



PHYTOREMEDIATION AT ROAD-STREAM CROSSINGS

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Introduction

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Road Runoff

Impacts to Fish

- Large concentrations of contaminants can cause large-scale mortality events.
- Smaller concentrations can cause reduced fecundity, reduced respiration, and increased juvenile mortality.
- Sediment clogs gills, fills and destroys spawning gravel, and reduces visibility for foraging
- Climate Change*

Where does it come from?

- Vehicle traffic produces heavy metals and chemicals from tires, brake pads, and exhaust.
- Sediment from roads and road shoulders can be introduced into waterways through erosion.



Phytoremediation?

Phytoremediation

- “The use of plants for containment, degradation or extraction of xenobiotics from water or soil substrates.”

Bioremediation

- “The use of either naturally occurring or deliberately introduced microorganisms or other forms of life to consume and break down environmental pollutants, in order to clean up a polluted site.”

How Does it Work?

Extraction

- Some plants, along with the microbes associated with their root systems, are able to remove heavy metals and other contaminants from surface water, if the water is able to soak into the soil.



Detoxification

- Surface runoff which has the chance to soak into the soil is cleaned in multiple ways:
 - Settling of the contaminants by reducing flow velocity.
 - Dissolved organic carbon attaching to heavy metals, reducing their bioavailability.
 - Filtering of the water through increasingly finer soils.

Cabin Creek Oil Refinery

- Aspen phytoremediation was utilized to clean up petroleum contamination in both soils and groundwater.
- Depending on the chemical, reduction in chemical was reduced by up to 90% in lower soil horizons, and up to 84% in groundwater.
- Data was gathered over the course of a decade.



Seattle Urbanized Streams

Bad News

- A 2022 study found that juvenile coho salmon exposed to 24 hours of untreated storm runoff experienced a 100% mortality rate.
- Mortality rates were significantly lower in other species, with a 0% mortality rate amongst sockeye salmon.
- All species did not recover when transferred to clean water.
- In this case, the causal agent was a chemical known as 6PPD, which is used in the manufacture of tires.
- Dilution of the stormwater only reduced the mortality rate by 10% in juvenile Coho salmon.

Good News!

- A 2015 study examining the ability of bioretention columns in reducing the toxicity of stormwater runoff found that storm water filtered through bioretention columns was significantly less lethal to *Daphnia* and juvenile coho salmon.

What Alaskan Plants?



Implementation

- Restoring Native vegetation
- Design implementations to divert flows to floodplain or adjacent wetlands
- Increase use of vegetation on road shoulders that has longevity and deep roots
- Increase knowledge on restoration of wetlands at crossing sites



Works Cited

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