

Isle Royale Protection Strategies

Site Name: Hay Bay

Site Number: 1

Inland Sensitivity Tile Number: Upper Peninsula of Michigan, Tile 5

Location: South side of the main island; North shore of Siskiwit Bay - Western half. T64N, R37W, Sections 13 and 24. T64N, R36W, Sections 18 and 19.

Land Ownership: Public (National Park Service)

Response Strategy: Diversion (depending upon wind direction and currents)

Description: The shoreline of Hay Bay from head to mouth is characterized by fringing marshes, sheltered low vegetated banks, mixed sand and gravel beaches, and gravel beaches. Game fish (coaster brook trout breeding ground), waterfowl (common loon), raptors (eagles), and large mammals are known to inhabit and frequent Hay Bay. Hay Bay trends West Southwest to East Northeast from head to mouth. The Little Siskiwit River enters Hay Bay at the extreme western end.

Access Points: Access is available by water only either with a shallower draft boat or float plane/rotor aircraft equipped with pontoons. Hay Bay is approximately 24 miles from Park Headquarters on Mott Island by boat. A boat dock is available for landing and staging of equipment (including the adjacent primitive camp sites) on the South Shore of Hay Bay approximately ½ mile from the head of the bay. Water depths within the bay vary from 17 feet at the mouth of the bay, to 11 feet within the middle of the bay, to 3 feet in the nearshore.

Protection Strategy Requirements: Strategy would be to place one or two 200 to 300 foot lengths of boom anchored on shore and in approximately 11 or 12 feet of water to divert oil impacts to the Little Siskiwit River at the head of the bay. Boom may be placed on either the North shore (gravel beach) or South shore (sheltered low vegetated bank) on the eastern side of the natural constriction of the bay depending upon the wind and currents. In addition, water herding techniques may be employed at this location to foster additional movement of oil into the diversion boom. Minimally, a boat with less than 6 feet of draft would be required for the nearshore work, suitable land and water anchors for the finger boom, and if herding is employed – appropriate equipment and personnel for this, as well. **Minimum boom length required for strategy: 200 feet.**

Site Name: Little Siskiwit River

Site Number: 2

Inland Sensitivity Atlas Tile Number: Upper Peninsula of Michigan, Tile 5

Location: Head of Hay Bay; South side of the main island; North shore of Siskiwit Bay - Western half. T64N, R37W, Section 24.

Land Ownership: Public (National Park Service)

Response Strategy: Exclusion

Description: The shoreline at the mouth of the Little Siskiwit River/head of Hay Bay is characterized by sheltered low vegetated banks and fringing marshes with a possible drowned river mouth in times of higher overall levels of Lake Superior. Game fish, wading birds, raptors, and large mammals are known to inhabit and frequent Hay Bay. Hay Bay trends West Southwest to East Northeast from head to mouth. The Little Siskiwit River enters Hay Bay at the extreme western end.

Access Points: Access is available by water only either with a shallower draft boat or float plane/rotor aircraft equipped with pontoons. Hay Bay is approximately 24 miles from Park Headquarters on Mott Island by boat. A boat dock is available for landing and staging of equipment (including the adjacent primitive camp sites) on the South Shore of Hay Bay approximately ½ mile from the head of the bay. Water depths within the bay vary from 17 feet at the mouth of the bay, to 11 feet within the middle of the bay, to 3 feet in the nearshore.

Protection Strategy Requirements: If the river mouth is threatened due to easterly currents and/or winds, then exclusion boom should be anchored on the outside of the apparent fringing wetlands at the mouth of the Little Siskiwit River approximately 200 feet apart and anchored off shore in shallow water (3 – 4 feet in depth) in a chevron. Approximate total boom length required will be 400 feet. A shallow draft boat and appropriate anchors for both shore and water anchoring will be required for boom deployment at this location. **Minimum boom length required for strategy: 400 feet.**

Site Name: Big Siskiwit River

Site Number: 3

Inland Sensitivity Atlas Tile Number: Upper Peninsula of Michigan, Tile 5

Location: South side of the main island at the head of Siskiwit Bay at far western end. T63N, R37W, Section 4

Land Ownership: Public (National Park Service)

Response Strategy: Exclusion

Description: The shoreline at the mouth of the Big Siskiwit River and the surrounding shore of the head of Siskiwit Bay are primarily fringing marshes, sand beaches, and mixed sand and gravel beaches. Game fish, nearshore upland zone vascular plants (including state-listed threatened), aquatic/riparian zone birds (including state-listed threatened), raptors, and large mammals are known to inhabit and frequent this area. The Big Siskiwit River enters Siskiwit Bay from the West.

Access Points: Primary access is available by water only either with a shallower draft boat or float plane/rotor aircraft equipped with pontoons. Siskiwit Camp (adjacent to Big Siskiwit River) is approximately 27 miles from Park Headquarters on Mott Island by boat. A boat dock is available for landing and staging of equipment (including the adjacent primitive camp sites) on the South Shore of Siskiwit Bay due South of Senter Point. This end of the bay is very open with water depths in the 40+ foot range North of Checker Point rising to 15 feet South of Senter Point and in the 3 – 5 foot range near the mouth of the Big Siskiwit River. In addition, the Feldtmann Ridge Trail and Island Mine Trail intersect at the Siskiwit Bay campground. Pedestrian access to the Big Siskiwit River is gained via the Island Mine Trail heading west and east from the dock/campground. This is approximately a ½ mile one-way trip.

Protection Strategy Requirements: In a typical year and season, the mouth of the Big Siskiwit River is approximately 50 feet across. The booming strategy would be to exclude oil impacts directly to the Big Siskiwit River itself and the fringing wetlands. Therefore, booming straight across the mouth with 100 feet of boom would be recommended due to the characteristically low velocity and volume of water leaving the Big Siskiwit River. Affixing boom would require a shallower draft boat and land anchoring. Island Mine Trail can also be utilized for boom maintenance and impact assessment. **Minimum boom length required for strategy: 100 feet.**

Site Name: Chippewa Harbor (Entrance)

Site Number: 4

Inland Sensitivity Atlas Tile Number: Upper Peninsula of Michigan, Tile 6

Location: South side of the main island, East of Siskiwit Bay and West of Rock Harbor. T65N, R34W, Section 17

Land Ownership: Public (National Park Service)

Response Strategy: Exclusion (if time and resources permit)

Description: The East shore of the mouth of Chippewa Harbor is characterized by shelving bedrock shores and the West shore is also shelving bedrock shores at the nearest point to the opposing shore but with gravel beaches south and towards the entrance. State threatened aquatic/riparian zone vascular plants and state and federally threatened aquatic/riparian zone birds are located at the harbor entrance and raptors and large mammals inhabit and frequent the

inner harbor. NPS reports that Chippewa Harbor is an extremely productive fishery, one of two walleye spawning grounds within park boundaries. Chippewa Harbor trends West to East but the harbor mouth itself is North – South.

Access Points: Primary access is available by water by boat. Chippewa Harbor is approximately 8 miles from Park Headquarters on Mott Island by boat. The harbor mouth is approximately 70 feet deep with steep-banked shores allowing larger boats to approach the shore in favorable weather and sea conditions. Pedestrian access is available via the Indian Portage Trail and the Lake Ritchie Trail from Moskey Basin. However, this is approximately an 8 mile one way trip and does not readily allow workable support. Chippewa Harbor primitive campsite is available at the first harbor “choke point” for limited staging.

Protection Strategy Requirements: If it is deemed conditions are favorable (slow moving oil, time to react and protect, and the availability of resources) the mouth of Chippewa Harbor could be boomed off to exclude oil impacts to the inner harbor. Anchoring the boom on the spit of land on the West side of the harbor entrance to the closest point of the East shore would require approximately 900 feet of boom and might allow collection of oil along low sensitivity bedrock shores. Most boats, appropriate to sea state and weather conditions, could be utilized for boom deployment. Anchoring could potentially be in bedrock. Potential seaward anchors due to the length of boom and sea state at the time of deployment, and additional length of boom if currents exceed 1 knot and greater boom angle is required should be anticipated. **Minimum boom length required for strategy: 900 feet.**

Site Name: Chippewa Harbor (Choke Point)

Site Number: 5

Inland Sensitivity Atlas Tile Number: Upper Peninsula of Michigan, Tile 6

Location: South side of the main island, East of Siskiwit Bay and West of Rock Harbor. T65N, R34W, Section 17

Land Ownership: Public (National Park Service)

Response Strategy: Exclusion (from inner harbor), diversion to cove on North shore east of choke point

Description: First choke point located approximately ½ mile in (and west) from harbor entrance. The North and South shores at this point are generally sheltered rocky shores interspersed with short sections of sheltered low vegetated banks. There are also exposed rocks approximately 80 feet off the North shore that could be utilized to anchor boom and to allow for a configuration that encourages diversion to and collection in a small cove east of the choke point. State threatened aquatic/riparian zone vascular plants and state and federally threatened aquatic/riparian zone birds are located at the harbor entrance and raptors and large mammals

inhabit and frequent the inner harbor. NPS reports that Chippewa Harbor is an extremely productive fishery, one of two walleye spawning grounds within park boundaries. Chippewa Harbor trends West to East but the harbor mouth itself is North – South.

Access Points: Primary access is available by water by boat. Chippewa Harbor is approximately 8 miles from Park Headquarters on Mott Island by boat. The water depth on the east side of the choke point is labeled on navigation charts as 47 feet and on the west side as 71 feet. Drop off from the shore and mid-channel rocks appears steep enough to permit larger boats to approach the shore in favorable weather and sea conditions. Pedestrian access is available via the Indian Portage Trail and the Lake Ritchie Trail from Moskey Basin. However, this is approximately an 8 mile one way trip and does not readily allow workable support. Chippewa Harbor primitive campsite is available at the first harbor “choke point” for limited staging.

Protection Strategy Requirements: The first option is that provided in the response strategy for the entrance to Chippewa harbor to exclude the oil from entering at all. If this fall back position is taken is to use this choke point to exclude the oil from encroaching any further into the harbor and diverting the oil into the cove just east of this choke point. Approximately 150 feet of boom should be placed from the South shore to the mid-channel rocks with a general southeast to northwest trend. An additional 100 feet should be anchored from the mid-channel rocks to the North shore with a north-south cant. This configuration, with favorable wind and currents should collect the oil in the small cove. Herding may be an additional appropriate tactic at this location to assist oil collection. Most boats, appropriate to sea state and weather conditions, could be utilized for boom deployment. Anchoring could potentially be in bedrock. If herding is employed – appropriate equipment and personnel should be made available for this, as well. **Minimum boom length required for strategy: 250 feet.**

Site Name: Tobin Harbor (Scoville Point)

Site Number: 6

Inland Sensitivity Atlas Tile Number: Upper Peninsula of Michigan, Tile 2

Location: East end of Tobin Harbor on East end of the main island at entrance, between Scoville Point, Smith Island, and Red Rock Point. T67N, R33W, Section 26

Land Ownership: Public (National Park Service)

Response Strategy: Exclusion

Description: On a line trending south to north: from Scoville Point (shelving bedrock shores and gravel beach in adjacent cove) to Smith Island (sheltered rocky shore) to Red Rock Point (exposed rocky cliffs flanked on either side by gravel beaches). Tobin Harbor contains state threatened aquatic/riparian zone birds and vascular plants, aquatic/riparian zone amphibians and reptiles, state endangered upland zone vascular plants, game fish, raptors, and large mammals.

Specifically these include: coaster brook trout at the West end of the harbor, loon nesting, eagles, and osprey. Summer residents still maintain and inhabit cottages in Tobin Harbor. Tobin Harbor trends southwest to northeast.

Access Points: Primary access is available by boat, by float plane or by foot from Snug Harbor. The entrance to Tobin Harbor is approximately 7 miles from Park Headquarters on Mott Island by boat. A boat dock and float plane dock is available approximately two miles southwest of the entrance in Tobin Harbor and major dockage for larger ships is located approximately 2 mile southwest of the entrance on the other side of the ridge from Tobin Harbor at Snug Harbor. Scoville Point is 2 miles by foot trail from Snug Harbor via the Stoll Trail.

Protection Strategy Requirements: Boom can be anchored at Red Rock Point and stretched to the eastern tip of Smith Island (1,900 feet) and then continued to the northern “finger” of Scoville Point (1,000 feet) for a total of 2,900 feet of required boom. Collection may occur at either end of the boom in the gravel beach cove of Scoville Point or at the northern end in the gravel beach and shelving bedrock shore just east of Red Rock Point depending upon current and wind conditions. If this strategy is employed, it should be paired with the booming tactics employed to protect Merritt Lane since this may have a tendency to make oil available to the western entrance of Merritt Lane. If sea states prohibit deploying boom or limits the effectiveness of boom placed at the entrance to Tobin Harbor, a second strategy would be to move defenses 1.5 miles southwest to the first choke point in Tobin Harbor while protecting Hidden Lake. Boat, landward anchors, potential seaward anchors due to the length of boom and sea state at the time of deployment, and additional length of boom if currents exceed 1 knot and greater boom angle is required should be anticipated. **Minimum boom length required for strategy: 2,900 feet.**

Site Name: Hidden Lake (Tobin Harbor)

Site Number: 7

Inland Sensitivity Atlas Tile Number: Upper Peninsula of Michigan, Tile 2

Location: North shore of Tobin Harbor, approximately 1 mile southwest of entrance. T67N, R33W, Section 34

Land Ownership: Public (National Park Service)

Response Strategy: Exclusion from Hidden Lake

Description: Shoreline is characterized as sheltered low vegetated banks where Hidden Lake is hydrodynamically connected to Tobin Harbor and flanked on either side by sheltered rocky shores. This small, reed-bordered lagoon on the North shore of Tobin Harbor is a favorite gathering spot for moose that come to lick the mineral deposits and replenish their salt supply.

Specifically these include: coaster brook trout at the West end of the harbor, loon nesting, eagles, and osprey. Summer residents still maintain and inhabit cottages in Tobin Harbor.

Access Points: Primary access is available by boat or by float plane. Hidden Lake is one mile northwest of the float plane dock on Tobin Harbor. Access is also available by the Lake Louise Trail which connects to the Green Ridge Trail but offers no real added benefit.

Protection Strategy Requirements: Approximately 100 feet of boom would be required to close off the inlet of Hidden Lake. Additional options may include the construction of a temporary dam, placement of sorbent materials as shoreline protection and re-oiling protection if only light sheening is anticipated. Resource needs minimally include a small boat, boom, and landward anchors. **Minimum boom length required for strategy: 100 feet.**

Site Name: Tobin Harbor (Choke Point)

Site Number: 8

Inland Sensitivity Atlas Tile Number: Upper Peninsula of Michigan, Tile 2

Location: Tobin Harbor, approximately 2 miles southwest of entrance. T67N, R33W, Section 34

Land Ownership: Public (National Park Service)

Response Strategy: Exclusion

Description: The shoreline at the choke point is characterized as primarily as sheltered rocky shores on the North shore and sheltered low vegetated banks on the South shore in the area of probable anchoring of boom. Tobin Harbor contains state threatened aquatic/riparian zone birds and vascular plants, aquatic/riparian zone amphibians and reptiles, state endangered upland zone vascular plants, game fish, raptors, and large mammals. Specifically these include: coaster brook trout at the West end of the harbor, loon nesting, eagles, and osprey. Summer residents still maintain and inhabit cottages in Tobin Harbor. Tobin Harbor trends southwest to northeast.

Access Points: Primary access is available by boat or by float plane. The choke point is approximately $\frac{3}{4}$ mile northwest of the float plane dock on Tobin Harbor. Tobin Harbor is mostly suitable for deeper draft vessels; however, close to the potential southern tie off point for the boom are numerous exposed rocks. The Stoll Trail is adjacent to the South shore anchor point and may afford the ability for maintenance of the southern anchor and visual inspection of the northern attachment and Hidden Lake if floating resources are unavailable for this location.

Protection Strategy Requirements: Approximately 750 feet of boom should be strung in mostly a north-south direction between the North shore and South shore of Tobin Harbor directly east of Bailey Island. A small cove at the southern end of the boom string may act as a

collection point. If this tactic is utilized it should be paired with the exclusion booming of Hidden Lake. Boat, landward anchors, potential seaward anchors (anticipate 50+ foot depth) due to the length of boom and sea state at the time of deployment, and additional length of boom if currents exceed 1 knot and greater boom angle is required should be anticipated. Herding may be an effective support technique to assist in oil collection. **Minimum boom length required for strategy: 750 feet.**

Site Name: Merritt Lane (West End)

Site Number: 9

Inland Sensitivity Atlas Tile Number: Upper Peninsula of Michigan, Tile 2

Location: Far Northeastern tip of Isle Royale, between Red Rock Point on the West and Blake Point on the East. T67N, R33W, Section 23, 24, 25, and 26.

Land Ownership: Public (National Park Service)

Response Strategy: Exclusion (with primary protection of Sucker Bay), strategy is weather and sea state contingent

Description: The shoreline at the West end of Merritt Lane is characterized by sheltered rocky shores, gravel beaches, and exposed rocky banks. Merritt Lane contains state-listed threatened aquatic/riparian zone birds, aquatic/riparian zone vascular plants, and upland zone (splash zone) vascular plants. Common loons are nesting May through July and feeding in August. Sucker Bay is similarly characterized, but also with nesting waterfowl. Merritt Lane trends southwest to northeast and is very exposed to Lake Superior conditions on the eastern end. Sucker Bay also trends southwest to northeast, but is but protected by barrier islands on all sides. Commercial shipping lanes are approximately 1 mile off Blake Point.

Access Points: Primary access is available by boat. It is approximately 6.5 miles from Park Headquarters on Mott Island and 2 miles from Rock Harbor Lodge by water. At the west end, water depths may be as shallow as 7 feet in mid-channel and are generally shallower than the east end (27 feet mid-channel) and adjacent Tobin Harbor.

Protection Strategy Requirements: Approximately 500 feet of boom should be strung from the South shore of the main island (North shore of Merritt Lane) to the tip of Porter Island. If sea state, weather, or resources dictate, an additional length of boom or secondary placement could take place at the choke point in Merritt Lane ¼ mile east of the West end entrance. This would require approximately 150 of boom. In addition, these strategies should be employed in tandem with exclusion booming of Sucker Bay at Porter Island. Shallow draft boat, landward anchors, and additional length of boom if currents exceed 1 knot and greater boom angle is required should be anticipated. Herding may be an effective support technique to assist in oil collection. **Minimum boom length required for strategy: 500 feet.**

Site Name: Merritt Lane (East End)

Site Number: 10

Inland Sensitivity Atlas Tile Number: Upper Peninsula of Michigan, Tile 2

Location: Far Northeastern tip of Isle Royale, between Red Rock Point on the West and Blake Point on the East. T67N, R33W, Section 23, 24, 25, and 26.

Land Ownership: Public (National Park Service)

Response Strategy: Exclusion (with primary protection of Sucker Bay), strategy is weather and sea state contingent

Description: The shoreline at the East end of Merritt Lane is characterized by shelving bedrock shores, sheltered rocky shores, gravel beaches, and exposed rocky banks. Merritt Lane contains state-listed threatened aquatic/riparian zone birds, aquatic/riparian zone vascular plants, and upland zone (splash zone) vascular plants. Common loons are nesting May through July and feeding in August. Sucker Bay is similarly characterized, but also with nesting waterfowl. Merritt Lane trends southwest to northeast and is very exposed to Lake Superior conditions on the eastern end. Sucker Bay also trends southwest to northeast, but is but protected by barrier islands on all sides. Commercial shipping lanes are approximately 1 mile off Blake Point.

Access Points: Primary access is available by boat. It is approximately 7 miles from Park Headquarters on Mott Island and 2.5 miles from Rock Harbor Lodge by water. At the East end, water depths in mid-channel are approximately 27 feet and are significantly deeper than mid-channel measurements on the West end (7 feet) of Merritt Lane. If utilizing deeper-draft boats, the approach route should take into consideration the much shallower depths of the West end.

Protection Strategy Requirements: Three primary lengths of boom would be required at the East end of Merritt Lane. Beginning on the South shore of the main island (North shore of Merritt Lane) near the site of the Merritt Lane primitive campsite, 450 feet of boom should be strung to the western tip of Merritt Island. From the western tip of Merritt Island, 600 feet of boom should extend to the western tip of Elizabeth Island. From the western tip of Elizabeth Island, 200 feet of boom should extend to the eastern tip of Long Island. This strategy leaves Third Island (shelving bedrock shores) completely exposed. Boat, landward anchors, potential seaward anchors (anticipate 50+ foot depth) due to the length of boom and sea state at the time of deployment, and additional length of boom if currents exceed 1 knot and greater boom angle is required should be anticipated. Herding may be an effective support technique to assist in oil collection. **Minimum boom length required for strategy: 1,250 feet.**

Site Name: Sucker Bay (Merritt Lane)

Site Number: 11

Inland Sensitivity Atlas Tile Number: Upper Peninsula of Michigan, Tile 2

Location: Far Northeastern tip of Isle Royale, between Red Rock Point on the West and Blake Point on the East. T67N, R33W, Section 23, 24, 25, and 26.

Land Ownership: Public (National Park Service)

Response Strategy: Exclusion

Description: The inner shoreline of Sucker Bay is characterized by fringing marshes, sheltered low vegetated banks, and sheltered rocky shores. Sucker Bay contains state-listed threatened aquatic/riparian zone birds, aquatic/riparian zone vascular plants, upland zone (splash zone) vascular plants, and nesting waterfowl. Merritt Lane trends southwest to northeast and is very exposed to Lake Superior conditions on the eastern end. Common loons are nesting May through July and feeding in August. Sucker Bay also trends southwest to northeast, but is but protected by barrier islands on all sides. Commercial shipping lanes are approximately 1 mile off Blake Point.

Access Points: Primary access is available by boat. It is approximately 7 miles from Park Headquarters on Mott Island and 2.5 miles from Rock Harbor Lodge by water. Boat access is gained either through Merritt Lane from the East and West entrances or the channel between Merritt and Elizabeth Islands from the east.

Protection Strategy Requirements: A short length of boom (100 to 150 feet in length) should be placed at the entrance to Sucker Bay on Porter Island. Shallow draft boat and landward anchors should be anticipated. **Minimum boom length required for strategy: 100 feet.**

Site Name: Passage Island

Site Number: 12

Inland Sensitivity Atlas Tile Number: Upper Peninsula of Michigan, Tile 2

Location: Passage Island is approximately 3 miles northeast of Blake Point. T67N, R32W, Section 3, 4, and 9

Land Ownership: Public (National Park Service)

Response Strategy: Exclusion at inlet

Description: The shoreline of Passage Island is generally of low and low-medium sensitivity characterized by exposed rocky cliffs, shelving bedrock shores, and gravel beaches. The inlet on Passage Island on the South shore is characterized by sheltered rocky shores and sheltered low vegetated banks at the head of the inlet. While the shoreline and splash zone of the island itself is relatively free from vegetation and animals, the upland zones do have state and federally threatened aquatic/riparian zone birds, state threatened and endangered aquatic/riparian zone vascular plants, and state threatened and endangered upland zone vascular plants. Look for possible eagle nesting within the inner cove. This may be an issue for crews on the island during response efforts.

Access Points: Access to Passage Island is either by boat suitable to the open water crossing weather and sea state conditions existing at the time or by helicopter as there is a maintained landing pad on the island for maintenance of the Passage Island Lighthouse. Access to the inlet can be gained by foot if arriving by helicopter. Passage Island is approximately 3 miles northeast of Blake Point.

Protection Strategy Requirements: Deploy 150 feet of boom across the inlet mouth anchored to the sheltered rocky shores. Current and sea state may require moving the boom farther in to enhance effectiveness. **Minimum boom length required for strategy: 150 feet.**

Site Name: Duncan Bay Narrows

Site Number: 13

Inland Sensitivity Atlas Tile Number: Upper Peninsula of Michigan, Tile 2

Location: Located on North shore of the main island, approximately 3 mile southwest of Blake Point. T67N, R33W, Section 27

Land Ownership: Public (National Park Service)

Response Strategy: Exclusion or diversion (weather dependant)

Description: Duncan Bay Narrows is primarily sheltered rocky shores and gravel beaches interspersed with small sections of sheltered low vegetated banks. Duncan Bay, trending southwest to northeast head to entrance, is largely sheltered rocky shores with fringing marshes primarily at the head of inlets where streams enter the bay and sporadic sheltered low vegetated banks. With Duncan Bay are state threatened aquatic/riparian zone birds, state threatened aquatic/riparian zone birds, state threatened upland zone vascular plants, and game fish.

Access Points: Access to Duncan Bay Narrows is primarily by boat and potentially by float plane or similarly equipped helicopter. Duncan Bay Narrows is 12 miles and 8 miles by boat from Park Headquarters on Mott Island and Rock Harbor Lodge, respectively. The approach to

the Narrows is in sufficiently deep waters, but near and within the Narrows itself are submerged and exposed rocks that may limit navigability.

Protection Strategy Requirements: Strategy for exclusion booming would be to string 300 feet of boom between the North and South shores of the Narrows. Strategy may also include booming inlet just to the north and west of the Narrows to protect the small fringing marsh at the head of the inlet. This would require an additional 300 feet at the inlet's widest or 150 feet closer to the fringing marsh. Weather, sea state, and resources may dictate ability to protect. A boat appropriate to navigating shallower waters, landward anchors, potential seaward anchors (anticipate 30 to 45 foot depth) due to the length of boom and sea state at the time of deployment, and additional length of boom if currents exceed 1 knot and greater boom angle is required should be anticipated. **Minimum boom length required for strategy: 300 feet.**

Site Name: Five Finger Bay

Site Number: 14

Inland Sensitivity Atlas Tile Number: Upper Peninsula of Michigan, Tile 2

Location: Five Finger Bay is located on the North shore at the eastern end of the main island. T67N, R33W, Sections 28, 31, and 32

Land Ownership: Public (National Park Service)

Response Strategy: Collection (weather permitting)

Description: Five Finger Bay is primarily characterized by exposed rocky banks, shelving bedrock shores, sheltered rocky shores, and gravel beaches. Species of concern in and around Five Finger Bay tend to be primarily related to the upland habitats.

Access Points: Access is probably limited exclusively to boat. Weather and sea state conditions probably also mandate a boat capable of travel in open water and rough seas. Five Finger Bay is approximately 12 miles and 8 miles by boat from Park Headquarters on Mott Island and Rock Harbor Lodge, respectively.

Protection Strategy Requirements: The National Park Service believes that this area is a natural collection point for debris and potentially spilled oil. It is believed that efforts to herd or deflect oil into Five Finger Bay or to prevent its entrance into the open bay would not be that fruitful. Once oil has entered, plans need to be developed to contain it and collect it. If impact is expected to Five Finger Bay, the entrance to Stockly Bay should be closed off (see below). Once oil is in Five Finger Bay, herding may be applicable and beneficial to enhance containment and collection.

Site Name: Stockly Bay

Site Number: 15

Inland Sensitivity Atlas Tile Number: Upper Peninsula of Michigan, Tile 2

Location: Stockly Bay is located at the southwestern end of Five Finger Bay at the eastern end of the main island on the northern shore. T67N, R33W, Section 31

Land Ownership: Public (National Park Service)

Response Strategy: Exclusion (if spill impacting Five Finger Bay)

Description: Stockly Bay is primarily sheltered rocky shores and occasional sheltered low vegetated banks. Potentially in the splash zone are state-listed threatened upland vascular plants.

Access Points: Access is probably limited exclusively to boat. Weather and sea state conditions probably also mandate a boat capable of travel in open water and rough seas. The entrance to Stockly Bay is approximately 15 miles and 11 miles by boat from Park Headquarters on Mott Island and Rock Harbor Lodge, respectively. Water depth is in the range of 20 to 50+ feet at the entrance and approach.

Protection Strategy Requirements: If impacts to Five Finger Bay are anticipated, the entrance to Stockly Bay should be boomed to exclude impacts. This would require approximately 650 to 700 feet of boom depending upon exact booming location. Weather, sea state, and resources may dictate ability to protect. A boat appropriate to navigating shallower waters, landward anchors, potential seaward anchors (anticipate 30 to 55 foot depth) due to the length of boom and sea state at the time of deployment, and additional length of boom if currents exceed 1 knot and greater boom angle is required should be anticipated. **Minimum boom length required for strategy: 650 feet.**

Site Name: Lane Cove

Site Number: 16

Inland Sensitivity Atlas Tile Number: Upper Peninsula of Michigan, Tile 2

Location: Lane Cove is directly south of Dean Island and east of Belle Isle on the north shore of the main island at the northeast end. T66N, R34W, Section 1 and T67N, R34W, Section 36

Land Ownership: Public (National Park Service)

Response Strategy: Exclusion

Description: Lane Cove is primarily sheltered rocky shores with sensitive plants in the splash zone interspersed with sheltered low vegetated banks and fringing marshes tucked in the back of inlets fed by streams. Lane Cove is a very popular waterfowl nesting area.

Access Points: Access is probably limited exclusively to boat. Weather and sea state conditions probably also mandate a boat capable of travel in open water and rough seas. The entrance to Lane Cove is approximately 17 miles and 13 miles by boat from Park Headquarters on Mott Island and Rock Harbor Lodge, respectively. Water depth is in the range of 9 to 35+ feet at the entrance. The Lane Cove Trail does terminate at the Lane Cove primitive campground, but would probably be of limited use. A portage is available for smaller boats (canoe or kayak) between Stockly Bay and Lane Cove which may afford some maneuverability to check and maintain boom at both these locations during rougher seas.

Protection Strategy Requirements: 1,200 feet of boom strung from one side of the cove mouth to the other and anchored (approximately 40 to 60 feet of water) in the middle. **Minimum boom length required for strategy: 1,200 feet.**

Site Name: Belle Isle/Robinson Bay

Site Number: 17

Inland Sensitivity Atlas Tile Number: Upper Peninsula of Michigan, Tiles 1 and 2

Location: Robinson Bay on the North shore of the main island opposite Amygdaloid Island approximately 10 miles southwest of Blake Point on the northeast end of Isle Royale. Belle Isle is located at the northeastern end of Robinson Bay. T66N, R34W, Sections 3, 4, 5, 8, and 9

Land Ownership: Public (National Park Service)

Response Strategy: Exclusion

Description: Robinson Bay is typically a mix of sheltered rocky shores, gravel beaches, and sheltered low vegetated banks. Physically the bay contains a number of laterally-aligned islands, flanked at the entrance by Belle Isle on the northern side. Species of concern include upland and aquatic vascular plants and state and federally-listed threatened aquatic/riparian zone birds. Five loon territories have been identified within Robinson Bay.

Access Points: Access is probably limited exclusively to boat. Weather and sea state conditions probably also mandate a boat capable of travel in open water and rough seas. Belle Isle is approximately 18 miles and 14 miles by boat from Park Headquarters on Mott Island and Rock Harbor Lodge, respectively. Water depths are typically in the range of 30 to 60+ feet within the bay, but there is a tendency to rapidly shoal especially between islands on the long axis. Navigation charts show the bottom near the entrance to be primarily rocky. At the northeastern

end of Belle Isle on the southern shore is a primitive campground and dock potentially available for storage and forward deployment of supplies and equipment.

Protection Strategy Requirements: The exclusion strategy for Robinson Bay includes a series of 3 boom strings island-hopping along the main northeast entrance to the bay and 1 shorter section that closes the “key hole” entrance to the bay at the southeastern tip of Belle Isle between Amygdaloid Channel and Robinson Bay. The key hole should only require a 50 foot section to close. It would probably be best to place the boom on the Amygdaloid Channel side. To close off the Northeast entrance, boom should stretch from the middle of the southern shore of Belle Isle to the northern shore on the northeastern end of Unnamed (250 feet); from the southern shore on the northeastern end of Unnamed to the northern shore of Horner Island (800 feet); and from the southern shore of Horner Island to the northern shore of the main island (750 to 1,000 feet depending upon the final configuration). Weather, sea state, and resources may dictate ability to protect. A boat appropriate to the waters, landward anchors, potential seaward anchors (anticipate 40 to 60+ foot depths) due to the length of boom and sea state at the time of deployment, and additional length of boom if currents exceed 1 knot and greater boom angle is required should be anticipated. **Minimum boom length require for strategy: 1,850 feet.**

Site Name: Amygdaloid Island (Kjaringa Kjeft)

Site Number: 18

Inland Sensitivity Atlas Tile Number: Upper Peninsula of Michigan, Tiles 1 and 2

Location: Southwestern end of Amygdaloid Island off the northern shore of the main island. T66N, R34W, Section 6

Land Ownership: Public (National Park Service)

Response Strategy: Other (Water Intake)

Description: Kjaringa Kjeft is an inlet of water at the southwestern most end of Amygdaloid Island. The potable water intake for the Ranger Station and camping facilities on Amygdaloid Island is with Kjaringa Kjeft. In addition, a 2,000 gallon gasoline tank is located at the Ranger Station. The shoreline in Kjaringa Kjeft is primarily sheltered rocky shores with shelving bedrock shores at the entrance and sheltered low vegetated banks at the head of the inlet. Within the inlet are state-listed threatened aquatic/riparian zone birds, aquatic/riparian zone vascular plants, and upland zone vascular plants.

Access Points: Access is limited to boat. Weather and sea state conditions probably also mandate a boat capable of travel in open water and rough seas. Amygdaloid Island Ranger Station is approximately 19 miles and 15 miles by boat from Park Headquarters on Mott Island and Rock Harbor Lodge, respectively. Water depths are in the mid-20 foot range at the entrance to Kjaringa Kjeft. Navigation charts show the bottom near the entrance to be potentially either

rocky or muddy. The Ranger Station and a dock are available at the southeastern end of Amygdaloid Island.

Protection Strategy Requirements: The strategy may be to close the potable water intake in Kjaringa Kjeft. The storage tank for the intake serving the two resident rangers is approximately 1,500 gallons. The intake depth is recorded at approximately 30 feet. Natural dispersal of any product into the water column would dictate any decision to temporarily close the intake.

Site Name: McCargoe Cove

Site Number: 19

Inland Sensitivity Atlas Tile Number: Upper Peninsula of Michigan, Tile 1

Location: McCargoe Cove is located off the northern shore of the main island, between Todd Harbor and Amygdaloid Island. T66N, R35W, Section 13

Land Ownership: Public (National Park Service)

Response Strategy: Exclusion and collection

Description: McCargoe Cove is flanked by exposed rocky banks and shelving bedrock shores. The entrance is predominantly sheltered rocky shores and gravel beaches. The upper reaches of McCargoe Cove are generally sheltered rocky shores and sheltered low vegetated banks with extensive marshes at the head of the cove. Within the cove are state and federally-listed threatened aquatic/riparian zone birds and state-listed threatened upland zone vascular plants. This includes loon nesting and very productive fish nurseries.

Access Points: Primary access is available by boat or by float plane. The Indian Portage Trail off the Greenstone Ridge Trail does terminate at McCargoe Cove Camp at the head of the cove. Two docks and camps are available, one at the entrance to McCargoe Cove (Birch Island) and the other at the head of McCargoe Cove (McCargoe Cove Camp). The entrance to McCargoe Cove is approximately 23 miles and 18 miles by boat from Park Headquarters on Mott Island and Rock Harbor Lodge, respectively.

Protection Strategy Requirements: Strategy would be to string boom just inside the entrance from Indian Point on the east side of the cove to the point of land directly across. This would utilize approximately 450 feet of boom. Boom placement is upstream from both Birch Island and Brady Cove. Containment and collection, in tandem with herding, could possibly occur in the two coves just to the north of the boom, one to the east and one to the west, depending upon current and wind direction. Weather, sea state, and resources may dictate ability to protect. A boat appropriate to the waters, landward anchors, potential seaward anchors (anticipate 20 to 30 foot depths) due to the length of boom and sea state at the time of deployment, and additional

length of boom if currents exceed 1 knot and greater boom angle is required should be anticipated. **Minimum boom length require for strategy: 450 feet.**

Site Name: Washington Harbor

Site Number: 20

Inland Sensitivity Atlas Tile Number: Upper Peninsula of Michigan, Tile 4

Location: Washington Harbor is located at the southern tip of Isle Royale. T64N, R39W, Section 36 and T63N, R39W, Section 1

Land Ownership: Public (National Park Service)

Response Strategy: Exclusion (from Washington Creek, by booming the harbor entrance)

Description: Washington Harbor is a mix of sheltered rocky shores, mixed sand and gravel beaches, and gravel beaches. The entrance to Washington Harbor is primarily exposed rocky banks, shelving bedrock shores, and gravel beaches. The head of Washington Harbor at the mouth of Washington Creek is fringing marshes and sheltered low vegetated banks. A potable water intake is located at the eastern end of Washington Harbor with a reserve capacity in the water tank of 15,000 gallons. 52,000 gallons of gasoline, aviation fuel, and diesel are stored at Windigo. Game fish, state-listed threatened aquatic/riparian zone birds and vascular plants inhabit Washington Harbor. Washington Creek is a fish nursery.

Access Points: Primary access is available by boat or by float plane. The Ranger Station at Windigo in Washington Harbor is approximately 48 miles from Park Headquarters on Mott Island and 22 miles to Grand Portage, Minnesota by boat. A boat dock and float plane dock is available approximately 2.5 miles northeast of the harbor entrance at Windigo.

Protection Strategy Requirements: To protect the creek, it is recommended to boom off the entrance to Washington harbor if the threat is external to the harbor. This would require approximately 1,500 feet of boom from Card Point northwest across to the opposing point. Due to the length of boom, it should be anchored at least once in the middle of the length. Water depth in this location is approximately 100 feet with a rocky bottom. If the threat is more immediate to Washington Creek, place 500 feet of boom anchored on either side of the fringing wetlands at the creek mouth. **Minimum boom length require for strategy: 1,500 feet.**

Site Name: Grace Creek

Site Number: 21

Inland Sensitivity Atlas Tile Number: Upper Peninsula of Michigan, Tile 4

Location: Grace Creek is located at the southern tip of Isle Royale at the head of Grace Harbor, south and east of Washington Harbor. T63N, R39W, Section 1

Land Ownership: Public (National Park Service)

Response Strategy: Exclusion

Description: The shore line on either side of Grace Creek is characterized as mixed sand and gravel beaches and gravel beaches. The mouth of Grace Creek is fringing marshes. Game fish predominate in the area.

Access Points: Primary access is available by boat or by float plane (probably into Washington Harbor). Grace Island, adjacent to Grace Creek is approximately 43 miles from Park Headquarters on Mott Island and Windigo Ranger Station is 22 miles to Grand Portage, Minnesota by boat. A boat dock is available at Grace Island. An additional boat dock and a float plane dock is available in the adjacent Washington Harbor at Windigo.

Protection Strategy Requirements: 300 feet of boom placed in a chevron would be required to boom the meandering mouth of Grace Creek. The middle anchor would be in approximately 8 feet of water on a rocky bottom. **Minimum boom length require for strategy: 300 feet.**

Site Name: South Shore Barrier Beach Wetland

Site Number: 22

Inland Sensitivity Atlas Tile Number: Upper Peninsula of Michigan, Tile 5

Location: The barrier beach wetland is approximately 2/3 miles east of Long Point on the southern shore of the main island at the southwestern end of the island. T63N, R38W, Section 26

Land Ownership: Public (National Park Service)

Response Strategy: Exclusion (condition dependent)

Description: The barrier beach itself is mixed sand and gravel. The wetland behind would be characterized as extensive marshes. Waterfowl have been recorded to annually nest and raise young in this wetland. Weather conditions and sea state, or seasonality may dictate the absence or presence of the barrier. This is a good example, but infrequent on Isle Royale, of a Great Lakes coastal wetland.

Access Points: Access is by boat.

Protection Strategy Requirements: If a breach is detected in the barrier, the opening would dictate length of boom. The total shore length of the wetland is 1,400 feet. This may be a good location to place precautionary pom-poms in the event of uncertainty but potential for impacts.
