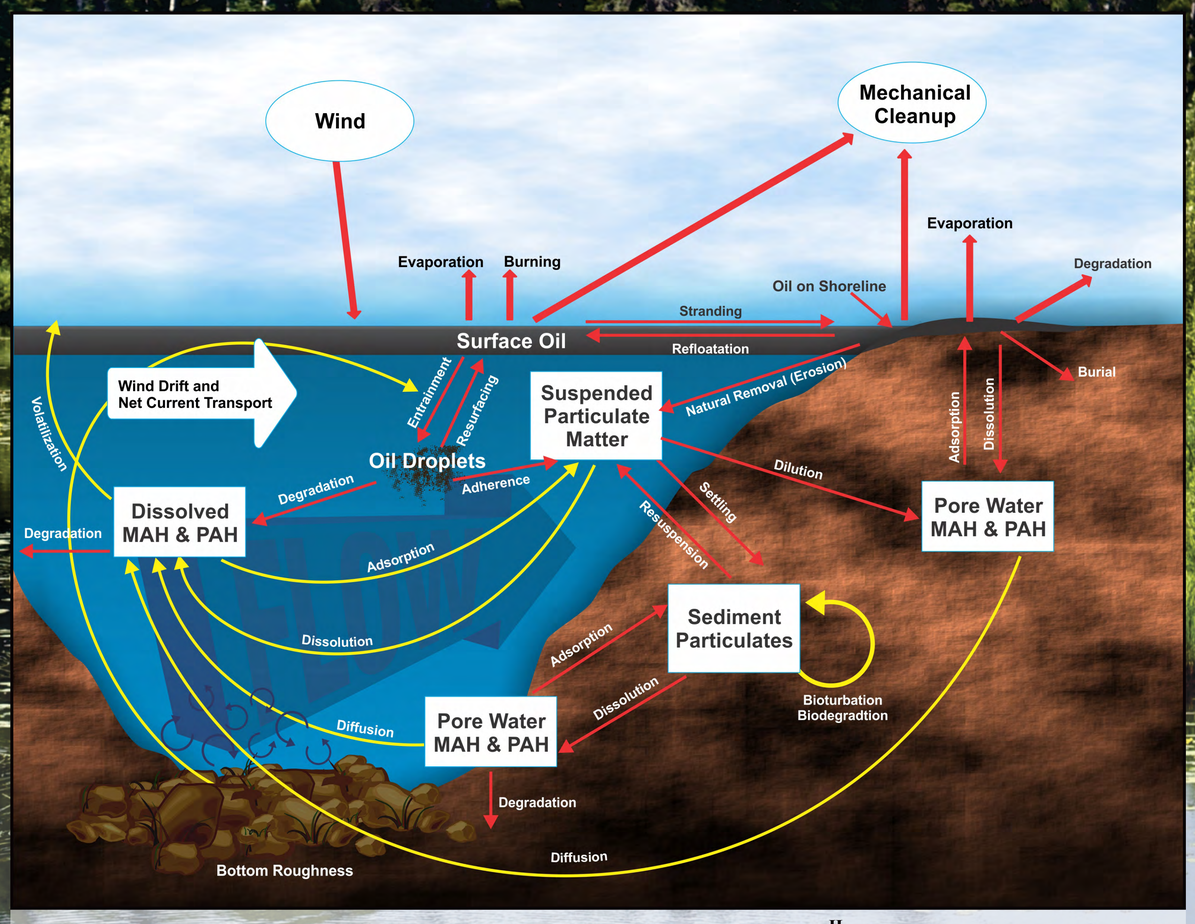
Modeling Oil Releases

Oil release modeling is used, in part, to better understand the range of effects that may occur to the natural environment along a pipeline route.

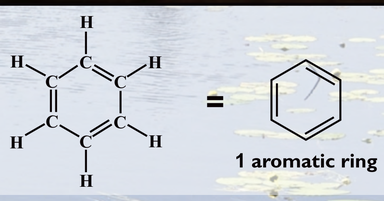
Oil modeling simulates the natural environment, such as seasons, weather conditions, and proximity to sensitive areas. It also takes into account the type of oil released, the volume of the release, and the timing of the emergency response and clean-up activities. Lastly, oil release modeling considers weathering (i.e. how it breaks down) from the chemical, physical, and biological processes that immediately begin to breakdown the oil.



SIMAP Modeled Oil Fates Processes

MAH (Monocyclic Aromatic Hydrocarbons) are organic compounds that contain only one carbon and hydrogen aromatic ring

PAH (Polycyclic Aromatic Hydrocarbons) are organic compounds that contain more than one carbon and hydrogen aromatic ring



Potential Effects of an Oil Release

If oil was accidentally released into the natural environment, adverse effects to the environment and its uses will occur. These can include:

- Contamination of soil and surface water
- Fouling of vegetation, wildlife, and shorelines
- Health effects for humans, plants, birds, fish, wildlife, and other living organisms
- Potential mortality of plants, birds, fish, and wildlife
- Changes in the human use of the environment
- Air emissions

Recovery from Oil Effects

Scientific studies of past oil spills on land and in freshwater have shown that the natural environment and human uses can recover from the effects of an oil release. These studies have shown that recovery is quite common, but does take time.

Recovery for releases on land and in freshwater typically takes about 3 to 5 years. Recovery time is influenced by the type of environment (e.g. field, marsh, forest), the species or resource affected, and other local factors. For example, fast moving freshwater systems tend to recover more quickly than slow flowing freshwater systems, as oil is flushed out more quickly.

Recovery occurs more rapidly when appropriate clean-up measures are employed during a response and oil is effectively removed from the environment. Bioremediation (i.e. microorganisms that are brought in) and phytoremediation (i.e. special plants that are introduced) can also accelerate recovery by breaking down oil more quickly.

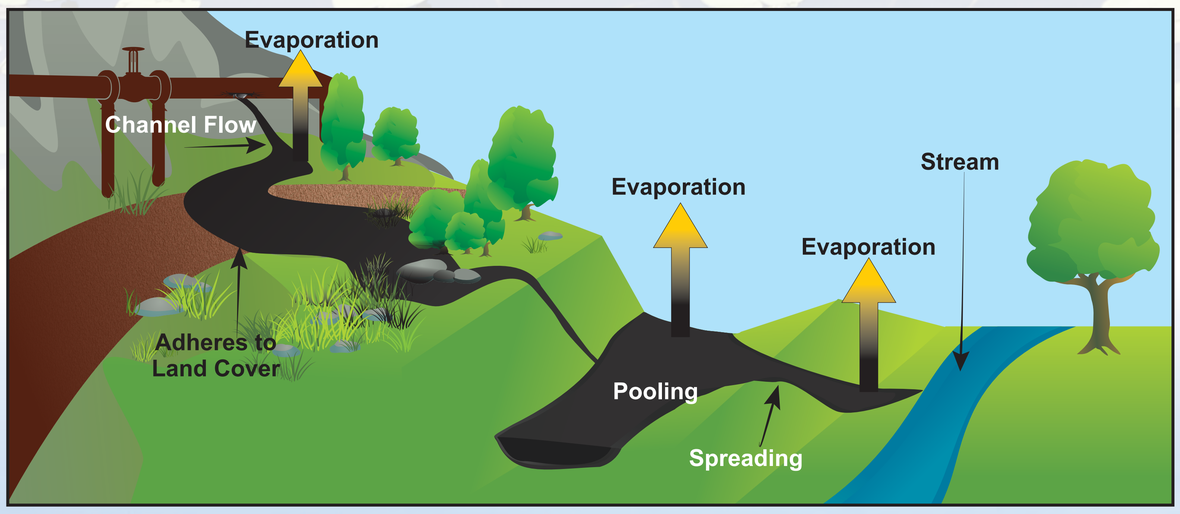
Sandpiper and Line 3 Replacement

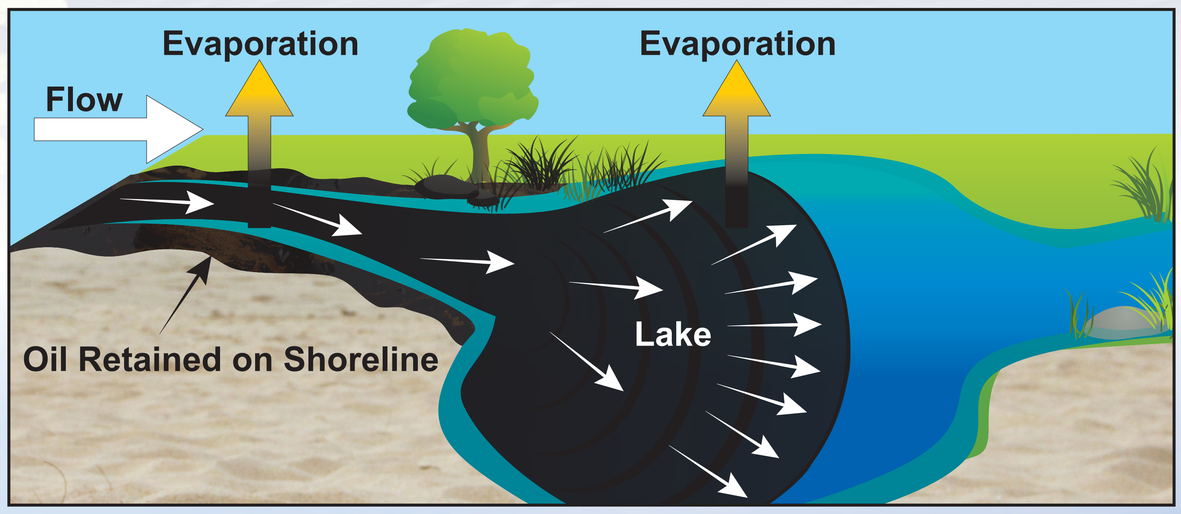
Oil spill modeling for the Sandpiper and Line 3 Replacement Pipeline projects is being done using two different modeling tools. Both are commonly used by industry and government:

- **OILMAP Land** is a 2D model that predicts where oil will move overland and downslope, how long it will take to get there, how it behaves and weathers after a release, and if it reaches a stream, river, or lake, how surface oil will move on the water.
- **SIMAP** is a more sophisticated model that predicts, in 3D, where oil will move within and throughout an aquatic environment (in the water), how long it will take to get there, and how it will behave and weather after a release.

Hypothetical spills are being modeled at multiple locations along the proposed and alternative routes that will be representative of the many different types of environments along the route and several route variations.

The modeling is also considering different types of oil and how they would behave under multiple seasons, including changing river flow conditions and the how snow and ice may affect a release.





OILMAP Land Modeled Oil Fates Processes