

Exxon Valdez Oil Spill
NOAA Harbor Protection Program Final Report

Harbor Water Quality Improvement Program

Exxon Valdez Oil Spill Trustee Council Project 16120112-A
Final Report

Ivy R. Patton

Native Village of Eyak
110 Nicholoff Way
Cordova, Alaska 99574

September 2018

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Study History: Project 16120112-A originated as a collaboration of concerned residents and local stakeholders who formed a coalition named Cordova Clean Harbor Project in 2010 to bring awareness to the polluted Cordova Small Boat Harbor. The constant presence of oil within the harbor has led it to being used as a positive control for hydrocarbon studies in the Prince William Sound (Thomas et al. 2007). Harbor water quality was voted the number one priority of environmental concern among local stakeholders during an Environmental Protection Agency's Community Awareness for a Renewed Environment workshop which took place in 2013. Top concerns included solid and hazardous waste disposal, best management practices, and outreach and education.

Abstract: The Native Village of Eyak took the lead position of the Cordova Clean Harbor project to analyze the practices of the Harbormaster's Office and the City of Cordova to understand and list Best Management Practices related to used oil, used antifreeze, used lead acid batteries, and harbor vessel garbage management, and to make improvements to existing harbor services. The Native Village of Eyak reached out to local businesses and stakeholders for solutions to improve harbor water quality. The Harbor Water Quality improvement program began in early 2014 when funds were awarded from *Exxon Valdez* Oil Spill Trustee Council. The National Oceanic and Atmospheric Association worked closely with the Native Village of Eyak to oversee the project and assist with reporting. The main purpose of this project was to recommend and implement best management practices pertaining to improper disposal of solid and hazardous waste, bilge water, maintenance solvents, and vessel garbage. These harbor services were improved by education and outreach through harbor user surveys, newspaper articles, harbor signage, Public Safety Announcements, and providing two well-placed antifreeze disposal stations, one lead acid battery disposal station, and two dumpster fences to catch flying debris in open dumpsters. Mussel tissue samples were collected during summer months to analyze the content of Poly-Cyclic Hydrocarbons, hoping to identify the sources and to determine if a decrease in toxins from the work could be detected. The Native Village of Eyak's Cordova Clean Harbor project had an active and passive yearly cycle. Most work was done during the active fishing season (April 1 – September 30) while preparation and evaluation was conducted during winter months (October 1 – March 31). The Harbor Water Quality Program ended in January 2018 however the Cordova Clean Harbor group still remains to assist with clean-up events, outreach, and education.

Key Words: Antifreeze disposal, battery disposal, Cordova Small Boat Harbor, harbor user survey, harbor water quality, lead acid

Project Data: Products of this effort include mussel tissue analysis results and condensed harbor user-survey results. Mussel tissue analysis includes Cordova Harbor Study (Appendix D).

Data were collected from blue mussels (*Mytilus trossulus*) that were collected from around the harbor and surrounding breakwall. Mussels were sent to Auke Bay Labs in Juneau, Alaska and were analyzed for Poly-Aromatic Hydrocarbons and other toxins. One-page surveys were distributed during busy summer months from 2014-2017 to all interested harbor users to encourage good boating practices and educational outreach. Results from this effort were collected as data and shared community wide to discuss concerns and ideas, see Appendix A.

Citation:

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Executive Summary:

Like many public harbors, the Cordova Harbor is faced with chronic oil and debris pollution. Annually the waters in and around the harbor are coated with spilled petroleum products, mostly the result of contaminated bilge water, and debris from boat maintenance projects. Other debris enters the harbor from stormwater runoff, dumpster garbage, animal waste, and littering. Harbor users that were surveyed prior to this project supported improving harbor conditions, increasing garbage bin availability, anti-freeze and waste oil management, and bilge-pumping services in addition to more public education and signage in the harbor.

The Harbor Water Quality Improvement Program project chose a technical approach, with input gathered via community outreach, by proposing a portfolio of several projects implemented in February 2014 through January 2018. The project was accepted and funded by the *Exxon Valdez* Oil Spill Trustee Council (EVOSTC) in February 2014 with technical support from the National Oceanographic and Atmospheric Association (NOAA) Restoration Center. The objectives of this project include:

1. Addressing harbor waste and disposal around the harbor
2. Examining ways to improve solid waste containment in and around the harbors
3. Continued outreach activities aimed at educating harbor users to best practices that will reduce waste reaching the harbor
4. Evaluate the effectiveness of the above effort

These objectives were addressed through a number of specific projects that were the result of many discussions with staff from the Harbormaster's Office, the City of Cordova, and other interested local stakeholders. (See Appendix E).

Harbor Waste and Disposal

Used antifreeze had always been a concern in Cordova because there was no place that accepted it. Often antifreeze was dumped into the City's used oil bin or directly into harbor waters. Funds were used to design and build a movable shed to house antifreeze disposal sites. In addition, a satellite disposal site was placed near the "Old Harbor" entrance.

Used lead acid batteries were another concern by not having a collection site, besides the local NAPA store. A shed was design and constructed to house used lead acid batteries close to the harbor behind the Native Village of Eyak's (NVE) office.

Solid Waste Containment

The main solid waste issue was harbor vessel trash being lost back to the environment from dumpsters left open. Wind and birds can carry the trash out of the dumpsters to make a large mess in and around the harbors. A 3-sided fence was designed and built around the two dumpster locations to discourage 'drift' from dumpsters.

Community Outreach and Education

In addition to the design and construction of improved services, community outreach was ongoing through the project to alert harbor users to proper disposal. During summer months, harbor volunteers walked the docks picking up trash and educating harbor users. Public service radio announcements were created and played on air during busy summer months. Flyers were

sent out to harbor user slip owners. Newsletters were created and distributed to all local USPS box-holders and put into the Cordova Times once every summer.

Signage

Harbor signage was improved by designing, creating, and installing outdoor metal directional signage and Harbor Rules/Regulations throughout the harbor and ramps. Existing GIS maps were updated with new disposal sites and circulated in newsletters and with interested stakeholders.

Evaluation

NVE chose to scientifically evaluate efforts by tracking change patterns in poly-cyclic Hydrocarbons (PAH) and pathogen levels in mussel tissues. This sampling program was modeled after NOAA's Mussel Watch program. Mussels were collected from throughout the harbor at different locations and shipped to Juneau's Auke Bay Laboratories for analysis twice a year. Results show increase or decrease in our efforts by total concentration in mussel tissues. Samples were not conducted in 2017 because of personnel changes at the lab and costs for analysis were significantly higher than we budgeted for.

To annually evaluate project effectiveness, other activities included

- Annually review summer outreach and winter infrastructure projects and report back to the Cordova Clean Harbor (CCH) stakeholders and funders
- Document the number of bilge pump uses/requests as compared to previous year
- Develop, distribute and analyze harbor surveys, as necessary, to identify challenges in achieving clean practices, suggestions for improvement, equipment needs, etc.
- Monitor PAH and pathogen levels in mussel tissues conducted twice per year

Introduction:

The Native Village of Eyak's (NVE) Harbor Water Quality Improvement Program, hereafter CCH (Cordova Clean Harbor) project began in 2014 to address the constant presence of oily sheen and general debris throughout the harbor. In addition, Cordova's Harbor Water Quality was voted number 1 on the NVE's list of environmental concerns through EPA's Community Action for a Renewed Environment (CARE) program. CCH had the following goals:

- Bring a local, physical presence down into the Cordova Harbor to promote clean boating practices through education and information dissemination,
- Engage local harbor staff, marine businesses, United States Coast Guard (USCG), and non-profit organizations in supporting increased use of available services, and
- Evaluate, recommend and assist with improving user practices and augmenting critical harbor services.

Cordova's harbor is located in the heart of town and serves as the home to Cordova's 700-vessel commercial and recreational fishing fleet. The harbor is heavily relied upon by the commercial fisherman, recreationists, tourists, and subsistence users for work, food, and recreation. Surveys collected from volunteers indicated that harbor users wanted to see more public education and signage, better trash management, antifreeze disposal, and more harbor outreach and education.

Objectives:

CCH goal is that Cordova Harbor's water quality will improve by applying best management practices to solid and hazardous waste disposal, boat maintenance, and good stewardship. It is our thought that if you make services easily available to harbor users with constant reminders and encouragement, these items will make their way to the proper disposal site and not into harbor waters.

Methods:

Throughout the project, NVE worked with the Harbormaster's Office and the City of Cordova, along with concerned citizens and local stakeholders. For certain events, NVE collaborated with organizations such as Alaska Clean Harbors, Copper River Watershed Project, United States Coast Guard, Prince William Sound Science Center, and Cordova District Fisherman United. Methods will be broken down into groups below.

Solid and Hazardous Waste

An antifreeze shed was designed and constructed and put into place February 2016 located adjacent to the used waste oil by the new harbor. In May 2015 a second satellite receptacle was placed near the used waste oil by the old harbor. NVE has collected and transported approximately 2,100 gallons of used antifreeze to Emerald Alaska Services for disposal.

Addressing Lead Acid Batteries

A lead acid battery shed was designed, constructed, and put into place February 2016 located behind the NVE's building. NVE collected and transported approximately 8.5 tons of lead acid batteries to Total Reclaim of Alaska in Anchorage.

Trash Management

A three sided 10' fence was built around both dumpster locations at the new and old harbor dumpsters, respectively. Approximately 15 harbor carts were purchased to help harbor users carry their trash to the dumpsters. These carts were painted "Cordova Clean Harbor Project" for awareness.

Harbor Signage

NVE worked closely with the Harbormaster's Office on the design of outdoor metal directional signage, in addition to harbor rules and regulations. Signs show proper instructions for disposal at the antifreeze and lead acid battery sheds, as well as the importance to keep hazardous waste separated at the oily waste disposal. There is signage at every ramp that leads down into the harbor that states the Cordova Harbor rules and regulations. See appendix for photos.

Education/Outreach

Weekly dockwalking (April 1 – September 30) took place during project implementation. This activity consisted of one or more persons walking up and down the floats and breakwater path picking up trash and talking to harbor users. Harbor user surveys were distributed to interested people, and as an incentive bilge pillows were given out. Bilge pillows had a tagalong sheet to them instructing harbor users why they are important and how to properly dispose of it.

Clean-up events

Community-wide Harbor cleanup events occurred in April and September. This well advertised event has been held in conjunction with Cordova Cleanup Day in the spring and held alone in the fall. It is popular with the USCG and the local Girl Scout troop. At these events, I would give a quick presentation on the importance of water quality with an emphasis on the birds and wildlife that are often seen in the harbor. I supplied trash bags and gloves, and we would pick up as much trash from the harbor water, floats, and breakwall.

Newsletter

An annual newsletter was created by NVE featuring articles and photographs from local stakeholders, businesses, and children. The newsletter included key information such as disposal sites, a biodegradation timeline, information on services available, point and non-point sources of pollution such as litter or stormwater contamination, user survey results, and information on the Cordova Harbor Water Quality project itself.

Advertisement

Public Service Radio Announcements were created and ran on air throughout the summer months. Topics include: Pet waste disposal, commercial fishing net disposal and recycling, proper oily waste disposal, engine maintenance and oil spills, antifreeze dangers and safe disposal, proper trash disposal, dumping human sewage and bilge pump out services, and hazardous paint and cleaning product dangers and their alternatives.

Results:

NVE provided the City of Cordova and Harbormaster's Office with lead-acid battery and antifreeze disposal units. We built capacity where there had been none before on the proper disposal of these hazardous wastes. Since 2015, NVE has maintained these disposal sites and

educated harbor users on how to properly dispose of lead acid batteries and used antifreeze, including where, when, and how to ship out of our community and at what costs. NVE is currently in the process of having a signed Memorandum of Understanding (MOU) with the City of Cordova on anti-freeze collection and backhaul that we anticipate being in effect summer 2018. In addition, the Harbormaster's Office has noted that there is a significant decrease of anti-freeze in the used oil receptacle.

We have seen a reduction in trash on the floats and in the harbor waters as the project continued. Many fishermen have taken to using a tarp to collect their net trimmings while working on the floats. NVE has provided harbor users with bilge pillows for their vessel engines with information on how to properly dispose at the used oil receptacle. The Harbormaster's office has noted a slight increase in their bilge pumping services.

Results from mussel sampling indicate the most likely sources seen in the harbor were unburned fuel in water (the petrogenic signal) and burned fuel and creosote pilings (the pyrogenic signal). A substantial proportion of higher molecular weight PAHs were present in 2014 (20 to 33%), therefore at least some of the contamination was likely particulate because these molecules are highly insoluble.

It was also determined that the effects of the Cordova Harbor project were not of a level and duration that could be detected through mussel sampling due to the time in which mussels hold toxins as well as the need for a much larger sample size. See Appendix D.

Discussion:

The Cordova Harbor Water Quality Program has addressed many on-going problems with solid waste in and around the Cordova Small Boat Harbor. Many of the issues had stemmed from the lack of available services, but also from harbor user behavior and lack of enforcement. With constant outreach and education, we informed harbor users on best management practices to take advantage of available services.

There are also non-point sources of pollution that enter our harbor that this project was not able to fully address because the Cordova Harbor is built at the base of Cordova and surrounded by hills and businesses. These include stormwater runoff, snow melt runoff, small engine and home heating tank oil and gasoline spills, and any accidental discharge of waste from surrounding businesses.

Due to Cordova's remote location, the cost of backhauling used oil, antifreeze, and lead acid batteries are very high. NVE suggests for these programs to continue, our local stakeholders will need to create MOU's with our local barge service and explore alternatives to shipping these used products out, such as recycling locally.

Conclusions:

Improving available services and public education were key components to this project and are critical if our efforts continue. The City of Cordova and the Harbormaster's Office have chosen to continue the used antifreeze collection and disposal. NVE will assist them with education efforts and by providing NVE's information on collection and backhaul. In addition, NVE will

continue to collect and stage lead acid batteries at the battery shed until funding becomes available for transport.

Harbor-user survey results show that most harbor users would like to see more enforcement and fines for people that continue to litter, break rules, and dispose of hazardous wastes illegally. This shows that there are enough people that care about our harbor to make a difference. I would recommend that the Harbormaster's Office begin to enforce posted rules, so the new generation of fishermen and harbor users will adhere to the best management practices and begin to teach it.

Survey results also show support for more dumpsters located closer to ramps, more utility carts, oil spill absorbents and skimmers, and more education/signage. NVE will assist the City of Cordova and the Harbormaster's Office with their efforts to engage the community in improving harbor water quality. We will continue to host annual harbor cleanup events, outreach and education through newspaper and newsletter articles, and harbor slip mailings.

This project has been essential to our community to show how stakeholders can come together to implement BMP pertaining to our harbor. Other small communities can learn from our successes to improve their harbor water quality, and I look forward to providing assistance when I can with public presentations at state-wide environmental forums.

Acknowledgements: We would like to thank the *Exxon Valdez* Oil Spill Trustee Council for funding this project and the National Oceanic Atmospheric Association for their guidance. We would like to acknowledge the City of Cordova and the Harbormaster's Office and Cordova Clean Harbor and their partners, and the Alaska Clean Harbor's Program for their efforts. Lastly, we would like to thank the many volunteers who helped with trash pickup and dockwalking.

Literature Cited:

Thomas, R.E., M. Lindberg, P.M. Harris, and S.D. Rice. 2007. Induction of DNA strand breaks in the mussel (*Mytilus trossulus*) and clam (*Protothaca staminea*) following chronic field exposure to polycyclic aromatic hydrocarbons from the *Exxon Valdez* spill. *Mar. Pol. Bul.*, 54(6): 726-7.

Appendices:

- A. Newsletters (2015, 2016 and 2017)
- B. Harbor user surveys and results (2014, 2015, 2016 and 2017)
- C. Photos (signage, harbor carts, antifreeze shed, lead acid battery shed, cleanup events)
- D. Cordova Harbor Study, Mark Carls
- E. Harbor Services Location Map



Working together to keep our harbor free of oil and debris

Let's work together to keep Cordova's harbor clean!

Cordova's harbor is the heart of our town and home to our vital fishing fleet. It is a valuable resource and our community deserves a healthy harbor that we are proud of.

The fertile waters of Prince William Sound and the Gulf of Alaska support abundant fisheries that supply food for thousands of people around Cordova, Alaska and the rest of the world.

Contamination of these waters can seriously harm fish and other marine life, and in turn may impact our fishing industry and local and regional economies.

Keeping our waters clean is an investment in our future, and helps ensure our renewable resources stay productive for generations to come.

Pollution can come into Cordova Harbor from all sorts of point and non-point sources.

Direct point sources include improper storage, transfer and disposal of petroleum products and hazardous chemicals (fuel, used oil, antifreeze, cleaners, solvents and paints). Food and litter are often blown or thrown overboard.

Other sources include dumping human or animal waste, YUCK!

Dog poop is a big problem it causes high amounts of fecal coliform in our waters.

Indirect sources of pollution to our harbor include contaminated storm water, sediment runoff, snow storage and runoff, and wind and birds spreading garbage from open dumpsters.

All of these pollution inputs create unknown risks to the people, environment, fish and wildlife that use the Cordova Harbor.

A little oil in the bilge water has a bigger impact than you might think.

Over 85% of petroleum introduced into the water by humans comes from runoff and improper discharge of oily water by vehicle and boat owners.

That's a lot of oil! And that oil has some serious impacts – one cup of oil can contaminate one million gallons of water. Salmon, which are vital to our economy, are impacted by hydrocarbon concentrates as low as one part per billion.

Each year more than 7 billion tons of marine debris makes its way into the oceans and thousands of animals die from ingestion or entanglement in trash. 80% of this trash comes from land-based sources. Some of the most dangerous culprits to marine life include plastic bags, balloons, derelict nets and line, 6-pack rings, large black rubber bands used in crabbing, and packing straps.

Pollutants spread out in water and contaminate the bountiful waters of Prince William Sound. From tiny plankton to large orcas, every time an animal grabs a bite, they eat the oil, antifreeze and plastics around their dinner. Those toxins don't easily leave the body and consequently build up in our food and in us. The further up the food chain we look, the greater the concentration of toxins.

If we all chip in and make some small changes, we can ensure a cleaner, healthier, and more sustainable Cordova.

FACT

Marine debris adversely impacts at least 260 marine species, including marine mammals, sea turtles and seabirds including 86 percent of all sea turtle species, 44 percent of all sea bird species, and 43 percent of marine mammal species.

Biodegradation Timeline



(Sources: EPA, US National Park Service, Mote Marine Laboratory)



What do you think about our harbor and how can we keep it clean?

Well, the Cordova Clean Harbor Commission asked and you answered!

In the summer of 2012, we surveyed 336 harbor users about issues affecting Cordova's harbor.

Fishermen, recreational users and the general public let us know that it is very important to keep chemical contaminants out of Cordova's harbor.

Most respondents use absorbent pads and bilge pillows to catch spills and know that they can be disposed of at the used oil collection tanks behind the Harbormaster and near the Old Harbor entrance.

Few people use the portable bilge or sewage pump-out stations; you can take advantage of this service by calling the Harbormaster!

About half of the respondents take their toxic waste to the Baler and many expressed interest in using an antifreeze waste container if it were near the harbor.

Harbor users let us know that more hand trucks and utility carts would be useful for transporting batteries, contaminants and trash off their boats. They recommended moving the dumpsters closer to the harbor ramps and making them more bird and animal proof.

Other improvement ideas include regular skimming of harbor waters, collection sites for used or contaminated fuel, modifying the fee structure for pump-out services, and increasing enforcement of illegal pumping and dumping.

Many people called for more education about proper prevention and disposal procedures as well as location of services.

You spoke and we listened! Read on to learn more about the threats to our fertile waters and what we can do to help keep our harbor clean.



Cordova Clean Harbor volunteer, Michelle Halm O'Leary, speaks with longtime fisherman, Mike Scott, as he shares his concerns about harbor pollution.

FACT

Birds and animals mistake items such as plastic bags, cigarette lighters, and brightly colored plastics as food and may suffer from internal injury, intestinal blockage and then starvation.

DOG POOP

HAZARD



Animal feces take about a year to degrade and are a source of fecal coliform and other contaminants. Pet waste can transmit parasites, salmonella, E. coli, and fecal coliform bacteria. These contaminants can make us sick and fuel the growth of unwanted algae in our waterways.

SOLUTION

- Collect your pet's waste with a bag and dispose of it in the trash.
- Reuse old plastic bags or better yet, use biodegradable bags! (Note locations of poop bag stations around Cordova...also they can be purchased as www.poopbags.com...not sure if you can promote a particular website or not.)

BILGE WATER

HAZARD

Oil can easily clog other marine life.

SOLUTION

- Prevent fuel spills
- Protect your bilge
- Place sorbent pads
- Monitor for leaks
- Before putting out, use automatic bilge pump
- Install a bilge pump
- Call the Harbormaster
- Do not use automatic bilge pump if you are not sure it is working properly. Instead, use a manual bilge pump.
- Harbor station soap in the bilge
- Never pump bilge water overboard.



NET DEBRIS

HAZARD



Torn, damaged, and discarded nets keep "fishing" long after they have left the boat. The gear continues to entangle and potentially kill marine life. Ghost nets can smother habitat and be a hazard to navigation. Ghost fishing normally occurs with passive fishing gear such as longlines, gill nets, entangling nets, trammel nets, and traps and pots as opposed to active fishing gear such as trawls and seines.

SOLUTION

- Support the development and purchase of biodegradable fishing gear.
- Make use of Cordova's net recycling program sponsored by community partners.
- Bring nets to collection bins located at the Harbormaster or Baler in the summer or at Redden Net in the winter.

easy CLEAN

ANTIFREEZE

HAZARD



Ethylene glycol, the main ingredient in antifreeze, is poisonous. Improperly disposed antifreeze can seep into soil, groundwater and waterways. Once in the water, it kills fish and other animals. Four tablespoons of antifreeze can kill a dog, one teaspoon can kill a cat, and two tablespoons is hazardous to children.

SOLUTION

- Use less toxic propylene glycol-based antifreeze.
- Keep antifreeze and fuel or oil in separate, sealed and marked containers.
- Never mix them together! Bring your antifreeze to the Baler for disposal or recycling.

SEWAGE

HAZARD

SOLUTION



TRASH

HAZARD

Trash and fishing line can strangle marine mammals and sea birds, trap fish, and entangle your engine prop. Plastic bags break down into small fragments and absorb surrounding toxins which are accidentally ingested. Birds, fish and mammals often mistake plastic for food, with a stomach full of plastic, the afflicted animal feels full and may die of starvation. Plastic loops such as packing straps, rubber bands and 6-pack rings can entangle and strangle marine animals.

SOLUTION



- Reduce trash and plastic consumption from the get go!
- Buy products with as little packaging as possible and throw away trash on land rather than bringing it onto your boat.
- Bring your own bags when shopping or opt out of taking a bag for small items. Secure trash on board so it cannot blow away or be eaten by animals.
- Cut all loops before tossing: packing bands, rubber bands, and 6-pack rings!
- Dispose of trash in the dumpsters behind the harbor office or in the parking lot across from the old harbor entrance near Cordova Outboard.
- Use a buddy system to manage the heavy and cumbersome lids; make sure to close the lids when finished.

FACT

Since 2010 the cities of Bethel, Hooper Bay and Homer have banned the distribution of plastic bags. Bethel has also banned the use of takeout containers.

contaminate bilge water, which if discharged, can harm fish and e.

st, absorb second, and pump third!

ur bilge from excess water from rain, snowmelt and seawater. ent pads/tray under your engine and in the bilge.

ie bilge for oil accumulation – find the source and fix it.

mping the bilge, soak up any floating oil – especially with an bilge.

lge water filter to help remove contaminants.

arbormaster to schedule a bilge pump out.

dispersants or soap to break up the oil in a bilge. The oapy, oily water is more toxic and much more difficult to clean l, use an enzyme-based bilge cleaner which is less polluting. If can separate oil and water and reuse the oil – but if there he mix, bilge water becomes hazardous waste which is much nsive to treat.

ip oily bilge water overboard, use a marine bilge pump out

USED OIL/OIL CHANGES

HAZARD

Small amounts of oil in the ocean can harm fish and other marine life. Plants and animals are sensitive to petroleum pollution and concentrations as low as one part per billion can harm salmon.

SOLUTION



- Run the engine and heat the oil prior to changing your oil; contaminants are not left in the pan and the oil will flow easier.
- Catch spills by using drip pans and absorbent pads under the engine drain, receptacle and transfer hoses.
- Remove the used oil filter and put it in a Zip Lock baggie.
- Seal, and dispose of the filter as hazardous waste at the Baler.
- Drop off used oil in collection tanks behind the Harbormaster office or in the parking lot across from the old harbor entrance near Cordova Outboard.

BATTERIES AND ZINCS

HAZARD

Batteries and zincs contain heavy metals which accumulate in marine sediments and work themselves into the food chain. If they are not handled properly, these metals can have long-term impacts on your health and environment.

SOLUTION



- Use rechargeable batteries in EPIRBs, flashlights, and other equipment.
- Dispose of batteries and zincs appropriately:
 - Lead batteries can be dropped off behind Cordova Outboard.
 - Small batteries should be disposed of as hazardous waste at the Baler or at the Post Office
 - Zincs should be saved and recycled for scrap metal at the Baler.

OIL AND FUEL SPILLS

HAZARD

Small oil and fuel spills are the leading cause of petroleum input into marine waters.

SOLUTION



- Never leave nozzle unattended when fueling.
- Maintain hoses, gaskets and fuel lines.
- Develop a spill plan and incorporate it into your regular checklist – ensure all crew members know the plan.
- Never hose down spills or use soap to disperse fuel or bilge oil.
- Bring contaminated fluids back to town and dispose of them properly.
- Do not mix oil and fuel together.
- Report all spills, regardless of size, to the Alaska Department of Environmental Conservation Spill Prevention and Response hotline: (907)269-3063

MEAN HARBOR guide

FACT

Nearly 75% of all metal is used just once. Recycling steel reduces air and water pollution and requires 70% less energy than producing it from raw materials.

PUMP-OUT

Dumping raw or partially treated human sewage can spread disease, contaminate marine habitats and poses a threat to harvesting seafood and recreational activities.

- Make use of sewage pump-out stations and never pump sewage overboard within three miles of shore.
- Use on-shore restrooms when in port.
- Install and use a marine sanitation device to keep raw sewage and chemicals out of the water.
- Don't use holding tank additives that contain chlorine, formaldehyde, or "preservatives" because these chemicals can harm marine life.
- Encourage the development of more pump-out stations.

BOAT CLEANING/SOLVENTS, PAINTS, & CLEANERS

HAZARD

Many boat paints and cleaning products (including detergents, scouring powders and bleaches) are extremely toxic to marine life.

SOLUTION



- Use biodegradable cleaners, solvents and paints.
- Don't be fooled by safe sounding names – read the product labels!
- Use a tarp when scraping or painting on the grid or beach.
- Limit overspray by using a high-volume low-pressure paint sprayer.
- Avoid painting on windy days.
- Re-use paint thinners and solvents by letting contaminants settle.
- Share leftover paints with other boaters.
- Dispose of unused or contaminated solvents, paints and toxic cleaners as hazardous waste at the Baler.

Mean green cleaning solutions

Windows/ Mirrors:

Mix 1 cup vinegar with 1 quart water, put in a spray bottle, rinse and squeeze.

Grease:

Use lemon juice, vinegar, or sprinkle with Borax and scrub with scrub brush.

Plastic:

Clean with a mix of 1 part vinegar to 2 parts water.

Interior Woods:

Clean with olive oil or almond oil. Only use on interior woods as they do not hold up to direct sunlight.

Fiberglass Stains:

Mix a paste of baking soda and water (abrasive!). Rinse with lemon or lime juice.

Toilet Cleaners:

Use Borax or liquid castile soap and baking soda and a toilet brush.

Decks:

Mix 1 part white vinegar with 8 parts warm water.

Chrome:

Use apple cider vinegar and a soft cloth, then a dab of baby oil to restore shine.

Brass:

Use worcestershire sauce, or a paste made of equal parts vinegar, salt and water.

Teak:

Use mild powdered soap and bronze wool.

Copper fittings:

Use a solution of lemon juice and water.

Stainless Steel:

Clean with undiluted white vinegar.

Glass:

Apply vinegar with newspaper and then buff with dry newspaper.

Powdered Bleach:

Sprinkle Borax on stains and scrub.

Aluminum:

Clean with a solution of 2 tablespoons cream of tartar and 1 quart hot water on a soft cloth.

RECAP: Where do I take that?

Dog Poop:
Bag and drop in the regular trash or dumpsters behind the harbor office or in the parking lot across from the old harbor entrance near Cordova Outboard.

Net Debris:
In the winter, drop off discarded nets at Redden Net.
In the summer, drop off nets at Harbormaster or Baler.

Bilge Water:
Schedule a bilge water pump out with the Harbormaster. Ph. (907)424-5600

Sewage Pump-out:
Schedule a bilge water pump out with the Harbormaster. Ph. (907)424-5600

Used Oil / Oil Changes:
Bring used oil to collection tanks behind the Harbormaster office or in the parking lot across from the old harbor entrance near Cordova Outboard.

Oil and Fuel Spills:
Report all spills, regardless of size, by calling the ADEC hotline: 907-269-3663

Trash:
Dispose of trash in the dumpsters behind the harbor office or in the parking lot across from the old harbor entrance near Cordova Outboard.

Batteries and Zincs:
Lead batteries can be dropped off behind Cordova Outboard. Small batteries should be disposed of as hazardous waste at the Baler or dropped off at the Post Office. Zincs should be saved and recycled for scrap metal at the Baler.

Antifreeze:
Bring antifreeze to the Baler for disposal or recycling.

Boat Cleaning Solvents & Cleaners:
Dispose of unused or contaminated solvents, paints and toxic cleaners as hazardous waste at the Baler.

Sources:
<http://www.projectorah.org/107/107-Take-4-don-Marine-Debris.html>
<http://www.fair.noaa.gov/protectedresources/entanglement/impacts.htm>
<http://www.scribd.com/doc/2006643/Tackling-Marine-Debris-in-the-21st-Century-Report-to-DOD>
<http://marinedebris.noaa.gov/marinedebris101/Impacts.html#entanglement>
<http://latimesblogs.latimes.com/greenepeace/2009/09/blasto-marine.html>
http://www.b-a-c-h.org/marine_debris.html
http://bigfishes.faa.usf.edu/submarine_debris.html
<http://ltdmmed.blogspot.com/2009/07/07es-macrodets.html>
<http://www.coastal.ca.gov/public/marinedebris.html>
<http://coastservice.noaa.gov/facts/goodfishing.html>
<http://www.fao.org/fishery/topic/4739/en>
<http://www.pws.wildapricot.org/Default.aspx?pageid=55304>
<http://alaskadeerharbors.org/>
<http://www.neyak.com/PDF/CoastalCordova%20Harbor%20Environment%20Plan.pdf>
<http://www.pws.wildapricot.org/resources/Documents/47%20CoastalCordova%20new%201.pdf>
<http://www.wco.noaa.gov/ENM/Factsheets/antifreeze.html>
<http://pumpoutwashington.org>
<http://www.ncddr.org/Boating/Laws/Safety/CleanVessel.cfm>
http://www.maine.gov/mtrm/public_health/wepwefacts2012.pdf

Take Action!

Inform your friends, families, and colleagues about the threats to our important harbor and waters. Encourage them to take individual action to clean up these threats as well.

Brought to you by the Native Village of Eyak CARE program and partners:
 Native Village of Eyak, Prince William Sound Science Center, Alaska Sea Grant Marine Advisory Program, Alaska Department of Fish and Game, City of Cordova, Copper River Watershed Project, and Prince William Soundkeeper.

Cordova Clean Harbor
 c/o Prince William Sound Science Center
 P.O. Box 1110
 Cordova, AK 99574

FACT Cordova's 500 dogs produce an estimated 162 pounds of waste *every day* - more than a ton in less than two weeks!





Working together to keep our harbor free of oil and debris

Summer 2016

Let's work together to keep Cordova's harbor clean!

If you think about it, the Cordova Small Boat Harbor is the heart of our town.

It is the home to over 720 fishing and recreational vessels that are directly connected to Cordova's economy and livelihood. It is a valuable resource and our community deserves a healthy harbor to be proud of. The waters of Prince William Sound, the Copper River, and Gulf of Alaska support abundant fisheries that supply food for the people of Cordova, Alaska and the rest of the world.

There are countless birds, sea otters, harbor seals and juvenile fish that live and forage here. Contamination of these waters can seriously harm the fish and marine life, which has a direct impact on our fishing industry. Keeping our waters clean is an investment in our future and helps ensure our renewable resources stay productive for generations to come.

Pollution comes into the Cordova Harbor from many point and non-point sources. Point sources include improper storage, transfer and

disposal of petroleum products and hazardous chemicals (fuel, used oil, antifreeze, cleaners, solvents and paints), food and litter that is blown or thrown overboard, and the dumping of human or animal waste. Non-point sources of pollution include contaminated storm water, sediment and snow storage runoff, and wind and birds spreading garbage from dumpsters left open.

Almost all litter and petroleum spills in town get washed into the harbor when it rains. These sources of pollution are all connected to harbor health and create unknown risks to the people, fish and wildlife that use the Cordova Harbor.

The Native Village of Eyak, the City of Cordova, and many local partners are working hard to improve harbor water quality by improving existing services and through outreach and education. This project has been funded by the Exxon Valdez Oil Spill Trustee Council.

Biodegradation Timeline



(Sources: EPA, US National Park Service, Mote Marine Laboratory)

Where do I take that?

TRASH:

Dispose of trash in the dumpsters behind the harbor office or in the parking lot across from the old harbor entrance near Cordova Outboard. Dumpsters are for harbor vessels only.

NET DEBRIS

Drop off discarded nets at Redden Net or the baler year round.

ANTIFREEZE

FREE: Bring anti-freeze to the anti-freeze collection site at the Harbormaster's office next to the used oil.

ANIMAL WASTE

Bag and drop in the regular trash or dumpsters behind the harbor office and in the parking lot across from the old harbor entrance near Cordova Outboard. There are dog waste bags at the Breakwater trailhead and the Harbormaster's Office.

USED OIL / OIL CHANGES

FREE: Bring used oil to collection tanks behind the Harbormaster office or in the parking lot across from the old harbor entrance near Cordova Outboard.

BOAT CLEANING SOLVENTS & CLEANERS

Dispose of unused or contaminated solvents, paints and toxic cleaners as hazardous waste at the Baler. Do not leave these toxins at the used oil or antifreeze collection sites.

SEWAGE PUMP OUT

Call the Harbormaster to schedule a sewage pump out. (907)424-6400. Cost: \$95.29/hour

BATTERIES

FREE: Lead acid batteries can be dropped off behind NVE or NAPA, and small batteries can be recycled at the Post Office.

BILGE WATER

Schedule a bilge water pump out with the Harbormaster.

CARDBOARD/PAPER, GLASS & ALUMINUM CANS

Is collected in marked bins on Harbor Loop Road across from AC's or behind the old library across from the Cordova Community Baptist Church. Recycle whenever you can to help preserve our landfill for years to come!

Take Action! Inform your friends, families, and fellow fishermen about the threats to our important harbor and waters. Encourage them to join you in taking action to clean up these threats.



The Curious Case of the Toxic Rainbow Puddle

Shae Bowman
Copper River Watershed Project



Stormwater has long been considered a nuisance and as a result city planners designed the cityscape to get rid of stormwater as efficiently as possible. The unintended result is rainwater washing across hardened surfaces like parking lots where it picks up pollutants and flows into stormdrains and then directly into local waterbodies. You often see the telltale rainbow sheen on the surface of stormwater. According to the Environmental Protection Agency (EPA) stormwater run-off is the largest threat to water quality in the United States today. Stormwater run-off includes any pollution from streets, parking lots, and driveways that wash into the storm drains when it rains. Pollution sources include heating fuel from home heating tanks, fluids from leaky vehicles, trash, dog poop, sand, gravel, and salt.

Stormwater pollution is especially toxic for the environment because unlike household wastewater, stormwater is untreated and flows directly into local waterbodies. Used oil from a single oil change has the potential to contaminate up to one million gallons of fresh water. According to the EPA, there are approximately 193 million gallons of used oil improperly dumped in America every year. That is roughly the equivalent of 17 Exxon Valdez oil spills!

Fortunately, there are simple ways to prevent oil, fuel, and other hazardous materials from becoming stormwater pollution by disposing of them in the proper locations. There are accessible collection tanks for used oil and antifreeze behind the Harbormaster. Unused cleaning solutions and paints can be disposed of at the City Baler.

Of course, the best solution is to prevent pollution in the first place. Regular inspection and repair of hoses, gaskets, and fuel lines is the first line of defense and it also saves money. When changing the oil, use a drip pan and an absorbent pad to catch any stray oil. If you see a spill, regardless of size, make sure to report it by calling the Alaska Department of Spill Prevention and Response at 907-269-3063. One quart of motor oil has the potential to contaminate 250,000 gallons of water if not properly cleaned up.

Next time it's raining, can you find and stop the source of one of those toxic rainbows? Sometimes identifying a single source is obvious and sometimes it's a conglomerate of several sources contributing to the toxic gushes. Please do what you can to help prevent stormwater pollution and Don't Run-off Salmon!

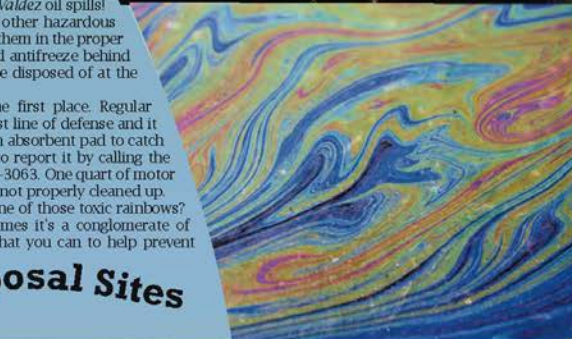
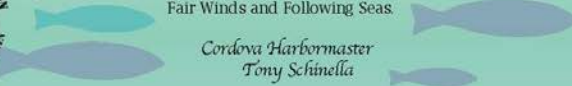
From the Desk of the Harbormaster

I would like to welcome everyone back to Cordova and wish all the fishermen a safe and prosperous fishing season. Thanks to the Clean Harbor group and Native Village of Eyak, we now have a place to dispose of used antifreeze and lead acid batteries.

Help make the harbor and surrounding area a cleaner place by picking up after your pets and putting your garbage in the provided dumpsters. Remember that the dumpsters are for bagged trash, please take your engine parts and debris to the Refuse Department.

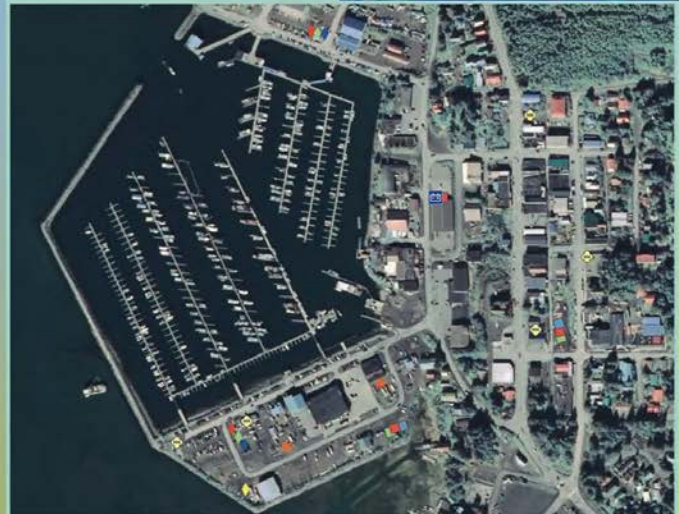
Fair Winds and Following Seas

Cordova Harbormaster
Tony Schinella



Cordova Waste Disposal Sites

- ◆ Dumpsters - For Vessels Only
- ◆ Used Antifreeze Only
- ◆ Used Engine Oil
- ◆ Used Nets
- ◆ Lead Acid Batteries
- ◆ Cardboard/Newspaper
- ◆ Aluminum
- ◆ Glass
- ◆ Household Batteries
- ◆ Dog Waste Dispensers
- ◆ City Baler





Using Mussels to Monitor Harbor Health

Mussel Sampling and Results

Ivy Patton
Native Village of Eyak

The Blue Mussel, *Mytilus trossulus*, was selected for the Cordova Clean Harbor monitoring plan because it is an important indicator species. The plan was modeled after the Prince William Sound Regional Citizens' Advisory Council (PWSRCAC) Long Term Environmental Management Plan (LTEMP). Mussels are filter feeders which take up contaminants readily and are an important subsistence food for humans, sea birds and sea otters. Previous studies at the Cordova Harbor (1997-2009) analyzing blue

mussel tissue samples for hydrocarbons confirmed high levels for petroleum. These results led to the Cordova Harbor being used as a positive control for hydrocarbon studies in the PWS. From 2014-2016, mussels were collected twice a year from the Cordova Harbor in accordance with the NOAA mussel watch program during low-tide along the rock-wall, boat launch, boat haul-out, and different locations from the piers at both the new and old harbor. The samples were sent to NOAA Auke Bay Laboratories in Juneau for analysis.

For reference, hydrocarbons in mussel tissues in this study were compared with those in mussels collected from another Prince William Sound location, Gold Creek near Valdez.

The composition was mixed, suggesting at least two different contaminant sources. Read more below for discussion.

Alkanes were also present in mussel tissues from the Harbor. Normal alkanes are a saturated hydrocarbon present in both fuel and creosote and there are natural sources. The mean concentration was 72,264 ng/g dry wt, significantly greater than background levels (1,389 ng/g dry wt). Pristane and phytane concentrations were dominant in Cordova Harbor mussels. This pattern typically emerges as a result of weathering processes because these branched isoprenoids are more resistant to weathering than comparable mass normal alkanes.

Mussel Sampling Discussion

Mark Carls
NOAA

Hydrocarbon concentrations in Cordova Harbor were consistently elevated above background levels in 2014 to 2015 (measured in this study) and in previously reported data (2002 to 2009). At least two different sources were evident, a petrogenic source and a pyrogenic source. These sources were likely unburned fuel in water (the petrogenic signal), and burned fuel and creosote pilings (the pyrogenic signal). There were also two plausible routes of accumulation in the mussels, which are filter feeders, uptake of dissolved constituents from water and consumption of contaminated particles. Concentration and composition of PAHs and alkanes varied among sample times, suggesting episodic contamination events that vary in magnitude.

Unburned diesel fuel was likely one of the sources of mussel contamination in Cordova Harbor. The drop in dibenzothiophene content in mussels after 2009 reflects a change in the diesel fuel source. The U.S. EPA mandated ultra-low sulfur diesel (ULSD) fuel oil in 2006 and this was apparently implemented in Cordova by about 2009. Diesel fuel collected at the Cordova fuel dock had very few dibenzothiophenes in 2015. Diesel source oil samples specific

to Cordova prior to the 2009 were not available, but composition can be inferred from local spills. Dibenzothiophenes were more prominent in diesel spills in Port Chalmers (2002) and Jack Bay in (2004). Thus the sulfur content changed in diesel

oil between 2002 and present, and this change is reflected in mussels. This is strong indirect evidence that diesel is a source of contamination in Cordova Harbor mussels.

Creosote is a second likely source of mussel contamination in Cordova Harbor. The substantial presence of Heavy Molecular Weight (HMW) PAHs in mussel tissue can be contributed by creosote but not diesel fuel. Composition of these molecules in mussels was highly similar across time, suggesting a single source and the observed composition was similar (but not identical) to that observed in the single creosote source sample measured for this study. The HMW PAHs are highly insoluble, thus the route of contamination for these molecules is likely consumption of particulate creosote abraded from treated pilings and available to the filter-feeding mussels.



What's New?

Lead-Acid Battery and Antifreeze Collection Sites

A lead-acid battery disposal shed was constructed and put in place late 2015. In May 2016, we have shipped out over 2,700 pounds of lead acid batteries to be properly disposed. Bring your intact (non-leaking or busted) lead acid batteries to the shed behind NVE. Do not leave your batteries in the rain. Do your part to recycle batteries responsibly.

What are Lead-Acid Batteries?

Lead-acid batteries are used in cars, trucks, motorcycles, boats, and other motorized equipment. Each battery consists of a polypropylene plastic case containing lead plates immersed in a sulfuric acid electrolyte.

Why are they harmful?

Symptoms of low-level lead exposure include fatigue, impaired central nervous system functions, and impaired learning. Severe lead poisoning can result in coma, convulsions, irreversible mental retardation, seizures, and even death.

Why should I recycle Lead-Acid Batteries?

If lead-acid batteries are disposed of in a solid waste landfill or illegally dumped, the lead and sulfuric acid can seep into the soil and contaminate ground water, potentially affecting the quality of our drinking water supply. If the batteries are disposed of near rivers, streams, lakes, or marine waters, the lead and sulfuric acid can also threaten aquatic life.

Antifreeze Shed Info

What is Antifreeze?

The antifreeze collection shed has been in place since late 2015. Over 85% of harbor users said they would support an antifreeze collection site if one was placed near the harbor. In May 2016, we shipped out over 330 gallons of used antifreeze. Do your part to recycle antifreeze responsibly. Never put used oil into the antifreeze bins, or vice versa. Do not leave random containers of antifreeze laying in the shed. Dispose of antifreeze by using the funnel and the drum/tank provided. It only takes a few minutes to dispose of your hazardous waste properly.

Did You Know?

- Ethylene glycol, the main ingredient of all major antifreeze brands, has long been known to be poisonous. It has a sweet smell and taste which is attractive to children and pets and is highly toxic. Drinking it will result in depression followed by heart and breathing difficulty, kidney failure, brain damage and even death.
- Used antifreeze may also contain metals, such as copper, zinc, and lead.
- All antifreeze, new and used, must be safely stored in order to avoid tragic consequences.
- Approximately 2 teaspoons of antifreeze is enough to kill a cat.

A Cleaner Future

The Cordova Clean Harbor (CCH) project is a partnership of Cordova organizations and individuals dedicated to spreading awareness about the benefits of having a clean harbor. Cordova's harbor is the heart of our town and home to our vital

fishing fleet. It is a valuable resource and our community deserves a healthy harbor that we are proud of. Keeping our waters clean is an investment in our future and helps ensure our renewable resources stay productive for generations to come. If we all pitch in and make small changes, we can ensure a cleaner, healthier, and more sustainable Cordova. Read further to find

out what you can do to help. Please take a moment to talk to the CCH volunteers this summer to ask questions, offer feedback, and to take a survey. We always have room for more volunteers! One of our goals is to get our harbor certified as an Alaska Clean Harbor, like the cities of Homer, Seward, and Haines. Let's work together to keep Cordova's harbor clean!

Did You Know?

- 1 cup of oil can contaminate up to 500 gallons of water. Always report oil spills in the harbor to the Harbormaster's Office or the State of Alaska at 1-800-478-9300.
- Net trimmings are trash, too. You can use a tarp on the floats to collect net trimmings for proper disposal. All those little pieces accumulate and add to over-sedimentation.
- Birds and animals mistake items such as plastic bags, cigarette lighters, and plastics as food and may suffer from internal injury, intestinal blockage, and then starvation. Please throw your trash in the garbage.
- Cordova's 500 dogs produce an estimated 162 pounds of waste every day - more than a ton in less than two weeks. Dog poop is a problem because it causes high amounts of fecal coliform in our waters. Bag it and dispose of it!
- It takes cigarette butts up to 5 years to biodegrade. Don't flick your cigarette butt!

The Numbers

- 43%** of harbor users surveyed do NOT take used antifreeze, gasoline, paint, solvents, or other waste to the Baler.
- 53%** of harbor users surveyed do NOT use the dog-waste bag dispensers to clean up after pets around the harbor.
- 98%** of harbor users surveyed think it is important to keep chemical contaminants out of the water.
- 62%** of harbor users surveyed use a tarp to collect net waste trimmings while net mending.
- 87%** of harbor users surveyed currently use absorbent and/or bilge boom in their bilge to catch spills.

* Survey responses are based on a Cordova Clean Harbor survey conducted by volunteers in 2015.

Cleaning Boats in Cordova's Harbor

Every mariner is aware that cleaning and maintenance is a part of owning a boat. These activities ensure safe and efficient operations at sea, but can have adverse impacts on human health, aquatic life and the water quality of Alaska's harbors.

Many of the products that are used in boat maintenance have toxic and corrosive components. Avoiding these products or using them responsibly can reduce the impacts that may affect your health and the health of our marine resources.

To keep more of what we want in the water, keep these tips in mind to keep the toxics out of the water.

- Minimize the use of corrosive and toxic cleaners. If you have to use these products, familiarize yourself and your crew with their correct use, handling, and disposal.
- Be an educated consumer and read the labels. Key words on labels are: DANGER, WARNING and CAUTION. "Danger" means extremely flammable, corrosive or toxic. "Warning" implies it is moderately hazardous. "Caution" indicates less hazardous products. If it's possible, choose products that are less hazardous.

- Use less toxic alternative cleaners that may require a little more elbow grease, but are usually less expensive and less toxic to you and the environment. See the list below of typical cleaners and their alternatives.

- Avoid products that contain ammonia, bleach, chlorinated solvents, petroleum distillates and lye - all common products that are toxic to marine life.

- Keep the finish on your vessel clean and well-maintained to resist dirt.

- Use frequent soft cleaning of the deck and hull to avoid abrasive cleanings. Wash down your vessel frequently with water and sponges.

- Limit the use of detergents or soaps and use phosphate-free soaps. Soaps have impact on habitat by limiting the ability of aquatic animals to breathe. The suds that are produced by excessive soap don't do anything - they aren't needed for effective cleaning!

- Collect wastes and properly dispose of them ashore. Use dust collection systems when sanding to minimize the introduction of paint chips into the environment.

Instead of... Use These Safe Alternatives!



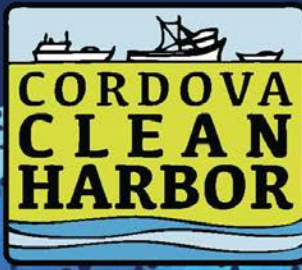
- Glass Cleaners
- Grease Cutters
- Powdered Bleach
- Toilet Cleaners
- All-Purpose Cleaners

- Apply vinegar with newspaper and then buff with dry newspaper. It really works!!!
- Use lemon juice, vinegar, or sprinkle with borax and scrub with scrub brush.
- Sprinkle Borax on stains and scrub!
- Liquid castile soap and baking soda or Borax and a toilet brush.
- Liquid castile soap and baking soda or Borax in different ratios will clean many things. Use very little soap and soda/Borax and lots of water on floors, walls and counters. Use more soap, soda/Borax for tubs, sinks, or anything that will be rinsed.



For more information, contact the Clean Harbor Coordinator at (907) 424-7738.
 Thank you from NVE and CCH partners: Alaska Sea Grant, City of Cordova, Copper River Watershed Project, Cordova District Fishermen United, F/V Alpine, F/V Chagvan, Native Village of Eyak, Oil Spill Recovery Institute, Prince William Soundkeeper, Prince William Sound Science Center, Alaska Clean Harbors Program, United States Forest Service and the National Oceanic and Atmospheric Administration.





Working together to keep our harbor free of oil and debris

A CLEANER FUTURE

The Cordova Clean Harbor (CCH) project is a partnership of Cordova organizations and individuals dedicated to spreading awareness about the benefits of having a clean harbor. Cordova's harbor is the heart of our town and home to our vital fishing fleet.

It is a valuable resource and our community deserves a healthy harbor that we are proud of. Keeping our waters clean is an investment in our future and helps ensure our renewable resources stay productive for generations to come. If we all pitch in and make small changes, we can ensure a cleaner, healthier, and more sustainable Cordova. Summer 2017 is the last of the funding awarded to assist in lead acid battery and antifreeze collection and disposal. Read further to find out what you can do to help. Please take a moment to talk to the CCH volunteers this summer to ask questions, offer feedback, and to take a survey.

We always have room for more volunteers! One of our goals is to get our harbor certified as an Alaska Clean Harbor, like the cities of Homer, Seward, and Haines. Let's work together to keep Cordova's harbor clean!



Photo courtesy The Cordova Historical Society
This is the Cordova Small Boat Harbor in the 1940s.

Harbor History

The first wharf was completed around 1927, but in 1935 Congress authorized funds and directed the Corps of Engineers to build a harbor for Cordova. It was completed in 1938.

After the 1964 earthquake the Corps came in and did major dredging and in 1966 rebuilt the two breakwaters that failed and built a 3rd breakwater and enlarged the harbor by 10.8 acres.

In 1981 with funding from the Economic Development Administration, dredging took place again and the North and South fill were created. In 1984, utilities, streets and drainage were completed on the fills.

The harbor was transferred from the state to the city in 2003.

In 2005 a \$4.8 million dollar renovation on the A-E floats (Old harbor) took place.



Where do I take that?

TRASH:

Dispose of trash in the dumpsters behind the harbor office or in the parking lot across from the old harbor entrance near Cordova Outboard. Dumpsters are for harbor vessels only.

NET DEBRIS:

Drop off discarded nets at the baler year round.

BILGE WATER:

Schedule a bilge water pump out with the Harbormaster

USED OIL/OIL CHANGES:

Bring used oil to collection tanks behind the Harbormaster office or in the parking lot across from the old harbor entrance near Cordova Outboard

SEWAGE PUMP OUT:

Call the Harbormaster at 907-424-6400 to schedule a sewage pump out.

ANTIFREEZE:

Bring used anti-freeze to the collection site behind the Harbormaster's office or across from the Old Harbor entrance.

ANIMAL WASTE:

Bag and drop in the regular trash or dumpsters behind the harbor office and in the parking lot across from the old harbor entrance near Cordova Outboard. There are dog waste bags at the Breakwater trailhead and the Harbormaster's Office.

BOAT CLEANING SOLVENTS AND CLEANERS:

Dispose of unused or contaminated solvents, paints and toxic cleaners as hazardous waste at the Baler. Do not leave these toxins at the used oil or antifreeze collection sites.

BATTERIES:

Lead acid batteries can be dropped off behind NVE or behind NAPA, and household batteries can be dropped off at the Post Office.

CARDBOARD/PAPER, GLASS AND ALUMINUM CANS:

Is collected in marked bins on Harbor Loop Road across from AC or behind the old library across from the Cordova Community Baptist Church. Recycle whenever you can to help preserve our landfill for years to come!

TAKE ACTION!

Inform your friends, families, and fellow fishermen about the threats to our important harbor and waters. Encourage them to join you in taking action to clean up these threats.



Stormwater Pollution:

The Curious Case of the Toxic Rainbow Puddle

BY SHAE BOWMAN
Operations Manager, Copper River Watershed Project

Stormwater has long been considered a nuisance and as a result city planners designed the cityscape to get rid of stormwater as efficiently as possible. The unintended result is rainwater washing across hardened surfaces like parking lots where it picks up pollutants and flows into stormdrains and then directly into local waterbodies. You often see the telltale rainbows sheen on the surface of stormwater. According to the Environmental Protection Agency (EPA) stormwater run-off is the largest threat to water quality in the United States today. Stormwater run-off includes any pollution from streets, parking lots, and driveways that wash into the storm drains when it rains. Pollution sources include heating fuel from home heating tanks, fluids from leaky vehicles, trash, dog poop, sand, gravel, and salt.

Stormwater pollution is especially toxic for the environment because unlike household wastewater, stormwater is untreated and flows directly into local waterbodies. Used oil from a single oil change has the potential to contaminate up to one million gallons of fresh water. According to the EPA, there are approximately 193 million gallons of used oil improperly dumped in America every year. That is roughly the equivalent of 17 Exxon Valdez oil spills!

Fortunately, there are simple ways to prevent oil, fuel, and other hazardous materials from becoming stormwater pollution by disposing of them in the proper locations. There are accessible collection tanks for used oil and antifreeze behind the Harbormaster. Unused cleaning solutions and paints can be disposed of at the City Baler.

Of course, the best solution is to prevent pollution in the first place. Regular inspection and repair of hoses, gaskets, and fuel lines is the first line of defense and it also saves money. When changing the oil, use a drip pan and an absorbent pad to catch any stray oil. If you see a spill, regardless of size, make sure to report it by calling the Alaska Department of Spill Prevention and Response at 907-269-3063. One quart of motor oil has the potential to contaminate 250,000 gallons of water if not properly cleaned up.

Next time it's raining, can you find and stop the source of one of those toxic rainbows? Sometimes identifying a single source is obvious and sometimes it's a conglomerate of several sources contributing to the toxic gushes. Please do what you can to help prevent stormwater pollution and Don't Run-off Salmon!



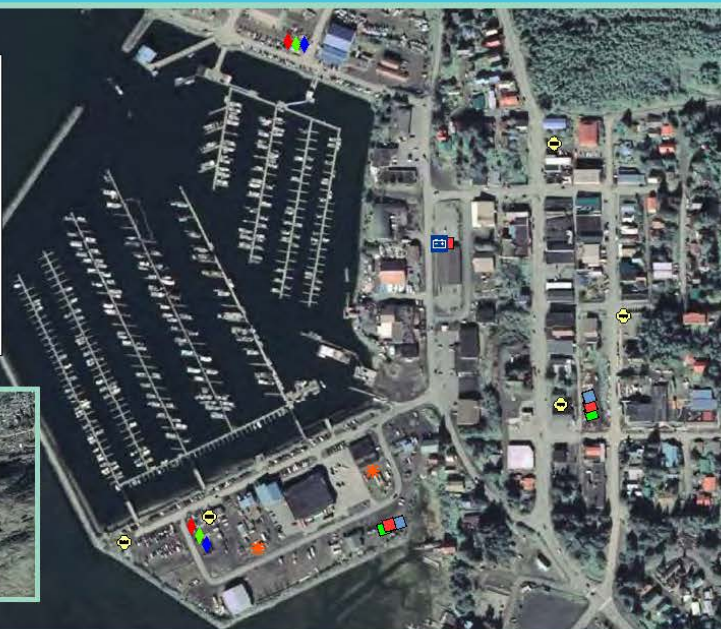
From the desk of the Harbormaster

Welcome back to the Port of Cordova and the beginning of the 2017 fishing season. We wish all of our returning customers a safe and enjoyable 2017 summer. Please help make the Harbor and surrounding areas a cleaner place by picking up after your pets and putting your trash in the provided dumpsters. Reminder that the dumpsters are for bagged boat trash and not trash from your home. Engine parts, webbing, construction debris and metals need to be taken to the Baler facility on Whittsed Road. A big thank you to the crew of the USCGC Sycamore for doing a great job cleaning up around the Harbor during Cordova Cleanup Day.

Fair Winds and Following Seas
— Harbormaster Tony Schinella

Cordova Waste Disposal Sites

- Legend**
- ◆ Dumpsters - For Fishing Vessels Only
 - ◆ Used Antifreeze Only
 - ◆ Used Engine Oil
 - ◆ Lead Acid Batteries
 - ◆ Carboard/Newspaper
 - ◆ Aluminum
 - ◆ Glass
 - ◆ Household Batteries
 - ◆ Dog Waste Dispensers
 - ◆ City Baler
 - ◆ Used Nets



Disposal map courtesy of Chugach Ranger District

The Heart of Cordova is Our Harbor

If you think about it, the Cordova Small Boat Harbor is the heart of our town.

It is the home to over 720 fishing and recreational vessels that are directly connected to Cordova's economy and livelihood. It is a valuable resource and our community deserves a healthy harbor to be proud of. The waters of Prince William Sound, the Copper River, and Gulf of Alaska support abundant fisheries that supply food for the people of Cordova, Alaska and the rest of the world.

There are countless birds, sea otters, harbor seals and juvenile fish that live and forage here. Contamination of these waters can seriously harm the fish and marine life, which has a direct impact on our fishing industry. Keeping our waters clean is an investment in our future, and helps ensure our renewable resources stay productive for generations to come.

Pollution comes into the Cordova Harbor from many point and non-point sources. Point sources include improper storage, transfer and disposal of petroleum products and hazardous chemicals (fuel, used oil, antifreeze, cleaners, solvents and paints), food and litter that is blown or thrown overboard, and the dumping of human or animal waste. Indirect sources of pollution include contaminated storm water, sediment and snow storage runoff; and wind and birds spreading garbage from dumpsters left open.

Almost all litter and petroleum spills in town get washed into the harbor when it rains. These sources of pollution are all connected to harbor health and create unknown risks to the people, fish and wildlife that use the Cordova Harbor.

Native Village of Eyak, City of Cordova and many local partners are working hard to improve harbor water quality by improving existing services and through outreach and education. This project is funded by the Exxon Valdez Oil Spill Trustee Council.

LEARN ABOUT WATER QUALITY FROM CORDOVA'S 6TH GRADERS!

What is direct pollution?

Direct pollution occurs when you directly put toxins in the water without thinking about the effect on the creatures in the water. It's like littering in the water!

What is indirect pollution?

Rain washes over toxins and they run into the water. Sometimes we carelessly drop litter and the chemicals may go into the water.

What is stormwater?

The water that runs off the street in the rain is stormwater. It might have sediment or even trash that goes into the water.

Where do you think the stormwater in downtown Cordova ends up?

It ends up in the ocean, the harbor, and even into Prince William Sound.

Can you provide an example of litter in the Cordova Harbor?

Plastic bags, soda cans, styrofoam cups, plastic in general, chapstick, garbage. The wind can catch garbage that you accidentally let go of, and then it goes into the water.

Can you name a fish or animal that lives in the Cordova Harbor?

Salmon, shrimp, sea otters, seagulls, eels, jellyfish, starfish, crab, shellfish, herring, dogs, cats, eagles, crows, people.

Bonus: What is your favorite thing about the Cordova Harbor?

- You can dock a boat there.
- I like seeing all the animals that are in the water, and I like to pick up jellyfish with sticks.
- Boats can stay there getting ready for fishing openers.
- There are bunch of jellyfish and you can see them absorbing things.
- I like to fish for king salmon in the harbor.

Biodegradation Timeline



Sources: EPA, US National Park Service, Mote Marine Laboratory

What's New?

Lead-Acid Battery and Antifreeze Collection Sites

A lead-acid battery disposal shed was constructed and put in place late 2015. In 2016, we shipped out over 22,400 pounds of lead acid batteries to be properly disposed. Bring your intact (non-leaking or busted) lead acid batteries to the shed behind NVE. Do not leave your batteries in the rain. Do your part to recycle batteries responsibly.

What are Lead-Acid Batteries?

Lead-acid batteries are used in cars, trucks, motorcycles, boats, and other motorized equipment. Each battery consists of a polypropylene plastic case containing lead plates immersed in a sulfuric acid electrolyte.

Why are they harmful?

Symptoms of low-level lead exposure include fatigue, impaired central nervous system functions, and impaired learning. Severe lead poisoning can result in coma, convulsions, irreversible mental retardation, seizures, and even death.

Why should I recycle Lead-Acid Batteries?

If lead-acid batteries are disposed of in a solid waste landfill or illegally dumped, the lead and sulfuric acid can seep into the soil and contaminate ground water, potentially affecting the quality of our drinking water supply. If the batteries are disposed of near rivers, streams, lakes, or marine waters, the lead and sulfuric acid can also threaten aquatic life.

Antifreeze Shed Info

What is Antifreeze?

The antifreeze collection shed has been in place since late 2015. Over 85% of harbor users said they would support an antifreeze collection site if one was placed near the harbor. In 2016, we shipped out over 1,100 gallons of used antifreeze. Do your part to recycle antifreeze responsibly. Never put used oil into the antifreeze bins, or vice versa. Do not leave random containers of antifreeze laying in the shed. Dispose of antifreeze by using the funnel and the drum/tank provided. It only takes a few minutes to dispose of your hazardous waste properly.

Did You Know?

- Ethylene glycol, the main ingredient of all major antifreeze brands, has long been known to be poisonous. It has a sweet smell and taste which is attractive to children and pets and is highly toxic. Drinking it will result in depression followed by heart and breathing difficulty, kidney failure, brain damage and even death.
- Used antifreeze may also contain metals, such as copper, zinc, and lead.
- All antifreeze, new and used, must be safely stored in order to avoid tragic consequences.
- Approximately 2 teaspoons of antifreeze is enough to kill a cat.

Did You Know ...

- 1**

1 cup of oil can contaminate up to 500 gallons of water. Always report oil spills in the harbor to the Harbormaster's Office or the State of Alaska at 1-800-478-9300.
- 2**

Net trimmings are trash, too. You can use a tarp on the floats to collect net trimmings for proper disposal. All those little pieces accumulate and add to over-sedimentation.
- 3**

Birds and animals mistake items such as plastic bags, cigarette lighters, and plastics as food and may suffer from internal injury, intestinal blockage, and then starvation. Please throw your trash in the garbage.
- 4**

Cordova's 500 dogs produce an estimated 162 pounds of waste every day – more than a ton in less than two weeks. Dog poop is a problem because it causes high amounts of fecal coliform in our waters. Bag it and dispose of it!
- 5**

It takes cigarette butts up to 5 years to biodegrade. Don't flick your cigarette butt!

By the Numbers

- 82%** use absorbent and/or bilge boom in their bilges to catch spills.
- 37%** do not take used gasoline, paint, solvents or other toxic waste to the Baler Facility at 1.2 mile on Whitshed Road
- 78%** do not use the portable bilge or sewage pump-out stations by calling the Harbor Master's Office.
- 49%** are proud of Cordova Harbor or expect it to be nominated as Alaska Clean Harbor.
- 93%** think it is important to keep chemical contaminants such as oil, antifreeze and paint out of the water in Cordova Boat Harbor.

* Survey responses are based on a Cordova Clean Harbor survey conducted by volunteers in 2016.



David Little Photography.com

Cleaning Boats in Alaska's Harbors

Instead of buying THIS CleanerUse this SAFE alternative
Glass Cleaners	Apply vinegar with newspaper and then buff with dry newspaper. It really works!!!
Grease Cutters	Use lemon juice, vinegar, or sprinkle with borax and scrub with scrub brush.
Powdered Bleach	Sprinkle Borax on stains and scrub!
Toilet Cleaners	Liquid castile soap and baking soda or Borax and a toilet brush.
All Purpose Cleaners	Liquid castile soap and baking soda or Borax in different ratios will clean many things! Use very little soap and soda/borax and lots of water on floors, walls and counters. Use more soap, soda/Borax for tubs, sinks, or anything that will be rinsed.

Every mariner is aware that cleaning and maintenance is a part of owning a boat. These activities ensure safe and efficient operations at sea, but can have adverse impacts on human health, aquatic life and the water quality of Alaska's harbors.

Many of the products that are used in boat maintenance have toxic and corrosive components. Avoiding these products or using them responsibly can reduce the impacts that may affect your health and the health of our marine resources.

To keep more of what we want in the water, keep these tips in mind to keep the toxics out of the water:

- Minimize the use of corrosive and toxic cleaners. If you have to use these products, familiarize yourself and your crew with their correct use, handling, and disposal.
- Be an educated consumer and read the labels. Key words on labels are: DANGER, WARNING and CAUTION. "Danger" means extremely flammable, corrosive or toxic, "Warning" implies it is moderately hazardous, "Caution" indicates less hazardous products. If it's possible, choose products that are less hazardous.
- Use less toxic alternative cleaners that may require a little more elbow grease, but are usually less expensive and less toxic to you and the environment. See the list below of typical cleaners and their alternatives.
- Avoid products that contain ammonia, bleach, chlorinated solvents, petroleum distillates and dye – all common products that are toxic to marine life.
- Keep the finish on your vessel clean and well-maintained to resist dirt.
- Use frequent soft cleaning of the deck and hull to avoid abrasive cleanings. Wash down your vessel frequently with water and sponges.
- Limit the use of detergents or soaps and use phosphate-free soaps. Soaps have impact on habitat by limiting the ability of aquatic animals to breathe. The suds that are produced by excessive soap don't do anything – they aren't needed for effective cleaning!
- Collect wastes and properly dispose of them ashore. Use dust collection systems when sanding to minimize the introduction of paint chips into the environment.



For more information, contact the Clean Harbor Coordinator at (907) 424-7738

THANK YOU FROM NVE AND CCH PARTNERS:

Alaska Sea Grant, City of Cordova, Copper River Watershed Project, Cordova District Fishermen United, F/V Alpine, F/V Chagvan, Native Village of Eyak, Oil Spill Recovery Institute, Prince William Soundkeeper, Prince William Sound Science Center, Alaska Clean Harbors Program, United States Forest Service, and the National Oceanic and Atmospheric Administration.

Appendix B

2014 Cordova Clean Harbor Awareness Questionnaire Results

1. Do you currently use absorbent and/or bilge boom in your bilge to catch spills?

Yes	77%
No	6%
Sometimes	13%
N/A	4%

2. Did you know that you can take oily absorbent pads and oil filters to the used oil disposal site?

Yes	87%
No	11%
Sometimes	0%

3. Do you ever use the portable bilge or sewage pump out stations by calling the Harbor Master's Office?

Yes	21%
No	70%
Sometimes	2%
N/A	6%

4. Do you ever use a tarp to collect your waste trimmings while net mending?

Yes	53%
No	32%
Sometimes	9%
N/A	6%

5. Do you ever take used antifreeze, gasoline, paint, solvents, or other toxic waste to the Baler Facility at 1.2 mile on Whitshed Road?

Yes	43%
No	34%
Sometimes	17%
N/A	6%

6. Do you ever use the Dog-waste bag dispenser to clean up after your pet in and around the harbor?

Yes	6%
No	43%
Sometimes	2%
N/A	49%

7. In your opinion, how important is it to keep chemical contaminants (oil, antifreeze, paint, etc.) out of the water in the Cordova Boat harbor?

Unimportant	0%
Slightly important	0%
Neutral	2%
Important	19%
Very important	77%

8. Is there anything you can think of that could be done to reduce the amount of spills and trash in the Cordova Boat Harbor?

Hand truck for battery transport	21%
Additional utility carts	34%
Trash dumpsters closer to harbor ramps	38%
Better enforcement for violators	38%
More education/signs	34%

Other: Signs to empty other waste besides oil at baler, gas collection closer to harbor, everybody clean up their own mess, antifreeze disposal receptacles by used oil receptacle, dispense absorbent boom in strategic locations in water.

9. How do you use the harbor?

This summer, Clean Harbor volunteers administered user surveys at the new and old harbors here in Cordova. We had 47 harbor users stop to talk to us and take the survey. Bilge pillows were given out as an incentive for harbor users who took the survey. The results are as follows.

2015 Cordova Clean Harbor Awareness Questionnaire Results

1. Do you currently use absorbent and/or bilge boom in your bilge to catch spills?

Yes	87%
No	5%
Sometimes	5%
N/A	0%

2. Did you know that you can take oily absorbent pads and oil filters to the used oil disposal site?

Yes	85%
No	10%
Sometimes	2%

3. Do you ever use the portable bilge or sewage pump out stations by calling the Harbor Master's Office?

Yes	10%
No	78%
Sometimes	8%
N/A	0%

4. Do you ever use a tarp to collect your waste trimmings while net mending?

Yes	62%
No	22%
Sometimes	12%
N/A	2%

5. Do you ever take used antifreeze, gasoline, paint, solvents, or other toxic waste to the Baler Facility at 1.2 mile on Whitshed Road?

Yes	45%
No	43%
Sometimes	8%
N/A	0%

6. Do you ever use the Dog-waste bag dispenser to clean up after your pet in and around the harbor?

Yes	15%
No	53%
Sometimes	2%
N/A	27%

7. In your opinion, how important is it to keep chemical contaminants (oil, antifreeze, paint, etc.) out of the water in the Cordova Boat harbor?
- | | |
|--------------------|-----|
| Unimportant | 2% |
| Slightly important | 0% |
| Neutral | 0% |
| Important | 18% |
| Very important | 77% |
8. Is there anything you can think of that could be done to reduce the amount of spills and trash in the Cordova Boat Harbor?
- | | |
|--|-----|
| Hand truck for battery transport | 17% |
| Additional utility carts | 47% |
| Trash dumpsters closer to harbor ramps | 43% |
| Better enforcement for violators | 28% |
| More education/signs | 30% |
| Other: Signs to empty other waste besides oil at baler, gas collection closer to harbor, everybody clean up their own mess, antifreeze disposal receptacles by used oil receptacle, dispense absorbent boom in strategic locations in water. | |
9. How do you use the harbor?
- | | |
|------------------------|-----|
| Seiner | 15% |
| Gillnet | 90% |
| Tender | 13% |
| Longline | 10% |
| Subsistence/Recreation | 5% |
| Live-aboard | 15% |
| Research/Government | 0% |
| Air taxi | 0% |
| Non-motorized | 2% |

This summer, Clean Harbor volunteers administered user surveys at the new and old harbors here in Cordova. We had 79 harbor users stop to talk to us and take the survey. Bilge pillows were given out as an incentive for harbor users who took the survey. The results are as follows.

2016 Cordova Clean Harbor Awareness Questionnaire Results

1. Do you currently use absorbent and/or bilge boom in your bilge to catch spills?		
Yes	65	82%
No	6	8%
Sometimes	8	10%
2. Did you know that you can take oily absorbent pads and oil filters to the used oil disposal site?		
Yes	70	89%
No	9	11%
3. Did you know that you can dispose of anti-freeze at the collections site near the used oil disposal site?		
Yes	66	84%
No	13	16%
4. Do you ever use a tarp to collect your waste trimmings while net mending?		
Yes	33	42%
No	28	35%
Sometimes	16	20%
N/A	2	3%
5. Do you ever take used gasoline, paint, solvents, or other toxic waste to the Baler Facility at 1.2 mile on Whitshed Road?		
Yes	35	44%
No	29	37%
Sometimes	15	19%
6. Do you ever use the Dog-waste bag dispenser to clean up after your pet in and around the harbor?		
Yes	8	10%
No	13	16%
Sometimes	1	1%
N/A	57	72%
7. Do you ever use the portable bilge or sewage pump-out stations by calling the Harbor Master's Office		
Yes	12	15%
No	62	78%

	Sometimes	5	6%
8.	Are you proud of the Cordova Harbor and want to see it nominated as an Alaska Clean Harbor?		
	Yes	39	49%
	No	40	51%
9.	In your opinion, how important is it to keep chemical contaminants such as oil, antifreeze paint out of the water in the Cordova Boat Harbor?		
	Unimportant	1	1%
	Slightly important	2	3%
	Neutral	3	4%
	Important	21	27%
	Very important	52	66%
10.	Is there anything you can think of that could be done to reduce the amount of spills and trash in the Cordova Boat Harbor?		
	Hand truck for battery transport	17	22%
	Additional utility carts	33	42%
	Trash dumpsters closer to harbor ramps	58	73%
	Better enforcement for violators	16	20%
	More education/signs	29	37%
	Other: Never lock dumpsters, classes about spills and trash possibly with prize incentive, workers to clean debris from harbor waterway remove navigational hazards, trash bin by BajaTaco, portable garbage bins during peak seasons,		
11.	How do you use the harbor?		
	Seiner	54	68%
	Gillnet	31	39%
	Tender	19	24%
	Longline	9	11%
	Subsistence/Recreation	13	16%
	Live-aboard	7	9%
	Research/Government	1	1%
	Air taxi	0	0%
	Non-motorized	0	0%
	charter	1	1%

This summer, Clean Harbor volunteers administered user surveys at the new and old harbors here in Cordova. We had 102 harbor users stop to talk to us and take the survey. Bilge pillows were given out as an incentive for harbor users who took the survey. The results are as follows.

2017 Cordova Clean Harbor Awareness Questionnaire Results

1.	Do you currently use absorbent and/or bilge boom in your bilge to catch spills?		
	Yes	91	89%
	No	4	4%
	Sometimes	7	7%
2.	Did you know that you can take oily absorbent pads and oil filters to the used oil disposal site?		
	Yes	95	98%
	No	7	7%
3.	Did you know that you can dispose of anti-freeze at the collections site near the used oil disposal site?		
	Yes	93	96%
	No	9	9%
4.	Do you ever use a tarp to collect your waste trimmings while net mending?		
	Yes	41	42%
	No	34	35%
	Sometimes	22	23%
	N/A	5	5%
5.	Do you ever take used gasoline, paint, solvents, or other toxic waste to the Baler Facility at 1.2 mile on Whitshed Road?		
	Yes	47	48%
	No	29	28%
	Sometimes	26	25%
6.	Do you ever use the Dog-waste bag dispenser to clean up after your pet in and around the harbor?		
	Yes	21	21%
	No	21	21%
	Sometimes	5	5%
	N/A	55	54%
7.	Do you ever use the portable bilge or sewage pump-out stations by calling the Harbor Master's Office		
	Yes	7	7%
	No	86	84%
	Sometimes	9	9%
			0.000

8.	Are you proud of the Cordova Harbor and want to see it nominated as an Alaska Clean Harbor?		
	Yes	90	88%
	No	12	12%
9.	In your opinion, how important is it to keep chemical contaminants such as oil , antifreeze paint out of the water in the Cordova Boat Harbor?		
	Unimportant	1	1%
	Slightly important	2	2%
	Neutral	5	5%
	Important	18	18%
	Very important	76	75%
10.	Is there anything you can think of that could be done to reduce that mount of spills and trash in the Cordova Boat Harbor?		
	Hand truck for battery transport	20	20%
	Additional utility carts	48	47%
	Trash dumpsters closer to harbor ramps	63	62%
	Better enforcement for violators	25	25%
	More education/signs	32	31%
	Other suggestions include: more bathrooms, liners for harbor carts, deploying skimmers and oil spill equipment, funding clean up products like absorbents, providing more access to hazard waste receptacles near		
11.	How do you use the harbor?		
	Seiner	53	
	Gillnet	55	
	Tender	17	
	Longline	10	
	Subsistence/Recreation	27	
	Live-aboard	6	
	Research/Government	2	
	Air taxi	3	
	Non-motorized	4	
	Other categories included USCG, net mending, and service		

Appendix C

Cordova Harbor Water Quality Improvement Photos



Fall 2017 Harbor Cleanup Day



Breakwater Trail pet waste station and rules

Cordova Harbor Water Quality Improvement Photos



Lead Acid Battery Shed



Dumpster Enclosures

Cordova Harbor Water Quality Improvement Photos



Anti-freeze shed



Used Oil Collection Center Signage

Cordova Harbor Water Quality Improvement Photos



Antifreeze Shed and signage





Cordova Harbor Carts

Welcome to the
CORDOVA SMALL BOAT HARBOR

 **ALL SURFACES ARE SLIPPERY
USE HANDRAIL AT ALL TIMES** 

- All vessels mooring in the Cordova Harbor are required to file a moorage agreement.
- Vessels must travel at no wake speed.
- Unattended items left on the docks are subject to impound.
- Pet owners are required to clean up after their pets. Violators are subject to a fine of \$85.00.
- All Hazardous materials must be disposed of properly.
- Place all trash in dumpsters provided next to the Harbormaster Office or next to the restrooms in the North Harbor.
- All web must be placed in the container behind the Harbormaster Office.

Rules and Regulations

Appendix D:

Cordova Harbor Study

Study area

Cordova Harbor (Fig. 1). Data from Gold Creek in Port Valdez were used as a local reference site, collected from 2002 to 2013. Source oil samples obtained from the tanker vessel *Exxon Valdez* were used for source information. Samples from two local diesel spills (Port Chalmers in 2002 and Jack Bay in 2004) were also used for source information.

Methods

Mussels were collected by hand, extracted and analyzed by GCMS (PAHs and alkanes). Hydrocarbons were extracted from tissue and source samples with dichloromethane, dried, fractionated, purified, and processed by gas chromatography-flame ionization detection (GC-FID) and gas chromatography-mass spectroscopy (GC-MS). Tissue was spiked with 500 μ L of deuterated surrogate recovery standard (SI 1), then extracted with dichloromethane using a Dionex accelerated solvent extractor (Larsen et al. 2015). Extracts were dried with sodium sulfate and concentrated to 1 ml in hexane. The extracts were applied to a chromatography column (20 g of 5% deactivated silica gel over 10 g of 2% deactivated alumina) and separated into aliphatic and aromatic fractions. The aliphatic compounds were eluted with 50 ml pentane, and aromatic compounds were eluted with 250 ml of a 1:1 mixture of pentane and dichloromethane. Both the aliphatic and the aromatic fractions were reduced to 1 ml in hexane, spiked with internal standards (dodecylcyclohexane and hexamethylbenzene, respectively) and stored at -20° C pending GC analysis.

Aromatic fractions were analyzed for PAHs by GC-MS. Data were acquired in selected ion monitoring (SIM) mode and concentrations were determined by the internal standard method (Short et al. 1996). Experimentally determined method detection limits were about 0.3 ng/g in tissue and 0.04 ng/g in sediment. The accuracy of the PAH analyses was about $\pm 1\%$ based on comparison with National Institute of Standards and Technology values (SRM1944), and precision expressed as coefficient of variation was about 30%, depending on the PAH. Surrogate recoveries averaged 56 and 95% in tissue and source samples, respectively. Total PAH (TPAH) concentrations were calculated by summing concentrations of individual PAH except perylene, which occurs naturally, was not included in the total. Measured PAHs were naphthalenes (N0 to N4), biphenyl (BPH), acenaphthylene (CAN), acenaphthene (ACE), fluorenes (F0 to F4), dibenzothiophenes (D0 to D4) phenanthrenes (P0 to P4), anthracene (ANT), fluoranthene (FLU), pyrene (PYR), fluoranthene/pyrenes (FP1 to FP4) benzo(a)anthracene (BAA), chrysenes (C0 to C4), benzo(b)fluoranthene (BBF), benzo(k)fluoranthene (BKF), benzo(e)pyrene (BEP), benzo(a)pyrene (BAP), perylene (PER), indeno(1,2,3-cd)pyrene (ICP), dibenzo(a,h)anthracene (DBA), and benzo(ghi)perylene (BZP). Concentrations are reported as ng/g dry weight. Higher molecular weight (HMW) PAHs are defined as BBF, BKF, BEP, BAP, PER, ICP, DBA, and BZP.

Aliphatic fractions were analyzed for normal-alkanes (*n*-alkanes) using GC-FID. Analyte concentrations were determined by the internal standard method. Experimentally determined method detection limits were about 5 ng/g in tissue and < 1 ng/g in sediment. The accuracy of the alkane analyses was $\pm 3\%$ based on a spiked blank processed with each set of samples, and precision expressed as coefficient of variation was usually less than about 20%. Surrogate recoveries averaged 79% and 95% in tissue and source samples, respectively. Total alkane concentrations were calculated by summing concentrations of individual calibrated alkanes [n-C9 through n-C36 alkanes plus pristane (PRI) and phytane (PHY)]. The unresolved complex mixture (UCM) concentration was determined from the difference between the total FID response area and resolved peak areas. Concentrations are reported as ng/g dry weight.

Statistics

Samples medians were compared with the Kruskal-Wallis one-way Analysis of Variance on ranks: followed with the Dunnett multiple comparison test with Gold Creek as the reference site. Relative quantities of sulfur-containing dibenzothiophenes was examined by comparing the total amount of dibenzothiophenes (Σ D) to the total amount of phenanthrenes (Σ P) within each sample. Phenanthrenes were chosen as the denominator because they weather at rates similar to dibenzothiophenes, thus reducing the potential for weathering-specific change.

Results

PAHs

Mussels in Cordova Harbor were contaminated with PAHs. Total PAH concentrations in Cordova Harbor were significantly greater than at the Gold Creek reference site at all sample times ($P_{\text{Dunnett}} < 0.05$; Fig. 2). Median concentrations in September 2014 were similar to those in previous years combined (2002 to 2009); concentrations were lower in February and August 2015.

Composition of PAH was mixed, consistent with at least two different contaminant sources. (The supporting information provides examples of typical petrogenic and pyrogenic composition.) Composition of naphthalenes, fluorenes, dibenzothiophenes, and phenanthrenes in Cordova Harbor mussels was generally petrogenic prior to 2015 (Fig. 3). Composition of fluorenes and dibenzothiophenes was petrogenic in February 2015 and mixed in August 2015. Phenanthrene composition was generally unclear in 2015. Fluoranthene-pyrene and chrysene composition was generally pyrogenic at all sample times (Fig. 3).

Proportions of HMW PAHs were significantly greater in Cordova Harbor than at Gold Creek at all sample times ($P_{\text{Dunnett}} < 0.05$; Fig. 4). Concentrations of HMW PAHs were proportionately greatest in 2014 (20 to 33%); they declined in February 2015 and were even less in August 2015, similar to those observed in previous years. Regardless of proportionate concentrations, HMW composition was highly similar among all Cordova Harbor mussel samples; BBF and BEP concentrations were consistently greatest among the HMW compounds (Fig. 3).

Relative dibenzothiophene content changed with time in Cordova Harbor mussels. The $\Sigma D/\Sigma P$ ratio was greater in previous years (2002 to 2009) than in contemporary samples (2014 to 2015; Fig 5). These ratios were significantly smaller in February and August 2015 than in previous years ($P_{\text{Dunnett}} < 0.05$).

Alkanes

Total *n*-alkane concentrations in Cordova Harbor were significantly greater than at Gold Creek for all sample times; ($P_{\text{Dunnett}} < 0.05$; Fig. 6). The greatest median concentration and variance was in September 2014.

Alkane composition was at least in part petrogenic, demonstrated by phytane and UCM concentrations and by relatively low proportions of odd-chain *n*-alkanes. Phytane and UCM concentrations were significantly elevated with respect to Gold Creek ($P_{\text{Dunnett}} < 0.05$; Fig. 7). Proportions of odd-chain *n*-alkanes were significantly less in Cordova Harbor than at Gold Creek ($P_{\text{Dunnett}} < 0.05$ except in February 2015; Fig. 8). The median odd-chain *n*-alkanes was 53% in ANSCO ($n = 28$), similar to the proportions observed in mussels from Cordova Harbor.

Discussion

Hydrocarbon concentrations in Cordova Harbor were consistently elevated above background levels in 2014 to 2015 (measured in this study) and in previously reported data (2002 to 2009). At least two different sources were evident, a petrogenic source and a pyrogenic source. These sources were likely unburned fuel in water (the petrogenic signal), and burned fuel and creosote pilings (the pyrogenic signal). There were also two plausible routes of accumulation in the mussels, which are filter feeders, uptake of dissolved constituents from water and consumption of contaminated particles. Concentration and composition of PAHs and alkanes varied among sample times, suggesting episodic contamination events that vary in magnitude.

Unburned diesel fuel was likely one of the sources of mussel contamination in Cordova Harbor. The drop in dibenzothiophene content in mussels after 2009 reflects a change in the diesel fuel source. The U.S. EPA mandated ultra-low sulfur diesel (ULSD) fuel oil in 2006 and this was apparently implemented in Cordova by about 2009. Diesel fuel collected at the Cordova fuel dock had very few dibenzothiophenes in 2015 (SI 4). Diesel source oil samples specific to Cordova prior to the 2009 were not available, but composition can be inferred from local spills. Dibenzothiophenes were more prominent in diesel spills in Port Chalmers (2002) and Jack Bay in (2004) (compare SI 4 and SI 5). Thus the sulfur content changed in diesel oil between 2002 and present, and this change is reflected in mussels. This is strong indirect evidence that diesel is a source of contamination in Cordova Harbor mussels.

Creosote is a second likely source of mussel contamination in Cordova Harbor. The substantial presence of HMW PAHs in mussel tissue can be contributed by creosote but not diesel fuel. Composition of these

molecules in mussels was highly similar across time, suggesting a single source and the observed composition was similar (but not identical) to that observed in the single creosote source sample measured for this study. The HMW PAHs are highly insoluble, thus the route of contamination for these molecules is likely consumption of particulate creosote abraded from treated pilings and available to the filter-feeding mussels.

Fig. 1. Study location. Yellow markers are current study (Sep 2014), green markers are previous data. Location is likely incorrect for the group at the far right.

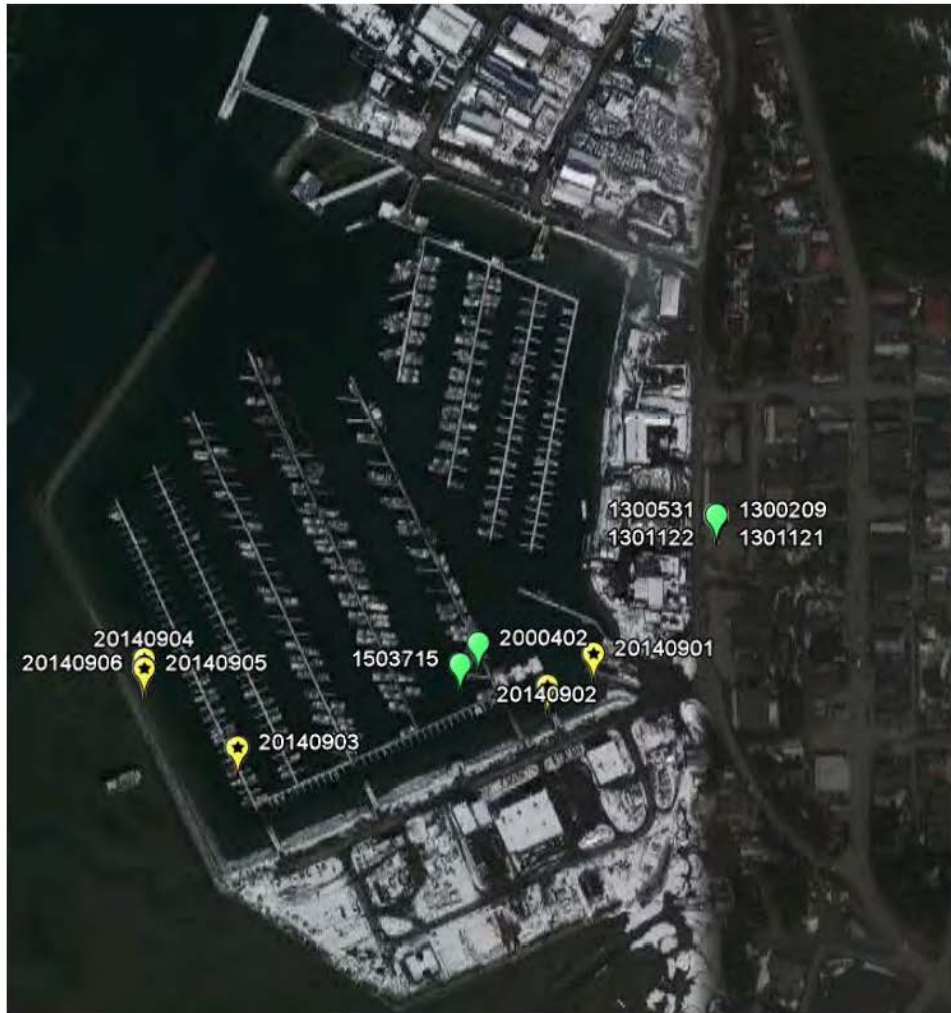


Fig. 2. Total PAH concentrations at the Gold Creek reference site (Gold) and Cordova Harbor. Cordova Harbor data are divided into previous years (previous; 2002 to 2009), September 2014, February 2015, and August 2015.

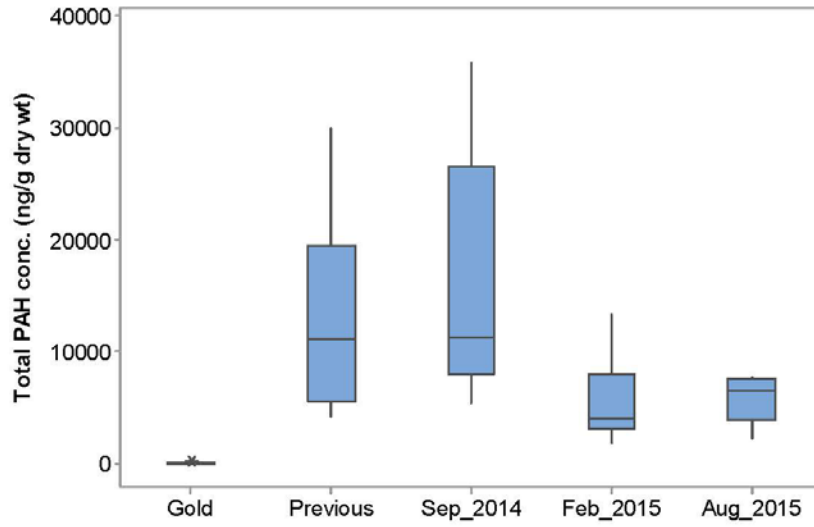


Fig. 4. Median proportions of higher molecular weight (HMW) PAHs at the Gold Creek reference site (Gold) and Cordova Harbor. Cordova Harbor data are divided into previous years (previous; 2002 to 2009), September 2014, February 2015, and August 2015. Asterisks indicate outliers.

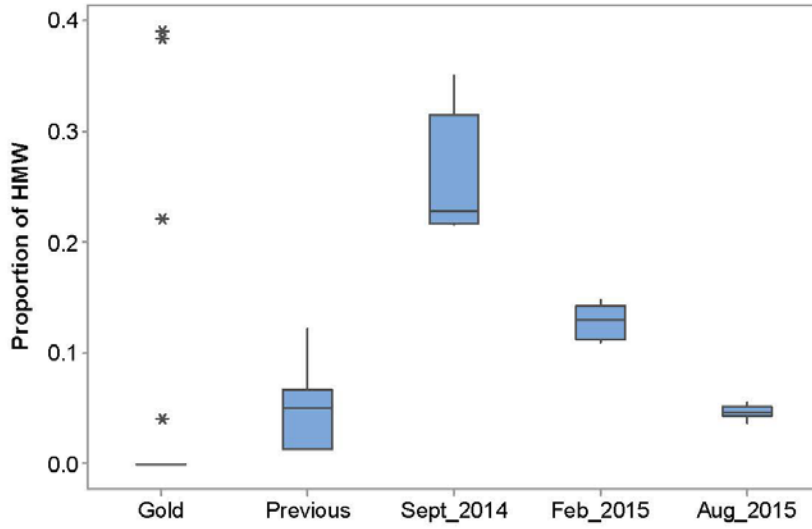


Fig. 5. Median dibenzothiophenes / phenanthrenes ratios in Cordova Harbor mussels. Data labeled previous were collected between 2002 and 2009.

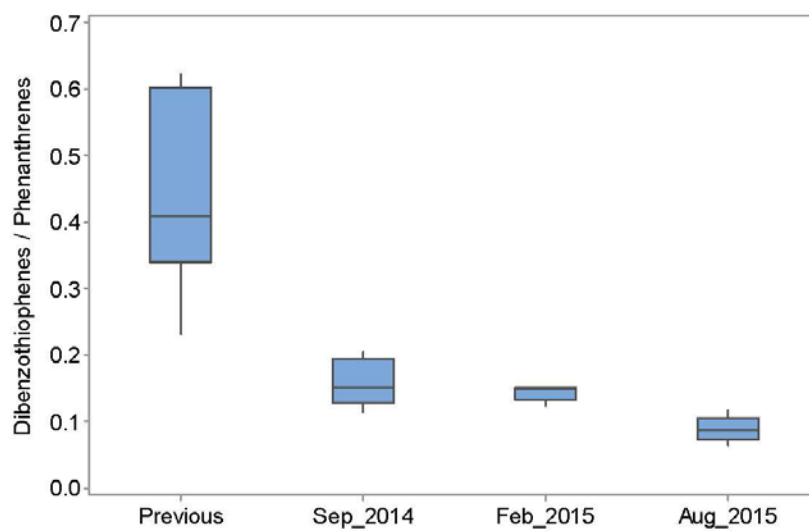


Fig. 6. Total calibrated alkane concentration at the Gold Creek reference site (Gold) and Cordova Harbor. Cordova Harbor data are divided into previous years (previous; 2002 to 2009), September 2014, February 2015, and August 2015. Asterisks indicate outliers.

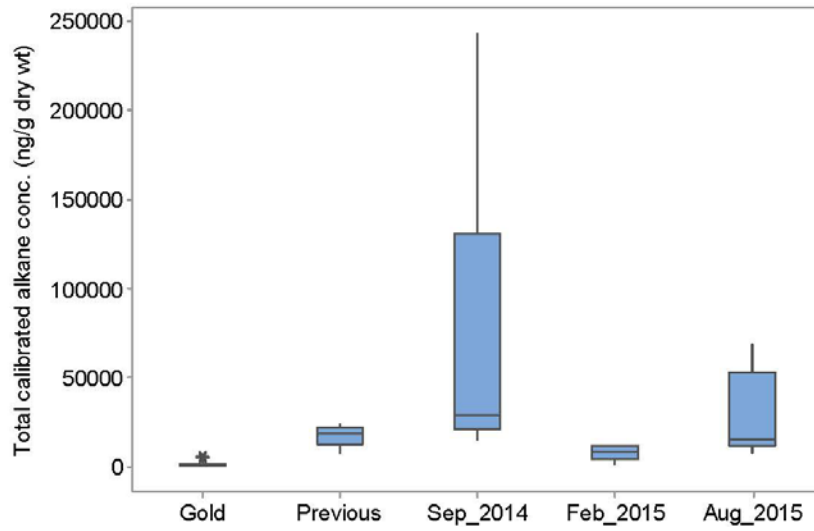


Fig. 7. Phytane (top) and UCM (bottom) concentrations at the Gold Creek reference site (Gold) and Cordova Harbor. Cordova Harbor data are divided into previous years (previous; 2002 to 2009), September 2014, February 2015, and August 2015. Note the units difference in the y-axis. Asterisks indicate outliers.

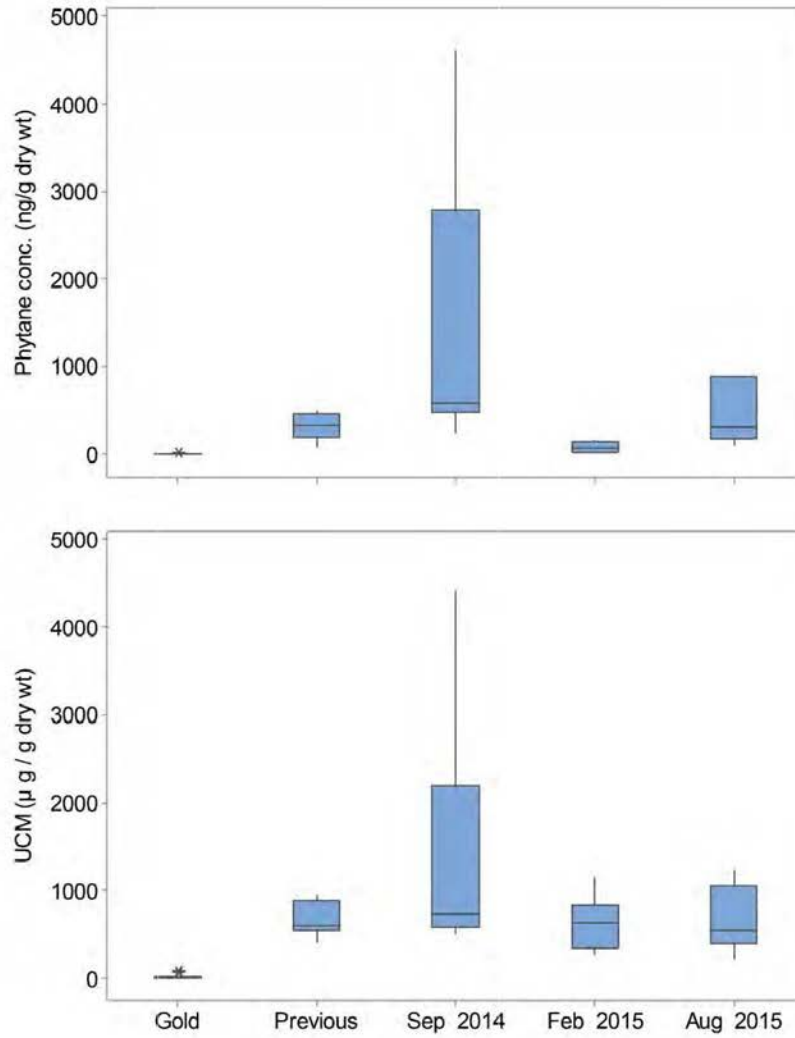
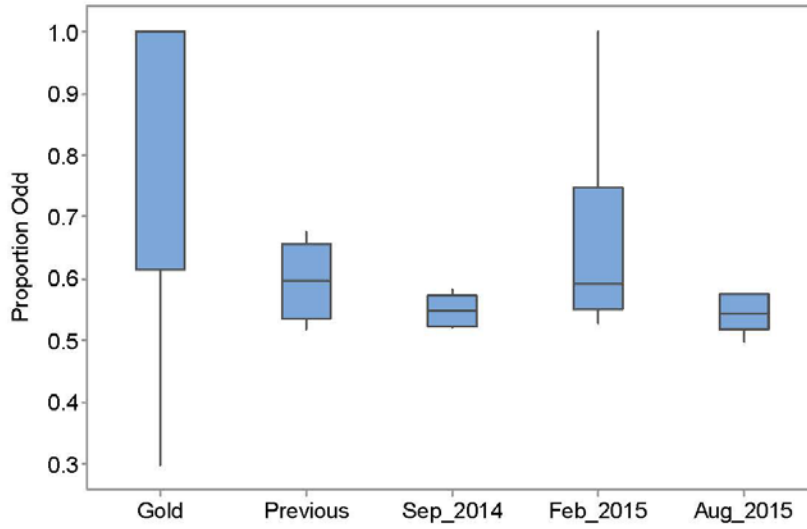


Fig. 8. Proportions of odd-chain alkanes at the Gold Creek reference site (Gold) and Cordova Harbor. Cordova Harbor data are divided into previous years (previous; 2002 to 2009), September 2014, February 2015, and August 2015.



Supporting Information (SI).

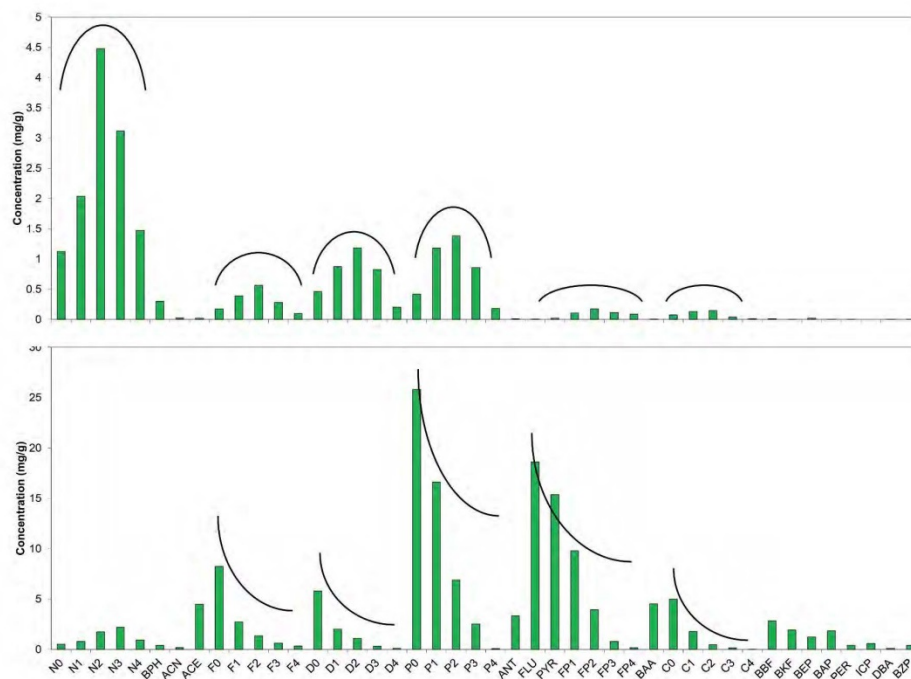
SI 1. Alkane and PAH composition in potential sources (creosote and diesel fuel).

Cordova Harbor creosote. I am rather surprised about this pattern. I generally expect fluorenes, dibenzothiophenes, phenanthrenes, fluoranthene-pyrenes, and chrysenes to all have pyrogenic attributes (see following two graphs). In this sample, only fluorenes and dibenzothiophenes had strong pyrogenic patterns – and probably the fluoranthene-pyrenes. Phenanthrenes and chrysenes did not. Benzo(a)anthracene seems unusually high. Visual inspection of the sample suggested it contained more wood fibers than creosote. I recommend several better creosote samples be collected to verify this pattern in Cordova Harbor.

SI 2. PAH composition in Cordova Harbor mussels.

SI 3. Alkane composition in Cordova Harbor mussels.

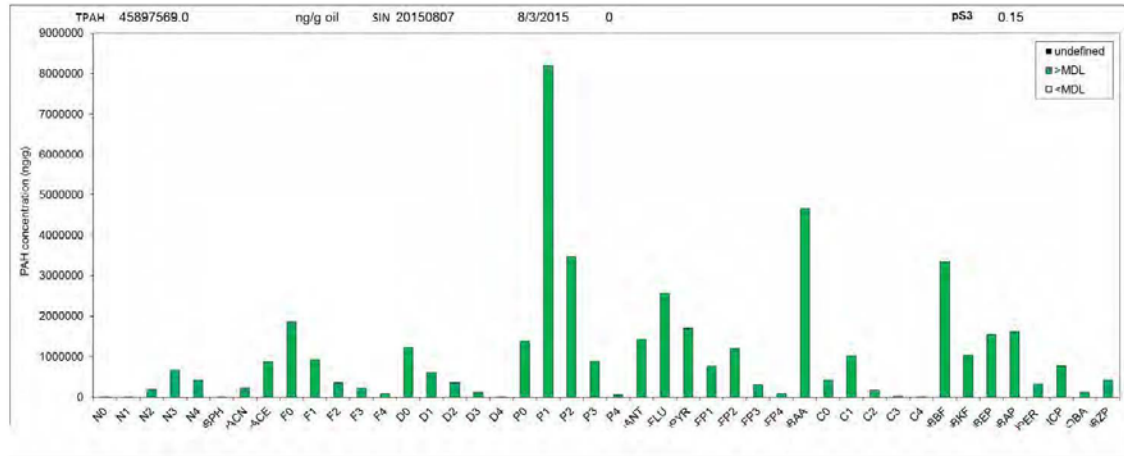
SI 0. Comparison of petrogenic (top) and pyrogenic patterns (bottom). Alaska North Slope crude oil is illustrated in the top panel and creosote from Auke Bay is illustrated in the bottom panel. Hump-shaped patterns indicate petroleum. Parent compounds are the most abundant homologs in pyrogenic sources.



SI 1

Potential PAH sources

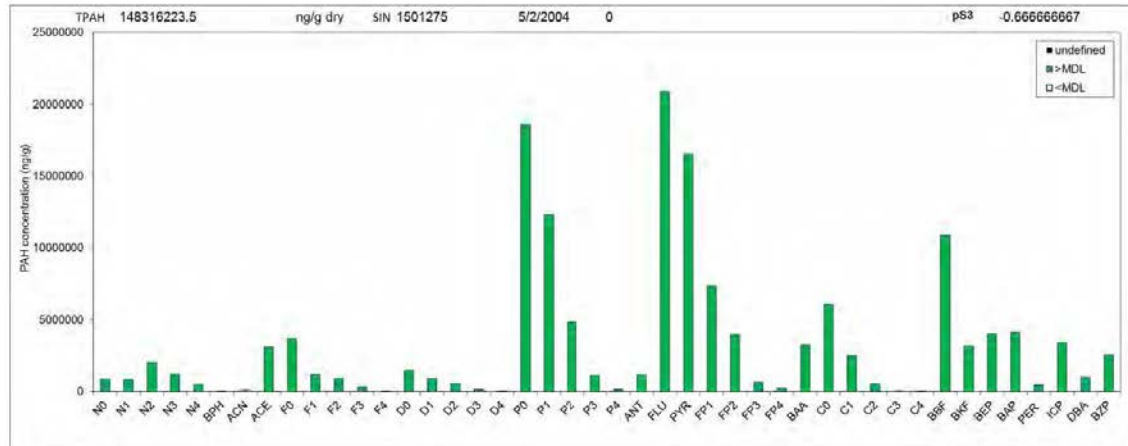
Creosote (SIN 20150807, Cordova Harbor, collected 8/3/2015)



I am rather surprised about this pattern. I generally expect fluorenes, dibenzothiophenes, phenanthrenes, fluoranthene-pyrenes, and chrysenes to all have pyrogenic attributes (see following two graphs). In this sample, only fluorenes and dibenzothiophenes had strong pyrogenic patterns – and probably the fluoranthene-pyrenes. Phenanthrenes and chrysenes did not. Benzo(a)anthracene seems unusually high. Perhaps there is another source of contamination sequestered on the pilings among the creosote.

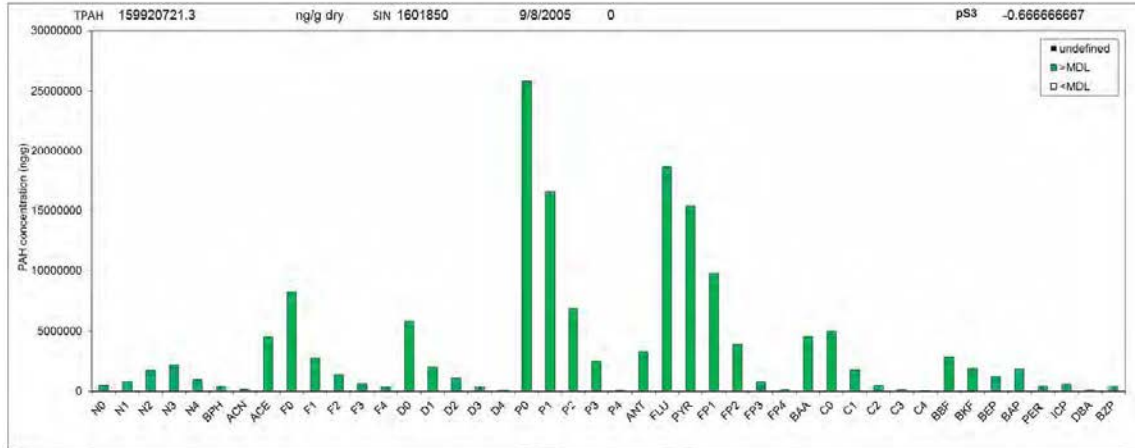
SI 2

Creosote from piling (SIN 1201275, Port Audrey, collected 5/2/2004



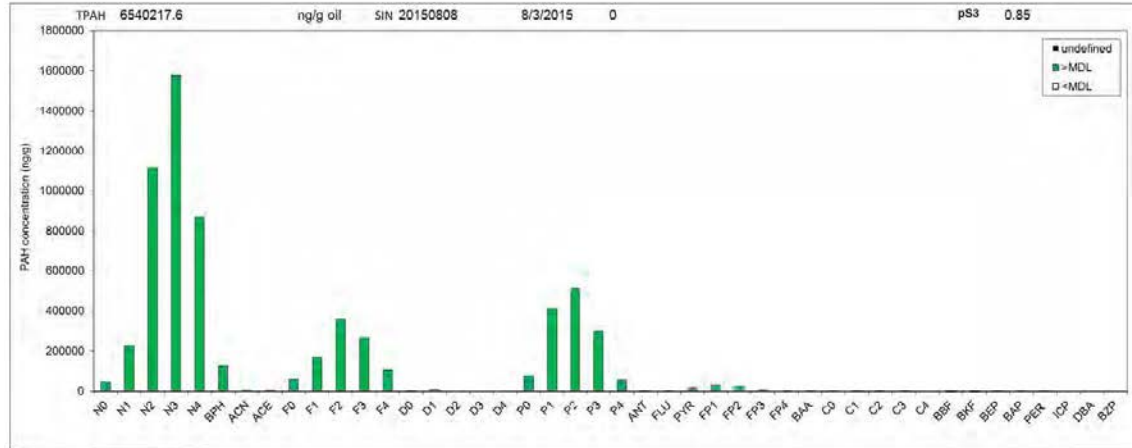
SI 3

Creosote from piling (SIN 1601850, Auke Bay Laboratory, collected 9/8/2005)



SI 4

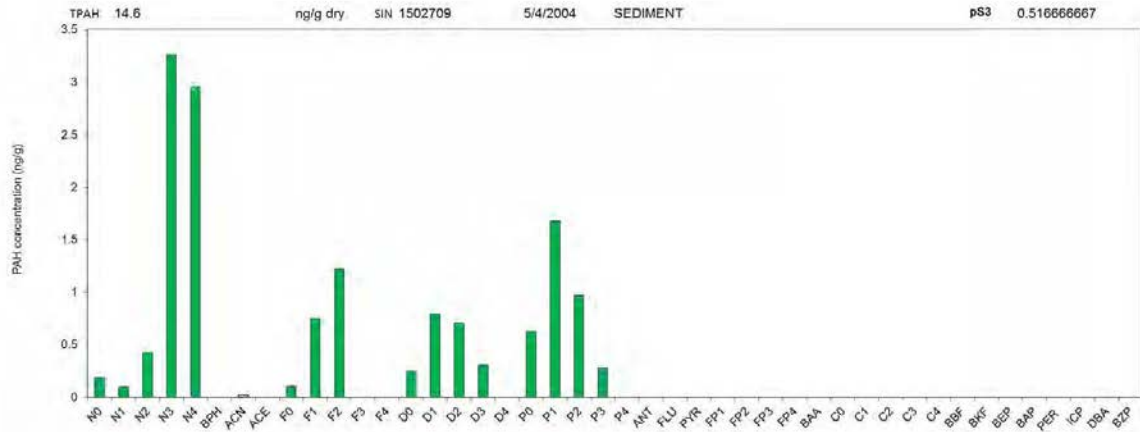
Diesel oil (SIN 20150808, collected in Cordova 8/3/2015)



Notice that the dibenzothiophenes are very depleted. This is low sulfur oil.

SI 5

Marine Diesel Oil in sediment (SIN 1502709, Jack Bay, 5/4/2004). This is likely similar to diesel fuel in Cordova before the switch to low sulfur oil.



Appendix: E

Cordova Waste Disposal Sites

Legend

- ◆ Dumpsters - For Fishing Vessels Only
- ◆ Used Antifreeze Only
- ◆ Used Engine Oil
- ◆ Used Nets
- ◆ Lead Acid Batteries
- ◆ Carboard/Newspaper
- ◆ Aluminum
- ◆ Glass
- ◆ Household Batteries
- ◆ Dog Waste Dispensers
- ◆ City Bailer

