Whatcom County Marine Resources Committee
Marine Creosote Piling Remediation Project

Project Partner with the City of Bellingham

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The Whatcom County Marine Creosote Piling Remediation Project began in 2002. The City of Bellingham received a $45,000 grant through the Washington State Department of Ecology to implement the project. The Whatcom County Marine Resources Committee contributed $24,000 to the project in 2002/2003 in order to help expand the area covered through the inventories and removals. The MRC funds also enabled a fixed piling inventory in Drayton Harbor and Bellingham Bay for source analysis.

Creosoted pilings and remnants from piling projects are a continuous source of pollution to marine beaches, with damaging environmental impacts, especially to forage fish spawning areas high on the intertidal zone. Some of these abandoned pilings work their way out of the sediments and wash up on the beaches as "rogue" logs. Many of these rogue logs remain on the beaches, leaching a chemical soup that includes polycyclic aromatic hydrocarbons (PAHs) for years, poisoning valuable beach habitat and biota important to the salmon food chain. For more information about creosote visit the City of Bellingham Environmental Resources.

Prior to this project, the multitude of single pilings, dolphins and old piling fields that are in the marine environment had not been inventoried or evaluated for treatment or removal. Many of the "fixed" pilings are abandoned and lack a remediation plan. There also had been no plan of action for removing and properly disposing of rogue logs. The Whatcom County Marine Creosote Piling Remediation Project involved surveying, classifying and subsequently removing creosote debris from the Whatcom County nearshore environment.

Approximately **100 tons** of rogue creosote-treated wood was removed from the shores of Whatcom County during the course of the project between February of 2002 and July of 2003. More detailed information is available for the specific reaches of Whatcom County shorelines that were inventoried by selecting a reach from the list below:

- Bellingham Bay/ Chuckanut Bay Area
  This area includes the shores between Marine Park and Larrabee State Park in the southern part of Bellingham Bay. Fixed pilings were inventoried between Marine Park and Teddy Bear Cove, but not any further south. There may be some private docks that have fixed creosote-treated pilings in them between Teddy Bear Cove and Larrabee State Park. There were approximately 378 fixed pilings in the area between Marine Park and Teddy Bear Cove. The majority of these are in railroad trestles. All of the fixed pilings at Marine Park are very old and weathered and may be a potential source of rogue logs.
- City of Bellingham Area (Fairhaven, South Hill,

Whatcom Industrial, Central Waterfront, Squalicum Harbor, Squalicum Industrial, Cliffside Drive)
This area consists of the shoreline between the ferry terminal in Fairhaven and the Nooksack River delta. There are over 14,673 fixed creosote-treated pilings in this area. The inventory of the area around the Whatcom Waterway has not yet been completed.

- Lummi Bay Area
  The Lummi Bay area consists of the shoreline between the Phillips Conoco/Tosco Refinery pier and the west side of the Lummi Reservation Peninsula.
- Lummi Island Area
  The North Lummi Island Area begins at the west end of Sunrise Road and goes around the northern point of the island to Gooseberry Point. The section of shoreline from the southwestern most point of the North Lummi Island Area to Fern Point was the only section of this area that was inventoried. The South Lummi Island Area begins at the west end of Sunrise Road and goes around the southern point of the island up to Gooseberry Point. Only a small section of this area was inventoried. The area inventoried was from Carter Point to the northwest boundary of this area.
- Cherry Point Area (Point Whitehorn, BP/Arco Refinery, Intalco Aluminum, Phillips Conoco/Tosco Refinery)
  The Cherry Point Area extends from the Phillips Conoco/Tosco Refinery to Birch Bay State Park. Approximately 869 cubic feet of creosote-treated wood was found on the shores of the Cherry Point reach during the first round of inventory in the spring and summer of 2002. A year later, prior to any removals, 1,050 cubic feet was present. About 909 cubic feet of the total amount was removed in July of 2003. The drift cells at Cherry Point move primarily in a southerly direction. Some of the rogue logs and timbers in this area may be coming from British Columbia, and other possible sources of the materials are the refinery piers at Cherry Point.
- Birch Bay Area
  The initial inventory from Birch Bay State Park to the north side of the marina in May, June and July of 2002 found approximately 1,286 cubic feet of creosote-treated wood on the beaches. About 1,246 cubic feet were removed in August of 2002. About 258 cubic feet were found in the follow-up inventory completed in the spring of 2003. Roughly 29 cubic feet of this was removed in May of 2003. The majority of the materials consisted of pilings and pile stubs, but there were also significant numbers of timbers, and a small number of railroad ties.
- Drayton Harbor/ Blaine Area (Drayton Harbor, Semiahmoo)
  The shores of Blaine, from the south end of Birch Point to the Peace Arch border crossing, had approximately 892 cubic feet of rogue creosote-treated wood present at the time of the initial inventory in the summer and fall of 2002. By May of the next year there was roughly 1053 cubic feet, 595 cubic feet of which was removed in May of 2003.
- Point Roberts Area
  Roughly 1,972 cubic feet of rogue creosote-treated wood was found from the northeast border to the northwest border of Point Roberts in November of 2002. There were a huge number of timbers and pilings that appear to be dock structures, and also lots of pile stubs. An entire dolphin, which looked fairly new, with 6 pilings over 55 feet long each, had washed up on the south part of the point. No removal of rogue creosote-treated wood has been done at Point Roberts to date.

The project received overwhelming support from various local groups and individuals. Funding is being sought to continue rogue creosote material removals in Whatcom County, and to begin similar efforts in Skagit, San Juan, and Island Counties. All the coastal counties of Puget Sound have expressed their desire to initiate similar efforts. The success of this project is due in large part to the partnerships that have been developed with local government, industries, non-profit groups and individuals.

Bellingham Bay/Chuckanut Bay Area

This area includes the shores between Marine Park and Larrabee State Park in the southern part of Bellingham Bay. Fixed pilings were inventoried between Marine Park and Teddy Bear Cove, but not any further south. There may be some private docks that have fixed creosote-treated pilings in them between Teddy Bear Cove and Larrabee State Park. There were approximately 378 fixed pilings in the area between Marine Park and Teddy Bear Cove. The majority of these are in railroad trestles. All of the fixed pilings at Marine Park are very old and weathered and may be a potential source of rogue logs.

Roughly 520 cubic feet of creosote-treated wood was discovered in this area during the inventory in the summer and fall of 2001. 100 cubic feet is a modest estimate of the amount removed in May and June of 2002. The materials that were not removed had either washed away or were utility poles and railroad ties along the railroad right of way. At the follow-up inventory of September and November 2002 two pieces had washed in, totaling around 8 cubic feet. At the second follow-up inventory in July of 2003 there was about 11 cubic feet, all of which was removed later that month.

There were a significant number of railroad ties and utility poles along the shoreline that had been removed and/or cut and left to lie where they fell.

- Approximately half a dozen utility poles had been cut and left partially in the water for what appears to be many years just north of Clark's Point. In June of 2003 the project coordinator observed they had either been removed by the railroad or had washed away over the winter.
- A small wetland adjacent to the railroad below a Fairhaven neighborhood has between one and two-dozen railroad ties visible in it. There are also a considerable number of railroad ties on the west side of the tracks, directly above the water, between Post Point and the wetland described above.
- Just south of Teddy Bear Cove there are many abandoned utility poles and railroad ties on the beach or directly above the water.

Teddy Bear Cove appears to be an area of accumulation, though in small quantities, for railroad ties, utility poles, and piling stubs. It was the only area that had rogue creosote-treated wood wash in over the one year following initial removals.

No rogue creosote materials were found in southern Chuckanut Bay or on Governor's Point.

A small number of rogue pilings were found at Larrabee State Park.

The primary source of rogue creosote-treated wood in southern Bellingham Bay and Chuckanut Bay

appears to be the Burlington-Northern Santa Fe Railroad. There are an insignificant number of derelict piling structures in this area that could be factored in as considerable sources of this contaminant.

City of Bellingham Area

This area consists of the shoreline between the ferry terminal in Fairhaven and the Nooksack River Delta. There are over 14,673 fixed creosote-treated pilings in this area. The inventory of the area around the Whatcom Waterway has not yet been completed.

More than 970 cubic feet of rogue creosote-treated wood was found on the beaches in this area at the first inventory during the summer and fall of 2001. Initial removals, done in May and June of 2002, collected and disposed of over 530 cubic feet of treated wood, and follow-up removals in July of 2003 removed another 120 cubic feet.

After completing an initial inventory and removals, a follow-up inventory and removals one year later, and an analysis of the condition and number of fixed pilings present in Bellingham Bay, it seems obvious that the number one source of rogue creosote-treated wood on the beaches of the bay is derelict dock structures. The areas that tend to have accumulations of rogue creosote-treated wood are the same areas that have abandoned dock structures. Specifically, the old ferry dock and structures at the end of Cornwall Avenue, the dock and other fixed piling structures at the Squalicum Creek estuary, and the cement plant pier at Little Squalicum beach. These structures continue to break apart with each passing winter and end up high on the intertidal beach, sometimes in valuable forage fish habitat, such is found at Little Squalicum beach.

Fairhaven Subarea
There were no rogue creosote-treated logs or timbers from the industrial area next to Marine Park north to the beach above Taylor Street Dock at the time of the initial inventory or the follow-up inventory. There are roughly 1,192 fixed creosote-treated pilings in this area that may contribute to rogue logs in other areas of Bellingham Bay.

South Hill Subarea
This subarea extends from the southern end of Boulevard Park to the northern most beach in Boulevard Park. This area has approximately 1,631 fixed pilings in it, a large part of which are short stubs intermixed with concrete rubble on the shores. There may be quite a few more fixed piling stubs below the surface of the concrete. Most of the fixed pilings in this subarea are derelict, very old and weathered, and are most likely a source of rogue logs in Bellingham Bay. In fact, one of the dolphins on the west side of the pier at the south end of the park lost one of its pilings over the winter of 2002.

Approximately 127 cubic feet of creosote-treated wood was found on the beaches in this area at the initial inventory in July of 2001, 19 cubic feet (only 2 pieces) at the follow-up inventory of November of 2002, and 19 in July of 2003. Most of the materials found during the initial inventory washed away and the two pieces found in November of 2002 had washed away by July of 2003. More than 44 cubic feet was removed in June of 2002 and 19 cubic feet in July of 2003.

The southern-most beach at Boulevard Park is an area of accumulation for pilings and timbers. The other two pocket beaches in Boulevard Park also tend to have small numbers of materials accumulate.

Whatcom Industrial Subarea
This area is comprised of the shoreline from the stretch of railroad between the north end of Boulevard Park and the shipping terminal. There are roughly 4,945 creosote-treated fixed pilings in this area. The shipping terminal dock alone has about 3,100 creosote pilings supporting it. There are a large number of steel and CCA (Chromated Copper Arsenic) pilings in the east side of the shipping terminal pier, also.

Approximately 83 cubic feet of treated wood was found during the initial inventory during the summer and fall of 2001, 37 cubic feet was found during the follow-up inventory of November of 2002, and 4 cubic feet during the second follow-up inventory of July of 2003. All of the materials found in November of 2002 washed away. About 46 cubic feet was removed in May and June of 2002 and what wasn't removed had washed away. 4 cubic feet was removed during follow-up removals. The materials that typically appear on this beach are pilings and timbers, and they are continually moving onto and off of the beach.

The beach at the end of Cornwall Avenue is an area that receives a significant amount of rogue creosote-treated materials.

One source of these materials is the old ferry dock adjacent to the Cornwall Avenue landfill, which had a large portion break off of it during the winter of 2002. This and the other fixed piling structures adjacent to the landfill should be removed to prevent continued breakage of these materials.

Central Waterfront Subarea
This is a small area consisting of the shoreline between the shipping terminal, including the mouth of Whatcom Creek, to the little beach on the north side of Georgia-Pacific's Aerated Stabilization Basin. The inventory of creosote-treated fixed pilings is not yet complete, but there are approximately 1,355 counted so far. There are a large number of derelict fixed pilings in the area at the mouth of Whatcom Creek, and there may be an even larger number of fixed pilings in use in this area.

There were no rogue creosote-treated materials between the shipping terminal and the south side of the I & J Waterway at the time of the initial inventory or the follow-up inventory.

Squalicum Harbor Subarea
This subarea stretches from the beach at the I & J Waterway to below Weldcraft in Squalicum Harbor. There are about 1,500 fixed creosote-treated pilings in this area, all of which are in Squalicum Harbor.

The initial inventory found 207 cubic feet in March of 2002, and the follow-up inventories yielded 2 cubic feet in October of 2002 and 1 cubic foot in July of 2003. At the time of the initial inventory there were two dolphins (a group of pilings cabled together) that had washed in. About 111 cubic feet was removed during initial removals in June of 2002 and one piece totaling 0.5 cubic foot was removed in July of 2003. What wasn't removed at the time of the removals had washed away or been removed by someone else.

The beach at the end of the I & J Waterway is an area of accumulation for rogue pilings, pile stubs and timbers.

Squalicum Industrial Subarea
The shoreline area around the industrial area that includes Bellingham Cold Storage, to the beach below the cement plant, makes up this area. There are almost 4,000 fixed creosote-treated pilings within this area. A large portion of these are at the mouth of Squalicum Creek. The cement plant pier also has a significant number of these, totaling about 1,670.

Approximately 130 cubic feet was present in March of 2002 at the time of the initial inventory, 14 cubic feet in October of 2002, and 37 in July of 2003. About half of the materials found during both the initial inventory and the follow-up inventory washed away. About a third of the amount of creosote materials found at the initial inventory were found at the time of the follow-up inventory. These materials consisted of timbers, pilings, piling stubs and railroad ties. About 68 cubic feet removed in June of 2002. What wasn't removed was not accessible. Two pieces found during the follow-up inventory washed away, and the rest, totaling approximately 37 cubic feet, was removed in July of 2003.

The beach between the parking area at Little Squalicum and the cement plant seems to be ever-changing and is constantly replenished with new batches of rogue creosote-treated wood. The wood gets scattered upon the shoreline, not collecting in any particular spot.

The derelict pilings and dock structure at the mouth of Squalicum Creek are a significant source of rogue creosote-treated wood in Bellingham Bay. The top part of the dock between Mt. Baker Plywood and Bellingham Cold Storage actually fell into the water over the winter of 2002. Some of these dock structures washed north onto the beaches between Little Squalicum and Cliffside Drive. All of the remaining abandoned fixed pilings in the estuary should be removed to control this source of rogue logs and timbers.

Cliffside Drive Subarea
This subarea starts at the beach below the north end of the cement plant and goes to the Nooksack River Delta. There are only about 50 creosote-treated fixed pilings in this subarea, all of which are located near the Locust Street beach access. They are all abandoned, very old and weathered pilings that are likely breaking apart little by little each year.

Two areas that receive a lot of rogue creosote-treated wood each year are below the cement plant and below the Cliffside Drive access. About 420 cubic feet was found during the initial inventory in February and March of 2002, 71 cubic feet in October of 2002, and 60 cubic feet in June of 2003. All of the materials found in October of 2002 had either washed away or were covered up in wood chips by June of 2003. The majority of the materials found below the cement plant were railroad ties, totaling over one dozen.

The shore below Cliffside Drive is the area of thickest accumulation of rogue creosote-treated wood in all of Bellingham Bay. The materials found during the initial inventory consisted of aged timbers, pilings, piling stubs and railroad ties. The area is covered with a thick layer of fine ground wood chips that cover up a lot of the wood on the beach, making it difficult to draw conclusions about long-term movement of materials on the beach. However, there were a few rogue materials identified during the initial inventory that moved north over the winter in the same direction as the drift cell there. There were also a significant number of logs and timbers found at the time of the initial and follow-up inventories that later could not be found that were probably covered up with wood chips. The materials found during the follow-up inventory were all aged timbers and pilings that look like dock structures that came from within the bay.

This was a difficult area for removals due to the low water and the limited beach access. Towing large logs and timbers by boat was not an option. About 261 cubic feet of rogue creosote-treated wood was hauled off the beaches of this area in June of 2002, and another 60 cubic feet in July of 2003.

From the beach access spot at Cliffside Drive north to the Nooksack River Delta the beach is covered in fallen trees and hardly receives any movement of driftwood or rogue creosote logs. This is a difficult area

to inventory, and would be extremely difficult to remove creosote logs from due to the fallen trees, extremely limited access, and low water.

The source of the accumulations of rogue creosote-treated wood in this area seems to be derelict piling structures from inner Bellingham Bay. A remediation plan for all of the abandoned creosote pilings in the bay is necessary to correct this problem.

Lummi Bay

The Lummi Bay area consists of the shoreline between the Phillips Conoco/Tosco Refinery pier and the west side of the Lummi Reservation Peninsula.

The Sandy Point area had a considerable amount of rogue creosote-treated wood at the time of the inventory that was completed from March through May of 2002. There was roughly 357 cubic feet from the marina north to the Gregorian Road beach access, and 429 cubic feet from the marina to the northeast border of the Sandy Point Community. The materials consisted of timbers, pilings, and piling stubs, most of which appeared to be dock structures. No removals were done in the Lummi Bay area.

A large portion of the rogue creosote-treated materials were gathered around the entrance to the marina.

Inventory was not completed on the Lummi Reservation.

Lummi Island

North Lummi Island Area
The North Lummi Island Area begins at the west end of Sunrise Road and goes around the northern point of the island to Gooseberry Point. The section of shoreline from the southwestern most point of the North Lummi Island Area to Fern Point was the only section of this area that was inventoried.

Roughly 771 cubic feet was found during the inventory of September and October of 2002. 730 cubic feet of the total amount in this area was removed in September and October of 2002. The materials that were not removed were left because the property owners asked us to leave them.

Legoe Bay is where most of the rogue materials in this area accumulate. About 473 of the total 771 cubic feet found in the North Lummi Island Area was congregated in Legoe Bay.

Source analysis in this area is not possible at this time, due to the reason described above under the South Lummi Island Area.

South Lummi Island Area
This area begins at the west end of Sunrise Road and goes around the southern point of the island up to Gooseberry Point. Only a small section of this area

was inventoried. The area inventoried was from Carter Point to the northwest boundary of this area.

About 50 cubic feet of creosote-treated wood was found in the section surveyed during September and October of 2002. All of it was removed by boat in October of 2002. All removals had to be done by boat because there are no access locations along that stretch of beach.

There were no areas of rogue creosote-treated wood accumulations in the section of the South Lummi Island Area that was inventoried.

Sources of rogue creosote-treated wood in this area are nearly impossible to evaluate without an inventory of fixed piling structures in San Juan County. Rogue logs and timbers that wash up on the beaches of the east side of the island may come from sources on the coasts of Whatcom County. A regional inventory of fixed piling structures would greatly add to an understanding of where rogue creosote materials on the islands come from.

Cherry Point Area

The Cherry Point Area extends from the Phillips Conoco/Tosco Refinery to Birch Bay State Park. Approximately 869 cubic feet of creosote-treated wood was found on the shores of the Cherry Point reach during the first round of inventory in the spring and summer of 2002. A year later, prior to any removals, 1,050 cubic feet was present. About 909 cubic feet of the total amount was removed in July of 2003. The drift cells at Cherry Point move primarily in a southerly direction. Some of the rogue logs and timbers in this area may be coming from British Columbia, and other possible sources of the materials are the refinery piers at Cherry Point.

The success of the clean up along the Cherry Point reach is due in large part to Intalco Aluminum and the BP/Cherry Point Refinery. Both companies provided a lot of help to the removal crew with the assistance of equipment. Without their help the removal of about 20 tons of creosote-soaked wood would not have been possible.

Point Whitehorn Subarea
From the southern edge of Birch Bay State Park to the BP/Arco Refinery pier there was about 37 cubic feet at the first inventory in May of 2002, and approximately 112 cubic feet at the second inventory in July of 2003. All but one piece found in the first inventory had washed away by July of 2003. Pilings, timbers and railroad ties made up the majority of the materials found in this area. No removals were done in this area during the course of the project.

The rogue logs and timbers that end up on this stretch of beach are fairly scattered along the shoreline. There were no significant accumulations during the course of the 2 years. The drift cells on the south side of Point Whitehorn move primarily in a southerly direction. Therefore, materials that end up on this part of the beach may be transported south down the beach.

There are no obvious sources of rogue logs and timbers on this stretch of beach. Since this area is located on the east side of the straits, a regional examination of creosote-treated wood structures would assist in identifying sources in this area.

BP/Arco Refinery Subarea
From the north side of Intalco Aluminum's pier to the BP/Arco Refinery pier there was about 554 cubic feet in May of 2002, and at the second inventory in June and July of 2003 there was roughly 660 cubic feet. Approximately 132 cubic feet of the total amount found during the initial inventory had washed away, and about 238 cubic feet had washed in, by the summer of 2003. All but about 12 cubic feet of the amount present on the beach in the summer of 2003 was removed. Timbers, pilings, piling stubs, and

railroad ties were scattered upon these shores. The largest rogue piling in all of Whatcom County was found on this beach, which was about 70 feet long and 20 inches in diameter.

Areas of consolidation were in the 2 estuaries just north of the Gulf Road parking area, and below and on the south side of the parking area. The drift cell present along the shoreline on this stretch of beach moves in a southerly direction. However, about half a dozen rogue logs/timbers identified in the first inventory had moved north between May of 2002 and June/July of 2003. Only one piece of creosote-treated wood moved south during that time. These conflicting factors make it difficult to draw conclusions about the movement of creosote-treated wood in this area.

There are no obvious sources of rogue materials in this subarea. Since this area is located on the east side of Georgia Strait, a regional examination of creosote-treated wood structures would assist in identifying sources in this area.

Intalco Aluminum Subarea

There was 225 cubic feet of creosote-treated wood on the beaches between the Phillips Conoco/Tosco Refinery pier and the Intalco Aluminum pier at the first inventory. 226 cubic feet was present at the second inventory in July of 2003, and all but 9 cubic feet of it was removed that month. 36 cubic feet of the materials present at the time of the initial inventory had washed away, and 37 cubic feet had washed in, by the time of the follow-up inventory. The materials in this subarea are characteristically chunks of pilings and small timbers.

All of the pieces that washed away over one year were light-weight timbers that were lying on top of other drift wood. All of the other pieces in the initial inventory were in exactly the same locations at the time of removal as they were at the initial inventory in the spring of 2002. The drift cell along this stretch of shoreline moves south. The 2 years of observing this beach found the majority of driftwood and rogue creosote-treated wood collected on the north side of the Phillips pier, in the southern-most part of this stretch of beach. The northern part of the beach only had very scattered driftwood or creosote-treated wood on it over the 2 years. Rogue logs and timbers that end up on this beach in the future are expected to follow this same pattern.

Sources of rogue creosote materials in this subarea are difficult to evaluate because it is located along Georgia Strait. The 2 refinery piers may contribute to some of the rogue logs and timbers that wash up on this beach.

Phillips Conoco/Tosco Refinery Subarea

This subarea stretches from the Gregorian Road access at Neptune Beach to the south side of the Phillips Refinery pier. There were roughly 53 cubic feet at the first inventory in May of 2002 and 52 cubic feet at the second inventory in July of 2003. 3 pieces totaling 44 cubic feet were removed in July of 2003. All of the materials present at the first inventory had washed away by the July of 2003. The materials on the beach at both inventories consisted of timbers and pilings that look like dock structures.

There is a drift cell offshore of this area that moves south. The scattered, few pieces of driftwood and rogue creosote wood that end up on this beach over time will probably eventually make their way further south down the beach towards Sandy Point.

The 3 refinery piers located along the Cherry Point reach may be a source of the rogue materials found in this subarea. Some materials also likely wash in from The Strait of Georgia.

Birch Bay Area

The initial inventory from Birch Bay State Park to the north side of the marina in May, June and July of 2002 found approximately 1,286 cubic feet of creosote-treated wood on the beaches. About 1,246 of this was removed in August of 2002. About 258 cubic feet was found in the follow-up inventory completed in the spring of 2003. Roughly 29 cubic feet of this was removed in May of 2003. The majority of the materials consisted of pilings and pile stubs, but there were also significant numbers of timbers, and a small number of railroad ties.

The estuary at the northeast corner of Birch Bay is an area where driftwood and rogue creosote-treated wood accumulates. There were also significant amounts from the intersection of Birch Point Road and Shintafer Road north to the estuary. This is a difficult area to draw conclusions about trends in movement because of a couple different factors. There is lots of vegetation growth in the area where there are accumulations of driftwood, so there could be creosote materials underneath that aren't easily exposed. There is also a lot of driftwood in the creek itself that probably gets moved around every winter. Some of the creosote materials removed from this area were actually almost entirely submerged in the fine-ground substrate in the creek. There are 2 drift cells on either side of the estuary that both move towards the estuary, explaining the heavy accumulations of wood there.

One point worth noting about possible sources of rogue logs and timbers in Birch Bay is that there are no docks in the bay and the railroad does not run anywhere near the shoreline. That means that the materials are either floating into the bay from elsewhere, or they are coming from some source(s) directly upland.

Drayton Harbor/Blaine Area

The shores of Blaine, from the south end of Birch Point to the Peace Arch border crossing, had approximately 892 cubic feet of rogue creosote-treated wood present at the time of the initial inventory in the summer and fall of 2002. By May of the next year there was roughly 1053 cubic feet, 595 cubic feet of which was removed in May of 2003.

Drayton Harbor Subarea
This subarea stretches from the western corner of the harbor adjacent to Semiahmoo Park north to the Cain Creek estuary. A fixed piling inventory was initiated, but has not been completed.

Approximately 132 cubic feet of creosote-treated wood was found on the shores of the Drayton Harbor Subarea at the first inventory in October of 2002. At the second inventory in May of 2003 there was about 140 cubic feet, 50 of which had washed in since October of 2002. Neither of these estimates include the dozens of railroad ties that were scattered upon the north side of the bay directly below the railroad. About 42 of the 132 cubic feet that was present at the time of the first inventory washed away over the course of the 2 winters. Approximately 128 cubic feet was removed in May of 2003. The majority of the creosote materials found in this area were railroad ties, but there were also timbers and pilings that appeared to be dolphin and dock structures.

There are a number of drift cells present within Drayton Harbor. There is one on the east side of the harbor that moves in a northerly direction along the shore towards the marina. There are also 2 drift cells along the inner part of the harbor that move in a southern direction along the shore starting around Dakota Creek. On the western half of the harbor there are a couple of drift cells that move in opposite directions. In the west corner of the harbor there is a drift cell that moves northeast along the shore. Just

south of that corner there is a cell that moves south and south beyond that there is a cell that moves both north and south. There was no driftwood or creosote-treated wood present on the beach in the inner harbor at any point during the project, and what was present in the northeast section was almost entirely railroad ties. The railroad ties may eventually get moved north towards the marina or south towards Dakota Creek since there are 2 drift cells there moving in opposite directions.

The number one source for rogue creosote materials in this area appears to be the railroad. Other possible sources include the Semiahmoo Resort marina, docks, and other fixed piling structures, and the Blaine marina.

Semiahmoo Subarea
In August of 2002 there was approximately 760 cubic feet of rogue creosote-treated wood on the shores between the park on the north side of Birch Bay Village marina and the western corner of corner of Drayton Harbor adjacent to Semiahmoo Park. 272 cubic feet more washed in by May of 2003, and 119 cubic feet had washed away, bringing the total to 913 cubic feet. Roughly 467 cubic feet was removed in May of 2003. Most of the materials recovered from the beach came from Semiahmoo Spit since most of Birch Point was not accessible. The rogue materials consisted mostly of timbers and pilings, but there were also lots of pile stubs, and a smaller number of railroad ties.

Removals on Birch Point were mostly unsuccessful due to the very limited beach access and the large rocks scattered in the low water. The only areas to access the beach via the land are at either end of the point, so using a boat was the only option. The first attempt to tow logs and timbers led to the realization that the area would not be able to be finished because of the poor visibility of the rocks below the surface of the water. If the area is to be cleaned of rogue creosote-treated wood in the future it will have to be done with an All Terrain Vehicle (ATV) during an acceptable time of the year.

Birch Point has 2 drift cells, one that moves north from the point and one that moves south from the point. Therefore, it would be expected that the rogue logs and timbers that wash onto the northern part of the point will eventually be washed up towards Semiahmoo Spit, and the materials that wash onto the southern half of the point will eventually get moved south into Birch Bay. However, there was one small timber that was on the southern end of Birch Point that moved at least a couple miles north around the point over the winter of 2003.

Along the western side of Semiahmoo Spit there is a drift cell that moves northeast along the shore. The rogue creosote-treated wood along this section was fairly scattered, and only one piece moved to the north over the winter. Materials that land on this stretch of beach may eventually make their way to the beach adjacent to Marine Drive or into Drayton Harbor. Along the inside of the spit there is a drift cell that moves northeast along the shore. There were quite a few pieces of rogue logs and timbers in this area that moved over the winter and did not follow the course of the drift cell. 10 pieces that were originally along that stretch of beach, where the drift cell movement is north, moved south. Only 2 pieces moved in the direction of the drift cell. The fact that the drift cell information clashes with the information gathered through the 2 years of the project makes it impossible to draw any reliable predictions of future trends in movement of rogue creosote-treated wood along this section of beach at this time.

There are no obvious sources for rogue creosote-treated wood on Birch Point. The Semiahmoo Resort marina, docks, and other fixed piling structures, and the Blaine marina may contribute to some of the rogue creosote-treated wood on the beaches of the area inside of Semiahmoo Spit. Materials that wash onto the shores of Blaine may come from the Strait of Georgia.

Point Roberts Area

Roughly 1,972 cubic feet of rogue creosote-treated wood was found from the northeast border to the northwest border of Point Roberts in November of 2002. There were a huge number of timbers and pilings that appear to be dock structures, and also lots of pile stubs. An entire dolphin, which looked fairly

new, with 6 pilings over 55 feet long each, had washed up on the south part of the point. No removal of rogue creosote-treated wood has been done at Point Roberts to date.

The creosote materials were pretty thick along the beaches the entire way around the point. One spot that had a rather significant accumulation in comparison with the rest of Point Roberts is on the east side of the marina where there is also a lot of untreated driftwood. The drift cells on either side of the point move in a northward direction, and along the southern part there are a few different cells that move in different directions. At the marina there is a cell that moves both east and west, and on the west side of that there is a cell that moves northwest around the corner. There is also a cell that moves west on the eastern half of the southern coast, and from the southeast corner there is a cell that moves north around the corner. It is not possible to draw any conclusions about future movement of creosote materials at this time since only one inventory was done.

The Point Roberts marina and the derelict pilings in front of the casino on the west side of the point are the only areas along the shores of Point Roberts that have significant numbers of fixed pilings that may be sources of rogue logs and timbers. Rogue creosote materials may be moving south on Point Roberts from sources in British Columbia, or may be floating in from the straits.