

Survey Notes

Mass DEP, CI GRP, #1 Old Harbor Creek (formerly site #14)

10/10/07 1600 Hr.

Tim Robertson, Nuka Research

John Joe Dec, USCG

Mark Galkowski, NRO Town of Sandwich

Tom Corriveau, FD Town of Sandwich, tcorriveau@townofsandwich.net (please add)

Survey Platform: vehicles

Conditions: overcast, 10+ mi. visibility, wind ~10 kts NE, tide 0.6 ft. ebb

Notes:

This estuary is a critical habitat to fish and fowl, and is an important recreation area. It is at risk of impact from spills of persistent oil from the nearby power plant (#6 FO) and from shipping in the Cape Cod Canal. The long-shore current is to the east and the prevailing winds in summer are SW in summer and NE-NW in winter. The flood tidal current in the entrance is estimated to exceed 4 knots at peak flow. We assume the oil trajectory is from the west of the estuary entrance, if not the deflection tactic should be adjusted accordingly. Note that the channel changes and maybe dredged in the future.

Strategy:

The strategy is to keep the oil out of the estuary by deflecting it offshore, where it can be recovered by free-oil recovery. Any oil that does come into the estuary will be deflected to shore for shore-side recovery using multiple fast-water boom arrays. Passive recovery will be used to collect any oil that get by the boom systems.

Staging and Access:

The parking lot (way point 60) NW of the estuary entrance will be the primary staging and access to the site. There is also road access on the east side of the site, but this is a critical habitat for plovers. ATVs should be used for access.

Tactics:

a. Deflection

If sea conditions allow, anchor 5 300' boom arrays in a cascading pattern to deflect oil off shore. (way point 61) 15 anchor systems, 1,500' of protected-water or calm-water boom (depending on conditions and boom availability). Consider using the oil jetty as an anchor point and sea break. Tend boom every hour. At least two vessels suitable for the sea conditions should used to set the boom. Vessel operators should have experience operating in the surf and sea conditions. Consider have a rescue vessel standing by and a safety spotter on shore.

b. Divert and Collect

During the flood tide, oil that enters the channel can be diverted to the north shore for recovery. Because of the fast current, multiple boom arrays will be required. Each boom will slow the oil velocity and divert it further to shore. We estimate that at least 3 300' calm-water boom will be required. Shore-side recovery will be used to correct the oil (see way point 62). The boom should be placed at low tide with enough slack to allow for the rising tide. Skiffs with operators skilled in fast water can be used to set the boom. Consider having a fast-water rescue team standing by. Tend continuously through the flood tide and consider letting the booms flag in the current in the ebb tide.

c. Passive Recovery

Oil that escapes tactic 02 can be collected through passive recovery. Use snare boom for persistent oil and sorbent boom for non-persistent oil. Line the marsh edges and place double the boom across the channels. A minimum of 2,000 ft. of passive boom will be required with 200 stakes for anchors. Place boom with skiffs and operators (used to deploy 02) or with hand crews. Replace oiled boom on each tide.

d. Free-oil Recovery

When available free-oil recovery should be used to collect oil off-shore.

Survey Notes

Mass DEP, CI GRP, #2 Scorton Creek (formerly #15)

10/10/07 1730 Hr.

Tim Robertson, Nuka Research

John Joe Dec, USCG

Mark Galkowski, NRO Town of Sandwich

Tom Corriveau, FD Town of Sandwich, tcorriveau@townofsandwich.net (please add)

Survey platform: vehicle

Conditions: overcast, 10+ mi. visibility, wind ~10 kts NE, tide 0.4 ft. ebb/low

Notes:

This estuary is a critical habitat to fish and fowl, and is an important recreation area. It is at risk of impact from spills of persistent oil from the nearby power plant (#6 FO) and from shipping in the Cape Cod Canal. The long-shore current is to the east offshore, but the bar at the mouth of the creek builds to the west. The prevailing winds in summer are SW in summer and NE-NW in winter. The flood tidal current in the entrance is estimated to exceed 3 knots at peak flow. We assume the oil trajectory is from the west of the estuary entrance, if not the deflection tactic should be adjusted accordingly. Note that the channel changes and maybe dredged in the future.

Strategy:

The strategy is to keep the oil out of the estuary by deflecting it offshore, where it can be recovered by free-oil recovery. Any oil that does come into the estuary will be deflected to shore for shore-side recovery using multiple fast-water boom arrays. Passive recovery will be used to collect any oil that get by the boom systems.

Staging and Access:

The parking lot NW of the estuary entrance will be the primary staging and access to the site. There is also foot access on the east side of the site, but this private property. ATVs should be used for access.

Tactics:

DF-01. Deflection

If sea conditions allow, anchor 3 300' boom arrays in a cascading pattern to deflect oil off shore. (way point 63) 9 anchor systems, 900' of protected-water or calm-water boom (depending on conditions and boom availability). Tend boom every hour. At least two vessels suitable for the sea conditions should used to set the boom. Vessel operators should have experience operating in the surf and sea conditions. Consider have a rescue vessel standing by and a safety spotter on shore.

DV-03. Divert and Collect

During the flood tide, oil that enters the channel can be diverted to the north shore for recovery. Because of the fast current, multiple boom arrays will be required. Each boom will slow the oil velocity and divert it further to shore. We estimate that at least 3 300' calm-water boom will be required. Shore-side recovery will be used to correct the oil (see way point 64). The boom should be placed at low tide with enough slack to allow for the rising tide. This boom can be placed with shore-based crews on each side of the channel using anchors and lines with block & tackles. Tend continuously through the flood tide and consider letting the booms flag in the current in the ebb tide.

PR-04. Passive Recovery

Oil that escapes tactic 02 can be collected through passive recovery. Use snare boom for persistent oil and sorbent boom for non-persistent oil. Line the marsh edges and place double the boom across the channels. A minimum of 1,000 ft. of passive boom will be required with 100 stakes for anchors. Place boom hand crews and a small skiff. Replace oiled boom on each tide.

FO-5. Free-oil Recovery

When available free-oil recovery should be used to collect oil off-shore.

Other Considerations:

It might be possible to construct an underflow dam at this location, given time and material.

Survey Notes

Mass DEP, CI GRP, #3 Barnstable Harbor (formerly #11)

10/9/07 1500 Hr.

Elise DeCola, Nuka Research
John Joe Dec, USCG
Mike Whiteside, MassDEP
Eric Shufelt, Barnstable Harbormaster
LT Richard Pfautz, Barnstable Fire Dept.

Survey platform: Barnstable Harbormaster vessel

Conditions: overcast, 9 mi. visibility, wind NE 8-10kts gusting to 20, ebb tide (0.59 ft low at 17:26)

Notes:

Barnstable Harbor is a major protection priority for the Town of Barnstable because the harbor and the extensive marsh system are an ACEC. The harbor supports over 50 active aquaculture grants, multiple threatened and endangered species, and provides extensive shellfish and finfish habitat. It is at risk of impact from spills of persistent oil from shipping in the Cape Cod Canal. There is also bulk fuel storage in the boat basin. Despite the high priority and relative spill risks, Barnstable Harbor as a whole would be an extremely challenging area to mount an on-water spill response due to the high tidal range (9-10 feet) and the prevalence of tidal flats. Because of the extreme tidal range, any on-water booming strategy would require near constant tending to account for changing water levels, particularly nearshore. The prevailing winds are SW in summer and NE-NW in winter. The flood tidal current in the entrance is estimated to exceed 5 knots at peak flow.

Strategy:

Because of the extensive tidal flats and high currents, it is not feasible under most conditions to deploy boom at the entrance of Barnstable Harbor to exclude or deflect oil. For this reason, the priority should be to encounter oil before it reaches Barnstable Harbor for marine or shoreside recovery. If oil enters the harbor/marsh system, passive recovery will be the primary strategy along shorelines and potentially impacted marsh areas, using sorbent materials as appropriate. Within the boat basin area, booming strategies may be used to contain, exclude, or divert and collect spilled oil depending upon the source and trajectory. For a spill originating in the boat harbor, the strategy should be to contain the oil as close to the source as possible.

There are several other tidal inlets within the harbor/marsh system with road access that were also surveyed to determine the feasibility of boom deployment, but it was determined that the high currents in these areas and the extensive marsh grass would make boom deployment difficult to impossible.

Staging and Access:

The boat harbor is an ideal staging area with a large parking lot, boat ramps (one at town marina and one at state pier), floating docks, and easy road access.

Tactics:

FO-01. Free-oil Recovery

When available free-oil recovery should be used to collect oil off-shore before it reaches Barnstable Harbor. Note that this is an advanced response tactic that requires experienced responders.

DV-02 Divert and collect (flood tide, oil entering the boat basin from outside)

Deploy a chevron boom configuration by anchoring one leg at the state boat ramp at Blisch point (way point 35), and the other to the point of land to the west. 7-8 anchor systems, 700-800' of protected-water or calm-water boom (depending on conditions and boom availability). A substantial portion of the boom leg on the state ramp side will be intertidal and will require constant tending. Intertidal portions of boom should be lined with sorbents for passive recovery. Oil that is diverted to the state pier side of the array could be recovered at that point, which has good road access and a parking lot. NOTE: This is an extremely difficult boom deployment and may not be possible under all conditions or during high currents. At least one vessel suitable for the sea conditions should be used to anchor the boom segments at the apex. Shoreline anchors can be set by land-based personnel. Vessel operators should have experience operating in the sea conditions. Consider have a rescue vessel standing by and a safety spotter on shore.

EX-03. Exclusion and Passive Recovery

During the flood tide, oil that has entered the boat harbor may be excluded from the marsh area behind the bridge by booming across that area. Because of the fast current, it is preferable to work in the wider area further outside the bridge (WP 36). Multiple pilings are available to use as anchors for the boom array. We estimate that 300-400' of calm-water boom will be required depending upon the boom angle. Shore-side recovery will be used to correct the oil (see way point 64). Most of the adjacent area is bulkhead. Sorbents should be used to line these areas as needed.

PR-04a through i. Passive Recovery

Passive recovery using sorbent materials appropriate for the type of oil spill may be used to mitigate the impacts of oil that enters Barnstable harbor marsh areas. Depending upon the spill size and trajectory, several thousand feet of sorbent boom or other materials may be required. Frequent tending is needed to remove soiled sorbents and replace them. Passive Recovery should be focused on areas that are readily accessible throughout the tide cycle, by vessel, shore or both. Note that PR locations shown on map are suggestions only – actual placement should be determined based on spill trajectory and local conditions.

Other Considerations:

During the summer, a large number of vessels and floating docks are resident in the boat harbor, which may complicate cleanup. Some of the floating docks and most of the boats are not present during winter months.

Survey Notes

Mass DEP, CI GRP, #4 Rock Harbor (formerly #3)

10/11/07 1500 Hr.

Elise DeCola, Nuka Research
Tim Robertson, Nuka Research
John Joe Dec, USCG
Dawson Farber, Town of Orleans Harbormaster
Jaime Goncalves, MassDEP
Mike Popovich, USCG

Survey platform: vehicle

Conditions: overcast, foggy, light rain, 4 mi. visibility, wind 5-8 kts ENE, tide slack (mid-tide)

Notes:

This tidal creek with an extensive associated marsh system supports a herring run up to Cedar Pond as well as shellfish. The marina supports a small charter fishing fleet. Like many Cape Cod Bay sites, this area is subject to extreme tides and has extensive tidal flats. The channel into Rock Harbor creek is not navigable at low tide. This site is located in the “elbow” of Cape Cod and is observed to be a location where ice accumulates during the winter months, which is a good indication that floating oil within Cape Cod Bay might impact this site. The prevailing winds in summer are SW in summer and NE-NW in winter. The flood tidal current in the entrance is estimated to exceed 3-5 knots at peak flow.

Strategy:

The purpose of this strategy is to protect the creek from incoming oil from the bay, therefore it is a flood tide strategy. The strategy is to divert incoming oil for shoreline recovery at the creek entrance. The highest chance of success with this strategy requires backup boom to be diverted further upstream to catch any oil that migrates past the initial boom array. Passive recovery will be used along the banks to collect any oil that get by the boom systems.

Staging and Access:

There is a parking area, a boat ramp and docks at the end of Rock Harbor Road. This strategy can be implemented from land.

Tactics:

FO-01. Free-oil Recovery

When available free-oil recovery should be used to collect oil in Cape Cod Bay to prevent it from reaching Rock Harbor creek. However, due to shallow water depths and strong currents, this will be extremely difficult. Not a first responder tactic.

DV-02a. Divert and Collect

Position two to three arrays of boom (300 ft each) across the creek at sufficient angle to withstand the current (WP 84). Position boom so that recovery points are on Rock Harbor Road side (south). Use shoreside recovery at collection areas and passive recovery along both banks of the creek. Tend continuously through the flood tide and consider letting the booms flag in the current in the ebb tide.

DV-02b. Divert and Collect

Use a backup boom array to divert and collect any oil that escapes the boom at the mouth of Rock Creek (WP 83). Deploy two 300-ft boom segments across the river. Put the first segment at the bend area at the end of the parking lot, and collect on the opposite shoreline (road access on that side as well). Use a second segment as a backup (less than 300ft may suffice). Use shoreside recovery at collection areas and passive recovery along both banks of the creek. Tend continuously through the flood tide and consider letting the booms flag in the current in the ebb tide.

PR-03a through c. Passive Recovery

Oil that escapes tactics a & b can be collected through passive recovery. Use snare boom for persistent oil and sorbent boom for non-persistent oil. Line the creek/marsh edges. A minimum of 1,000 ft. of passive boom will be required with 100 stakes for anchors. Boom can be deployed from the shoreline in some areas, and in others from a small skiff. Replace oiled boom on each tide.

Other Considerations:

Currents may be too fast at maximum flow to effectively deploy boom. Vessel operations are difficult due to extremely shallow depths at low tide, be sure that vessel operators have local familiarity.

Survey Notes

Mass DEP, CI GRP, #5 Barnstable Harbor (formerly #9)

10/30/07 14:30

Elise DeCola, Nuka Research
John Joe Dec, USCG
Mike Flanagan, Wellfleet Harbormaster

Survey platform: Wellfleet Harbormaster vessel

Conditions: clear skies, 10+ mi. visibility, wind W 8-10kts gusting to 15, flood tide (11.98 ft high at 15:12)

Notes:

Wellfleet Harbor is a protection priority for the Town of Wellfleet because it supports a number of aquaculture grants and has a number of areas of environmental concern. It is at risk of impact from spills of persistent oil from shipping in the Cape Cod Canal. There is also bulk fuel storage in the harbor (4,000 gallons diesel). Part of the harbor is included in the Cape Cod National Seashore.

Despite the high priority and relative spill risks, Wellfleet Harbor as a whole would be an extremely challenging area to mount an on-water spill response due to the high tidal range (9-10 feet), strong currents, and the prevalence of tidal flats and shoaling. Because of the extreme tidal range, any on-water booming strategy would require near constant tending to account for changing water levels, particularly nearshore. The prevailing winds are SW in summer and NE-NW in winter. Water circulation within the harbor moves in a generally clockwise rotation, with stronger flow toward the Duck Creek side of the harbor than toward Great Island.

The site survey of Wellfleet Harbor included several areas for which no tactics have been identified, such as Jeremy Point and Loagy Bay, because these areas are too exposed for spill response tactics using equipment that is typically available to local first responders. However, if open water response equipment is available, then marine recovery and boom deployment may be more feasible in these locations.

Strategy:

The mouth of Wellfleet Harbor is a large opening with high sea states and would be a difficult place for first responders to work under typical conditions. Therefore, the focus would be to use booming strategies to contain, exclude, or divert and collect spilled oil depending upon the source and trajectory. For a spill originating within harbor, the strategy should be to contain the oil as close to the source as possible. For a spill that migrates in on Cape Cod Bay, on-water free-oil recovery should be used to pick up as much oil as possible before it can migrate into the harbor.

Staging and Access:

Wellfleet harbor is a good staging area with a large parking lot, boat ramps, and easy road access. At the time of the site survey, the harbor was undergoing improvements.

Tactics:

FO-01. Free-oil Recovery

Use on-water free-oil recovery to encounter oil in Cape Cod Bay and Wellfleet harbor before it reaches shoreline areas. This tactic will require responders with experience towing boom on water.

DV-02a. Divert and recover

Deploy a cascading deflection boom array starting just off the channel marker (WP 111) outside of the jetty. Attempt to catch incoming oil (flood tide) in the channel and then continue the array toward the beach area. Use shoreside recovery for oil that is diverted to the beach area. There is a parking lot behind the beach that provides good vehicle access. We estimate that 800 to 1000 feet of boom would be required, to be deployed in 200 ft segments.

DV-02a alt. Divert and collect

Divert oil incoming (flood tide) away from the front of the marsh by deploying boom out from the inner harbor jetty at an angle toward the mid-channel buoy (WP 108 is the general area). Collection point at the Old Pier Landing (WP 109). 1500 feet of boom is required for this tactic to get the proper boom angle. Note that there is an oyster bed near the collection point. This is a backup strategy for oil that escapes the diversion array at the outer jetty.

DV-02b. Divert and collect (ebb tide)

Deploy cascading boom array out from the eastern shoreline near Duck Creek to divert and collect oil on an ebb tide. Use 4 to 5 200 ft boom segments. This tactic should be deployed on a slack tide, and will require tending as the tide runs out and much of the boom becomes intertidal.

EX-03 Exclusion

Exclude oil from entering the inner harbor area by deploying approximately 650 feet of boom (WP 107 is apex of exclusion array) in a chevron.

PR-04 Passive Recovery

Use appropriate sorbent materials (sausage boom or pom-poms) to line the jetty/breakwater to reduce oiling of jetty materials. The jetty is approximately 800 ft long, so this would be the minimum length of sorbent materials required.

Other Considerations:

During the summer, there are large mooring fields in the inner harbor area. This area is widely used by recreational boaters in summer months. The collection point in Tactic a is a popular bathing beach.

Survey Notes

Mass DEP, CI GRP, #6 Pamet Harbor (formerly #8)

10/16/07 1400 Hr.

Elise DeCola, Nuka Research

Allison Miller, USCG

Luis Ribas, Provincetown Assistant Harbormaster

John Davidson, Provincetown Harbor Dept.

Mike Whiteside, MassDEP

Survey platform: Provincetown Harbormaster vessel

Conditions: sunny, 10+ mile visibility, wind 10-15 kts NNW, gusting to 20kts, tide flood (8.96 ft high at 1535)

Notes:

This tidal river and associated marsh system includes a small boat harbor and supports shellfish. Like many Cape Cod Bay sites, this area is subject to extreme tides and has extensive tidal flats. The channel into the boat harbor is fairly narrow. The prevailing winds in summer are SW in summer and NE-NW in winter. The flood tidal current in the entrance is estimated at 2-3 knots at peak flow.

Strategy:

The purpose of this strategy is to protect the creek from incoming oil from the bay, therefore it is primarily a flood tide strategy. There is no persistent fuel stored at the marina and few diesel vessels therefore the chance of an incident within the harbor is unlikely. The strategy is to divert incoming oil for shoreline recovery just inside the entrance, with a backup boom configuration at the entrance to Pamet River. Booming would be extremely challenging outside of the harbor entrance due to the high tidal range and strong currents in the area; however, on-water free oil recovery may be used further offshore to recover oil before it can threaten the harbor and river. Passive recovery may be used within the Pamet system to collect any oil that get by the boom systems.

Staging and Access:

There is a parking area, a boat ramp and docks at the boat harbor, which is at the end of Depot Road. Boom deployment boats could be launched at Pamet Harbor, or a vessel could travel south from Provincetown Harbor if conditions were favorable.

Tactics:

a. Divert and Collect

Position boom in a chevron just inside the harbor entrance, with the northern shoreline anchor point at the tip of Harbor Bar and the southern anchor point at the point where the harbor entrance begins to narrow. The apex of the boom (WP 90) should be in the

middle of the channel. Use shoreline recovery at each of the collection points, which are adjacent to each shoreline anchor point on sandy beaches. There is limited road access to both collection points, with slightly better access on the southern side. Approximately 1200' of boom is required for this chevron.

b. Divert and Collect

Position boom in a chevron at the entrance to Pamet River, just to the north of the boat harbor. Apex of chevron (WP 91) in the channel. Use shoreline recovery at each of the collection points. The collection point nearest the boat ramp will offer the best opportunity for shoreline recovery because of good road access. Approximately 900' of boom is required for this chevron.

c. Passive Recovery

Oil that escapes tactics a & b can be collected through passive recovery. Use snare boom for persistent oil and sorbent boom for non-persistent oil. Line the shoreline edges. A minimum of 1,000 ft. of passive boom will be required with 100 stakes for anchors. Boom can be deployed from the shoreline in some areas, and in others from a small skiff. Replace oiled boom on each tide.

d. Free-oil Recovery

When available free-oil recovery should be used to collect oil in Cape Cod Bay to prevent it from reaching Pamet Harbor.

Other Considerations:

Currents may be too fast at maximum flow to effectively deploy boom. Vessel operations are difficult due to extremely shallow depths at low tide, be sure that vessel operators have local familiarity.

Survey Notes

Mass DEP, CI GRP, #7 Provincetown Harbor (formerly #6)

10/16/07 1300 Hr.

Elise DeCola, Nuka Research
Allison Miller, USCG
Luis Ribas, Provincetown Assistant Harbormaster
John Davidson, Provincetown Harbor Dept.
Mike Whiteside, MassDEP

Survey platform: Provincetown Harbormaster vessel

Conditions: sunny, 10+ mile visibility, wind 10-15 kts NNW, gusting to 20kts, tide flood (8.96 ft high at 1535)

Notes:

Provincetown Harbor is large and extremely busy during the summer months, with ferry traffic, a fishing fleet, and numerous recreational vessels. There is a large mooring field and boat slips. The prevailing winds in summer are SW in summer and NE-NW in winter. The harbor experiences a large tidal range (~10 feet). The large harbor includes several small beaches as well as both residential and commercial waterfronts.

In harbor occurrences are most likely to be from a vessel or multiple vessel incident of small size. Given tidal range isolating with an encircling containment boom will limit tidal issues on the flats and breakwaters. Contact local authorities for a work platform to be stationed on the lee of the containment.

Strategy:

The purpose of this strategy is to intercept oil at either the east end of the harbor or just inside the breakwater at the east end and to diver the oil for shoreline recovery. Spill risks in the harbor include both local vessel traffic and fuel storage, and a spill from a vessel transiting Cape Cod Bay. Circulation and wind patterns in Cape Cod Bay are such that a spill from a vessel near the mouth of the Cape Cod Canal could potentially travel to Provincetown.

Staging and Access:

MacMillan Pier is a large commercial pier with boat slips and jib cranes, road access, and ample parking (although during summer months most spaces may be filled). There is also a boat ramp just west of Vine Street. Launching from the West End Boat ramp can only be done from half tide or higher. There are 14 town landings or access points throughout town. Some landings could provide vehicular access. Others are less useful. Check with local officials during initial stage event planning.

Tactics:

FO-01. Free-oil Recovery

When available free-oil recovery should be used to collect oil in Cape Cod Bay and Provincetown Harbor to prevent it from reaching shoreline points. Responders should be experienced in on-water spill response.

DV-02a. Divert and Collect

Position boom in a cascading configuration, angled to the current or prevailing wind, to catch oil traveling east with the longshore flow and divert to the sandy beach at the end of Snail Road. Begin to set the cascade away from the shoreline based on the anticipated trajectory, and continue toward shore with 200' sections of boom. Use shoreline recovery at the Snail Road collection point. An estimated 1200 feet of boom would be required for this tactic, although that amount could be modified depending upon the trajectory. Note that this strategy will be most effective on a high tide; during low tide, the boom segments closest to shore will be intertidal. This strategy would need near constant tending due to the extreme tidal range.

DV-02b. Divert and Collect

Position boom out from the base of the seawall, angled to the current, to divert oil to the small sandy beach at Town Cove. Use shoreline recovery to collect oil on the beach. An estimated 800 feet of boom would be required for this tactic, although that amount could be modified depending upon the angle.

Note that this strategy will be most effective on a high tide; during low tide, the boom segments closest to shore will be intertidal. This strategy would need near constant tending due to the extreme tidal range.

PR-03. Passive Recovery at the Breakwater

The breakwater on the west end of the harbor should be lined with sorbent materials, if available, if the trajectory threatens to move oil in that direction. Use snare boom for persistent oil and sorbent boom for non-persistent oil. The breakwater is 1.25 miles in distance, therefore a large quantity of sorbents will be required. Sorbents can be deployed from the breakwater during low tide. Replace oiled boom on each tide.

Other Considerations:

Vessel operations are difficult due to extremely variable water depths and strong tidal currents and winds; be sure that vessel operators have local familiarity.

Survey Notes

Mass DEP, CI GRP, #8 Hatches Harbor (formerly #7)

10/16/07 1330 Hr.

Elise DeCola, Nuka Research
Allison Miller, USCG
Luis Ribas, Provincetown Assistant Harbormaster
John Davidson, Provincetown Harbor Dept.
Mike Whiteside, MassDEP

Survey platform: Provincetown Harbormaster vessel

Conditions: sunny, 10+ mile visibility, wind 10-15 kts NNW, gusting to 20kts, tide flood (8.96 ft high at 1535)

Notes:

Hatches Harbor is an extremely dynamic tidal inlet at the tip of Cape Cod, with strong currents and shifting sandbars at the entrance to the harbor. At the time of survey, there were breaches at the northwest and southeast ends of the sandbar that allowed entrance to the harbor. Previously, there have been breaches in the middle of the bar, but at the survey date this had closed. Due to the high tidal range, these openings may not be navigable at low tide, particularly the smaller opening at the southeast. At peak flood tides, the flow through these small channels could be in excess of 5 knots. Because of the exposed location, high tidal range, strong currents, and potential for high sea states, the survey team determined that it would not be safe under typical conditions to deploy boom at this location.

Strategy:

Because of the high level of difficulty and safety risks associated with operating small boats in Hatches Harbor, the strategy for protecting this area if threatened by an oil spill is to conduct on-water free-oil recovery in Cape Cod Bay. Shoreside recovery could be used on sandy beach areas that are impacted by oil, and passive recovery could be used for small pockets of oil as well.

Staging and Access:

The nearest boat launch and most likely staging area would be Provincetown Harbor. Road access to Hatches Harbor is limited, although it is possible to drive to within walking distance and then walk to the beach areas. Vessel access is challenging.

Tactics:

FO-01. Free-oil Recovery

When available free-oil recovery should be used to collect oil in Cape Cod Bay to prevent it from reaching Hatches Harbor. Vessels involved in on-water free-oil recovery

must be appropriate for the sea conditions and familiar with the local waters, as there are numerous shoals and sand bars throughout Cape Cod Bay.

PR-02. Passive Recovery

Oil that reaches shoreline areas can also be collected through passive recovery. Use snare boom for persistent oil and sorbent boom for non-persistent oil. Line the beach areas that are at risk of impact. A minimum of 1,000 ft. of passive boom should be on hand with 100 stakes for anchors. Boom can be deployed from the shoreline in some areas, and in others from a small skiff. Replace oiled boom on each tide.

Other Considerations:

Vessel operations are difficult due to strong currents and extremely shallow depths at low tide; be sure that vessel operators have local familiarity.

Survey Notes

Mass DEP, CI GRP, #9 Nauset Harbor (formerly #4)

10/11/07 12:00

Elise DeCola, Nuka Research
Tim Robertson, Nuka Research
Dawson Farber, Orleans Harbormaster
Henry Lind, Eastham Natural Resources Director
Mike Popovitch, USCG
Jaime Goncalves, MassDEP

Survey platform: Orleans Harbormaster vessel

Conditions: overcast with light drizzle, limited visibility, wind ENE 5kts gusting to 14, high tide (6.26 ft high at 12:35)

Notes:

Nauset Harbor is an extensive system of tidal inlets, marsh, and sand bars that opens to the Atlantic Ocean. Nauset spans the towns of Orleans and Eastham, and parts of it are included in the Cape Cod National Seashore. The tidal flow in and out of Nauset Harbor is uneven, with an approximately 8 hour ebb and a 4 hour flood, therefore flood tide velocities are considerably higher. The entrance to Nauset Harbor has been changing, with significant erosion on the northern edge and deposition to the sandbar at the south. Nauset Harbor contains extensive tidal flats and marsh systems, a shellfish hatchery, shellfishing, and high recreational use during the summer. There are a few points where the highway runs close enough to parts of the harbor that a spill from a road source (i.e. truck rollover) could also threaten the water body.

Despite the high sensitivity of Nauset Harbor, many areas within this system would be an extremely challenging to protect due to the tidal currents, and the prevalence of tidal flats and exposed marsh. A large marsh dominates the entrance into Nauset Harbor, and there are few good opportunities to encounter oil before it would have the potential to impact these marshes. The prevailing winds are SW in summer and NE-NW in winter. Water circulation within the harbor is relatively complex, with a dynamic flood delta near the harbor entrance and several channels running through the marsh and tidal flats over which the flood tide splits and travels.

During the site survey, the team noted that for this system, GRP implementation must take into consideration the specific conditions on-scene and the trajectory of the oil.

Strategy:

The strategy for protecting Nauset Harbor focuses primarily on areas within the harbor where booming strategies and recovery were determined to have a higher potential for success. Because most of the GRP focuses on areas within the harbor, it is possible that

the marsh area, shoreline and tidal flats near the entrance could be impacted by oil. Obviously, active cleanup and recovery in these areas (or containment/trapping of oil) will minimize the overall impacts further into the system. The highest priority will be to recover oil and minimize spreading throughout the system. After that, the priority of each sub-tactic within this GRP should be determined by on-scene officials based on the trajectory of the oil and the actual conditions.

Staging and Access:

There is a boat ramp with easy access to Route 6 and a parking area on Town Cove at ??? (location).

Tactics:

FO-01 Free-oil recovery

Conduct on-water free-oil recovery in Nauset Harbor and in nearshore areas outside of the harbor to collect any oil that is floating on the surface before it can impact shoreline areas. Free-oil recovery requires trained responders with the appropriate equipment, if conditions permit.

DV-02a. Divert and collect – Mill Pond

Deploy a chevron boom configuration outside of the opening to mill pond with the apex at a midpoint (WP 83). A total of approximately 700 feet of boom will be required for the two legs of the outer chevron. If feasible, also deploy a backup chevron boom configuration inside the opening to mill pond with the apex at a midpoint. A total of approximately 600 feet of boom will be required for the two legs of the inner chevron. Adjust the length and angle of the chevron legs depending upon prevailing winds and currents. Recovery will be easier on the east side of the chevron. There is a landing on the east side of Nauset Harbor just outside Mill Pond that could be used for staging. Vessel operators should have experience operating in the local waters. This is a flood tide tactic.

DV-02b. Divert and collect – Town Cove entrance

Deploy a cascading deflection boom array (WP 77) in the vicinity of Snow Point to intercept oil on an incoming tide and divert it to a recovery area (WP 78) on the sandy beach on the northwest bank. Total boom required will be 800-900 feet depending upon the angle. Note that this tactic involves Cape Cod National Seashore land management areas and the National Seashore should be consulted as soon as possible. There is road access to the recovery area.

EX-03a. Exclusion – Christian Creek

Boom across the entrance to Christian Creek (WP 79) using approximately 600 feet of boom. Currents are slow enough here that boom deployment should be feasible. Note that there is aquaculture in this area. Since Christian Creek is fairly high up into the Nauset Harbor system, this tactic was designed primarily to contain a spill from a highway source to prevent it from spreading into other areas of the harbor. Therefore, this is primarily an ebb tide tactic. Water depths can be fairly shallow in this area. There is a small private dock, but Town Cove would be a more accessible staging area.

EX-03b. Exclusion – Salt Pond and River

Boom across the entrance to Salt Pond River Creek (WP 82) using approximately 200 feet of boom. Currents are slow enough here that boom deployment should be feasible. Note that there is an aquaculture facility in this area, and immediate notification should be made to turn off the pump system if oil is in the water. Since Salt Pond is fairly high up into the Nauset Harbor system, this tactic was designed primarily to contain a spill from a highway source or from the highway discharge pipe (#81) to prevent it from spreading into other areas of the harbor. Therefore, this is primarily an ebb tide tactic. Water depths can be fairly shallow in this area. During low tide, the boom could be deployed from land by responders in waders.

PR-04a through d. Passive Recovery

Use passive recovery along the marsh areas and tidal flats near the harbor entrance to recover as much oil as possible. Use snare boom for persistent oil and sorbent boom for non-persistent oil. Line the marsh and shoreline areas that are at risk of impact. Several thousand feet of passive boom, anchored every ten feet, may be needed depending on the scale of the spill. Sorbents must be deployed from a small skiff as there is no land access to most of these areas. Replace oiled boom on each tide. Exact locations where passive recovery boom is deployed should be determined based on the trajectory and on-scene conditions. Town Landing (PR-04b) is located across from the entrance to Nauset Harbor and based on typical flood tide circulation, would be a likely location for shoreline impacts. Therefore, if the wind and tides support the right trajectory, shoreline recovery should be used to recover oil on the beach during the ebb tide. There is good access to this area from Town Landing.

Other Considerations:

This area is widely used by recreational boaters in summer months. Since the harbor spans two towns, both should be involved in all GRP tactics.

Survey Notes

Mass DEP, CI GRP, #10 Pleasant Bay/Chatham Harbor (formerly #1)

10/17/07 13:00

Elise DeCola, Nuka Research
Dawson Farber, Orleans Harbormaster
Jennifer Stockwell, USCG
Dan Crafton, MassDEP

Survey platform: Orleans Harbormaster vessel

Conditions: clear skies, 10 mi. visibility, wind W 2kts gusting to 9, low tide (0.4 ft)

Notes:

The Pleasant Bay/Chatham Harbor system is an extensive system of tidal inlets, marsh, and sand bars that opens to the Atlantic Ocean through several breaches which often shift, close and open. Pleasant Bay spans the towns of Chatham, Orleans and Harwich, and parts of it are included in the Cape Cod National Seashore. The tidal flow in and out of Pleasant Bay is uneven, with an approximately 7.5 hour ebb and a 4.5 hour flood, therefore flood tide velocities are considerably higher, and can be 5kts or more at peak flow in the harbor entrance and through the breach. Pleasant Bay, Little Pleasant Bay, and Chatham Harbor are an interconnected system that are separated from the Atlantic to the east by a barrier beach system. The entrance to Chatham Harbor is at the south. A breach has also formed in the barrier beach system which can be navigated at high tide, with extreme caution. Pleasant Bay & Chatham Harbor contain extensive tidal flats and marsh systems, aquaculture grants, shellfishing, and high recreational use during the summer.

Despite the high sensitivity of Pleasant Bay and Chatham Harbor, many areas within this system would be extremely challenging to protect due to the tidal currents, and the prevalence of tidal flats and exposed marsh. The prevailing winds are SW in summer and NE-NW in winter.

Strategy:

The strategy for protecting Pleasant Bay & Chatham Harbor focuses primarily on areas within the embayment where booming strategies and recovery were determined to have a higher potential for success, and areas where smaller bodies of water could be closed off to protect them from any circulating oil. Because most of the GRP focuses on areas within the harbor and bay, it is possible that shoreline and tidal flats near the entrance could be impacted by oil. Obviously, active cleanup and recovery in these areas (or containment/trapping of oil) will minimize the overall impacts further into the system. The highest priority will be to recover oil and minimize spreading throughout the system. After that, the priority of each sub-tactic within this GRP should be determined by on-scene officials based on the trajectory of the oil and the actual conditions.

Staging and Access:

River Road boat ramp or fish pier.

Tactics:

FO-01. On-water Free-oil Recovery

Wherever possible and safe to do so, attempt to contain and recover spilled oil on water using towed boom and skimmers. Efforts should focus on the vicinity of the two inlets into the system (Chatham Harbor and Chatham breach) and outside the Narrows where Pleasant Bay empties into Little Pleasant Bay. Operators should be experienced with on-water equipment deployment and familiar with local conditions.

SR-02. Shoreline Recovery – barrier beach

Shoreline recovery methods can be used to remove oil that impacts the barrier beach if conditions are favorable. Most beach areas are accessible by vessel or 4-WD vehicle. Whenever possible, oil should be trapped along this sandy shoreline for recovery and to prevent re-oiling of shoreline areas in the Pleasant Bay system. Since the incoming tide into Pleasant Bay flows on either side of Strong Island, this may be an area where passive recovery could be attempted.

DV-03a. Divert and collect – Ryder Cove

Use a sharply angled boom array to divert incoming oil on a flood tide for recovery on the northwest bank. This tactic requires a steep angle due to the high (3kts) current. Total length of boom required is approximately 1700 feet. Because of the significant length of boom required and challenging currents, this tactic should only be attempted by experienced responders when Ryder Cove is within a reasonable trajectory of the oil spill. (WP 102/103 are sort of in the middle of this boom).

DV-03b. Divert and collect – Crow's Pond

Deploy a chevron boom configuration outside of the opening to Crow's pond with the apex (WP 104/105) such that there are two uneven legs. Set up a collection area at the beach area at the end of the longer leg (south side, toward Ryder Cove). Note that shoreline access may be difficult and that the current can still run at 3kts here at peak flow, so boom angle is critical. A total of approximately 600-700 feet of boom will be required for the two legs of the chevron (longer leg approximately 450 feet and shorter leg 150-250). This is a flood tide tactic.

EX-04a and b. Exclusion Boom with Passive Recovery – Muddy Creek and Round Cove

Deploy chevron boom configurations to protect the inlets for these two small inlets off Pleasant Bay. Both are small streams with relatively low velocity flow. Since water depths here are fairly shallow, it may be more feasible to deploy equipment from the land. There is easy road access from where the road (#?) crosses Muddy Creek. Approximately 400 feet of boom would be required at each point (800 total) and configured with equal legs of the chevron at 200 ft each.

EX-04c and d. Exclusion Boom – Areys Pond and Lonnie’s Pond (Kescayo Gansett Pond) Boom off the entrances to these two small pond systems using approximately 200 feet of boom at each location (400 feet total).

EX-04e. Exclusion Boom – Meeting House Pond

Boom across the entrance to Meeting House Pond using approximately 500 feet of boom. Currents are slow enough here that boom deployment should be feasible. Note that the River Road Boat Ramp would be upriver of this tactic, so if vessel traffic is anticipated in and out of this area, a gate may be necessary.

Other Considerations:

This area is widely used by recreational boaters in summer months. Since the harbor and bay spans three towns, both should be involved in all GRP tactics. There is also a Pleasant Bay Resource Management Alliance which is active in protecting the watershed and should be advised of any oil spill response operations.

Survey Notes

Mass DEP, CI GRP, #11 Stage Harbor (formerly #2)

10/17/07 0900 Hr.

Elise DeCola, Nuka Research
Jennifer Stockwell, USCG
Robert Duncanson, Chatham Natural Resources Director
Dan Crafton, MassDEP

Survey platform: Chatham DNR vessel

Conditions: clear skies, 10 mi. visibility, wind W 2kts gusting to 9, tide ebb (.91 low at 10:33am)

Notes:

Stage Harbor is a small harbor inlet on the outer “elbow” of Cape Cod, opening to Nantucket Sound. The prevailing water circulation in the Sound is from West to East, therefore the location of the harbor at the eastern point of land extending into the Sound makes it seem feasible that a spill in Nantucket Sound could travel to Stage Harbor. The tidal range in Stage Harbor is typically 3-4 feet, and the tidal currents in and out of the Harbor entrance typically run no more than 2-3 knots, so it may be feasible to work in the harbor entrance or outside the harbor, if conditions are favorable. There is aquaculture in Oyster Pond.

Strategy:

The purpose of this strategy is to encounter oil as early as possible to minimize the amount of oil that enters Stage Harbor. The implementation priority will be determined by on-scene conditions. When conditions are favorable, the first priority is to divert and collect oil before it enters Stage Harbor. If sea conditions preclude operating outside the harbor entrance, the priority shifts to excluding the oil from sensitive areas within the system.

Staging and Access:

There are small boatyards/marinas on both Oyster Pond and Mill Pond with road access, parking, and boat ramps/small docks.

Tactics:

FO-01 Free-oil recovery

Conduct on-water free-oil recovery in Stage Harbor and in Nantucket Sound nearshore waters to collect any oil that is floating on the surface before it can impact shoreline areas. Free-oil recovery requires trained responders with the appropriate equipment, if conditions permit.

DV-02a and b. Divert and Collect outside Harbor entrance (fair weather only)

Position cascading boom arrays to catch oil moving from west to east through Nantucket Sound toward Stage Harbor entrance. Boom arrays can be positioned on either or both sides of the entrance, angled into the channel to divert the oil to shoreline collection points. Boom array on northwest side of channel can be deployed as a straight length of 600 ft of boom (end of this is WP 94). On the southeast side of the entrance, each cascaded array should contain 3-5 segments of 200-ft boom. A single cascade may suffice but backup arrays will maximize recovery, if sufficient boom is available. Note that this tactic is only feasible if conditions in Nantucket Sound are calm enough to suit the limitations of the boom and to allow safe deployment and vessel operation.

DV-02 c and d. Divert and Collect inside Stage Harbor (c=ebb, d=flood)

If conditions are too rough to work outside the harbor entrance, the next priority would be to divert oil for recovery as it enters the harbor to minimize the amount of oil that travels further into the inlet. During a flood tide, boom may be deployed from the Morris Island side of the harbor entrance to catch oil in the channel and divert it to the slack area to the southeast of the harbor entrances. Set up a cascading array beginning in the channel to move oil toward the shoreline. Depending upon the movement of the oil, array may be set up at Harding Beach Point near harbor entrance (3-5 200-ft boom segments – WP #96), or further into the harbor off of small finger of beach on Morris Island (5-7 200-ft boom segments). Note: due to limited road access to this sandy beach area, fast tanks would be required for temporary storage of recovered oil.

DV-02e and f. Mitchell River/Mill Pond Divert and Recover

Close off the entrance to Mill Pond either at the narrow point in Mitchell River or behind the bridge at the opening to Mill Pond, depending upon the oil location and trajectory. Approximately 400 feet of boom would be required at either location. Both could be deployed if needed. There is good access through Stage Harbor marine for shoreside recovery, depending upon the collection point. A 200-ft segment of boom could be used to close off Johnson's Creek (DV-02e) if it is at risk of oiling. This could be deployed from vessel or from the shore, and would be in addition to the 400 feet deployed at the mouth of the Mitchell River.

DV-02g. Divert and Collect – Oyster Pond

If oil either from an outside spill or from an incident at the yacht basin threatens Oyster Pond, the pond can be closed off with a straight boom segment angled across the channel. Approximately 500 -600 feet of boom is needed depending upon the angle and anchor points. The Vineyard Ave landing would make a good collection point with easy access.

EX-03. Exclusion – Oyster Pond River

Use a chevron configuration to prevent oil from entering the Oyster Pond River. Place the apex of the chevron mid-way (WP 97), with 600 ft of boom on either leg of the chevron (1200 feet total required).

Other Considerations

Survey Notes

Mass DEP, CI GRP, #12 Herring River Harwich (formerly #5)

No survey conducted as of 11/20/07

Strategy drafted by:
Elise DeCola, Nuka Research
Rich Packard, MassDEP
John Joe Dec, USCG

Survey platform: n/a

Conditions: n/a

Notes:

This tidal river connects to Nantucket Sound through a channel reinforced on both side by jetties. Pending field visit and verification, the tidal currents are not known however based on the relatively small volume of water, it is presumed that currents would average 2-3 knots and not exceed 4 knots.

Strategy:

The purpose of this strategy is to protect Herring from incoming oil, by either diverting the oil away from the river entrance or by diverting and collecting oil that does enter the river. The predominant water circulation in Nantucket Sound is from west to east, therefore the most likely scenario would involve oil traveling toward the river from the west. There is a beach along the southwest jetty where sand has been deposited, and this beach would provide a good opportunity to collect and recover migrating oil before it reaches the river channel.

Staging and Access:

Tactics:

FO-S-01. On-water free-oil recovery

If safe and feasible, assign on-water free-oil recovery task forces to intercept oil before it reaches shoreline. (Note: This is not a first responder tactic).

DV-02a. Divert and Collect outside Herring River

If conditions are safe for vessel operations and boom deployment in Nantucket Sound, position a cascading boom array to catch oil migrating west to east and divert it to the sandy beach for collection. An estimated 4 to 6 200-ft boom segments should be arranged in an overlapping pattern, beginning offshore and moving toward the beach. There is a large parking lot near the beach that could be used to bring in recovery equipment.

DV-02b. Divert and Collect (inside Herring River)

A straight length of boom, angled to the current, may be deployed to divert oil that has entered the Herring River to a recovery area along the eastern bank. Approximately 400 feet of boom will be required depending upon the angle and anchor points. There is limited access to the recovery area.

DV-02c. Divert and Collect (near bridge)

If tactics a through c are not feasible or are unsuccessful, deploy a chevron boom just south of the bridge to prevent oil from traveling higher into the River. Establish collection points on either side of the chevron. There should be good road access to these shoreline areas. Approximately 600 feet of boom (2 300-ft legs) are required.

PR-03. Passive Recovery

Oil that escapes tactic a can be collected through passive recovery. Use snare boom for persistent oil and sorbent boom for non-persistent oil. Line the southwestern side of the jetty with sorbents. A minimum of 300 ft. of passive boom will be required to line the jetty. Additional sorbents should be on hand to replace as needed. Boom can be deployed from the shoreline if conditions are calm. Replace oiled boom on each tide.

Other Considerations:

Currents may be too fast at maximum flow to effectively deploy boom. Vessel operations are difficult due to extremely shallow depths at low tide, be sure that vessel operators have local familiarity.

Survey Notes

Mass DEP, CI GRP, #13 Lewis Bay/Hyannis Harbor (formerly #17)

10/11/07 13:00

Elise DeCola, Nuka Research
Tim Robertston, Nuka Research
Karl VonHone, Yarmouth Natural Resources
John Joe Dec, USCG
Mike Popovitch, USCG
Jamie Goncalves, MassDEP

Survey platform: Yarmouth DNR vessel

Conditions: overcast, light drizzle, 5 mi. visibility, wind E 7kts gusting to 13, ebb tide (1.4 ft)

Notes:

Lewis Bay and Hyannis Harbor experience high levels of vessel traffic year-round, due to the ferry terminal in Hyannis. This large embayment opens to Nantucket Sound through a fairly wide channel with currents averaging 2-3 kts at peak flow. Because of the high volume of large vessel traffic in and out of the Inner Harbor, this area has a relatively high risk of a spill from a ferry vessel. There is also bulk fuel storage in the Inner Harbor. Lewis Bay sensitive resources include finfish, shellfish, birds, piping plovers, human use, commercial fishing, marshes, and tidal flats.

Prevailing circulation in Nantucket Sound is west to east. The prevailing winds are SW in summer and NE-NW in winter.

Strategy:

The strategy for Lewis Bay includes tactics designed to divert and recover oil from a spill within the harbor as well as tactics to exclude oil from many of the smaller inlets in this system.

Staging and Access:

Hyannis Inner Harbor has large dock facilities and good parking, although during the summer months this area is extremely congested. There is another small boat ramp in West Yarmouth that could be used to stage out of, particularly for tactics in the eastern parts of Lewis Bay.

Tactics:

FO-S-01. On-water free-oil recovery

If safe and feasible, assign on-water free-oil recovery task forces to intercept oil before it reaches shoreline. (Note: This is not a first responder tactic).

DV-02a. Divert and Collect Hyannis Inner Harbor (Primary strategy for spill that occurs within harbor)

Deploy cascading boom array across the channel to divert oil to sandy beach for recovery. Angle boom appropriately for current (max 3-4kts at peak) There are a series of groins along the west side of the harbor entrance that could be good boom anchor points and recovery areas. (WP #67 & #68 = possible anchor points near lighthouse.#66 = Hyannis marina refueling). Recovery areas have good road access. There are roads and parking lots immediately adjacent to dock areas. High vessel traffic in channel, including multiple large ferry boats. Boom array must either include a gate or be tended to allow vessel passage. Angle of boom and location of collection areas should be adjusted based on prevailing winds and currents. Note that there is a culvert near possible recovery area.

Marsh area may be bermed off, although it is not tidal.

DV-02b. Hyannis Inner Harbor - Divert & collect with free-oil recovery (Secondary strategy to prevent booming across busy channel)

Deploy diversion boom on either side of the channel just inside of the harbor entrance to divert oil to collection points on either shoreline. Use on-water free-oil recovery to collect oil that escapes diversion boom.

DV-02c. Divert and collect –Uncle Robert’s Cove (primary)

Use an open chevron boom configuration to divert oil away from the entrance to Little Roberts Cove and use shoreside recovery to collect oil from adjacent sandy beach areas. 1200 ft boom 6 sets anchors. WP 71 & 72 = apex . If spill source is located within Hyannis Inner Harbor, consider West Yarmouth or closest boat ramp. Road access to collection point on east side of cove entrance.

DV-02d. Divert and Collect – Pine Island

Deploy boom in chevron configuration just inside mouth of small inlet. 700 ft boom. Limited Road access – 4WD vehicles could access recovery areas over sand.

EX-03a through d. Exclusion from small streams

Exclude oil from entering small tidal streams by either creating an earthen berm, an underflow dam, or a small length of boom across the stream mouth. Select tactic based on available materials and time. All streams have reasonable access from the road. Shore-based deployment should be feasible.

EX-03e. Exclusion – Pine Island (backup to DV-02d)

Deploy boom straight across the river mouth at an appropriate angle to block off the marsh and everything behind it. Recover pooled oil on shore. 300 ft boom. Limited Road access – 4WD vehicles could access recovery areas over sand.

e.1. Sweetheart Creek – Exclusion (primary)

Close off Sweetheart Creek and everything behind it. 820 ft boom. WP 75&76 for straight across points

e.2. Sweetheard Creek – Exclusion (backup)

Deploy boom across inner entrance to Sweetheart Creek to protect creek .

f. Divert & Collect – Mill Creek

Deploy open chevron boom configuration outside of Mill Creek to divert oil to sandy areas on adjacent shorelines for recovery while allowing vessel traffic to access Mill Creek. Specific configuration (which leg is longer) depends upon the wind and tide conditions. 820 ft boom.

Deeper water on west side of bank.

Other Considerations:

Vessel traffic.

Survey Notes

Mass DEP, CI GRP, #14 West Bay/North Bay/Cotuit Bay (formerly #10)

10/09/07 09:30

Elise DeCola, Nuka Research
Tim Robertston, Nuka Research
Eric Shufelt, Barnstable Natural Resources
Mike Whiteside, MassDEP

Survey platform: Barnstable Harbormaster vessel

Conditions: overcast, 9 mi. visibility, wind NE 8-10kts gusting to 20, flood tide (1.7 ft at start of survey; 12:07pm high)

Notes:

Cotuit, North and West Bays comprise a large, interconnected system. There are two openings to Nantucket Sound – one through Cotuit Bay at the southwest and one through West Bay at the southeast. Cotuit Bay and West Bay communicate through the SEapuit River. Cotuit Bay connects to North Bay at its northeast through a fairly wide inlet. West Bay connects to North Bay at its north through a smaller channel to the east of Little Island. There are three marinas located at the narrow area between West and North Bay, with fairly large vessels and bulk fuel storage (Crosby Yacht Yard, Nautica Marina, and Oyster Harbor Marine). While the survey team determined that it was not appropriate to write a GRP centered on containment of a marina-source spill, they noted the importance of containing a spill at its source to minimize the amount of oil that could spread to impact other parts of the system. Most of the North Bay strategies would be most likely implemented in the case of a spill from one of the marinas. The strategies for areas closer to the entrances to Cotuit and West Bays are based more on the risk of a spill from Nantucket Sound entering the system. Because the three waterbodies are interconnected and the potential for impacts so highly dependent upon the conditions on-scene, they have all been included in one GRP. In most spill scenarios, only parts of this GRP would be implemented. Tactics focus on North Bay and West Bay because geomorphology in these areas is appropriate for exclusion tactics. In Cotuit Bay, the survey team noted that the higher flow velocities and coastal features would make it more difficult to exclude oil. However, there are several shoreline areas with good beach access that may make logical recovery points, depending on trajectory.

Prevailing circulation in Nantucket Sound is west to east. The prevailing winds are SW in summer and NE-NW in winter. Circulation patterns within the three bays vary based upon tidal flow.

Strategy:

The strategy for the three bays depends upon the source and movement of oil. Most of the tactics focus on closing off small inlets and reducing the potential for oil to flow from

one bay to another. The survey team determined that the current in the Cotuit Bay cut and the West Bay channel would preclude safe or effective boom deployment. The priority of response strategies will depend upon the source and trajectory of the oil. GRP tactics were identified for areas within the three bays where the survey team believed the highest potential for oil impacts existed. Many of the tactics here could be applied to other areas of the three bay system if needed.

Staging and Access:

There are boat yards and marinas at Little Island/West Bay that may be used for staging. There is a marina with a boat ramp at Princes Cove on North Bay. There is a small boat ramp and parking lot on Cotuit Bay. There is also a small boat ramp at the Bay St. landing.

Tactics:

a. Divert and Collect Seapuit River

Deploy boom across the Seapuit River at an angle to the current to divert oil to a collection area. The angle of the boom should be based on the predominant flow. The purpose of this tactic is to prevent oil from entering the river from either side. In the event that oil does enter the river, geotextile materials may be used to line the beach area to protect shorebirds from oil impacts. If possible, oil should be diverted to Grand Island bank because there is no road access to Dead Neck. Approximately 600 ft of boom needed, depending on angle. Consider using a hook in the recovery end of the boom on the West Bay to minimize shoreline oiling, as most of the shoreline on this end of the Seapuit is marsh. The collection area on the Cotuit Bay side is a sandy beach.

b. Exclusion – Eel River

Deploy boom across the Eel River at an angle to the current to prevent oil from entering this system. There is minimal current here. 500-600 feet of boom will be needed depending upon the angle. (WP 31 = middle of the channel). Stage out of West Bay boatyard/marinas.

c. Exclusion – Dupont/Hendricks Cove

Deploy a chevron configuration (WP 32 = apex) to prevent oil from entering this cove. This tactic should only be deployed if there is a realistic risk of oil impacting the cove, which would probably require a southeast wind. Approximately 400 feet of boom would be required.

d. Exclusion with Passive Recovery – St. Mary's/West Bay

Deploy a chevron boom with the apex anchored at the mooring buoy (WP #30). Anchor to the rocky shoreline to the north and to the sandy beach to the south. Set up passive recovery on the sandy beach. Approximately 1000 feet of boom is required to close off this entrance.

e. Exclusion with Passive Recovery – North Bay/Dam Pond

Deploy a chevron (WP 26/27 = apex) to exclude oil from dam pond. Legs of chevron will be uneven, with longer leg approximately 400 ft and shorter leg approximately 250 feet (650 feet total). Adjust the angle according to the oil trajectory. Note that there are town moorings in the vicinity that may be used to set boom anchors – contact the harbor department. Use passive recovery at shoreline anchor points.

f. Exclusion with Passive Recovery – Marston Mills River

Deploy a chevron (WP 25 = apex) outside the entrance of the Marston Mills River. Anchor in the center of the channel and on either side. Approximately 500 feet of boom will be required (200 ft short leg, 300ft long leg). If possible, use a hook in the end of the boom to pool oil for passive recovery. Stage out of Prince Cove or one of the West Bay boatyards, depending upon where the spilled oil is. Note that there is seasonal boat

traffic in and out of Prince Cove, therefore boaters should be advised of the boom, and it should be lighted at night.

g. On-water free-oil recovery – Cotuit and West Bays

If conditions permit, use on-water free-oil recovery to collect oil floating on the surface in Nantucket Sound and in West and Cotuit Bay. Free-oil recovery should only be attempted by experienced responders. Effective recovery of oil from surface slicks can reduce shoreline impacts.

h. Shoreline recovery – Cotuit Bay

Pockets of oil may be recovered from the shoreline of Cotuit Bay. Location of shoreline oiling will likely depend upon prevailing winds and tide. There are several beach areas where shoreline recovery or passive recovery may be used to encounter oil.

Other considerations:

Survey Notes

Mass DEP, CI GRP, #15 Popponesset Bay (formerly #13)

11/28/07 09:30

Elise DeCola, Nuka Research
Perry Ellis, Mashpee Harbormaster
Rich Packard, MassDEP
Mike Popovich, USCG

Survey platform: Mashpee Harbormaster Dept. vessel

Conditions: clear skies, 10+ mi. visibility, wind NW 15-20kts, low tide

Notes:

Popponessett Bay is a small embayment in Mashpee and Barnstable that opens to Nantucket Sound. It contains shellfish areas, aquaculture grants, barrier beach, salt marsh, numerous bird species, and high recreational use. There is fuel storage at the town landing and at New Seabury Marina. Popponesset Beach is a barrier beach system at the opening to Popponesset Bay which continues to migrate and change. Areas of the beach may overwash during winter storms. Currently, the entrance channel consists of multiple shoals that may shift, with a significant flood delta. The flow comes in along the northeast bank and most of it splits off toward the northwest (Popponesset Island) side. Tidal flow in and out of Popponesset creek is actually through the opening at the north. Tidal currents into the mouth of the bay run normally around 3 knots, but may be as high as 4 or 4.5 knots at peak flow. The strong currents combined with the multiple shoal areas make the entrance to Popponesset a particularly challenging place to deploy oil spill protection equipment.

There are road crossings on the Mashpee River (Rt 28) and Shoestring Bay (Quanaquissett Road) that have the potential for road-source spills to enter the bay through either of these smaller inlets.

Strategy:

The strategy for Popponesset focuses first on preventing an oil spill in Nantucket Sound from entering the system, recognizing that it may be extremely difficult to work directly in the entrance channel. Secondary strategies have been developed to close off various rivers and smaller embayments within the system, in the event of either a local spill from a refueling point or vessel accident, or from an outside spill that migrates into the bay, to reduce the areas impacted.

Staging and Access:

Town landing or New Seabury marina both provide potential staging and boat launching points. During the summer months, there is high recreational use at both places.

Tactics:

FO-S-01. On-water free-oil recovery – Popponeset Bay and Nantucket Sound

If conditions permit, use on-water free-oil recovery to collect oil floating on the surface in Nantucket Sound and in Popponeset Bay. Free-oil recovery should only be attempted by experienced responders. Effective recovery of oil from surface slicks can reduce shoreline impacts.

DF-02. Deflection away from entrance

If oil is migrating toward Popponeset Bay from a source to the west/southwest in Nantucket sound, attempt to deploy a boom array to deflect oil back out into Nantucket Sound to keep it out of the bay. Use a cascading boom array that begins in the channel, with the shoreside leg anchored on Popponeset Beach. Note that deployment may be possible only at high tide, due to extremely shallow water depths and shoaling. This tactic should only be attempted when conditions on Nantucket Sound are calm enough for safe boom deployment. Use 1000 to 1500 feet of boom in 200-300 foot segments.

PR-03. Exclusion with Passive Recovery – Meadow Point marsh areas

Deploy boom along the marsh area on the Meadow Point side of the channel opening to protect this area from oiling. Passive Recovery materials may also be placed here and tended on each tide. At least 1200 feet of boom will be required to line the entire area.

DV-04a Divert and Collect – inside entrance channel

If it is safe and feasible to operate along the inside of Popponeset Beach, take advantage of the cove area closest to the entrance channel and attempt to catch oil on the incoming tide and divert it to that beach for collection before it travels further into the Bay. Approximately 600 to 800 feet of boom would be used, depending upon the angle to the current. Collection point on Popponeset Beach could only be accessed by 4WD vehicles.

DV-04b. Divert and Collect – Popponeset Island south end (Popponeset Creek entrance)

Deploy boom at an angle across the small channel between Popponeset Island and Popponeset Beach. Oil will be diverted to sandy beach on inside of Popponesett barrier beach. This tactic will work well under prevailing summer conditions on an incoming tide, when the southwest winds and the tidal flow both push oil in this direction. The boom is far enough into the Creek to avoid the highest current. Approximately 500 to 600 feet of boom will be required. A 4WD vehicle will be required to drive over sand to get to the recovery point.

EX-05a. Exclusion – New Seabury Marina

Three boom legs may be used to effectively seal off New SEabury Marina in the event that a spill occurs from the fuel tanks or refueling activities. Deploy one leg from the end of Popponeset Island toward the opposite shoreline (approximately 800 ft). Deploy the other 2 legs go block off Popponeset Creek and the small area of canals to the west (600 feet for each). Total boom required = 2000 feet to close of all 3 areas.

EX-05b. Exclusion with Passive Recovery – Ockway Bay

To prevent oil from entering Ockway Bay, deploy a chevron (apex = WP05) extending from Daniels Island to a center point in the channel, to Goosefield Island. Note that Goosefield Island is a great blue heron rookery. The shoreline in this area of the bay is predominantly marsh, so

collection will be difficult. Passive recovery may be used along the marsh shoreline. 600 feet of boom for each leg – 1200 ft total.

EX-05c. Mashpee River/Shoestring Bay exclusion

The Mashpee River and Shoestring Bay can both be closed off from the rest of the Bay with a single length of boom across the opening between Goosefield Island and Ryefield Point. This tactic would be used if the oil spill were traveling toward these areas from elsewhere in the Bay, or from a large spill outside the Bay. 500 to 600 feet of boom is required.

EX-05d. Mashpee River exclusion

This tactic is intended specifically for a spill that enters the Mashpee River from the Rte 28 crossing. Deploy boom straight across the river as close to the spill source as possible to prevent it from migrating into Popponneset Bay. 200-400 feet of boom is sufficient to cross the river at most points upriver. A back-up boom could be used as well. (ebb tide)

EX-05e. Exclusion – Shoestring Bay (Santuit River)

Deploy a length of boom across Shoestring Bay at the first point where it narrows, to prevent a spill upriver from reaching Popponneset Bay. 200 to 400 feet of boom will close off the River. (ebb tide)

EX-05f. Exclusion – Pinguickset Cove

Deploy a length of boom across the opening to Pinguickset Cove to protect the marsh areas back in the cove from a spill in Popponneset Bay (flood tide). 300 feet of boom is required.

Other considerations: Be sure that boat operators have good local knowledge due to shallow water depths and shoaling in certain areas.

Survey Notes

Mass DEP, CI GRP, #16 Waquoit Bay (formerly #12)

10/10/07 12:30

Elise DeCola, Nuka Research
Tim Robertston, Nuka Research
Rick York, Mashpee Shellfish Warden
Sanjoy Paul, Mashpee Shellfish Dept.
Andy Jones, MassDEP
John Joe Dec, USCG

Survey platform: Mashpee Shellfish Dept. vessel

Conditions: overcast, light rain, 4 mi. visibility, wind E 2-5kts, high tide beginning to ebb

Notes:

Waquoit Bay is a National Estuarine Research Reserve and an Area of Critical Environmental Concern. It contains shellfish areas, barrier beach, salt marsh, numerous bird species, and high recreational use. There are anadromous and catadromous fish runs in the Moonakis and Quashnet Rivers. There is fuel storage at Edward's Boat Yard on the Child's River, and there is an underground storage tank at the marina at Little River. Waquoit Bay communicates with Eel Pond, and each opens to Nantucket Sound. The barrier beach system that runs along Washburn Island provides nesting for several threatened and endangered bird species. The marshes associated with Hamblin, Jehu, and Sage Lot Ponds have all been identified as important protection priorities because of avian habitat and eelgrass beds which provide juvenile habitat for finfish and shellfish.

Tidal currents are moderate at the entrances to both Eel River (Eel Pond) and Waquoit Bay, averaging 2-3 knots and running as high as 5 knots at peak flow.

Strategy:

The strategy for Waquoit Bay, Eel River and the associated ponds and estuaries focuses first on preventing an oil spill in Nantucket Sound from entering either system, by working at the two entrance channels. Because conditions may preclude response in these locations, particularly during peak tidal flow, the strategy also includes areas where some of the most sensitive ponds and estuaries can be closed off from the main circulation to prevent oil from entering these areas. Because this entire system is so sensitive and such a high protection priority, if oil does enter Waquoit Bay or Eel River, on-water free-oil recovery will be an important tool to minimize shoreline impacts.

Staging and Access:

Little River marina (? On name) WP 40 has a small parking area and dock where the Mashpee Shellfish Constable field office is located. It is adjacent to a larger commercial boat yard, and would probably be the best staging area for most of the WAquoit Bay

tactics. There are several small boat ramps and docks on the Eel River that might be a better option for tactics in that side of the system.

Tactics:

FO-S-01. On-water free-oil recovery – Waquoit Bay and Nantucket Sound

If conditions permit, use on-water free-oil recovery to collect oil floating on the surface in Nantucket Sound and in Waquoit Bay. Free-oil recovery should only be attempted by experienced responders. Effective recovery of oil from surface slicks can reduce shoreline impacts.

DV-02a. Divert and Collect – entrance channel to Waquoit Bay

Deploy boom at an angle across the entrance channel to divert it to sandy beach areas for recovery. Boom may be deployed in one or both of the locations show, based on conditions. If conditions at the mouth of the entrance are too rough for equipment deployment, this same approach may be carried out further into the entrance, with the goal of intercepting the oil as close to the entrance channel as possible. There is 4WD vehicle access all the way to the jetty on the Dead Neck side of the entrance.

a.1. This strategy uses a length of boom across the channel from one jetty to the other at a steep enough angle to handle the current, to put the oil onto the beach area near the jetty on the Dead Neck side. Conditions must be calm enough for boom deployment based on the available equipment. Approximately 500 feet of boom would be required for this tactic (jetty anchor points are WP 46 & 49). Collection point is WP 47.

a.2 (alt). A second set of boom may be deployed at a slightly different angle to divert oil to the sandy beach area to the western side of the channel, further in. The area where a.2. is located has quieter water than a.1. and may be feasible in more conditions. If a.2 is deployed, it is recommended to use two lengths of boom, one in front of the other, for redundancy to catch as much oil as possible. The first boom would be much longer, approximately 550 feet long, with the back boom 100-200 feet. WP 50 = shoreline anchor for primary boom; WP 51 = backup boom. Collection Points on Washburn Island.

DV-02b. Divert and Collect – Menuahant/Eel River entrance

Deploy boom just inside of the entrance to Eel River at a fairly steep angle to divert to the Menuahant shoreline for recovery. There is a rock wall and a parking area immediately adjacent to the collection point (WP 56), which will make shoreside recovery more feasible. Anchor the other end of boom inside of the spit (WP 54). Approximately 500 feet of boom is required for this tactic.

DV-02c. Divert and Collect – Sage Lot Pond

Deploy boom at an angle straight across the opening to Sage Lot Pond. This is a relatively small opening and should be easy to close off. Set up a collection area at the northeast bank (WP 45). Approximately 600 feet of boom required. At an extreme high tide, this strategy could be deployed from a shallow draft boat, otherwise it could be deployed by shore-based responders in waders since water depths are extremely shallow.

DV-02d. Divert and Collect with passive recovery – Hamblin and Jehu Pond entrance

This tactic works outside of the common entrance to Hamblin and Jehu Ponds to keep oil from entering either system, while allowing for shoreside and passive recovery. Deploy boom in a chevron (Apex = WP 44) with collection points on either side of the chevron (WP 42 & 43). Collection point on Seconsett Island (WP 42) can be accessed at the end of Seconsett Point Road. Collection point on south side (WP 43) is bordered by a rock wall and could be accessed by dirt road using a 4WD vehicle. At this collection point, a hook could be placed in the shore end of the boom and sausage boom placed in the J-shaped hook for passive collection and to

minimize oiling of the shoreline. This strategy requires approximately 1200-1400 feet of boom, and should only be attempted by responders and vessels capable of deploying this much boom.

EX-03a. Exclusion – Moonakis River

Deploy a length of boom across the opening to the Moonakiss River to exclude oil. This area is extremely shallow and may require responders in waders, except at high tide when a boat may be able to navigate just in front of the marsh area. (WP 58 = anchor point on one side of the mouth). Approximately 200 feet of boom is required for this tactic.

EX-03b. Exclusion – Child's River

Route 28 crosses the Child's River, creating the potential for a spill from a truck rollover or similar incident along the highway. There is also a boat yard (Edward's) with fuel storage on the Child's River. In the case of a spill from either source, it is possible to boom straight across the river at whatever point would maximize the amount of oil contained, to prevent it from traveling either into Eel River or further up Child's River. Depending upon the location and the angle of the boom, 200-400 feet is required to span the river.

CV-04. Culvert Blocking – Hamblin Pond

There is a culvert that connects Hamblin Pond with Waquoit Bay (WP 59), which could be blocked off to prevent a spill from traveling into Hamblin Pond from Waquoit, or vice-versa (although the spill risk in Hamblin Pond is rather low due to low water depths restricting vessel size).

Other considerations: Be sure that boat operators have good local knowledge due to shallow water depths and shoaling in certain areas.

Is a pdf Survey Notes

Mass DEP, CI GRP, #17 Woods Hole Harbor (formerly site #16)

3/12/08 0800 Hr.

Elise DeCola, Nuka Research
Greg Gifford, Steamship Authority
LT Keith Hanley, USCG
Gregg Fraser, Falmouth Harbormaster
Dan Crafton, MassDEP
Andy Jones, Mass DEP
Dave Kosewski, NOAA NMFS
Ernie Charette, Woods Hole Oceanographic Institute
Rich Cutler, Marine Biological Laboratory

Survey platform: USCG 41' Patrol Boat

Conditions: overcast, intermittent rain, wind 6-10 kts WSW, gusting to 16kts, tide flood

Notes:

Woods Hole Harbor is unique among the Cape and Islands GRP sites for a number of reasons. Three major waterbodies come together in the vicinity of Woods Hole harbor – Vineyard Sound, Nantucket Sound, and Buzzards Bay. The circulation patterns and tidal flow create an extremely dynamic and challenging operating environment, with numerous small sub-currents, eddies, and convergence areas. The current floods to the east and ebbs to the west. Standing waves may form as the tide builds and changes, and tidal currents may be as much as 7 knots. The prevailing winds are SW in summer and NE-NW in winter. The harbor experiences a rather low tidal range (~2 feet).

Woods Hole Harbor experiences a high level of vessel traffic, both commercial and recreational. The Steamship Authority operates a ferry terminal in the harbor that is active year-round. The oceanographic institutes also have research vessels docking there throughout the year. The Coast Guard Station also has several patrol boats that are resident at the Coast Guard docks. Recreational boating is extremely busy during the summer months, and there is a large mooring field within the harbor as well. The large harbor is a mix of residential and commercial waterfronts. Most of the inner harbor area is bulkheaded, with some sandy areas mixed in. There are several marsh areas within the harbor, and sensitive species include finfish, shellfish, and sea birds. There is a large population of gray seals that haul out on the rocky areas of the harbor.

There are two oceanographic institutes (Woods Hole Oceanographic Institute – WHOI – and Marine Biological Laboratory – MBL) and a NOAA research facility/aquarium located in the heart of Woods Hole harbor. All three facilities intake large volumes of seawater from the harbor continuously, with higher usage rates in summer months. If the water intakes of any of these facilities were to be contaminated during an oil spill, the

impacts would be devastating and would be nearly impossible to quantify or to undo. Researchers at MBL and WHOI have numerous ongoing studies that could be interrupted or ruined by a contamination incident. Many of these projects have broader reaching human health, disease control, and social welfare implications. Therefore, it is critical that the Woods Hole GRP emphasize the presence of these unique and irreplaceable resources and the need for quick and effective mitigation to prevent contamination of water intakes.

Spill risks include vessel traffic and refueling. The Steamship Authority vessels refuel from trucks but WHOI and MBL both have storage of marine diesel. The MBL storage tanks are on the Eel Pond side.

Strategy:

Because of the extremely challenging and dynamic operating environment in Woods Hole Harbor, this strategy focuses on opportunities to divert oil to shoreline areas for shoreside recovery. An important component of this strategy is the notification of the oceanographic institutes and NOAA so that they may protect their water intakes from potential contamination.

Staging and Access:

The Steamship Authority terminal has dock space and parking areas that may be available for staging a response. The Coast Guard station also has dock space and a boat ramp that could be used for staging. MBL, WHOI, and NOAA also have boat slips, dock space, and boat launching capabilities. The Steamship Authority has several small boats available year round to support a response. The steamship authority and the oceanographic institutes have some spill response equipment available as well.

Tactics:

EX-01. Exclude oil from area around water intakes for MBL, WHOI and NOAA Notify each institution of the release immediately (see Notification list).

- a. Woods Hole. Deploy exclusion boom around the entire Woods Hole dock area, since the water intake is located under the dock approximately 11 feet below the surface and is not accessible from the water.
- b. Marine Biological Laboratory. Deploy exclusion boom around the seawater intake for the MBL facility (this facility uses the highest volume of seawater). The intake is located at the end of a short pier approximately 20-25 feet below the surface.
- c. NOAA NMFS facility. Deploy exclusion boom around the seawater intake for the NMFS facility.

EX-02. Exclusion – Eel Pond

Position boom across the narrow channel at the entrance to Eel Pond at a shallow angle. Deploy two sets of boom for redundancy. There are numerous pilings that could be used to tie off boom array. Note that there are plans to replace the bridge at this location. When the new bridge is constructed, permanent boom anchors may be installed.

CB-03. Culvert Blocking - Eel Pond

There are two culverts that lead from Eel Pond into marsh or pond systems. These should be closed off in the event that a spill occurs in or migrates into Eel Pond.

- a. Mill Pond – close off using culvert plug or plywood. Accessible from the road.
- b. Marsh – close off culvert flowing to marsh area. Use sandbags or gravel, as the culvert does not have a standard opening. Accessible from the road.

DV-04. Divert and Collect – Great Harbor

Use an angled cascade of boom to catch migrating oil and divert it to shoreline areas for recovery. Boom angle will depend upon tidal stage, and boom arrays will need to be tended on each tidal cycle. Several potential recovery areas have been identified, but consider on-scene conditions and oil trajectory when implementing. There is road access for most collection areas.

- a. NOAA boat ramp/Yacht Club. There is a small sandy beach area near the boat ramp that could be used for shoreline recovery.
- b. WHOI
- c. Between ferry terminal and Eel Pond channel
- d. Steamship Authority ferry terminal – Slips 1 and 3 would be best recovery areas. Good parking lot access.
- e. Near Steamship Authority – small sandy patch adjacent to restaurant.
- f. Parker Flats

DV-07 Divert and Collect – Juniper Point/Little Harbor

Use an angled cascade of boom to catch migrating oil and divert it to shoreline areas for recovery. Boom angle will depend upon tidal stage, and boom arrays will need to be tended on each tidal cycle. Most likely to catch oil on the ebb tide as it flows back toward the West. Several potential recovery areas have been identified, but consider on-scene conditions and oil trajectory when implementing. Most of the shoreline is rocky; focus on sandy patches for recovery if possible. There is some dirt road access for collection areas, small road. Boat ramp at the Coast Guard station.

DF – 05. Deflect – Great Harbor

If diverting oil to collection areas is not feasible, it may be possible to deploy angled boom arrays to deflect migrating oil away from the shoreline and into the major circulation flow. Deploy boom from the end of piers and jetties at an appropriate angle. This tactic would most likely be used on a flood tide when overall circulation is moving oil from west to east and into the Sound. Only experienced responders familiar with Great Harbor should attempt to deploy deflection boom.

EX-06 – Exclusion Penzance Point

Deploy exclusion boom around marsh areas on Penzance Point. There is some road access, although few places where a vehicle could get all the way to the shoreline. Recovery would probably require hoses. Also mostly private property and homes along the shoreline. Several docks but all are private.

A – larger marsh system

B – other marsh system

FO-06. Free-oil Recovery

Free-oil recovery should be used to collect oil in Woods Hole Harbor only if conditions are safe and spill responders are familiar with local currents and water circulation. The goal of free-oil recovery is to prevent oil from reaching shoreline points. Floating oil may collect in eddies and areas of still water within Woods Hole harbor.

Other Considerations:

Coordinate with U.S. Coast Guard and Steamship Authority regarding the need to restrict vessel traffic in the area.

Survey Notes

Mass DEP, CI GRP, #18 Lake Tashmoo (formerly #23)

11/2/07 09:30

Elise DeCola, Nuka Research
Rich Packard, MassDEP
Steve Lehmann, NOAA
John Crocker, Tisbury Assistant Harbormaster

Survey platform: Harbormaster vehicle (surveyed from land)

Conditions: sunny skies, 10+ mile visibility, winds 20 kts gusting to 30. Tide ebbing (1.6 ft high at 06:23)

Notes:

Lake Tashmoo is tidal inlet on the north side of Martha's Vineyard, with a small channel opening to Vineyard Sound. The site can be accessed by land over small, unpaved roads to either side of the inlet, although these roads are privately owned. The entrance is reinforced with rip-rap and could be closed off if conditions permit. Shoreside recovery is possible but will require accessing private property in some locations. This strategy requires a trajectory from the Northwest, which makes it more likely that this strategy would be implemented during the winter months when the prevailing winds are NW, as opposed to summer when prevailing winds are SW.

Strategy:

The purpose of this strategy is to divert and collect oil either outside of the opening to Lake Tashmoo or as it first enters the system, to minimize the amount of oil that makes it back into the inlet.

Staging and Access:

Vineyardhaven Harbor would be closest marine staging area. Note that conditions must be calm enough and response vessels must be capable of operating in the open waters of Vineyard Sound. Some tactics may be implemented from land by accessing either side of the inlet from the road.

Tactics:

FO-S-01. On-water free-oil recovery – Vineyard Sound

If conditions permit, use on-water free-oil recovery to collect oil floating on the surface in Vineyard Sound to prevent it from entering Lake Tashmoo. Free-oil recovery should only be attempted by experienced responders.

DV-02 Divert and Collect outside Lake Tashmoo entrance channel

If conditions are safe for vessel operations and boom deployment in Vineyard Sound, position boom in a chevron outside of the entrance to Lake Tashmoo. (Note: boom

lengths are estimated as strategy was developed from shore). Approximately 2000 feet of boom would be required to deploy the chevron far enough out to avoid the current in the center of the channel. Two 1,000-foot legs could be anchored to the sandy shoreline on either side of the opening, with the apex anchored a few hundred feet offshore in the entrance channel.

DV-02b. Divert and Collect inside the entrance channel

If tactic a is not feasible or not successful, or as a backup to tactic a, boom could be deployed inside the entrance channel in one of two configurations, depending upon wind and tide.

b.1. Chevron

Position a chevron with the shoreline anchors on the points of land inside of the entrance channel and the apex in the channel. Collection points can be on either or both sides of the chevron depending upon the wind and shoreline access.

Approximately 1200 feet of boom total would be required, in two 600-foot legs.

b.2. Angled diversion boom

A single length of boom could be angled across the channel to divert oil to one side or the other for recovery. Select angle based on wind, tide and currents.

Approximately 800-1000 feet of boom will be required depending upon the angle.

Survey Notes

Mass DEP, CI GRP, #19 Vineyard Haven Harbor/Lagoon Pond (formerly #24)

11/2/07 08:30

Elise DeCola, Nuka Research
Rich Packard, MassDEP
Steve Lehmann, NOAA
John Crocker, Tisbury Assistant Harbormaster

Survey platform: Harbormaster vehicle (surveyed from land)

Conditions: sunny skies, 10+ mile visibility, winds 20 kts gusting to 30. Tide ebbing (1.6 ft high at 06:23)

Notes:

Vineyard Haven Harbor is an active, commercial port with a ferry dock, marinas, a high level of vessel traffic and bulk fuel storage. Lagoon Pond connects to Vineyard Haven Harbor through a small channel underneath a road bridge. Currents can run through the channel at 5-6 knots at peak flow. Lagoon Pond supports shellfishing, including the main Martha's Vineyard scallop fishery as well as quahogs, and is a high recreational use area in the summer. The shoreline is predominantly fringing marsh. There is a herring run at the end of Lagoon Pond, however the fresh water is at a higher elevation so there is a directional flow toward Lagoon Pond. There is a lobster hatchery on the Oak Bluffs side of Lagoon Pond, although it is not in active use. There is an active hatchery further up the Pond that is still in operation.

Strategy:

This strategy focuses on opportunities to prevent a spill in Vineyard Haven Harbor from impacting Lagoon Pond. It also identifies areas in Vineyard Haven Harbor and Lagoon Pond where collection and recovery may be conducted. If a spill occurs locally, either from a vessel or from the bulk fuel facility, containment at the source is the first, most important action to limit adverse impacts.

Staging and Access:

Vineyardhaven Harbor has parking and a dock. There is a large commercial ferry dock and a smaller dock at the harbormaster's and at the Black Dog. There are no boat ramps in Lagoon Pond, so vessels must be launched in Vineyard Haven Harbor.

Tactics:

FO-S-01. On-water free-oil recovery – Vineyard Haven Harbor

If conditions permit, use on-water free-oil recovery to collect oil floating on the surface in Vineyard Haven Harbor. Free-oil recovery should only be attempted by experienced responders. Effective recovery of oil from surface slicks can reduce shoreline impacts.

DV-02a. Divert and Collect – Lagoon Pond entrance channel

- a.1. Vineyard Haven Harbor side - If conditions are appropriate for boom deployment, deploy a closed chevron in front of the Lagoon Pond entrance channel, on the Vineyardhaven Harbor side of the bridge. Work outside of the primary tidal current. There is a sandy beach area on the northeast side of the chevron that could be easily accessed from the road for recovery. The shoreline on the southwest side of the boom is riprap and seawall for much of its extent, with a small sandy patch that could be targeted as a collection point.
- a.2. Inside Lagoon Pond – If a.1. is not feasible, or as a backup to a.1, boom could be deployed on the Lagoon Pond side of the bridge to catch any oil as it comes under the bridge and into Lagoon Pond. Use the #2 day marker (WP 120) as apex of this boom, with approximately 700-800 feet of boom on each leg. A collection area will be formed at the apex of the boom, in the vicinity of the day marker, and an on-water recovery system will be needed to remove pooled oil.

EX-03. Marina exclusion

In the case of a spill at the small marina on the Cedar Neck lobe of Lagoon Pond, deploy 200-300 feet of boom across the opening into the marina to close it off from the rest of the pond. This tactic could also be used to close off the marina in the event that a spill occurs at the Bulk Fuel facility and drains through the storm drains into Lagoon Pond.

Hatchery Notification and Monitoring

In the case of a spill that impacts Lagoon Pond, notify the hatchery and direct them to shut down water intakes and initiate water sampling and testing near the intakes.

Survey Notes

Mass DEP, CI GRP, #20 Sengekontacket Pond (formerly #21)

11/1/07 1200 Hr.

Elise DeCola, Nuka Research
Steve Lehmann, NOAA
Rich Packard, MassDEP
Dave Grunden, Oak Bluffs Shellfish Warden
Dean Bragonier, Nantucket Soundkeeper

Survey platform: Nantucket Soundkeeper vessel

Conditions: sunny, 10+ mile visibility, wind 15-20 kts WSW, gusting to 25kts, tide low

Notes:

Sengekontacket is a large coastal pond separated from Vineyard Sound by a long barrier beach. There are two small channels (Big Bridge and Little Bridge) that connect the Pond to the Sound. The primary water exchange occurs through Big Bridge, with a maximum tidal current of approximately 2 knots. The pond supports shellfish, marshes, and bird species and parts are included in the Joseph Sylvia State Beach Park.

Strategy:

The purpose of this strategy is to close off one or both entrances to Sengekontacket Pond, in the event that a spill occurs in Vineyard Sound or Nantucket Sound and threatens this area. The primary strategy focuses on the larger of the two entrances, at the Big bridge. The bridge height limits vessel access into the pond, so the risk of a spill occurring from a vessel in the pond is relatively low.

Staging and Access:

Vessels would need to be launched from Vineyard Haven Harbor or Oak Bluffs to access the outside. Smaller vessels could be launched in the Pond. There is good road access for shoreline recovery areas.

Tactics:

FO-S-01. On-water free-oil recovery – Vineyard Sound

If conditions permit, use on-water free-oil recovery to collect oil floating on the surface in Vineyard Sound. Free-oil recovery should only be attempted by experienced responders. Effective recovery of oil from surface slicks can reduce shoreline impacts.

DV-02a. Divert and Collect - Big Bridge

- a.1. Outside - Deploy boom in a chevron outside the Big Bridge to divert oil to sandy beach on either side of the bridge, for recovery. Depending upon how close

to the bridge the boom is deployed, anywhere from 800 to 2000 feet of boom may be required. (WP 115= apex of one possible chevron).

a.2. Inside Sengekontacket Pond

If it is not possible to deploy boom outside of Big Bridge, a smaller chevron may be deployed inside the pond opening. However, this will require on-water recovery in the apex of this chevron. Approximately 400-800 feet of boom would be required.

DV-02b. Divert and Collect – Little Bridge

Deploy boom in a chevron outside of the opening at Little Bridge. Approximately 800-900 feet of boom would be required. Collection points on either side of the chevron, with good road access to both.

Other Considerations:

Survey Notes

Mass DEP, CI GRP, #21 Edgartown Harbor/Katama Bay (formerly #22)

11/1/07 0900 Hr.

Elise DeCola, Nuka Research
Steve Lehmann, NOAA
Rich Packard, MassDEP
Dave Grunden, Oak Bluffs Shellfish Warden
Dean Bragonier, Nantucket Soundkeeper

Survey platform: Nantucket Soundkeeper vessel

Conditions: sunny, 10+ mile visibility, wind 15-20 kts WSW, gusting to 25kts, tide ebbing (0.2 ft low @10:30)

Notes:

Edgartown Harbor opens to Vineyard Sound on the Northeast, and connects with Katama Bay along the west side of Chappaquiddick Island. Katama Bay also communicates with Nantucket Sound to the south through a breach that occurred recently along the southeastern side of the bay. The major tidal exchange occurs through the Edgartown Harbor opening. Because the breach is relatively new, it has caused some changes to shoaling in the southern parts of Katama Bay, and has also caused the circulation patterns to shift in a manner that is still not fully documented. The tidal currents in and out of Edgartown Harbor are moderate, 2-3 knots, with the strongest current around the bend at Chappaquiddick Point.

There is shellfishing and aquaculture in the bay, as well as a herring run in the Mattakeset River. There is high recreational use, especially toward Edgartown Harbor. There is a water intake for a hatchery at Chappaquiddick Point.

Strategy:

This strategy focuses on deflecting oil at the Edgartown Harbor entrance and diverting it to collection areas to reduce the amount of shoreline oiling and to keep it from moving further into the harbor and Katama Bay. The strategy also considers opportunities to protect small inlets off of Katama Bay to prevent oil from entering those systems.

Staging and Access:

There is a dock with parking in Edgartown Harbor where the Chappaquiddick ferry lands (see map). If conditions permit, a vessel could access Edgartown Harbor from Vineyard Haven Harbor or Oak Bluffs as well. There is also a dock on Mattakeset Bay.

Tactics:

FO-S-01. On-water free-oil recovery – Edgartown Harbor and Katama Bay

If conditions permit, use on-water free-oil recovery to collect oil floating on the surface in Edgartown Harbor and Katama Bay. Free-oil recovery should only be attempted by experienced responders. Effective recovery of oil from surface slicks can reduce shoreline impacts.

EX-03a. Exclusion with Passive Recovery – Edgartown Harbor waterfront.

To reduce shoreline impacts from a spill once it has entered Edgartown Harbor, deploy exclusion boom along the heavily developed western shoreline and to use passive recovery along the hard boom to collect as much oil as possible.

DV-02a. Divert and Collect – Edgartown Harbor entrance

a.1. Chevron Position boom in a chevron – either open or closed – at the entrance of Edgartown Harbor to divert oil for collection on the sandy shoreline to the southeast. This tactic should only be attempted if the current is not running too fast. Primary collection point and length of longest leg will depend upon trajectory. Each leg would be between 800-1200 feet long.

a.2. A cascaded boom array may be deployed off the point of land to the northwest of the harbor entrance to divert oil to the opposite shoreline, if it is angled to the trajectory and the oil is coming in from the north. Collection at Chappaquidick Point/Sturgeon Flats. 1200-2000 feet of boom may be required, in 200 ft segments.

DV-02b. Divert and Collect – Caleb Pond

Deploy boom in a chevron or straight across the opening to Caleb Pond. The north side recovery area has better access than the south (Snow's Point Side). Approximately 600-800 feet of boom will be required. (WP 113 is apex)

EX-03a. Divert and Collect – Mattakeset Pond

Use a chevron or straight across boom segment to close off Mattakeset Pond if oil trajectory threatens this area, although the risk is rather low. A considerable length of boom – 2000 feet or more – would be required to close off the entire Pond. Note that water depths are extremely shallow in this area which will make vessel deployment difficult.

Other Considerations:

Vessel operations are difficult due to extremely shallow depths at low tide, particularly in Katama Bay. Be sure that vessel operators have local familiarity.

Survey Notes

Mass DEP, CI GRP, #22 Cape Poge Bay (formerly #20)

11/1/07 1000 Hr.

Elise DeCola, Nuka Research
Steve Lehmann, NOAA
Rich Packard, MassDEP
Dave Grunden, Oak Bluffs Shellfish Warden
Dean Bragonier, Nantucket Soundkeeper

Survey platform: Nantucket Soundkeeper vessel

Conditions: sunny, 10+ mile visibility, wind 15-20 kts WSW, gusting to 25kts, tide low

Notes:

Cape Poge Bay is a large, shallow salt pond on the eastern end of the island, connected to outer Edgartown Harbor by a narrow channel. Water depths in the bay are extremely shallow. The bay supports scallops and quahogs, and has both marshes and eel grass beds.

Strategy:

In order for oil to enter Cape Poge Bay through its single opening, it would require a trajectory driving a spill from Vineyard Sound or Edgartown Harbor to the southeast. Since northwesterly winds are more common in the winter than summer, the survey team identified this strategy as most likely during a winter storm event.

Staging and Access:

Edgartown Harbor is closest.

Tactics:

FO-S-01. On-water free-oil recovery – Edgartown Harbor

If conditions permit, use on-water free-oil recovery to collect oil floating on the surface in Edgartown Harbor to prevent it from entering Cape Poge Bay. Free-oil recovery should only be attempted by experienced responders. Effective recovery of oil from surface slicks can reduce shoreline impacts.

DV-02. Deflection

Deflect oil moving toward the entrance from the north and push onto the shoreline area on the opposite side of the entrance. Because the shoreline is high bluffs, shoreside recovery would be difficult along this coastline, but should be attempted if possible. 600 to 1400 feet of boom would be required, deployed in a cascading array of 200 ft segments.

EX-03a. Exclusion – Little Neck

If oil is moving toward the small embayment north of Little Neck, this area could be closed off with approximately 2000-2200 feet of boom deployed straight across the opening.

Other Considerations:

Extremely shallow water depths and serpentine channels make navigation difficult. Rely on local knowledge.

Survey Notes

Mass DEP, CI GRP, #24 Menemsha Pond (formerly #18)

11/2/07 12:30 Hr.

Elise DeCola, Nuka Research
Steve Lehmann, NOAA
Rich Packard, MassDEP
Dennis Jason, Aquinnah Harbormaster Dept.
Bret Stearns, Wampanoag Tribe

Survey platform: Town of Aquinnah/Wampanoag Tribe vessel

Conditions: sunny, 10+ mile visibility, wind 15-20 kts NE, gusting to 25+kts, flood tide (high @13:45)

Notes:

The Menemsha Pond complex borders Chilmark and Aquinnah as well as Wampanoag tribal lands. The Tribe has significant oyster aquaculture in place in the pond, and a large bay scallop restoration program is ongoing, which has led to a major increase in local commercial catches over the last 5 years. The system also supports a herring run. The watershed is important both biologically and culturally.

Menemsha Pond opens to Vineyard Sound through a small channel. Because of the large volume of water in this system and the relatively small opening, tidal currents are extremely high, averaging 3.5 to 4 knots, and approaching 7 knots at maximum flow. A combination of dredging and jetty construction has changed the flow patterns and sediment deposition in Menemsha Creek, causing Edy's island to erode and the tidal flats at the Menemsha Pond end to become more prominent.

Because of the location of Menemsha Pond, it has the potential to be impacted from outside spills in Vineyard Sound or Buzzards Bay, depending upon the conditions. Prevailing winds are SW in summer and NW in winter. There is also bulk fuel storage – gasoline and diesel – at Menemsha harbor, as well as fairly large fishing vessels who may carry up to 3,000 gallons of fuel on board. Menemsha Pond connects to Nashaquitsa pond, which in turn connects to Stonewall Pond. Squibnocket Pond connects to Menemsha Pond through Hern's Creek, although there is an elevation difference between Menemsha and Squibnocket so that the only time water flows from Menemsha to Squibnocket would be at peak high tide. All ponds are of high importance to the local communities and the Tribe. While spill response may be challenging in parts of Menemsha Pond, especially close to the entrance channel where currents are significant, it should be feasible to close off both of the connecting ponds if needed.

Strategy:

One purpose of this strategy to prevent a large oil spill that occurs outside of the Pond Complex from entering the pond, with backup tactics focused on recovering any oil that does enter the pond as close to the entrance as possible, to minimize impacts to the system. The strategy also looks at opportunities to contain and recover oil from a spill within the pond, again focusing on minimizing the spread of oil throughout the system. The strategy also identifies opportunities to isolate the Nashaquitsa Pond and Stonewall Pond.

Staging and Access:

There is a dock with parking at Menemsha marina. There is a Coast Guard station at Gay Head. During the winter months, there may not be many boats in the water to readily respond to a spill.

Tactics:

FO-S-01. On-water free-oil recovery – Vineyard Sound

If conditions permit, use on-water free-oil recovery to collect oil floating on the surface in Vineyard Sound and in Menemsha Pond. Free-oil recovery should only be attempted by experienced responders. Effective recovery of oil from surface slicks can reduce shoreline impacts.

DV-02a. Divert and Collect – Menemsha Pond entrance channel.

Position boom in a chevron at the entrance of Menemsha Pond to divert oil for collection on the sandy shoreline to either side. This tactic should be attempted outside of the strong rip current at the channel entrance. The #1 buoy (WP 123) may be used as an apex for the chevron, if conditions permit. This tactic would require a substantial quantity of boom, approximately 1000 to 1200 feet for each leg. This tactic should only be attempted when conditions in Vineyard Sound are calm enough for boom deployment.

DF-02b. Divert and Collect – Menemsha Creek

Deploy cascaded boom at an angle out from the shoreline north of Edy's Island and in front of the Island to move oil away from the marshy area around Edy's and toward the sandier shoreline on the west side of the creek. Shoreline access on the west side of Menemsha creek is limited to off-road vehicles. The tidal currents can still move at 1.5 to 2 knots through the creek. 1200 to 1500 feet of boom (in 200 ft segments) will be required to span the marshy area. A second leg of boom (800 to 1000 feet long) may be deployed off Long Point to collect oil for recovery on the beach. Use a hook at the end of the Long Point boom segment to collect oil. Total boom required for this tactic may be 2000 to 2500 feet.

DF-03. Deflection – Use a cascaded boom array to intercept oil flowing toward the Menemsha Pond entrance and deflect it past the opening. Length of boom required could vary from 1200-2000 feet or more, in 200 ft segments. It should be deployed at an angle to the incoming oil based on trajectory and on-scene conditions.

EX-04a. Exclusion – Nashaquitsa Pond

Use a chevron with 400-600 feet of boom on each leg to prevent oil from entering Nashaquitsa Pond.

EX-04b. Exclusion – Stonewall Pond

Use a chevron with the apex on the small island in front of the channel, anchored to a piling on the northeast side where there is a pier, and the beach to the southwest. 350-500 feet of boom on each leg.

CV-05. Dam or Berm – Hern's Creek

The small entrance to Squibnocket Pond (Hern's Creek) could be blocked off using a dam or berm placed under the small wooden footbridge that crosses the creek as it enters Menemsha Pond. The risk of oil traveling to Squibnocket is limited to high tide, since the smaller pond is at a higher elevation than Menemsha.

Other Considerations:

Serpentine channel and continuous shoaling in Menemsha Creek and other areas of the Pond. Local boat operators will have best familiarity.

Survey Notes

Mass DEP, CI GRP, #25 Muskeget Island (formerly #29)

NOTE: This site was not physically surveyed due to difficulty accessing by vessel. However, this strategy was developed in discussion with the individuals listed below

Elise DeCola, Nuka Research
Tim Robertson, Nuka Research
Mark McDougal, Nantucket Fire Dept.
Chris Vanderwalk, Madaket Harbormaster
Dave Fronzuto, Nantucket Marine Dept. Director

Survey platform: n/a

Conditions: n/a

Notes:

Muskeget Island is a small, isolated island. The entire island is important because it is the southernmost, and one of the largest gray seal breeding colony in North America, and a halulout area for gray seal and harbor seal. It is primarily sandy shoreline with dynamic shoaling and extreme shallow water depth . The island has changed quite a bit from the existing charts, with a large, fully enclosed lagoon area now located in the southeast quadrant of the island.

Strategy:

Because of the challenging vessel access and shallow water depths, and the distance from Nantucket Island where response equipment is located, it would be unfeasible under most circumstances to deploy boom along shoreline areas. Also, since the primary goal of the strategy is to prevent oil encounters with local seal populations, shoreline protection strategies may not be appropriate. Instead, the primary purpose of this strategy is to bring materials to the island for passive recovery along the high tide line, to prevent opportunities for contamination by seals further upland.

Staging and Access:

The nearest staging area would be Madaket Island. Vessel size and capabilities must be sufficient for the open water conditions in Nantucket Sound, while also having the ability to access shallow areas.

Tactics:

FO-S-01. On-water free-oil recovery

If conditions permit, use on-water free-oil recovery to collect oil floating on the surface before it reaches Muskeget. Free-oil recovery should only be attempted by experienced responders. Effective recovery of oil from surface slicks can reduce shoreline impacts.

PR-MM02. Marine Mammal Passive Recovery

Position natural passive recovery materials (such as sphagnum moss) along the entire shoreline of Muskeget Island at the high tide line to absorb floating oil. Change materials on each tide, if feasible.

Other considerations: The Marine Mammal Protection Act prohibits approaching marine mammals; therefore responders should take care to avoid encounters with seals. All response activities should be conducted in coordination with state and federal marine mammal specialists.

Survey Notes

Mass DEP, CI GRP, #26 Tuckernuck Island (formerly #30)

10/5/07 1000 Hr.

Elise DeCola, Nuka Research
Tim Robertson, Nuka Research
Chris Vanderwalk, Madaket Harbormaster
Mark McDougall, Nantucket Fire Dept.

Survey platform: Madaket Harbormaster vessel

Conditions: overcast, light drizzle, 1 mile visibility with patchy fog, wind 5-10 kts WNW, tide ebbing

Notes:

Tuckernuck is a small island off the western end of Nantucket. The shoreline is predominantly sandy, with frequently shifting bars. The primary resources to be protected are shellfish in the tidal flats. The island has a very small population and few year-round residents.

Strategy:

The strategy focuses on excluding oil from the two major pond systems on the island – East Pond and North Pond. Note that at the time of the survey, the North Pond system had changed quite a bit from the topo map, as had the area around Whale Island, due to shifting shoals and sand bars. Therefore, before this strategy is implemented, it is important to survey the shoreline area for any additional changes in the shoreline that might effect how the tactics are implemented.

Staging and Access:

The nearest staging area would be Madaket Harbor. Vessel size and capabilities must be sufficient for the open water conditions in Nantucket Sound, while also having the ability to access shallow areas.

Tactics:

FO-01 Free-oil Recovery

If possible, conduct free-oil recovery to collect floating oil before it impacts shoreline areas. Note shallow waters and shoals may limit access in some areas.

EX-02a East Pond Exclusion

a.1. Exclusion – East Pond (outside)

Deploy boom in a chevron configuration to exclude from the entrance of East Pond (apex around WP#08, although it's not exact b/c it was low tide when we surveyed). Current at this location ranges from 2-3 knots, so ensure that boom angle is sufficient for the current at the time of deployment. Approximately 1000

feet of boom would be required for each leg of the chevron (2000 total). If sea state is too high or currents are too fast to deploy, tactic a.2 may be used as an alternate.

a.2. Exclusion – East Pond (inside)

If conditions are too rough to work outside East Pond, deploy boom in a chevron configuration inside East Pond. Approximately 600 feet of boom would be required for each leg of the chevron (1200 total).

EX-02b. Exclusion – North Pond

At high tide, it may be possible to deploy a chevron of exclusion boom to close off the opening to the pond adjacent to North Pond (which is newly formed). At low tide, vessel access is not possible. (Note: will need to determine length of boom based on map – couldn't access this area during site survey).

DF-03. Deflection – Whale Island

If oil is traveling toward Tuckernuck from the southwest, on a flood tide, it may be possible to deploy a leg of deflection boom off of the tip of Whale Island (the newly formed spit of land coming off the south shore of Tuckernuck). Note that there are shoal areas all around here, therefore a shallow draft vessel would be required. Approximately 600-800 feet of boom would be required. This tactic should only be attempted if conditions are suitably calm.

Other Considerations:

Survey Notes

Mass DEP, CI GRP, #27 Madaket Harbor (formerly #28)

10/5/07 1000 Hr.

Elise DeCola, Nuka Research
Tim Robertson, Nuka Research
Chris Vanderwalk, Madaket Harbormaster
???, Nantucket Fire Dept.

Survey platform: Madaket Harbormaster vessel

Conditions: overcast, light drizzle, 1 mile visibility with patchy fog, wind 5-10 kts WNW, tide ebbing (1.3 ft low at 13:30).

Notes:

Madaket Harbor is located at the west end of Nantucket Island and, like many other shoreline areas in Nantucket, experiences dynamic sand transport that shifts shoals and sandbars. The busiest dock in Madaket is located in Hither Creek, with sensitive marsh areas adjacent to it on either side. There is a small boat yard at the head of that creek as well. There is shellfishing throughout the harbor and associated creek.

Strategy:

The strategy focuses on protecting sensitive marsh areas by deflecting oil away or diverting to sandy shoreline collection points. This strategy might apply to either a local spill source or to a spill that migrates into the harbor from Nantucket Sound.

Staging and Access:

The nearest staging area would be Madaket Harbor (Hither Creek dock or marina). Some of the tactics could be implemented from the shoreline.

Tactics:

FO-01. Free-oil Recovery

If possible, conduct free-oil recovery to collect floating oil before it impacts shoreline areas. Note shallow waters and shoals may limit access in some areas.

DF-02a. Deflection – Eel Point/Esther Island

- a.1. Ebb Tide - If oil is migrating on an ebb tide, deploy deflection boom out from Eel Point to move the oil away from the harbor. Anchor boom in the vicinity of beach marker #57 (WP 09). Use 600-800 feet of boom in 200' cascaded segments set along the eddy line formed by the tidal current.

a.2. Flood Tide - If oil is migrating on a flood tide, deploy deflection boom out from Esther Island to move the oil away from the harbor. Use 600-800 feet of boom in 200' cascaded segments.

DV-03a. Divert and Collect – inner harbor entrance

a.1 – Position boom at an angle to the current to block off the entrance into the inner harbor. Shoreside recovery on the east bank – will require boat support due to limited road access. 1200-1600 feet of boom depending upon angle.

a.2 –Position approximately 400 feet of boom at an angle from the sandy patch of shoreline across from Jackson Point (WP 04) to divert and collect oil moving with the current to keep it from traveling further up Hither Creek.

EX-04a. Exclusion – Hither Creek

Deploy exclusion boom in a straight line across Hither Creek at the narrow point to close off the marina area. Approximately 150 feet of boom is required (WP at center of line = 01). Current is fairly low in this area.

EX-04b. Exclusion – small creek

Boom off the small creek near the marina using approximately 50 feet of boom. This can be deployed from land by driving to the marina.

CV-05. Culvert blocking – Warren Point

There is a small drainage pipe at Warren Point (WP 06 & 07) that can be accessed by vehicle and closed off.

Other Considerations:

Survey Notes

Mass DEP, CI GRP, #28 Nantucket Harbor (formerly #25)

10/5/07 1300 Hr.

Elise DeCola, Nuka Research
Tim Robertson, Nuka Research
Dave Fronzuto, Director Nantucket Marine Dept.
Mark McDougall, Nantucket Fire Department

Survey platform: Nantucket Harbormaster vessel

Conditions: partly cloudy with patches of fog, 2 mile visibility, wind 10-15 kts WNW, tide low

Notes:

Nantucket Harbor is large natural harbor with most of the major commercial use areas near the harbor entrance, including a bulk fuel storage facility in the boat basin, ferry docks, mooring fields, and marinas. Water depths decrease toward the head of the harbor, so there is less large vessel traffic further up. The harbor supports a bay scallop fishery, with significant reseeding and aquaculture efforts supported by the town. Therefore, it is important to contain any spilled oil as close to the source as possible to prevent impacts further into the bay. Because of the large volume of the entire harbor, the full volume is not exchanged on every tide, which makes the spill risks toward the head of the bay fairly low. This GRP focuses on the areas adjacent to the harbor entrance. A separate GRP exists for Polpis Harbor, further into Nantucket Harbor.

Strategy:

The purpose of this strategy is to prevent a spill from within the harbor or boat basin from spreading further up the bay. This strategy also serves to protect a sensitive marsh area (the Creeks) from a waterborne oil spill. This strategy addresses risks from within the harbor or from vessel traffic in and out of Nantucket Harbor.

Staging and Access:

The town dock provides dock space, with limited parking. Vessel access is required to deploy most of these tactics.

Tactics:

FO-01. Free-oil Recovery

When available, free-oil recovery should be used to collect floating oil from the channel and into the harbor entrance. No booming strategies were identified in this area because typical conditions will exceed safe operating limits for available equipment. However, maximizing free-oil recovery will minimize shoreline impacts.

EX-02a. Exclusion – First Point (calm weather only)

Deploy a long, straight length of boom across the harbor at First Point to exclude oil from traveling further up into the harbor system. (WPs 22 & 23 are anchor points). This tactic would require 2000 to 2200 feet of boom and sufficient anchor sets to hold it in place.

This tactic should only be attempted by vessels and operators capable of managing such a long boom array, and only when conditions are calm enough for boom deployment. This boom array would require tending or lighting, and may require a gate to allow vessel traffic through.

EX-02b. Exclusion – the Creeks

Deploy boom from the yacht club to the road accessible beach area to the east to exclude oil from entering the Creeks system. The Creeks is an extensive marsh system that was recently restored by the town. 1800 to 2000 feet of booms and ??? anchors would be required for this strategy. It could be implemented from land by anchoring to a dock structure or piling at the yacht club (WP 24) and to the shoreline on the eastern point.

EX-02c. Exclusion – Boat Basin

The boat basin is one of the highest risk areas in Nantucket harbor due to the high volume of traffic in an out of here and the bulk fuel storage facility. Because the entrance to the boat basin is fairly small, this entire area could be closed off to keep an oil spill from migrating to other more sensitive parts of the harbor. Exclusion at the entrance to the boat basin (WP 15) would require approximately 100 feet of boom.

EX-02d and PR-03. Exclusion and Passive Recovery - bulkhead

To contain a spill that occurs at the bulkhead area of the Boat Basin, where vessel refueling occurs, hard boom can be deployed from slip 1417 (WP 13) across to slip 1285 (WP 14) , and lined with sausage boom and pads for passive recovery. This tactic has been practiced in the past by the harbormaster department. Approximately 150 feet of boom is required.

Other Considerations:

High volume of vessel traffic in the channel and several mooring fields in the area near the tactics.

Survey Notes

Mass DEP, CI GRP, #29 Polpis Harbor (formerly #27)

10/5/07 1300 Hr.

Elise DeCola, Nuka Research
Tim Robertson, Nuka Research
Dave Fronzuto, Director Nantucket Marine Dept.
Nantucket Fire Department

Survey platform: Nantucket Harbormaster vessel

Conditions: partly cloudy with patches of fog, 2 mile visibility, wind 10-15 kts WNW, tide low

Notes:

Polpis Harbor is located approximately halfway up Nantucket Harbor, opening to the east. It is a fairly shallow harbor with extensive marsh and eel grass beds. Currents are generally moderate and there are several opportunities to close this system off to protect it from an oil spill that occurs toward the mouth of the harbor. Because of the low water depths, larger vessels cannot enter Polpis Harbor, therefore it is unlikely that a spill of any volume would occur within the harbor. There are shellfish beds within Polpis Harbor and significant shellfish and aquaculture in Nantucket Harbor.

A bulkhead has been placed on the southwestern side of the harbor entrance (near the "s" in Polpis on the topo map), and this has changed the sediment deposition so that the spit of land that used to come down from the northwest to the south east has eroded.

Strategy:

The purpose of this strategy is to prevent a spill from further out (toward the harbor entrance) from entering Polpis Harbor, and to recover as much oil as possible before it can contaminate other parts of Nantucket Harbor.

Staging and Access:

The town dock provides dock space, with limited parking. Vessel access is required to deploy all of these tactics. There is no staging area within Polpis Harbor. Vessels used to deploy this strategy must have a relatively shallow draft.

Tactics:

FO-01. Free-oil Recovery

When available, free-oil recovery should be used to collect floating oil from Nantucket Harbor to prevent it from reaching Polpis Harbor.

DV-02a. Divert and collect – Quaise Point

Deploy a chevron boom configuration outside of Quaise Point to divert oil away from the entrance to Polpis Harbor and collect it on shoreline areas (WP 20 = apex of chevron). Typical currents range from 1 to 1.5 knots. Approximately 2300 feet of boom would be required, with the apex off-center and the longer leg approximately 1800 feet; the shorter leg approximately 500 feet. Shoreside recovery may be possible on the southwest shoreline adjacent to the short leg (WP 21), although there is no road access. This tactic is intended for high tide deployment – at low tide much of the boom would be intertidal.

DV-02b. Exclusion and Shoreline Recovery – east and west lobes of Polpis

Deploy boom to exclude oil from entering either lobe of Polpis Harbor. For the northeastern lobe, deploy boom straight across (from WP 18 to WP 17) with a collection point on the beach to the west of WP 17. Approximately 550 feet of boom will be required for this leg of boom. Deploy another leg of boom roughly parallel, from the shoreline area near WP 17, in front of the bulkhead (WP 16) and to the opposite shoreline (WP 19). Approximately 850 feet of boom is required for this leg (total of 1400 feet for this tactic). At low tide, portions of the boom will be intertidal and will require tending. Boom can be lined with sorbents for passive recovery, especially along shoreline anchor points, where a “J” can be used at the end of the boom to pool oil while keeping it from contacting sensitive shorelines.

EX-03. Exclusion – Pocomo Meadow

Deploy approximately 100 feet of boom across the mouth of the small stream leading into Pocomo Meadow.

Other Considerations:

Low water depths, dynamic shoaling, and limited shoreline access will make deployment more difficult.