

Oil Spill and Marine Debris Response: The Power of Integration

Environmental Response Data Collection
Standards

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Marine Debris Research at the University of New Hampshire



Coastal Response Research Center

Background for Workshop

- Paper-back log for both Shoreline Clean-up Assessment and Marine Debris Assessment –
 - PDA for data collection
 - Integration with GPS
- Case Study Example: Selendang Ayu (Unalaska, AK)
- Developed a joint proposal; funded by the NOAA Marine Debris Program
- Incorporated Marine Debris into NOAA-led spill exercise: “Safe Seas 2006”
- Evolving platform for integrating spectrum of data sources



Marine Debris and Spills

- Shoreline Assessment and Cleanup Technique (SCAT) and Marine Debris –
 - Marine debris may hamper response
 - Marine debris and oil – similar mechanisms and collection areas
 - Apply same survey approach, geo-referenced photo-logging
 - Integrated database/PDA development and mapping needs
- Complicates cleanup and disposal
- Restoration – removal of marine debris



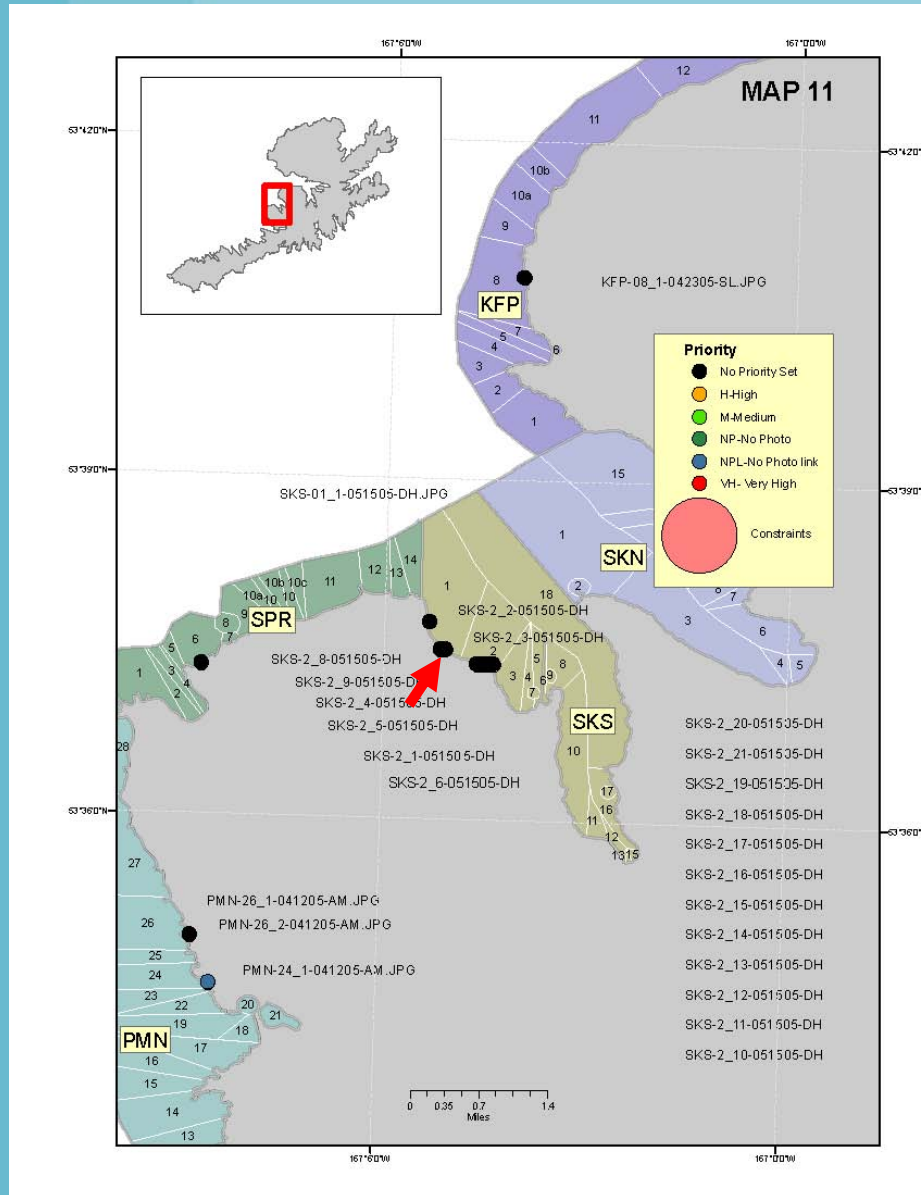
Selendang Ayu Response

- Broke apart Dec 8, 2004, Unalaska, AK
- Helicopter crashed during rescue
- ~ 500 miles of shoreline surveyed for extent of oiling
- Marine debris issues on remote shoreline
 - Incident-related and general MD challenges
- Combined project to have SCAT teams collect MD data during surveys
- MD database – prioritized MD cleanup and led to removal effort using NOAA MD funds





Helicopter Crash Debris Field



Helicopter Crash Debris Field



Black box located by SCAT teams



Marine Debris and Spill Response

- Tier 1 – Emergency Phase
- Tier 2 – Project Phase
- Tier 3 – Marine Debris Focus
- Tier 4 – Unrelated to Spill Event



An Integrated PDA-GPS Protocol

Project Objectives:

- Incorporate the use of Personal Digital Assistants (PDAs) in monitoring and data logging marine debris
- Test the use of the PDA at a current marine debris monitoring location with researchers and volunteers
- Implement the use of PDAs at current monitoring sites and map marine debris at each location with Geographic Information Systems (GIS) after cleanups/responses
- Survey of local coastal areas not currently monitored for marine debris (e.g., Great Bay National Estuarine Research Reserve) utilizing the PDA and mapping in GIS
- Document the use of the PDA, database and GIS in a protocol that can be used in the future as well as by other entities



Advantages to using PDA-GIS Use

- More efficient data collection, transfer and input
- More accurate debris location
- More detailed/standardized debris characterization
- Any potential influencing data available can be tied to a monitoring location. Some of the available data that may be useful in the evaluation include
 - weather data,
 - population density,
 - tourist visitation estimates,
 - water levels and currents,
 - and water quality.
- The full integration of all available data will allow us to examine trends and correlations in marine debris data with many potential influences.



Hardware/Software

- Researched and chose a PDA with integrated GPS
 - Purchased Garmin M5, Garmin M3
- Researched and chose software that interfaces with MS Access to record marine debris characteristics and location
 - Purchased Pendragon
 - Constructed a form to be used for monitoring/cleanup in Pendragon
 - Data automatically uploaded from PDA
 - Data exportable into Access and Excel



Garmin M5 with Pendragon form developed for MD data collection



Data Collection

- Developed list of marine debris items for an expanded database (beyond that currently used for SCAT and NH community-based cleanups)
 - NH community-based historical data compiled in a database – trends examined
 - Expanded typical marine debris list from handwritten card at community clean-ups
 - Requested feedback on new database list from stakeholders
 - Expanded list to be integrated into SCAT database
 - Working with NOAA ERD to ensure MD component for spill response linked to larger SCAT database



Testing

- PDA use tested in various situations
 - August 2006, Safe Seas
 - September 2006, ICC in NH, ICC in Anacostia;
 - regular monthly volunteer beach cleanups (2)
 - New Great Bay Sites, Detailed Mapping Surveys



Zach Magdol, UNH Research Asst. using PDA at Foss Beach

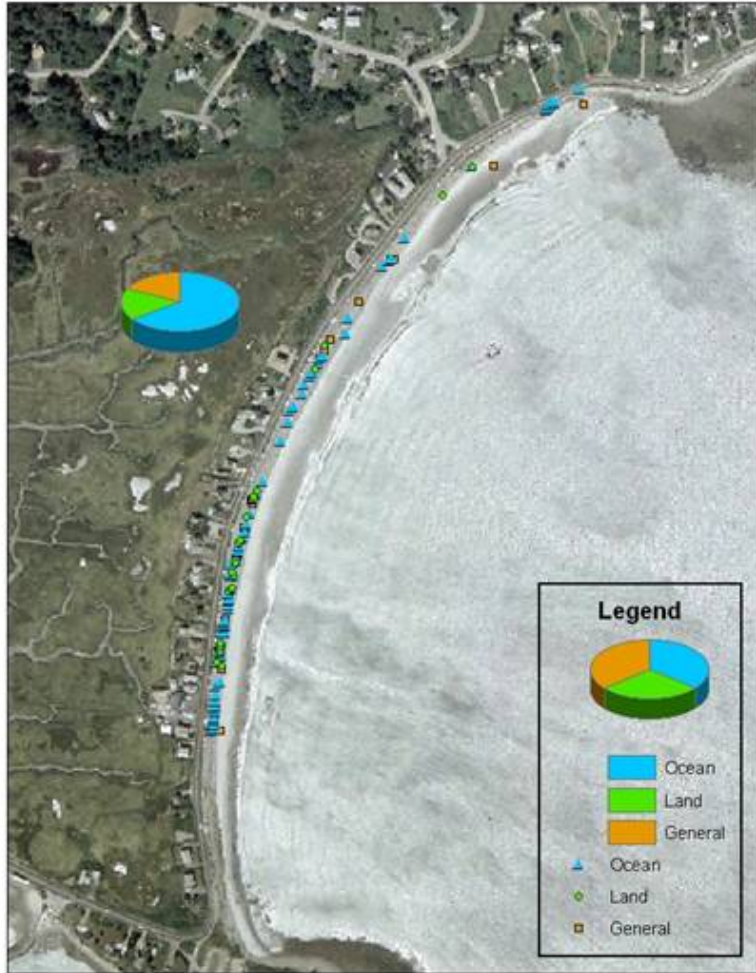


Lisa Damiano, UNH Student Research Asst. using PDA at Safe Seas

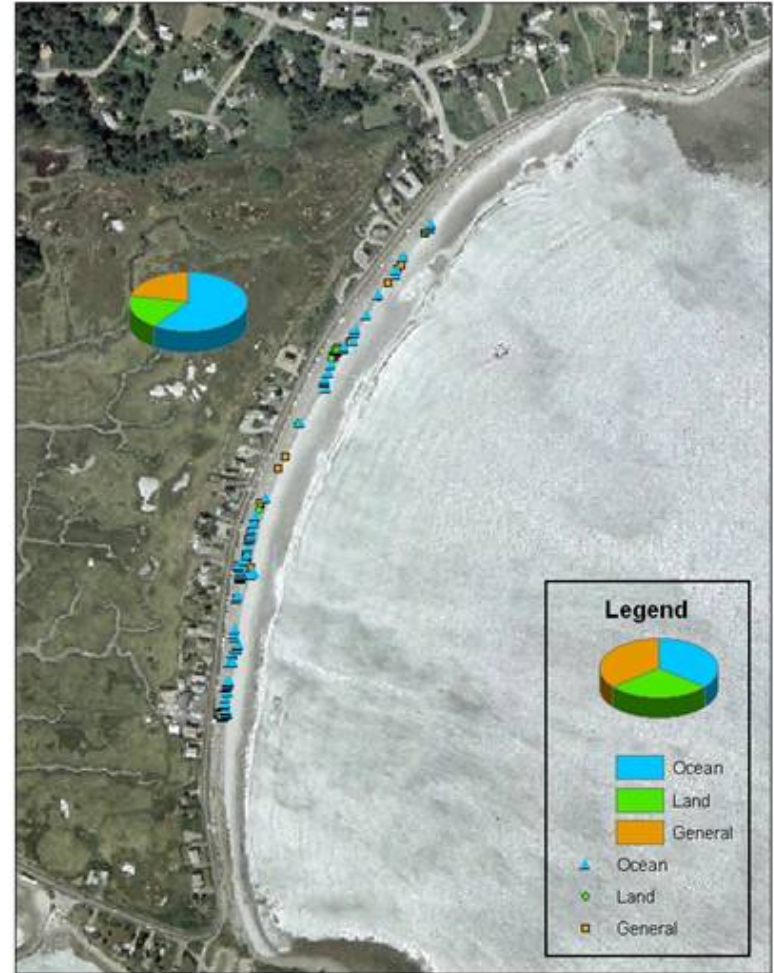


Dynamic Marine Debris Mapping

Foss Beach 6-14-07



Foss Beach 6-21-07

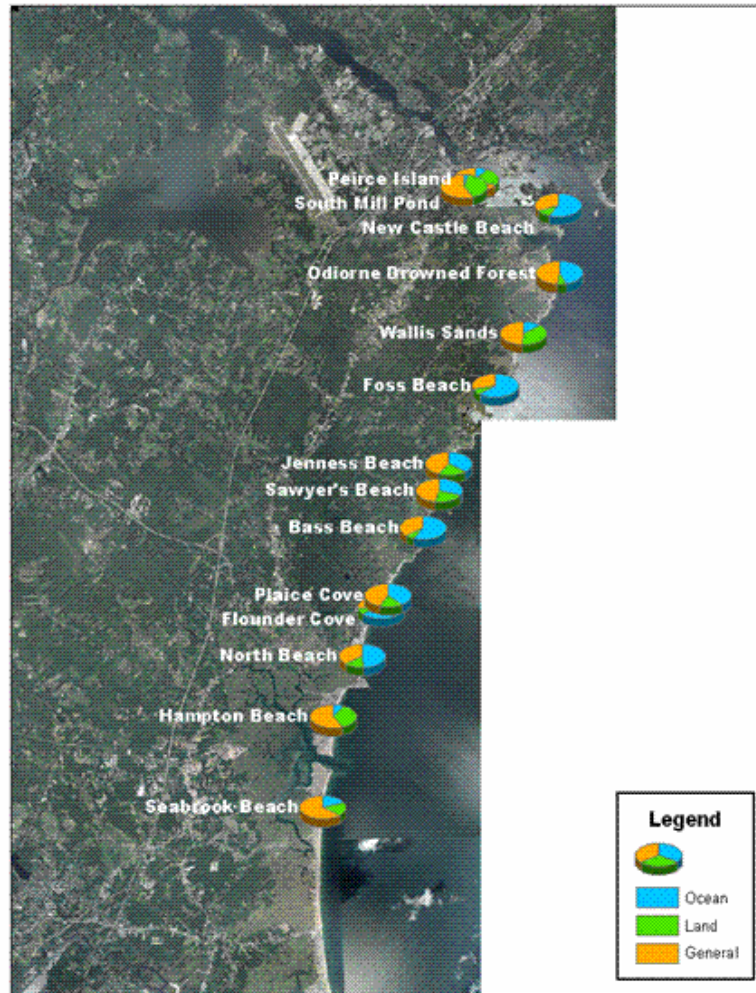


GIS

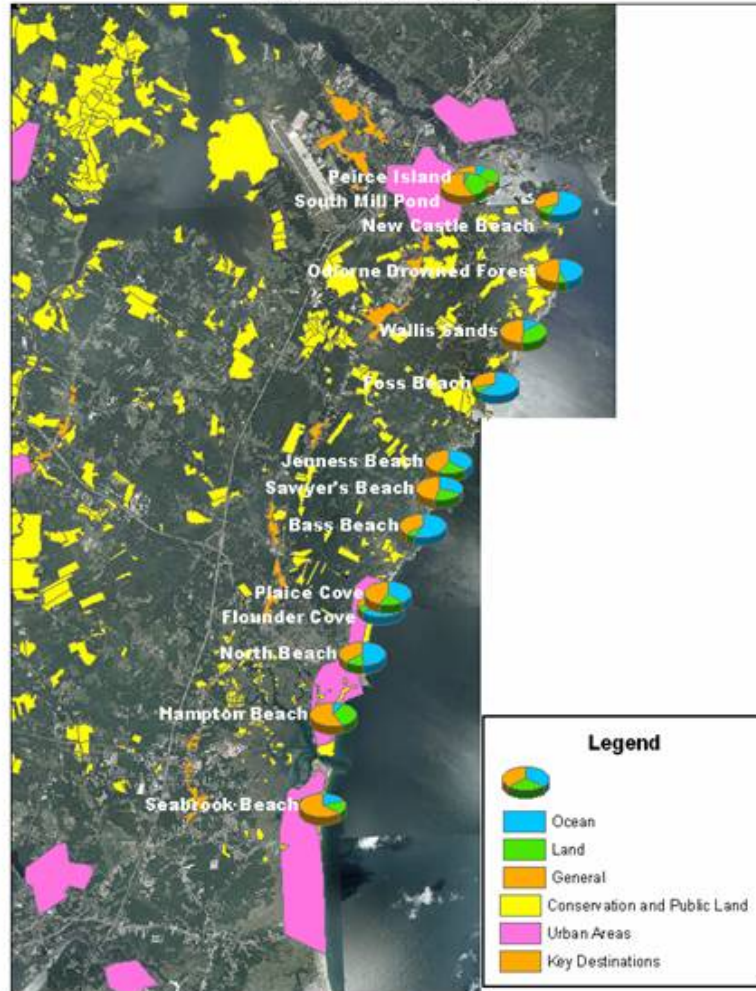
- Marine debris composition (e.g., land-based, ocean-based) was mapped in Geographic Information Systems (GIS) along with potential influencing factors
- Marine debris quantity and composition per collection site
- Potential influencing factors can be tied to all of these locations
- The eventual full integration of all available data will allow the researchers to examine trends and correlations in marine debris data with various potential influences



Marine Debris Sources on the Coast of New Hampshire 2006



Conservation and Public Lands
Urban Areas
Key Destinations
Coast of New Hampshire



Preliminary GIS Analysis

Name of Beach	Ocean	Land	General	Stormwater Outfall Located on Beach	Within .25 mile of Urban Area	Within .25 mile of Conservation/ Public Land	Within 1 mile of Marina/Port
Bass Beach	58%	6%	36%	yes	no	no	no
Flounder Cove	67%	7%	27%	no	yes	yes	no
Foss Beach	63%	7%	29%	no	no	yes	yes
Hampton Beach	10%	31%	59%	yes	yes	yes	yes
Jenness Beach	35%	25%	40%	no	no	no	yes
New Castle Beach	59%	9%	31%	no	no	yes	yes
North Beach	49%	16%	35%	no	yes	yes	no
Odione-Drowned Forest	44%	8%	47%	yes	no	yes	no
Plaice Cove	37%	21%	42%	yes	yes	yes	no
Peirce Island	11%	21%	69%	yes	yes	yes	yes
Sawyer's Beach	30%	24%	46%	yes	no	yes	yes
Seabrook Beach	19%	14%	66%	yes	yes	yes	yes
South Mill Pond	5%	37%	58%	yes	yes	no	yes
Wallis Sands	16%	35%	49%	no	no	yes	no



Issues to Consider

- Should marine debris issue be treated more like oil spills?
 - 1) Assess
 - 2) Cleanup
 - 3) Evaluate
- Continue to further integrate and leverage technology developed for oil spill response and marine debris data collection – especially software, data collection, transfer and storage methods
- What other technologies/developments are needed to integrate marine debris in oil spill and emergency response?



Prototype Web-based GIS Platform

- Integrate and synthesize disparate types of info
- Provide a common operational picture for situational awareness
- Improve communication and coordination among responders and stakeholders
 - Visualization of a complex situation
- Provide resource managers with the information they need to make better informed decisions



Functional Web GIS Platform for Response

- Package data in a well-designed management, visualization, and analysis tool:
 - Easily accessible - field and command
 - User friendly
 - Quick to display
 - Capable of real-time data display
 - Simple to update/ download from
 - Secure

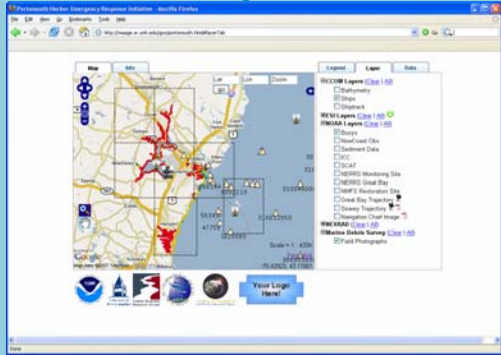
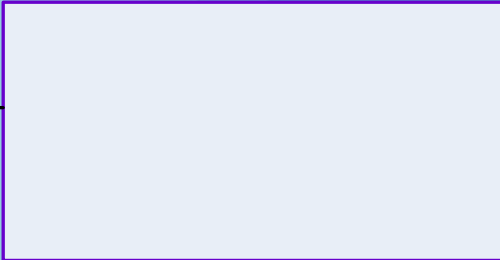
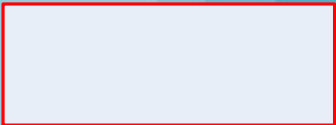
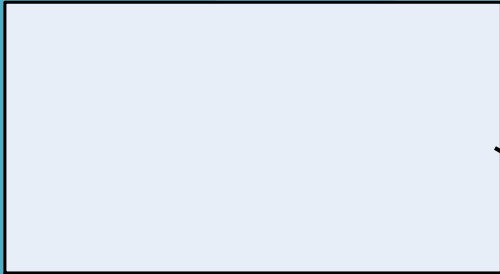


Leveraging Existing Data Resources

- Environmental - contaminant datasets, water quality monitoring sites, marine debris cleanup areas, protected areas, restoration sites, etc.
- Habitat classifications and species distributions data
- Navigational - electronic navigation charts & scanned paper charts
- Meteorological observations
- Models - trajectories/forecasts



Spill Incident Info
Volume & Chemistry of Spill
Hydrodynamic and Shoreline Data
Resources at Risk

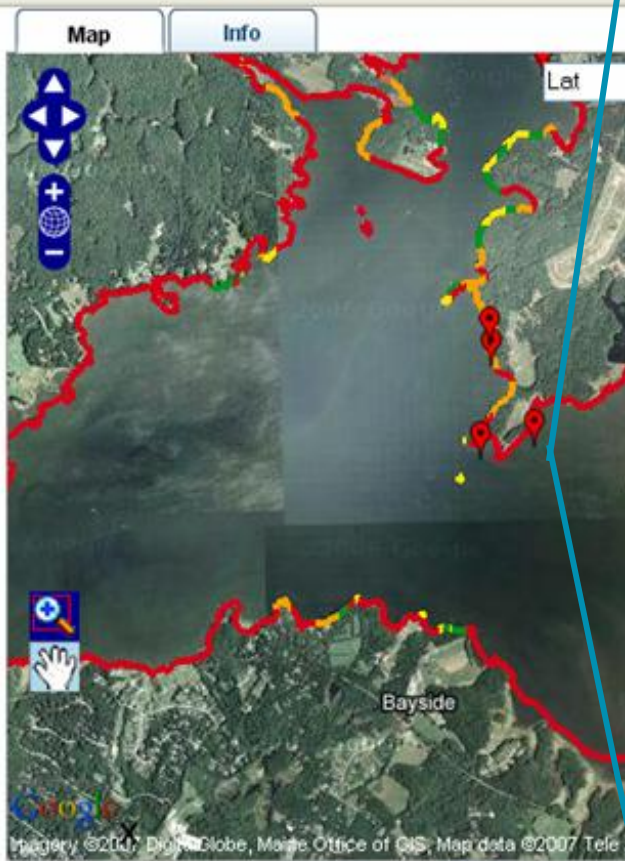




Legend Layer Data

- ☑ CCOM Layers ([Clear](#) | [All](#))
- ☑ ESI Layers ([Clear](#) | [All](#))
- ☑ NOAA Layers ([Clear](#) | [All](#))
 - Buoys
 - NowCoast Obs
 - Sediment Data
 - ICC
 - SCAT
 - NERRS Monitoring Site
 - NERRS Great Bay
 - NMFS Restoration Site
 - Great Bay Trajectory
 - Seavey Trajectory
 - Navigation Chart Image
- ☑ NEXRAD ([Clear](#) | [All](#))
- ☑ Marine Debris Survey ([Clear](#) | [All](#))
 - Field Photographs
- ☑ JCOOT Weather ([Clear](#) | [All](#))





Shoreline Treatment Recommendation Transmittal Form

Site Location: Anderson Point
 Segment: AND06 Length (m): 1260 Survey Date: 28 Apr 06
 Sediment Type: Beach Substrate: Pebble-cobble Coastal Character: Bedrock Cliff

Box 1 Ciled Area for Treatment (EU)
 Zone A - ~1% of coal/ocvetar-balls (grass, debris) continues throughout upper and supraltidal zone.
 Zone B - 3m3m Shell hash pocket beach within rocky headland outcrops at Anderson point, buried oil layer (3cm) and tarballs on surface.

Box 2 Treatment Recommendations (EU)
 Rake, shovel and collect oil and ciled sediments and buried oil layer.

Box 3 Recommendations / Staging and/or Logistic Constraints / Waste Issues (OP6)

Box 4 Ecological Resource Comments
 Possible OTER nesting area.
 Avoid disturbance to sea otters with pups.
 Constraint: SPECIAL CONSIDERATION

Box 5 Cultural Resource Comments (HPS)
 Report any cultural resources found during operations to the FOGC Historic Properties Specialist or Environmental Unit Leader.
 Constraint: REPORT

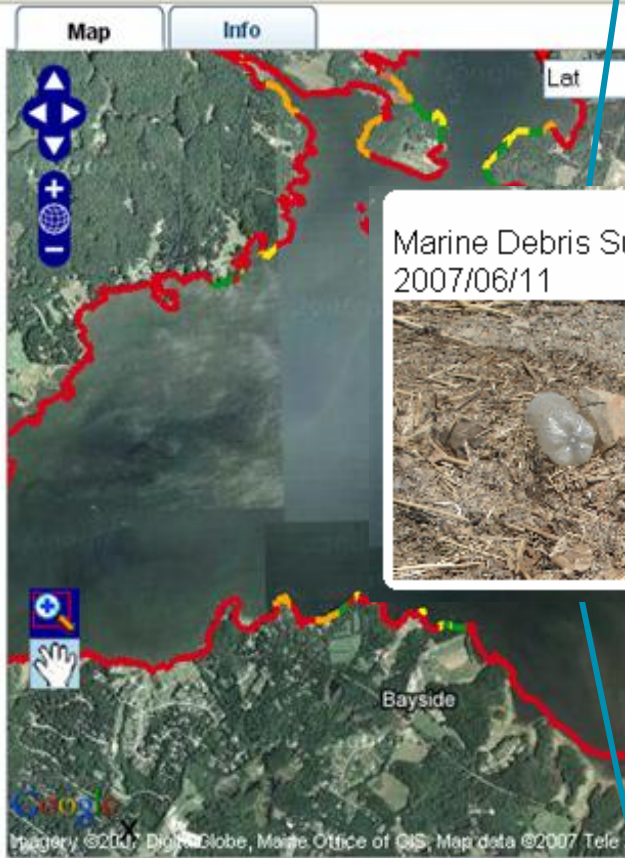
Box 6 Safety Issues (EU/OPS/SSO)
 Access: Slips, trips and falls. Proper PPE.

Attached: Segment Map Sketch Map SOS Form Other

FINAL APPROVALS:
 Environment Unit Lead: [Signature]
 Planning Section Chief: [Signature]
 Historic Property Specialist: [Signature]
 RP: [Signature] SOSC: [Signature] FOSC: [Signature]

To Ops: [] To HPS: [] To DNR: [] To SSD: [] To EUL: [] To PLM: [] To JC: []
 Final Approval to OPS: [] Final Approval to EUL: []

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



Marine Debris Survey
2007/06/11



Shoreline Treatment Recommendation Transmittal Form

Site Location: Anderson Point
 Segment: AND06 Length (m): 1260 Survey Date: 28 Apr 08
 Substrate Type: Beach Substrate: Pebble-cobble Coastal Character: Bedrock Cliff

Box 1 Ciled Area for Treatment (EU)
 Zone A - ~1% of coal/coveralls (grass, debris) continues throughout upper and supralittoral zone.
 Zone B - ~30cm Shell hash pocket beach within rocky headland outcrops at Anderson point, buried of layer (3cm) and larballs on surface.

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