Washington State Ferries Are Destroying Habitat and Wasting Money in Misplaced Effort to Restore Habitat Through Creosote Removal Initiative

Prepared for:

Creosote Council II

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An article posted on the Washington State Ferries (WSF) web site titled, Creosote Removal Initiative, calls their project to replace creosote treated wood structures with steel or concrete, an initiative that "improves and restores salmon habitat." This initiative will not improve salmon or other marine species habitat, but will, in fact, destroy valuable existing habitat and is an example of faulty science leading to misplaced priorities and wasteful public spending.

What is wrong with the WSF Creosote Removal Initiative?

1. Removing creosote treated wood structures will destroy valuable habitat in the Puget Sound thereby reducing, rather than improving, the environment that supports species such as salmon.
2. Removing creosote treated wood structures will make no difference in the levels of chemicals in the sediment or water of the Puget Sound.
3. The creosote removal initiative is contributing to the fear of chemicals and misleading itself and the public about the environmental effects of creosote treated wood structures in the marine environment.
4. Washington State Ferries is wasting millions of tax-payer dollars by replacing serviceable structures. To the extent that some structures are no longer structurally sound, the initiative is spending more money than necessary for more expensive concrete and steel structures.

What is the environmental impact of creosote treated wood in marine structures? Brooks and Goyette[1] reported on a study in Sooke Basin (at south tip of Vancouver Island) where new and used creosote treated wood dolphins (clusters of pilings uses as moorings or bumpers) were installed in a sensitive marine environment to determine the environmental effects. Their study found only minor reductions in benthic (bottom dwelling) organisms within half a meter of the large structures during the first year. More importantly, they reported that:

> *At the end of four years, the most significant environmental response to these structures was the establishment of a diverse and abundant epifaunal* [surface attached] *community on the piling and the attraction of large numbers of Dungeness crabs, starfish, finfish and other megafauna* [larger animals] *to what had become an artificial reef.*

Proof of this statement is provided by the photograph on the following page of one piling addressed in this study. Note the prolific marine growth attached to the creosote treated piling after only four years in the water.

The report also describes the development of the biological marine community from the date of installation as follows:

[1] K. M. Brooks and D. Goyette, Addendum Report, Continuation of the Sooke Basin Creosote Evaluation Study, Year Four – Day 1360 and 1540, May 12, 2001

Sooke Basin Creosote Treated Piling
After 4 Years In Place

> *All of the pilings on Day 14 were relatively 'clean' with little or no evidence of new marine growth. By Day 180* [about 6 months], *a light film of brown filamentous algae had developed on the BMP* [creosote treated] *piling. This film became progressively thicker near the water's surface. A marine community had started to establish itself on the pilings by Day 384* [about 1 year]. *The amount of growth appeared to be slightly greater on the MC* [untreated control] *pilings than at the BMP site, particularly with respect to the number of mussels. By Day 1540* [about 4 years], *a diverse and abundant biological community covered the entire length of the BMP pilings. This community included mussels, barnacles, numerous starfish (up to 15 to 20 individuals per piling in some cases), plumose sea anemones, calcareous tube worms, hermit crabs, coonstripe shrimp, tunicates, marine snails, sea cucumbers, sponges, macroalgae and a host of other marine organisms. In contrast the untreated piling supported a much smaller community because the pilings were disintegrating.*

The WSF will destroy habitat described above in a misdirected effort to improve the environment. The WSF has removed about 2,000 pilings so far and is proposing to remove an additional 18,000 over the next 10 years. Assuming 1 foot diameter pilings with an average of 20 feet of length between high water and the sediment level, this amounts to about 30 acres of existing valuable marine habitat, such as pictured above, that has or will be removed from the Puget Sound. Rather than improving habitat, the WSF is destroying part of the habitat that helps support the food chain upon which the endangered salmon depend.

Why use creosote treated wood? Wood pilings are preserved with creosote to make them resist decay and weathering. While untreated wood in a marine environment may only last a few years, treated wood offers a useful life of many decades. As noted in the WSF article, the terminals where wood is being replaced were originally built in the 1940s and '50s. Thus, the treated wood has already lasted 50 to 60 years. That is a long time for a relatively small investment. Construction using wood pilings is simpler and less expensive than with steel or concrete. Wood pilings float so they require less equipment to handle them, they are lighter so that smaller pile drivers can be used, and specialized tools are not required for cutting and trimming after installation. Wood is forgiving because it is flexible enough to absorb shocks yet strong enough to handle very high loads.

The installed cost of treated wood pilings is typically about half the cost of steel or concrete pilings. Two case studies document savings of roughly $2,400[2] and $1,580[3] per piling due to use of wood pilings instead of steel or concrete. Thus, for the 20,000 pilings the WSF has or will replace, they will spend about $2,000 each or $40 million more than if they used creosote treated wood. The waste is even greater if many of the existing pilings are still structurally sound and do not need to be replaced.

What is creosote? Creosote is distilled from coal tar. Coal tar results from heating coal to about 2000 ^{o}F to produce coke for use in making steel. Vapors from this process are condensed to produce coal tar. Coal tar is then distilled in much the same way as crude oil is distilled to make petroleum products. Roofing tar, coal tar pitch, and creosote are products of the distillation. Creosote is a black, tar-like material that is a complex mixture of many naturally occuring hydrocarbons that have been extracted from coal. It has a distictive "moth ball" aroma. It has a very low solubility in water and very low vapor pressure, so that after being pressed into the wood, it stays there for a very long time.

Creosote contains polycyclic aromatic hydrocarbons (PAHs). At high concentrations, these have the potential to be damaging to the environment, including bottom dwelling fish like flounder and sole. However, the concentrations of PAH measured around piling located where there are no other sources of PAH are generally much lower than the levels associated with adverse effects.[4]

What happens to the creosote? While the creosote in treated wood will last a long time, it does eventually degrade. A number of bacteria and fungi will use creosote constituents as a food source, thus degrading these constituents. As the concentration of creosote in the wood is diminished, marine boring animals will eat the wood. Eventually, all of the creosote, including PAHs, will be broken down to the basic materials of hydrogen and carbon, thereby, recycled back to nature. This was clearly documented in the Sooke Basin report in which PAHs were

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[2] WWPI, Homeowner Chooses Treated Wood Over Steel or Concrete – Saves $58,000 On His Personal Use Dock!, available at www.wwpinstitute.org.
[3] WWPI, Treated Wood: the Win Win Solution, A case Study by the Western Wood Preservers Institute, available at www.wwpinstitute.org.
[4] K. M. Brooks, Literature Review, Computer Model and Assessment of Potential Environmental Risks Associated with Creosote Treated Wood Products Used in Aquatic Environments, Revised June 1,1997, available at http://www.wwpinstitute.org.

noted to increase in the sediment adjacent to the pilings during the first year and then significantly declined within three to four years.

So, where did the PAHs in the Puget Sound come from? PAH's are everywhere and have been associated with organic compounds since life began on earth. PAHs result naturally from combustion sources, such as forest fires and volcanic activity. In response to this long history of co-existance with PAHs, plants and animals have developed specific enzyme systems for breaking down PAHs and either using them for food or eliminating them. The result is that polycyclic aromatic hydrocarbons are not harmful at low concentrations – they are a natural part of earth's biosphere.

Waterways in urban areas receive significant quantities of PAHs from human activities. Vehicle exhaust, power plants, home heating and industrial emissions are all significant sources of PAH. PAHs are contained in petroleum fuels at levels of 17 ppm for gasoline and 10 ppm for No. 2 diesel fuel to 2461 for No. 6 diesel fuel[5], so that drips and spills can be a major source. Thus, highways are major sources of PAHs to our environment. When these are close to waterways, as in the Puget Sound area, storm runoff can wash much of this mass into the marine environment.

If PAHs can be toxic, why won't removing the creosote treated pilings improve the Puget Sound environment? Let's use the analogy of the straw that breaks the camels back. In a simplified view, one of three conditions may exist;

1. In most of the Puget Sound, the camel's load is small and easy to carry. That is, relatively low levels of PAHs exist which are not having a negative impact on the environment.
2. In some areas, the camel back in already broken. That is, PAH levels are already at levels toxic to at least some marine life.
3. In a few areas, the camel is fully loaded and/or not so strong and cannot carry any more. In these areas, adding any new source of PAHs could have a negative impact.

The weight of straw and health of our camel, ie. conditions existing at a specific project location, must be evaluated to determine whether installing creosote treated wood is appropriate.

Even with all these sources, most of the Puget Sound remains healthy, ie. condition 1 above. In fact, the National Oceanic and Atmospheric Administration reports that approximately 99% of the Puget Sound area contains sea bottom animal communities classified as "relatively abundant and diverse" or better.[6] The small, temporary additional load of PAHs from creosote treated piling can be accepted by the environment in most locations.

However, localized conditions within the Sound may result in toxic levels of PAHs, such as areas impacted by contaminated storm water runoff, sewage discharge, industrial sites, and/or marine oil spills. In these areas, the magnitude of PAHs coming from these sources is very large relative to the potential addition of PAHs from creosote treated pilings. For this condition 2, the presence or lack of creosote treated piling is irrelevent. One straw, more or less, will not help the camel.

[5] USEPA, Emergency Planning and Community Right-to-Know Act – Section 313: Guidance for Reporting Toxic Chemicals: Polycyclic Aromatic Compounds Category, March 2001.
[6] National Oceanic and Atmospheric Administration, National Status and Trends Program, Sediment Quality in Puget Sound, Year 2, Central Puget Sound, December 2000

Finally, there may be tenuous or very sensitive environments where a small increase in PAH levels could be detrimental, condition 3. Such conditions may exist, for example, in enclosed bays with very little natural flushing action. Since it is important to indentify these conditions before damage is done, the wood preserving industry has developed and made available a computer model to evaluate potential impacts from the addition of treated wood structures.[7] Where the model indicates the potential for environmental harm, the industry agrees that options to creosote treated wood should be considered. Note, however, that removal of **existing** creosote treated structures will **not** improve conditions in these environments because the community of organisms on the wood surface is already established and able to neutralize any minor on-going releases. In fact, the disruption of sediment and organisms caused by piling removal could have significant negative impacts.

Is use of creosote treated wood prohibited by the Endangered Species Act or other regulations? No, the Endangered Species Act requires that prior to any construction or reconstruction, potential impacts to those species or the habitats upon which they depend are carefully evaulated based on good science. Where appropriate, site specific science indicates that the proposed work will not negatively impact the endangered species, that work may be allowed. This includes replacement or installation of creosote treated wood. The WSF statement that "the Endangered Species Act and other environmental regulations prohibit the introduction of any new creosote-treated wood into the water" is wrong.

What should the WSF do?

1. The WSF should look deeper to truly understand the environmental effects of their system and structures within the Puget Sound ecosystem. They need to use the best available science and empirical evidence rather than basing actions on activists posing as scientists and their their unsubstantiated theories. Rather than removing, WSF should be preserving the pilings and the habitat they provide.
2. They should continue to use creosote treated wood as part of their overall maintenance and construction program in an environmentally responsible and cost effective manner. Tools are available to insure that creosote treated wood is properly managed and used only in applications where it will have minimal or no effect on the Puget Sound. Such work includes periodic replacement of pilings and structural members as necessary, rather than wholesale and wasteful replacement of entire structures.

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[7] K. M. Brooks, Literature Review.