
- Offshore Arabia Conferences

Relevant papers from these conferences are listed in the Bibliography. These papers have been used to provide guidance and insights into the implementation and use of Shoreline Cleanup Assessment Teams (SCAT). The International Tanker Owners Pollution Federation Ltd. (ITOPF) has also provided additional references.

The literature study identified two additional oiled shoreline assessment approaches, those of the Australian and New Zealand authorities. Therefore the approaches covered in detail by this study are those published by:

1. National Oceanic and Atmospheric Administration (USA)
2. Environment Canada
3. Arctic Council
4. CEDRE (France)
5. Maritime & Coastguard Agency (UK)
6. European Commission
7. Australia Maritime Safety Authority
8. Maritime New Zealand

3 Comparative Assessment

Each of the eight approaches identified in the literature study were analysed for their key features or aspects; to identify similarities and differences. The project's ToR stipulated that the following five aspects should be incorporated into the analyses, with information presented in table form:

1. Context of development
2. Scope
3. Structure and components
4. Forms
5. Dissemination support

For items 2-5 above, it was stipulated that a further list of elements should be identified to facilitate a comparison of the different approaches used and that these differences and similarities should be highlighted and presented in a check list format. This section of the Report is structured to meet these specific ToR requirements.

Shoreline Assessment Manual (2000)	
Publishing organization(s)	National Oceanic and Atmospheric Administration (NOAA)
Context of development	The Manual was developed in the context of the USA response framework. It is designed to integrate within the Incident Command System (ICS) and, where appropriate, link to Natural Resource Damage Assessment (NRDA). The terminology is deliberately aligned to the Environment Canada SCAT Manual.
Scope	The integration with the ICS means the document is specifically targeted at Shoreline Assessment Team(s) reporting to a Shoreline Assessment Coordinator within the Environment Unit of the Planning Section of a Response team. The Shoreline Assessment Team includes a coastal geologist, a coastal ecologist and an archaeologist as its cornerstones. However the focus often lies with the shoreline oiling conditions provided by the geologist. This infers the knowledge level of the team will be relatively high.
General user	An abbreviated 'short' form is provided for less experienced assessors.
Specialized user	There is a standard form plus tarball and wetland forms for trained and experienced assessors. The numbers of people involved in the assessment depends on the complexity of the specific incident. It is a reasonable assumption that the scale of incident likely to require formalized shoreline assessment will have led to establishment of a significant ICS team. Shoreline Assessment Teams also liaise with Operations Section staff to ensure safety and exchange of important information. The NRDA Representative is likely to have an interest in assessment outputs and works through the Liaison Officer at the Command Staff level.
Structure and components	The Manual is a comprehensive document addressing: • The assessment process • Methodology • Roles and responsibilities of the assessment team • Activities of the assessment team • Terminology and codes • Planning for assessments • Pre-impact assessment Each section provides relatively large amounts of detail, with the 'Activities' covering the full range of activities normally conducted as part of the shoreline assessment process. The document includes a variety of examples of the assessment process and how forms should be completed The Manual is complemented by the 'Shoreline Assessment Job Aid'- a pocket-sized field guide used to assist in recording accurate field observations in a concise, systematic, and standard format. It consists of colour photographic examples of all shoreline assessment terms, shoreline types, and cleanup methods.

Shoreline Assessment Manual (2000)	
Data collection	Yes; in detail.
Terminology and definitions	Oil distribution: Yes. Surface oil thickness: Yes Surface oil type: Yes Sub-surface oil: Yes Sediment type: Yes Differentiation between black and refined oils: Yes Shore roughness: No
Shoreline Classification	Rocky Cliffs (ESI 1A) Exposed Man-made Structures (ESI 1B) Wave-cut Platforms (ESI 2) Fine-Medium grained Sand Beaches (ESI 3) Coarse-grained Sand Beaches (ESI 4) Mixed Sand and Gravel Beaches (ESI 5) Gravel Beaches (ESI 6A) Riprap (ESI 6B) Exposed Tidal Flats (ESI 7) Sheltered Rocky Shores (ESI 8A) Sheltered Man-made Structures (ESI 8B) Sheltered Tidal Flats (ESI 9) Wetlands (ESI 10) Other The Environmental Sensitivity Index (ESI) of each shoreline type is indicated; these are not shown on the forms but are included in the document's text. It should be noted that NOAA documents display variations of ESI's based on different geographic areas; the ones in this Manual represent a 'typical' classification.
Decision making support	Yes; the Manual outlines methods for incorporating the results into the decision-making process for shoreline cleanup.
Forms	Four forms are included: • Shoreline Assessment Form • Short Shoreline Assessment Form • Tarball Shoreline Assessment Form • Wetland Assessment Form The forms vary in their detail but they share the following common sections: General Information, Survey Team, Segment, Shoreline Type, Operational Features, Oiling Conditions & Comments
Guidance notes	Yes; for each form
Illustrative examples	Yes; for all forms Includes a 'primer on drawing field sketches'.
Survey equipment	Yes; Appendix A – Shoreline Equipment Assessment Checklist.
Dissemination	The Manual and Job Aid are available as PDFs. Forms are included in the Manual or can be downloaded separately, along with related explanation/instructions. The complete documentation represents a detailed and comprehensive (totalling over 150 pages) set of shoreline assessment material.
Hard copy	Not available.

Shoreline Assessment Manual (2000)	
Electronic copy	PDFs: free downloads are available from the NOAA Office of Response and Restoration website (http://response.restoration.noaa.gov/index.php)

The SCAT Manual (2000)	
Publishing organization(s)	Environment Canada
Context of development	SCAT surveys are an important standard component of spill response management in North America. The SCAT Manual is tailored to the Canadian environment and context and therefore would be used by a variety of national and local agencies in Canada. However the Manual has been used worldwide, as one of the earliest and well recognised document relating to this subject. The terminology is very closely aligned to the NOAA Shoreline Assessment Manual and forms and, directly compatible in content and format.
Scope	The Manual integrates with ICS and is specifically targeted at SCAT personnel working as Technical Specialists and reporting to a Shoreline Coordinator in the Planning Section of a Response team. The Shoreline Coordinator also liaises with Operations and other Planning section staff.
General user	Yes, but a need for introductory training and familiarization with ICS is inferred. The Manual postulates that practical considerations limit an assessment team to two or three, and occasionally four or five participants. The ideal composition of a team combines (i) an individual with oil spill experience and SCAT training (ii) an individual familiar with the coastal ecology of the affected area (iii) in areas where archaeological or cultural resources exist, a specialist who can advise on precautions and constraints to protect those resources and (iv) a representative from the Operations group who can identify feasibility issues, logistical constraints and solutions, and who can evaluate the types of resources and level of effort that might be required for cleanup or treatment of a segment.
Specialized user	Yes.
Structure and components	The Manual comprises three Parts; SCAT 'Procedures and Forms', 'Application' of SCAT data and 'Supporting Materials'. The Procedures and Forms provides example of the various forms supporting guidance on completing them, whilst the Supporting Materials includes Standard Terms and Definition and various Job Aids, including photographic guides of shorelines and oil distribution.
Data collection	Yes; in detail.
Terminology and definitions	Oil distribution: Yes. Surface oil thickness: Yes Surface oil type: Yes Sub-surface oil: Yes Sediment type: Yes Differentiation between black and refined oils: No Shore roughness: No
Shoreline Classification	*Shoreline Type:* Bedrock (cliff, sloping or platform) Manmade (vertical, sloping or platform) Sediment Beach (sand, pebble-cobble, boulder or mixed sand-gravel)

The SCAT Manual (2000)	
	Sediment Flats (mud-flats, sand flats, sand-gravel, pebble-cobble or boulder) Marsh *Coastal Character:* Cliff or Hill Beach Delta Tidal inlet Marsh/wetland Barrier beach Dune Channel Other The Terms and Definitions provide a discussion on shore types and coastal character, and differentiating between them. 'Shoreline Type' focuses on the upper shore (where oil strands). 'Coastal Character' refers to the shore as a whole and incorporates features that have a bearing on clean-up operations (backshore, access and staging areas).
Decision making support	Yes; Part 2 of the Manual includes guidance on the application of SCAT data including procedures for determining cleanup recommendations and endpoints.
Forms	Five forms are included: • Shoreline Oiling Summary (SOS) Form • "Short" Shoreline Oiling Summary (SOS) Form • Tar Ball Oiling Summary Form • Wetland Oiling Summary Form • Tidal Flat Oiling Summary Form Adaptations to the SOS are proposed for different environments; Large Freshwater Lakes, Arctic Shorelines, Winter Shorelines (with Ice and/or Snow), Coral, Rivers, Streams and Creeks. The Manual recognises that forms can be developed for specific needs of a spill. The forms vary in their detail and they share the following common sections with the NOAA Shoreline Assessment Form: General Information, Survey Team, Segment, Shoreline Type / Coastal Character, Operational Features, Oiling Conditions & Comments.
Guidance notes	Yes; there are specific instructions for filling out the forms.
Illustrative examples	No example of a completed form. An example sketch map is provided.
Survey equipment	Yes; Section 1.3.2 – Field Equipment Checklist.
Dissemination	The Manual has been widely distributed within Canada and is used in various other countries.
Hard copy	The 108-page pocket manual is printed on 4½" x 7" (12 x18 cm). waterproof paper. The cost is 15 Canadian Dollars. Also available in French.
Electronic copy	Only the Shoreline Oiling Summary (SOS) Form is available, both as a PDF and XLS – free download can be obtained at: www.etc-cte.ec.gc.ca/estd_west/estdwest_scat_e.html#02.

The Arctic SCAT Manual (2004)	
Publishing organization(s)	The Arctic Council, Emergency Prevention, Preparedness and Response (EPPR).
Context of development	The EPPR programme wished to extend the existing Environment Canada SCAT Manual to cover northern latitude shorelines. The manual is one in a series of EPPR products: the Analysis of the Adequacy and Effectiveness of Existing Arrangements and Agreements (2000); the Field Guide for Oil Spill Response in Arctic Waters (1998); the Circumpolar Map of Resources at Risk from Oil Spills in the Arctic (2002); and the emergency chapter of two PAME guidelines (Arctic Offshore Oil and Gas Guidelines [1997, updated in 2002] and the Guidelines for the Transfer of Refined Oil and Oil Products in Arctic Waters [2004]).
Scope	The Arctic SCAT is completely compatible and consistent with the SCAT Manual. It contains additional material on unique shoreline types found in arctic regions, on the character of the various forms of snow and shore-zone or nearshore ice in the Arctic or in other cold climate regions during winter months, on the behaviour of oil, and on the activities of SCAT teams in these environments.
General user	Yes; short forms are included. The Arctic SCAT Manual infers that users will be familiar with ICS but does include a section for the 'First Responder' which are likely to be "regional inhabitants". This is in recognition of the remoteness and inaccessibility of large areas of the Arctic, which could lead to delays in support from specialised SCAT personnel.
Specialized user	Yes.
Structure and components	The same as the SCAT Manual, plus the addition of a section for the 'First Responder'. This section includes the "short" form aimed at the general user. The Manual contains detail on the character of US and Canadian shore-zones and the behaviour of oil on Arctic shorelines.
Data collection	Yes; in detail.
Terminology and definitions	Oil distribution: Yes. Surface oil thickness: Yes Surface oil type: Yes Sub-surface oil: Yes Sediment type: Yes Differentiation between black and refined oils: No Shore roughness: No
Shoreline Classification	The classification is the same as the SCAT Manual, with the additional of shoreline specific i.e. tundra and peat shores. In the same manner as the SCAT Manual, the Terms and Definitions provide a discussion on shore types and coastal character, differentiating between them. 'Shoreline Type' focuses on the upper shore (where oil strands). 'Coastal Character' refers to the shore as a whole and incorporates features that have a bearing on clean-up operations (backshore, access and staging areas).

The Arctic SCAT Manual (2004)	
Decision making support	Yes; Part 2 of the Manual includes guidance on the application of SCAT data including procedures for determining cleanup recommendations and endpoints.
Forms	Five forms are included: • Arctic Shoreline Oiling Summary (ASOS) Form • "Short" Arctic Shoreline Oiling Summary (ASOS) Form • Winter Tar Ball Summary (WTB) Form • Winter Wetland Oiling Summary (WWOS) Form • Winter Tidal Flat Oiling Summary (WTFOS) Form Adaptations to the SOS are proposed for different environments; Large Freshwater Lakes, Arctic Shorelines, Winter Shorelines (with Ice and/or Snow), Coral, Rivers, Streams and Creeks. The Manual recognises that forms can be developed for specific needs of a spill. The forms vary in their detail and they share the following common sections with the NOAA Shoreline Assessment Form: General Information, Survey Team, Segment, Shoreline Type / Coastal Character, Operational Features, Oiling Conditions & Comments.
Guidance notes	Yes; there are specific instructions for filling out the forms.
Illustrative examples	No example of a completed form. An example sketch map is provided.
Survey equipment	Yes; Section 1.3.3 – Field Equipment Checklist.
Dissemination	The Arctic SCAT Manual is listed on the EPPR website (http://eppr.arctic-council.org/), with availability from Environment Canada.
Hard copy	The manual is printed on waterproof paper and is illustrated with colour photo job aids. Cost is 25 Canadian Dollars from Environment Canada.
Electronic copy	No.

Survey Sites Polluted by Oil: An Operational Guide for Conducting An Assessment of Coastal Pollution (2006)	
Publishing organization(s)	Centre de Documentation, de Recherche et d'Expérimentations sur les Pollutions Accidentelles des Eaux (CEDRE)
Context of development	This Guide was been produced by CEDRE with financial support from Total and the French Ministry of the Environment and Sustainable Development. It was integrated in the frame of the European cooperation project EROCIPS (Interreg III B Espace Atlantique), for which CEDRE provided technical assistance for the French Regions (Pays de la Loire, Bretagne, Poitou-Charentes et Aquitaine).
Scope	The guide seeks to present a coastal survey method likely to produce a useable, short and yet complete report that can be used as a basis for filling in an operational coastal report form. The document does not specify who would be expected to use the assessment system, other than indicating the importance for adequate decision making.
General user	Inferred but not specified.
Specialized user	Not specified.
Structure and components	The document is presented in three main Sections: A. What you will need to know (why conduct surveys, defining sites, describing pollution); B. What to do before leaving on assignment (preparing for an assignment, what to take with you); C. What to do during the assignment (observing, measuring, taking notes, taking samples). Section C provides detail regarding the shoreline assessment form and guidelines on filling out forms.
Data collection	Yes
Terminology and definitions	Section A provides a recommended Nomenclature of describing oil on shorelines. Oil distribution: Yes. Surface oil thickness: Yes Surface oil type: Yes Sub-surface oil: Yes Sediment type: Yes Differentiation between black and refined oils: No Shore roughness: No
Shoreline Classification	The guide provides a shoreline classification example (below) based on ESI and an adaptation of this approach used during the *Amoco Cadiz* oil spill in 1978. Exposed rocky headlands (ESI 1) Eroding wave cut platforms (ESI 2) Exposed fine-grained sandy beaches (ESI 3) Exposed coarse-grained sandy beaches (ESI 4) Exposed tidal flats with compact fine sediment (ESI 5) Exposed tidal flats with coarse-grained sand and pebbles (ESI 5a) Exposed pebble beach (ESI 6) Exposed sandy or gravel beach (ESI 6a)

Survey Sites Polluted by Oil: An Operational Guide for Conducting An Assessment of Coastal Pollution (2006)	
	Boulders (ESI 7) Sheltered rocky shores (ESI 8) Sheltered sandy-silty to silty tidal flats (ESI 9) Salt marshes (ESI 10) There is some detail and guidance provided on the key factors to consider when assessing shorelines (wave exposure, sediment grain size and appearance, flora and fauna, slope of beach and signs of erosion).
Decision making support	No; the guide is limited to the assessment process and procedures, not the application of collected data.
Forms	Section C1 provides examples of forms: • Polluted Site Survey Form (note that the resolution of the PDF makes this form quite difficult to read) • Simplified Survey Form (Site Survey Form) • Simplified Survey Form (Summary of Sectoral Form) The 'standard' Polluted Site Survey Form is structured into the following sections: Observation, Site Identification, Site Characteristics, Beach Characteristics, State of Pollution, Site Illustration, Operational Aspects/Options and Others Observations
Guidance notes	Yes; Section C2 details to procedures and guidance for completing the standard form.
Illustrative examples	Yes; an example of a completed form is provided – though the resolution of the PDF makes it quite difficult to read.
Survey equipment	Yes; section B2 – List of Equipment
Dissemination	
Hard copy	Yes; in French
Electronic copy	Yes; PDF - English and French versions, available for free download from the publications section of the CEDRE website, www.cedre.fr.

The UK SCAT Manual (2007)	
Publishing organization(s)	Maritime & Coastguard Agency (MCA)
Context of development	The UK SCAT manual was adapted (with permission) from the Environment Canada SCAT Manual and materials. The electronic files were provided by Environment Canada and edited to make them relevant to the UK. In particular, modifications were made to make the manual compatible with the UK National Contingency Plan for Marine Pollution from Shipping and Offshore Installations and various technical aspects of shoreline classifications in the UK.
Scope	The approach towards SCAT in the UK is set within a well defined national planning framework. Local authorities have a responsibility for clean-up of shorelines but a variety of other agencies will have a legitimate interest in information collected. To bring coordination SCAT teams will be appointed and managed by the Shoreline Response / Coordination Centre; with assistance from the Environment Group. The inference is therefore that SCAT personnel should have some familiarity and knowledge of the UK planning framework.
General user	Yes; with introductory training.
Specialized user	Yes. The Manual postulates that practical considerations limit an assessment team to two or three, and occasionally four or five participants. The ideal composition of a team combines (i) an individual with oil spill experience and SCAT training (ii) an individual familiar with the coastal ecology of the affected area (iii) in areas where archaeological or cultural resources exist, a specialist who can advise on precautions and constraints to protect those resources and (iv) a representative from the shoreline response / coordination centre who can identify feasibility issues, logistical constraints and solutions, and who can evaluate the types of resources and level of effort that might be required for cleanup or treatment of a segment.
Structure and components	The Manual comprises three Parts; SCAT 'Procedures', 'Application' of SCAT data and 'Supporting Materials'. The Procedures includes SCAT Form Instructions and 2-page SCAT Form, whilst the Supporting Materials includes Standard Terms and Definitions. The Terms and Definitions provide supporting guidance on filling out the SCAT Form.
Data collection	Yes; in detail.
Terminology and definitions	Oil distribution: Yes. Surface oil thickness: Yes Surface oil type: Yes Sub-surface oil: Yes Sediment type: Yes Differentiation between black and refined oils: No Shore roughness: No
Shoreline Classification	Bedrock Stable boulders/cobbles Mobile boulders/cobbles/pebbles

The UK SCAT Manual (2007)	
	Solid seawalls Revetment Coarse sediment Mobile sand Stable sand Clay/Peat Stable mixed substrata Firm muddy sand Soft mud Saltmarsh Reed swamp The above categorisation is designed for differentiation based on cleanup measures and not ecological character. The information listed for collection also includes wave exposure of the shoreline: Very exposed / Exposed / Partially sheltered / Very sheltered / Extremely sheltered.
Decision making support	Yes; Part 2 of the Manual covers application of SCAT data including cleanup recommendations, endpoints and the incorporation of Net Environmental Benefit Analysis.
Forms	There is a 2-page SCAT Form, modelled on the Environment Canada Shoreline Oiling Summary (SOS) Form. The first page is structured to prompt necessary information collection using standard terminology. The second has three sections with more scope for free hand data entry (sensitivities, cleanup recommendations and sketch map).
Guidance notes	Yes; Section 1.5 provides detailed instructions on completing the SCAT Form. Section 1.6 provides guidance on drawing the sketch map.
Illustrative examples	No example of a completed form. Example sketch map is provided.
Survey equipment	Yes; Section 1.3.2 – Field equipment checklist.
Dissemination	The Manual was disseminated to all relevant public sector stakeholders and is familiar in the wider European context through dissemination to the BONN Agreement, HELCOM and EMSA.
Hard copy	Original print-run stocks exhausted.
Electronic copy	PDF – plans to make the PDF available on the (newly revised) MCA website.

POLSCALE (1996)	
Publishing organization(s)	European Commission
Context of development	The POLSCALE guide proposes a uniform methodology for ranking and magnitude and, an agreed terminology for describing the situation in cases of oil spill incidents. The guide was proposed to be part of the European Commission's Community Information System for the control and reduction of pollution caused by hydrocarbons discharged at sea (CECIS); complementing the Impact Reference System and inventory of equipment and materials for combating oil spills. Thus the guide and methodology were designed to be part of an integrated decision support system.
Scope	The POLSCALE system sets out to provide a set of instructions to enable observers to evaluate the severity and extent of coastal pollution with reasonable and consistent accuracy. The procedure used distinguishes between the differing roles of the observer (who may have no experience of reporting oil spills) and the interpreter of information (generally expected to be a qualified or experienced person). A distinction is also made between initial observations and subsequent ones, which aim to provide more detail. Within the Member States of the European Commission, the POLSCALE guide is aimed at government, administrators, local municipality and harbour officials, police and fire services, engineers and other technical personnel responsible for oil spill response and clean-up. Furthermore POLSCALE also aims to serve the needs of the scientific community in Member States, who may be advising national governments. Targets for reports generated from POLSCALE are the various levels of authority (national authorities, other interested States, European Commission) and, when cleared by the responsible authority, the public and media.
General user	Yes; includes a reporting system proposed for use by unskilled first observers (typified as a "police officer or fire service officer").
Specialized user	Yes; includes detailed pollution scales proposed for use by trained observers.
Structure and components	The POLSCALE guide is a comprehensive document. Following the introduction, which set outs the guide's purpose, scope, principles and target readership, there are six sections plus five appendices. The sections are: 1. Using the POLSCALE guide: a quick look at the system 2. Observation guidelines and procedures 3. Interpretation guidelines and procedures 4. Specific guidelines for the various types of coastal environments 5. Special techniques for surveys 6. Shoreline classification, oil types and behaviour The sections incorporate 33 'fiches' that describe the various aspects of POLSCALE. Those of specific relevance to data collection are: • G3 - Segmentation of the coastline and pre-survey

POLSCALE (1996)	
	arrangements • G5 – Surveying a coastal pollution on foot • G7 – General procedures for quantifying oil on shorelines • G8 – Using the POLSCALE Form to collect and report survey data Appendix B is the POLSCALE Form for field survey reports and is therefore highly relevant to this project.
Data collection	Yes; in detail.
Terminology and definitions	Appendix E provides a list of standard terms and abbreviations. Oil distribution: Yes. Surface oil thickness: Yes Surface oil type: Yes Sub-surface oil: Yes Sediment type: Yes Differentiation between black and refined oils: Yes Shore roughness: Yes
Shoreline Classification	Section 4 of POLSCALE, identifies the following coastal environments and cross references them to further detailed information in the Impact Reference System: Exposed or sheltered rocky or boulder shores Shingle or gravel beaches Soft beaches and tidal flats Coastal saltmarshes Supratidal maritime fringe and adjacent lands Ice-covered shorelines and nearshore waters Mangrove ecosystems Coral reefs Harbour basins, docks., marinas and other commercial installations on the coast Aquaculture installations Nearshore waters However Section 6 and the POLSCALE Form are not consistent with these coastal environments or each other, though there is overlap in terms.
Decision making support	Yes; the POLSCALE system provides detailed guidance on interpreting data and using this to support clean-up decisions.
Forms	There is a three part POLSCALE Form • Part 1 is the cover sheet, which contains general information about the survey; it is filled in once per survey • Part 2 is a three page form intended for reporting the pollution situation for each shoreline segment • Part 3 is the final sheet for completion at the end of the survey, containing surveyor's comments and administrative information; also filled in once per survey
Guidance notes	Yes; fiche G8 provides instructions for filling in the POSCALE form
Illustrative examples	No; though an example sketch map is provided. Includes a 'primer on drawing field sketches'.

POLSCALE (1996)	
Survey equipment	Yes; General Recommendations and Detailed List of Equipment.
Dissemination	The Manual and Job Aid are available as PDFs. Forms are included in the Manual or can be downloaded separately, along with related explanation/instructions. The complete documentation represents a detailed and comprehensive (totalling over 150 pages) set of shoreline assessment materials.
Hard copy	A4 soft cover publication is available through the Office for Official Publications of the European Communities for €70. (Cat. No CR-09-97-971-EN-C; ISBN-92-828-1815-8)
Electronic copy	No.

Oil Spill Monitoring Handbook (2003)	
Publishing organization(s)	Australian Maritime Safety Authority (AMSA)
Context of development	The Handbook provides guidelines for undertaking monitoring for actual or potential marine spill responses. It was specifically developed for the Australian authorities.
Scope	The Handbook covers a comprehensive range of monitoring tasks of which shoreline monitoring, incorporating the assessment of shoreline oiling is one section. Shoreline assessors report to a Shoreline Coordinator within the oil spill management team and would be expected to use the oiled shoreline assessment approach.
General user	Yes; however it is designed for use by personnel who are familiar with the field information needed during a spill response. A scientific background, whilst an advantage, is not required.
Specialized user	Yes.
Structure and components	The section on Monitoring the Shoreline Environment includes 14 specific guidelines. The following guidelines are of direct relevance to assessment of oiled shorelines: S.1 Guideline for determining sectors and segments S.2 Guideline for characterising shoreline substrate S.5 Guideline for assessment of oiled shoreline: surface oil S.6 Guideline for assessment of oiled shoreline: sub-surface oil S.9 Guideline for calculating the mass of oil on shorelines In addition to the Handbook, a Shoreline Oiling Assessment form and associated guidance notes have been produced by AMSA.
Data collection	Yes; in detail.
Terminology and definitions	The Shoreline Oiling Assessment form has a detailed description of terminology and associated abbreviations / map symbols. Oil distribution: Yes. Surface oil thickness: Yes Surface oil type: Yes Sub-surface oil: Yes Sediment type: Yes Differentiation between black and refined oils: Yes Shore roughness: No Also includes beach gradient and energy.
Shoreline Classification	The Shoreline Oiling Assessment form includes 24 shoreline types (essentially features) and 13 shoreline substrates.
Decision making support	Limited.
Forms	A standard form is not included in the Handbook but is available as a separate Shoreline Oiling Assessment form.
Guidance notes	Yes,;detailed notes available with the form and within the handbook.
Illustrative examples	No; though guidance notes have some helpful explanatory graphics.
Survey equipment	No.

Oil Spill Monitoring Handbook (2003)	
Dissemination	The Handbook and Shoreline Oiling Assessment form are available to the public as PDFs. The form is not easily found, as it incorporated within the Environment and Scientific Coordinators Workshop Proceedings 2005.
Hard copy	Not available.
Electronic copy	PDFs: free downloads from AMSA website.

Shoreline Cleanup Assessment Techniques: SCAT (2006)	
Publishing organization(s)	Maritime New Zealand
Context of development	The New Zealand SCAT is directly incorporated within the National Marine Oil Spill Contingency Plan (as Chapter 5). Though not stated in the documentation, the terminology is very closely aligned to Environment Canada's SCAT approach in content and format.
Scope	The Manual integrates with ICS and is specifically targeted at SCAT Teams reporting to a Shoreline Coordinator in the Planning Section. The Shoreline Coordinator also liaises with Operations and the On Scene Commander. The SCAT process is summarised into a Standard Operating Procedure. This incorporates survey planning, data collection and evaluation and support to clean-up decision making.
General user	Yes; with introductory training and familiarization with ICS inferred.
Specialized user	Yes. The Manual postulates that practical considerations limit an assessment team to two or three, and occasionally four or five participants. The ideal composition of a team combines (i) an individual with oil spill experience and SCAT training (ii) an individual familiar with the coastal ecology of the affected area (iii) in areas where archaeological or cultural resources exist, a specialist who can advise on precautions and constraints to protect those resources and (iv) a representative from the Operations group who can identify feasibility issues, logistical constraints and solutions, and who can evaluate the types of resources and level of effort that might be required for cleanup or treatment of a segment.
Structure and components	The process is presented in the structure of a relatively short (12 pages for the complete Chapter) Standard Operating Procedure (SOP). There is limited detail on the data collection aspect of the process.
Data collection	Yes.
Terminology and definitions	Oil distribution: Yes. Surface oil thickness: Yes Surface oil type: Yes Sub-surface oil: Yes Sediment type: Yes Differentiation between black and refined oils: No Shore roughness: No
Shoreline Classification	Shoreline Type: Bedrock (vertical, sloping or platform) Manmade solid (vertical, sloping or platform) Volcanic (vertical, sloping or platform) Permeable manmade (riprap) Sediment Beach (sand, pebble-cobble, boulder or mixed sand-gravel-shell) Sediment Flats (mud, sand, mixed sand-gravel or pebble-cobble) Mangrove or Marsh/Wetland

Shoreline Cleanup Assessment Techniques: SCAT (2006)	
	Coastal Character: Barrier beach Beach with dune Beach without dune Broken shell (Chenier) bank Cliff – consolidated Cliff – unconsolidated Developed / manmade Estuarine / tidal inlet Lagoon Platform / terrace Spit Tidal flats The information listed for collection also includes wave exposure of the shoreline: Open coast / Partially sheltered / Sheltered.
Decision making support	Yes; the SOP includes guidance on the application of SCAT data including procedures for determining cleanup recommendations and endpoints.
Forms	One Shoreline Oiling Summary (SOS) Form is included. The forms vary in their detail and three share the following common sections with the Environment Canada SOS Form: General Information, Survey Team, Segment, Shoreline Type / Coastal Character, Operational Features, Oiling Conditions & Comments.
Guidance notes	No.
Illustrative examples	No example of a completed form.
Survey equipment	Yes.
Dissemination	Not widely available but has been posted on the internet as part of the National Marine Oil Spill Contingency Plan.
Hard copy	Not available.
Electronic copy	The SCAT is Chapter 5 of the NZ National Marine Oil Spill Contingency Plan, available as PDF as a download at: www.hbrc.govt.nz/Portals/0/OilSpill/Chapter5.pdf.

4 Analyses of Similarities and Differences

The elements identified in the Comparative Assessment (see Section 3) are used as the basis of the analyses of the differences and similarities between the seven approaches. These are presented in a check list format or 'summary matrix' in this Section.

In order to facilitate this comparison it was determined that the NOAA Manual should be used as the reference against which the other seven approaches are subject to comparative analyses. The NOAA Manual was chosen as it represented one of the earliest, widely utilised and comprehensive approaches to the description of oiled shorelines. This does not infer that the NOAA Manual is regarded as the best approach - simply that it provides a convenient benchmark against similarities and differences, amongst all the approaches presented. It is also noted that in 2000, NOAA undertook a joint project with Environment Canada to align and harmonise the content and style of their recording forms. This provides a further justification for using NOAA as the reference.

Table 3 provides a quick reference to identify areas of high or low similarity for each element. This information is used to provide justification for proposing the adoption of certain elements, or their features, in line with international approaches.

It is clear that there are substantive similarities between all the approaches covered by this study. This is primarily due to the approaches having been developed from the original SCAT approach from Environment Canada. Against this background of a shared root, a number of issues have been identified. These form the basis of the differences that do exist between approaches.

4.1 Issues Identified during the Assessment

4.1.1 Shoreline Classification

Where there has been deliberate alignment of assessment approaches (e.g. Environment Canada's approach with that of NOAA and also the UK), there is open acknowledgment of differences in relation to the classification of shoreline types. It is also notable that the New Zealand SCAT, which is clearly based on Environment Canada's, also differs primarily in shoreline classification.

These differences are due to two main factors: (i) the history of shoreline classifications used within each country for different purposes and by various agencies and (ii) the geographic variations between regions or countries.

This issue was considered in detail in the Atlantic European context in 2006, within the Emergency Response to coastal Oil, Chemical and Inert Pollution from Shipping (EROCIPS) project. This project recognised that:

"One of the main stumbling blocks come across during this study was the lack of detailed information on the different practices concerning sensitivity mapping in the different countries involved in the EROCIPS project. More importantly, the disparity between the different classifications, terminology and ranking systems used was striking even between regions of the same country, not to mention between countries. This variation in practices applies not only to physical sensitivity mapping, but also, and to a greater extent, in terms of economic and ecological sensitivity. It became apparent that certain countries and regions have very advanced classification and mapping methodologies, while others have very basic systems or none at all."

The project presents and analyses the various classification systems used in the study's region and postulates ten "basic shoreline substrata" for the region:

- Bedrock
- Stable boulders
- Mobile boulders/cobbles/pebbles
- Clean sand
- Mixed shingle/gravel/sand
- Firm muddy sand
- Soft mud banks
- Salt marsh
- Riprap (and other protection)
- Solid seawalls

The report also highlights the need to take into account site-specific features that significantly influence and modify the likely impacts of oil on a shoreline. Three noteworthy examples are given as:

- large shallow pools on moderately exposed and sheltered rocky/shingle shores
- deep open cracks in moderately exposed and sheltered bedrock
- pockets of muddy gravel between bedrock ridges and at the top of sheltered shingle shores

A reference is also made to the standard Environmental Sensitivity Index (ESI) classification, as described in NOAA (2002) recommending that this classification should be used, as it is internationally accepted and each of the categories has already been well defined. This ESI classification system is shown in Figure 1. It is noted that an adapted ESI has been developed for the Mediterranean coastline of Israel (Adler and Moshe, 2007).

In the Mediterranean context, the Regional Information System's *Operational Guides and Technical Documents, Section 1, Part D,* includes guidance on shoreline clean-up (Chapter 11). This guidance, factors types of coastline against clean-up methods. The types of coastline identified are:

- Man-made structures
- Rocky shores, cliffs
- Boulders
- Tidal pools and scattered rocks
- Cobbles-pebbles-shingle-gravel
- Sandy beaches
- Muddy coasts
- Salt marshes with vegetation

The relatively simple nature of this classification and its incorporation within existing regional documentation makes it a very good candidate for adoption in the oiled shoreline assessment guidelines.

This comparative study has clearly indicated that shoreline classifications systems have commonalities but also differ in their detail. It is noted that some systems use terms that are only meaningful to trained specialists and/or include types of shore having limited geographic distribution, such as mangrove, tundra and ice-infested shores. It is recommended that these shorelines should not be considered for the Mediterranean, due to their absence from the region.

ESI	Estuarine
1A	Exposed rocky shores
1B	Exposed, solid man-made structures
1C	Exposed rocky cliffs with boulder talus base
2A	Exposed wave-cut platforms in bedrock, mud, or clay
2B	Exposed scarps and steep slopes in clay
3A	Fine- to medium-grained sand beaches
3B	Scarps and steep slopes in sand
3C	Tundra cliffs
4	Coarse-grained sand beaches
5	Mixed sand and gravel beaches
6A	Gravel beaches
6B	Riprap
7	Exposed tidal flats
8A	Sheltered scarps in bedrock, mud, or clay
8B	Sheltered, solid man-made structures
8C	Sheltered riprap
8D	Sheltered rocky rubble shores
8E	Peat shorelines
8F	Vegetated, steeply-sloping bluffs
9A	Sheltered tidal flats
9B	Vegetated low banks
9C	Hypersaline tidal flats
10A	Salt- and brackish-water marshes
10B	Freshwater marshes
10C	Swamps
10D	Scrub-shrub wetlands; Mangroves
10E	Inundated low-lying tundra

Figure 1 ESI Shoreline Classification for Estuarine Environmental Settings (adapted from NOAA, 2002)

4.1.2 Forms' Complexity

Some of the original oiled shoreline recording forms, e.g. the Environment Canada SCAT Shoreline Oiling Summary form, encountered problems in their application. The problems were primarily due to the difficulties encountered by untrained personnel using the forms. These personnel found the forms difficult to understand, complex and bureaucratic. This is contrasted with experienced or trained personnel, who are reported to have no problems using the original forms.

To address the needs of untrained personnel, abridged or 'short' forms were developed. However, there was criticism from more experienced oiled shoreline surveyors that these forms can be over-simplified, with resultant downgrading or inaccuracy of data collection. This generates an antagonism, whereby a form considered appropriate for untrained shoreline assessors is not favoured by experienced assessors and vice versa.

In this context one of the workers closely involved in the development of oiled shoreline documentation has proposed a list of "essential SCAT data" (Owens, 1999). These are reproduced in Table 1. The same worker stressed that the root of the problem for untrained personnel lay in their lacking familiarity with terms used on the form, rather than a fundamental complexity. It is postulated that this issue is most effectively addressed by ensuring that personnel are given a basic level of training prior to using the forms, so that as a minimum, the context and terms used in the form are understood and appreciated.

The issue of downgrading or inaccuracy of data with abridged or 'short' forms was specifically addressed by NOAA and Environment Canada, who jointly undertook to align their SCAT forms in 2000. The short form was revised to contain sufficient information to allow shoreline oiling to be described at an appropriate level of accuracy.

In order to address the issue, of the level of complexity of documentation, it is noted that the project ToR recognises that most potential users in the Mediterranean region are unlikely to be highly trained or experienced in oiled shoreline assessment (ToR section 4.4.4.3). Therefore the following guiding principles are proposed for the development of a Mediterranean-wide approach:

- the shoreline oiling form is as simple as possible, whilst remaining comprehensive enough to capture meaningful data for operational purposes
- consideration is given to the proposed "essential SCAT data"
- close attention is paid to design of the form and guidance notes
- structured briefings for untrained personnel are incorporated in procedures

General	• Location, date, time and segment code • Information on team members
Surface	• Length and width of oiled section or subdivision described • Location of oil relative to tidal zones or lake/river levels • Distribution (percent surface coverage to nearest 5 or 10%) • Oil thickness • Oil character
Subsurface	• Location and areas (length and width) of penetrated or buried oil • Pit or trench locations and depths • Thickness of clean sediment on buried oil • Thickness of sediment to base of penetrated/buried oil
Field Sketch or Map	• Scale, North arrow, GPS coordinates • Surface oil locations and characteristics (abbreviations) • Pit and trench locations • Access, staging and safety or operational concerns • Photographs and/or video of the segment (optional)

Table 1 Essential components of a SCAT data set (Owens, 1999)

4.1.3 Creating Shoreline Segments

It is a feature of all the approaches, that a length of shoreline to be surveyed is split into sections, often referred to as segments, for the purposes of oiling descriptions. The

size and nature of these segments is usually based on the physical character of the shore, the oiling conditions or, operational factors.

If the character of the shore is utilized, then creating shoreline segments may be possible in advance of oil spills; as part of the contingency plans. This may be particularly relevant for areas of higher risks, such as relatively congested shipping lanes or approaches to ports and marine terminals, and can allow key non-incident specific elements of the shoreline environment to be acquired in advance. Such ground work will save time and is likely to improve the efficiency of oiled shoreline surveys if an incident occurs.

4.1.4 Proposals for Flexibility and the "SCAT Rules of Thumb"

Whilst the content and design of documentation can make a significant contribution to the successful capture of oiled shoreline data by field personnel, it is also recognised that there are other contributory factors. Alongside the "essential SCAT data" previously mentioned, the same experience worker also proposed "rules of thumb" for both SCAT documentation and process (Owens, 1999); these are reproduced in Table 2. These rules of thumb provide an insight into how effective management of the oiled shoreline assessment process is equally important to its successful implementation. They also raise the issue of consideration, of flexibility in the design of data recording forms on an incident-specific basis. It is recommended that these rules of thumb are taken into consideration in the construction of any guidelines and briefing notes associated with recording form(s) for the Mediterranean.

4.1.5 Use of Digital Technology

Paper systems (albeit created by and printed from computer applications) remain the predominant method for oiled shoreline documentation and recording. However, there is evolving use of digital technology in the field collection of oiled shoreline information and subsequent data management. This includes on-going developments of SCAT software for Personal Digital Assistants (PDAs), systems to link to digital video and photographs, Geographic Positioning Systems (GPS) and Geographic Information Systems (GIS). It is also likely that in the near future, digital field data transfer to command posts will take place using mobile telephone or Wi-Fi connectivity.

Whilst the use of digital technology shows potential to improve the efficiency and accuracy of data collection, it is outside of the scope of this study. REMPEC may wish to follow-up on this issue at a later stage if Contracting Parties request.

Documentation
• Remember, the role of the SCAT is to be the "eyes and ears" for the Planning and Operations teams • Record, on a form or in a field note book, any and all information required to later recreate the character and location of the oil • Define practical segments, based on either the physical shore-zone character, oiling conditions, or operational units • Be more, rather than less, detailed and do not categorize (i.e. enter the actual value of **15%** for distribution, not **patchy**; enter the value **15m** for width of oiled beach, not **>3m**) • Always make a sketch (or draw a map or on a map if cannot sketch too well) to indicate important features and the location of the oil) • If there is not a standard term or definition that fits an observed feature, define and describe the feature • Look around and identify advantages or constraints that might help or hinder the field cleanup crew
Process
• **Use an existing form if that is appropriate**: generate a new form if existing forms are not appropriate • **Modify terms, definitions, forms at the outset**: try not to change definitions or terms midway through a project (can always add new terms or redefine terms in some cases) • **SCAT can be labour intensive and generate a large volume of data**, so be sensible and practical in designing field surveys: do not promise more than you can deliver and do not do more than is necessary • **Calibration** is an ongoing activity as personnel and as oiling conditions change • **Minimize substitutions** and select team members who can stay with the programme, or have a systematic schedule of alternates: people who see conditions change through time have a better perception of reality • Assign a **data manager** as soon as possible for anything other than a small response: field teams do not have time to complete their paper work, perform data entry and routine management tasks, as well as map or report production unless the affected area is very small • **Have a data manager review field forms daily**: post-spill reconstruction of oiling conditions is tedious and usually inaccurate

Table 2 SCAT documentation and process 'rules of thumb' (Owens, 1999)

	NOAA[1]	Environment Canada	Arctic Council	CEDRE	MCA	European Commission	AMSA	Maritime New Zealand
Scope								
General user	✓	✓	✓	✓[2]	✓	✓	✓	✓
Specialized user	✓	✓	✓	×	✓	✓	✓	×
Structure and components								
Data collection	✓	✓	✓	✓	✓	✓	✓	✓
Terminology and definitions:								
Oil Distribution	●●●	●●●	●●●	●●●	●●●	●●●	●●●	●●●
Graphic showing distribution	●●●	●●●	●●●	●●●	●●●	●●●	●●●	N/A
Surface oil thickness	●●●	●●●	●●●	●	●●●	●●●	●●●	●●●
Surface oil type	●●●	●●●	●●●	●	●●●	●●●	N/A	●●●
Sub-surface oil	●●●	●●●	●●●	●●	●●●	N/A	●●	●●●
Sediment type	●●●	●●●	●●●	●●	●●●	●●●	●●●	●●●
Shoreline Classification	●●●	●●	●●	●●	●●	●●	●	●●
Photo guide to shorelines	✓[3]	✓	✓	✓	×	✓	×	×
Photo guide to oil distribution	✓[4]	✓	✓	✓	×	✓	×	×
Decision making support	✓	✓	✓	×	✓	✓	✓[5]	✓
Forms								
Guidance notes	✓	✓	✓	✓	✓	✓	✓	×
Example of completed form	✓	✓	✓	✓	×	×	×	×
Illustrative example of map	✓	✓	✓	✓	✓	✓	×	×
Survey equipment list	✓	✓	✓	✓	✓	✓	×	✓
Dissemination								
Hard copy	×	✓	✓	×	×	✓	×	×
Electronic copy	✓	?	×	✓	✓	×	✓	✓

Key to symbols for 'Terminology and definitions':

●●● Very high level of similarity with NOAA approach

●● Medium level of similarity with NOAA approach

● Low level of similarity with NOAA approach

N/A Not Applicable i.e. element absent

Table 3 Summary of Shoreline Assessment Approaches

[1] NOAA used as reference for the comparative assessment
[2] Inferred, rather than stated
[3] As separate, related Job Aid
[4] As separate, related Job Aid
[5] Limited

5 Recommendations for Phase II

The elements proposed for inclusion in the shoreline assessment guidelines for development in Phase II of the project, are presented in this section. These elements are included in most of the approaches analysed in this Report. A critical consideration in Phase II will be the level of detail for each of these elements, as this is the primary difference between existing approaches. In line with the ToR requirements (ToR section 4.4.3), it is recommended that in all aspects, the guidelines are kept relatively short. The main task in Phase II will be to ensure the guidelines and form(s) are as simple as possible, whilst still retaining functionality.

5.1 Proposed Elements

The following are the proposed elements considered essential for the draft guidelines, from the viewpoint of the author. These will be considered by the Mediterranean Technical Working Group (MTWG). Based on their comments and suggestions plus the requirements in the project ToR section 4.4.3, these recommendations will serve as the reference for Phase II (i.e. drafting the standard guidelines on oiled shoreline assessment). Various comments have been provided to explain or justify the inclusion of proposed elements, in order to assist the MTWG in their review.

The elements are structured in an order to reflect a contents list for the proposed guidelines:

Element	**Comments**
Introduction and overview	Explanation of the regional applicability and compatibility with international approaches. Inclusion of graphic showing the assessment process and its link into decision making for clean-up and related endpoints.
Purpose	Explanation of why oiled shoreline assessments are needed and the benefits of a systematic approach.
Planning the survey and shoreline assessments	The need to utilise aerial survey reports in planning ground surveys, segmentation of shorelines, briefing teams (technical and safety aspects), providing suitable field equipment and determining assessment team composition.
Instructions for completion of shoreline oiling form	Detailed and clear instructions on completing each section of the shoreline oiling form.
Annexes:	
Standard shoreline oiling form	A single form based on the content of SCAT approaches is recommended, with sections covering: • General information • Survey team • Segment details • Shoreline type and character • Operational features

	• Oiling conditions: surface • Oiling conditions: sub-surface • General comments Attention should be paid to the specific detail of layout and space – annotations to explain how certain fields are expected to be completed, are proposed. This may extend the form but will ensure it is usable by non specialists. Ease of printing / photocopying the form in black and white, without loss of clarity or information.
Standard terms and definitions	The terminology developed for 'SCAT' is recommended for oiling conditions (distribution, thickness and character). The recommend shoreline types are: • Man-made structures, revetment or riprp • Rocky shores, cliffs • Boulders • Tidal pools and scattered rocks • Sandy beaches • Cobbles-pebbles-shingle-gravel • Muddy coasts • Estuary and river outlet • Salt marshes • 'Other' in order to allow flexibility or special local features to be incorporated It is not recommended that ESI rankings are linked to these shoreline types, as this would be likely to raise discrepancies or confusion with some existing or future national shoreline sensitivity systems. In addition it is recommended that the following modifying aspects are included on the form: • Indication of wave energy • Pools • Deep cracks or crevices • Sediment pockets • Dead seagrass (*Posidonia*) deposits • Marine litter • Amenity use
Photographic guide to shoreline types	Inexperienced users may need visual examples to explain or clarify the shoreline types.
Example of a completed form	Completed forms are very useful in providing guidance to inexperienced users.
Example of a sketch	An example sketch provides a clear indication of what

	is expected.
Field equipment checklist	A checklist is a very useful tool for assessment teams.
A graphic illustrating oil distribution	This graphic provides a useful tool for estimating oil distribution.
Production of the Guidelines	The production of A4 high resolution PDFs is recommended. These should be made readily available on the REMPEC website with encouragement for wider distribution. Production in A4 size will allow users to print a convenient and workable survey form. It is also recommended that the form and instructions for its completion are made separately available as both PDF and Microsoft Word document. This will allow more advanced users to make amendments to the form to suit specific incident needs if required, whilst retaining the overall framework. A Microsoft Word version using the 'forms' functionality should also be considered; this would allow for the creation of a version of the form that users could access and complete without destroying the original document formatting. The cost and distribution issues associated with the production of the manual in hard copy leads the author to recommended avoiding this option.

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Appendix 1: Examples of Shoreline Assessment Forms

This Appendix provides reproductions of the various oiled shoreline assessment forms and associated instructions and example sketches discussed in this report. These reproductions are for quick reference only. The original documentation is required to obtain the complete materials.

The forms included are:

NOAA:	Shoreline Assessment Form
	Shore Shoreline Assessment Form
	Tarball Shoreline Assessment Form
	Wetland Assessment Form
Environment Canada:	Shoreline Oiling Summary (SOS) Form
	"Short" Shoreline Oiling Summary (SOS) Form
	Tar Ball SOS Form
Arctic Council:	Winter and Arctic SOS Form
	Winter Tar Ball SOS Form
	Winter Tar Ball Summary Form
	Winter Wetland Oiling Summary Form
	Winter Tidal Flat Oiling Summary Form
CEDRE:	Polluted Site Survey Form
	Simplified Survey Form
UK MCA:	Shoreline Clean-up Assessment Technique Survey Form
European Commission:	POLSCALE Form
AMSA:	Shoreline Oiling Assessment
Maritime New Zealand:	New Zealand Shoreline Oiling Summary (SOS) Form