Penobscot River System

Phase III Engineering Study

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Introduction

From 1967 to 1970, a chlor-alkali facility located adjacent to the Penobscot River (the River) in Orrington, Maine, discharged mercury-contaminated wastewater to the River. Releases of mercury-containing materials continued throughout the operation of the facility and ceased with facility closure in 2000. The facility had used mercury in the production of chlorine and caustic soda, materials used to support the State's then-vibrant paper industry.

Penobscot River Mercury Study

In 2000, the Maine People's Alliance and Natural Resources Defense Council filed suit in the United States District Court for the District of Maine against Mallinckrodt US LLC and HoltraChem Manufacturing Company, LLC, two former owners of the facility. After a trial in 2002, the Court concluded that mercury downriver of the facility may endanger public health and the environment. The Court ordered a study on the mercury in the River to be directed by a three-member Study Panel appointed by the Court.

Under the Court's oversight, the Study Panel completed two phases of scientific studies and submitted its results and recommendations to the Court in 2013. Based on the Phase I and Phase II studies, and other testimony presented by the litigants, the Court concluded in 2015 that mercury contamination in the River continues to present an endangerment to health and the environment. The Court further concluded that it was essential for an engineering firm to investigate the status of the mercury contamination in the River and propose potential solutions to mitigate the harm to people, biota, and the environment.

Phase III Engineering Study

In 2015, the Court ordered the selection of an engineering firm to conduct an immediate, thorough, open, and independent identification and evaluation of potential active remedies to speed the recovery of the Penobscot River estuary from its present state of mercury contamination. The Court directed that the engineers should identify feasible, effective, and cost-effective remedies, and recommend to the Court a remedial plan that would be effective and cost-justified or explain why there is no viable remedy to pursue. The Court identified at least five factors it will use in evaluating potential remedies: (1) whether the proposed solution has been successfully attempted previously or is innovative; (2) the likely cost of the solutions; (3) the length of time to complete the recommendations; (4) the likely effectiveness of the solution; and (5) any potential environmental harm that may be caused by the proposed solution.

The Phase III Engineering Study began in January 2016 and the Court-appointed engineering firm submitted its final report and recommendations to the Court in September 2018.

Copies of the Court-commissioned reports are available online at:
http://www.penobscotmercurystudy.com/information-repository.

The Penobscot River

The section of the River upstream of Bangor is freshwater, while the section downstream mixes with ocean tides. Where the freshwater mixes with ocean tides, the River becomes an estuary and serves as a spawning and nesting area for fish, shellfish and birds. The area is home to endangered species, including Atlantic salmon, shortnose sturgeon and Atlantic sturgeon. The area's variety of plants also provide food and habitat for migrating birds.

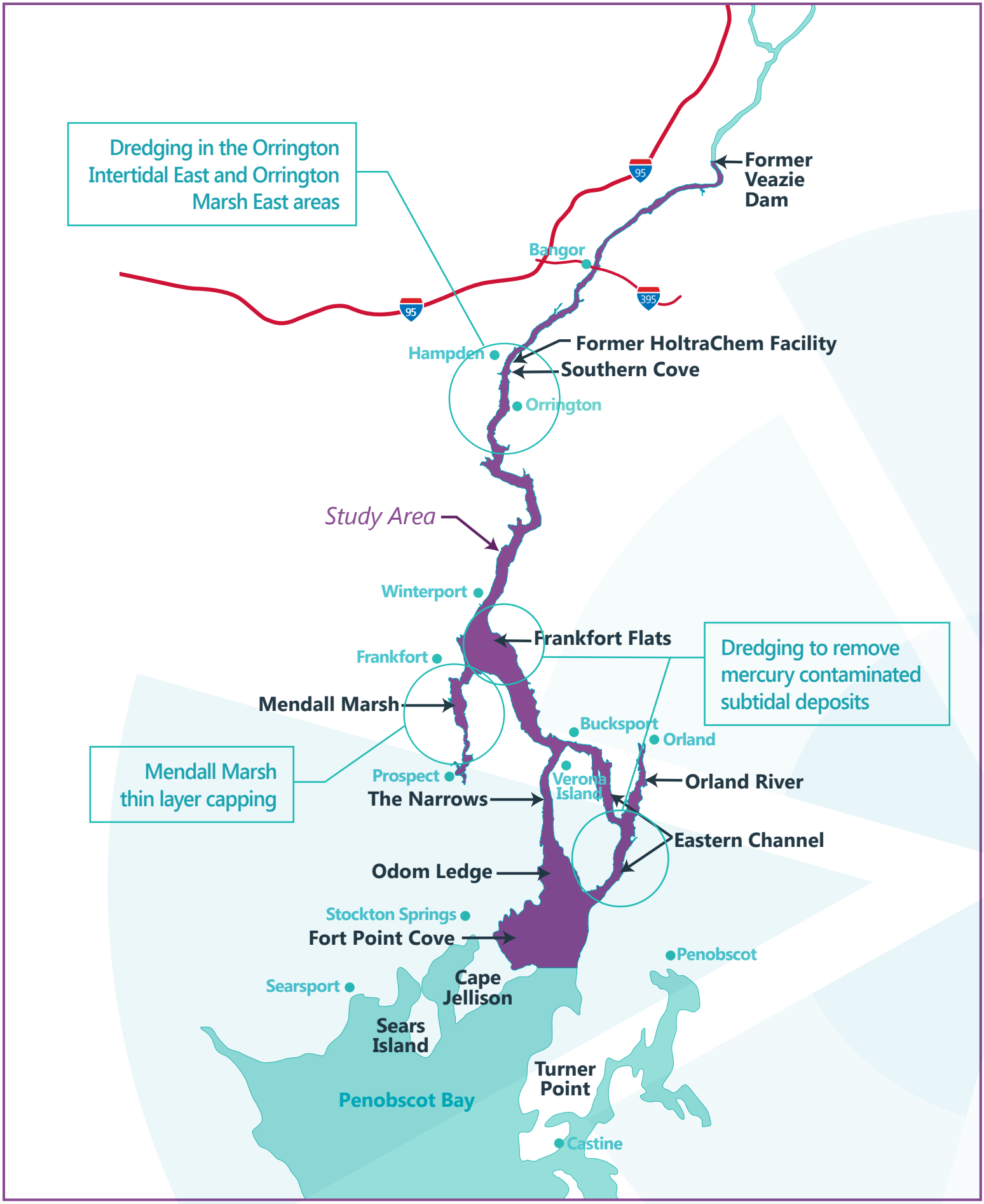
What options are there to address mercury in the Penobscot River?

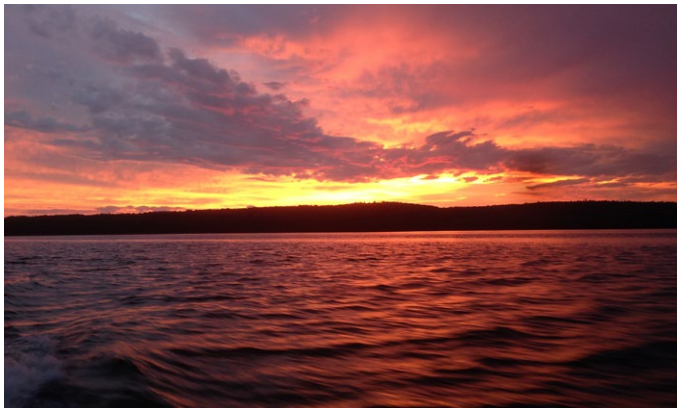
The Phase III Engineering Study team has recommended a suite of remedies to the Court to address various portions of the River. The table below provides an overview of each component of the recommended remedy, as well as the benefits, challenges, and estimated timeframes and costs for completion.

Alternative/Description	Benefits	Challenges	Timeframe	Cost (USD)
Mendall Marsh thin layer capping Thin layer capping involves placing approximately 3 inches of clean sediment over half of the marsh, in areas with higher mercury concentrations. Pilot study capping in smaller areas of the Marsh would be completed first to evaluate effectiveness and look for negative impacts before full scale implementation.	• Effective way to reduce mercury exposure and achieve acceptable levels in a relatively short time. • Low-impact, proven remedial alternative.	• Short-term disruption to the marsh. • Public education and advisories would continue and be expanded during work.	Takes 13 years for pilot studies, design and full-scale capping	$60 million
Dredging to remove mercury contaminated subtidal deposits This dredging would remove mercury-contaminated sediment deposits through excavation at five discrete locations: in the river channel near Frankfort Flats, in the Orland River, and in three locations off the southeastern side of Verona Island.	• Permanently removes contaminated sediments and may reduce recovery time. • Also removes wood waste with elevated mercury concentrations. • It may be possible for removed sediment to be beneficially reused on land as fill material away from the River (e.g. to close gravel pits); mercury in the dredged sediment would be contained and not enter the food chain. • Proven technology.	• Waterway disruptions. • Increased traffic on water and land. • Several years of preparatory work to obtain permits and approvals, equipment and access. • Some contaminated sediment could move downstream during dredging. • Could impact tourism and recreational uses. • Additional sampling required prior to starting work to better define areas to be dredged. • Removed sediment may have to be put in a landfill.	7 years for additional sampling, design and dredging	$107 million to $175 million
Dredging in the Orrington Intertidal East and Orrington Marsh East areas This dredging would remove mercury-contaminated sediment in intertidal and marsh areas along the eastern side of the River near Orrington. Sediment would be removed through excavation, replaced with clean backfill, and marshes would be replanted.	• Permanently removes contaminated sediments and may reduce recovery time. • Removal targeted at the area with the highest mercury concentrations. • Sediment removed could be beneficially reused on land as fill material away from the River (e.g. to close gravel pits); mercury in dredged sediment would be contained and not enter the food chain. • Proven technology.	• Waterway disruptions. • Increased traffic on water and land. • Several years of preparatory work to obtain permits and approvals, equipment and access. • Some contaminated sediment could move upstream and downstream during dredging. • Could impact tourism and recreational uses. • Additional sampling required prior to starting work to better define area to be dredged. • Removed sediment may have to be put in a landfill.	5 years for additional sampling, design and dredging	$54 million to $74 million
Long-Term Monitoring Comprehensive environmental monitoring to include biota (fish, shellfish, and birds), sediment, and surface water programs starting before remediation and continuing through and after active remediation. Long-term monitoring will be used to assess effectiveness of remediation efforts and assess recovery of the River.	• Assesses effectiveness of remedies over time. • Evaluates recovery rates of the environment. • Allows evaluation of possible additional "adaptive management" remedies to be considered following evaluation of effectiveness of remedies recommended	• Takes several years to evaluate trends to assess effectiveness and recovery.	45 years	$25 million

The remediation components identified in the chart above would be implemented as the initial recommended remedy. The recommendations also include an adaptive management approach to the remedy. Adaptive management focuses on updating a course of action based on the review of on-going data collection and analysis concerning remedy effectiveness. Potential adaptive management alternatives are provided in the Phase III Report for evaluation as contingency measures that could be implemented at a later date if long term monitoring indicates that the initial suite of remedies has not been successful.

For the adaptive management alternative focused on adding clean sediment to the Orland River and the channel on the east side of Verona Island, the Phase III Engineering Report recommends that numerical modeling and pilot studies be undertaken to evaluate whether this approach could be effective. Modeling and pilot studies could be undertaken during the time period in which the recommended remedial measures are being implemented.

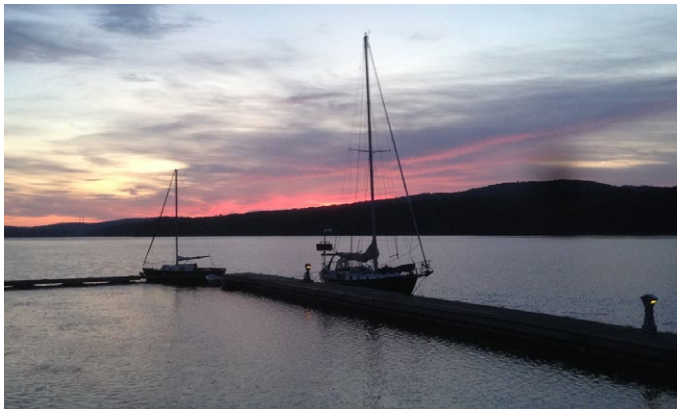

Dredging in the Orrington Intertidal East and Orrington Marsh East areas
Former Veazie Dam
95
Bangor
395
95
Hampden
Former HoltraChem Facility
Southern Cove
Orrington
Study Area
Winterport
Frankfort Flats
Dredging to remove mercury contaminated subtidal deposits
Frankfort
Mendall Marsh
Bucksport
Orland
Mendall Marsh thin layer capping
Prospect
Verona Island
Orland River
The Narrows
Eastern Channel
Odom Ledge
Stockton Springs
Fort Point Cove
Penobscot
Searsport
Cape Jellison
Sears Island
Turner Point
Penobscot Bay
Castine



What's Next

The Phase III Engineering Study has been submitted to the Court. The recommendations will be reviewed by the litigants and, following their review, it is expected that they will present their views on the recommendations to the Court. The Court will then decide what happens next.

The process as identified by the Court does not currently contemplate a public review process, and there is no timeframe defined for the Court's decision.



Where can I find more information?

The website, *http://www.penobscotmercurystudy.com/*, has reports, background information and closures and consumption advisories.

For more information regarding the Phase III Engineering Study please visit the Study website: *http://www.penobscotmercurystudy.com/*

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