February 17, 2020

Board of Environmental Protection
c/o Ruth Ann Burke
17 State House Station
Augusta, ME 04333-0017

NordicAquaFarms.DEP@maine.gov

RE: Nordic Aquafarms Inc. Applications for Site Location Of Development and Natural Resources Protection Act Permits, and Maine Pollutant Discharge Elimination System (Mepdes)/Waste Discharge Licenses

Dear Ms. Burke; Mr. Duchesne, BEP Presiding Officer; BEP Members and DEP Staff:

Islesboro Islands Trust (IIT) advances land conservation, ecosystem education and environmental advocacy in the Penobscot Watershed. For more than 30 years, IIT's education, advocacy, water quality monitoring, and research demonstrate particular interest in the quality and integrity of water throughout the watershed. IIT advocates for the exceptionally important Penobscot Bay marine economy and ecology. Nordic Aquafarms must demonstrate that the proposed salmon farm will not harm Penobscot Bay.

Islesboro Islands Trust is an interested party in the above captioned matter. We have several comments on the applications at this time.

In summary, concerns include:

1. The application review must be halted while applicant conducts and provides comprehensive seafloor and water column baseline assessments along pipeline routes and at the saltwater discharge location, especially as to mercury contamination, methane gas and sediment turbidity and scouring.
2. Applicant must undertake additional, scientifically rigorous Pen Bay circulation modeling that confidently predicts effluent movement through Penobscot Bay to determine the least environmentally damaging alternative for discharge.
3. Elements of concern likely or potentially present in discharge, such as TSS, BOD, Total N, Total P, Ammonia, nutrients, antibiotics and other chemicals of high concern, including chemicals that may only be used in emergencies, must have strict year round limits that ensure no local or regional environmental harm.
4. As a condition of approval, applicant must provide for third party, extensive, on-going water quality and habitat monitoring capable of determining impact on migratory fish and other species that use, may use or move through the discharge and pipeline location. Monitoring should incorporate protocols that initiate rapid production response, should discharge or discharge impacts exceed approved limits.
5. As a condition of approval, protocols for intensive internal system water quality monitoring must be available for third party review and results of on-going internal systemic monitoring made available for third party analysis.
6. If approved, permit should provide for revision or revocation in the event that subsequent aquaculture projects in or near Penobscot Bay, if any, are found in the aggregate with the Nordic development to have an adverse impact on the migratory fish that use the Bay, such as Atlantic salmon, shad and alewives, or other marine organisms as per baseline information and monitoring.
7. If approved, permit should be conditional on Nordic Aquafarms' installation and maintenance of effective fish passage for anadromous species in Little River.

We will provide some background for our above-enumerated concerns.

Extensive research and analysis undertaken as part of the court-ordered Penobscot River Mercury Study, especially Phase II, clearly indicates that (1) significant concentrations of mercury are likely to be found in sediment along the proposed Nordic Aquafarms pipeline (and therefore along the dredging) route and (2) mercury concentrations in the overall Penobscot system remain high in part due to mobility of contaminated sediment recycling through the river and upper portions of the bay (rather than moving and diluting via circulation outside the bay region).

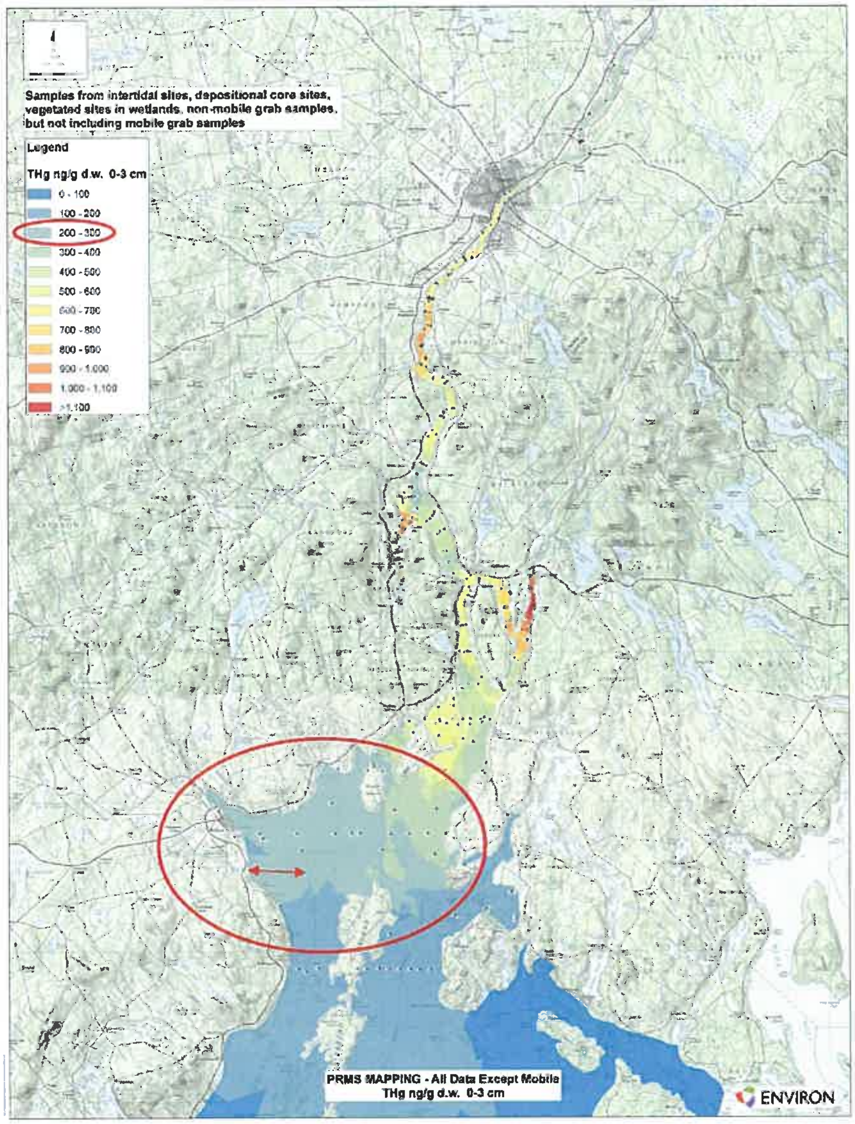


Figure 1-9 PRMS Phase II Report

Figure 1-9 from the Penobscot River Mercury Study shown here indicates both location of the proposed pipeline and dredge area and the level of mercury-contaminated sediment found nearby. These sobering findings speak not only to the absolute need for accurate mercury analysis in the proposed dredge area but also underscore the importance of better circulation modeling than currently exists.

The proposed pipeline and related dredging traverse a mapped natural gas deposit and then end immediately next to or within an extensive bed of pockmarks. Professor Joseph T. Kelley from the University of Maine, School of Earth and Climate Sciences, Orono, Maine, speaking in Searsport on June 9, 2015 (transcript attached), emphasized that, "In my experience, the most widespread potential geohazard in the coastal Gulf of Maine is the natural gas, or methane, found in Maine's seafloor."

Kelley's map of the Penobscot Bay craters, called pockmarks presumably formed by gas escaping, and gas deposits, when overlaid with the illustration of the proposed pipeline and orthographic data to ensure proper orientation and scale, clearly shows the proposed pipeline moving through a gas deposit and ending immediately adjacent to mapped pockmarks. See Figure 2 on the next page.

These pockmarks in soft mud are continually flushed of sediment due to a "scouring" effect from currents in this region, Kelley notes. In addition, pockmarks and nearby gas deposits may be subject to on going "expulsion events" that send sediment plumes into the water column. Further study is necessary to determine whether any such turbidity plumes, occurring immediately next to the proposed intake pipeline, pose significant disruption to the Nordic salmon production at the other end of the intake line.

Further, the proposed pipeline and its dredging travel through a mapped gas deposit. Though stated in a different context but relevant to the uncertain stability of these gas deposits, Kelley indicates that, "Until there is an engineering/geotechnical study of the gas pressure and sediment strength and sediment column permeability, we cannot really be confident what will happen when gassy sediment is disrupted..." by the proposed pipeline dredging.

The possibility of re-suspension of buried contaminants in this area, including mercury, warrants extensive new research.

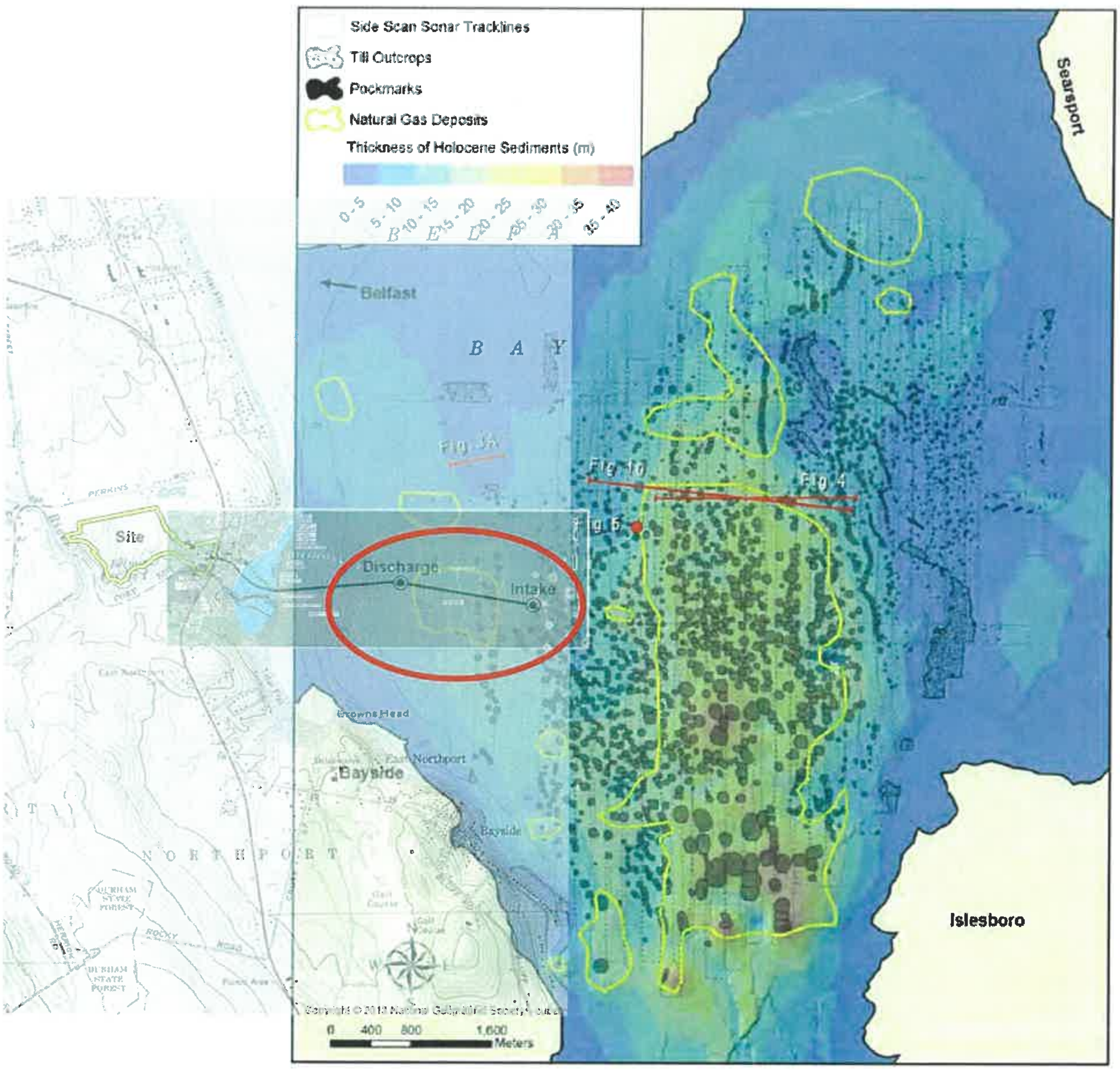


Figure 2 - Kelley, Nordic and Ortho Overlays

Even with numerous historical onslaughts on the ecological integrity of the Penobscot Estuary, Penobscot Bay is a vibrant estuarine environment for a host of species of interest, including large numbers of lobsters and improving numbers of Atlantic Salmon, and important quantities of Sturgeon, Alewives, other anadromous fish, clams, mussels, scallops, shrimp, crabs, cod, haddock, flounder, mackerel and more. Evidence supports success of the Penobscot River Restoration project. Up in the Penobscot watershed, discharge regulations, in recent years, support improvements in water classifications. Court-ordered clean-up of the horrendous mercury discharges from the former HoltraChem plant appears poised for remediation.

Research by Steneck and Wilson (see figure and citation below) suggests that the vicinity of the proposed Nordic intake and discharge pipelines is an area of high lobster settlement.

Additionally, there are ten anadromous fish species native to the Penobscot watershed: alewife, striped bass, Atlantic salmon, rainbow smelt, blueback herring, American shad, sea lamprey, Atlantic sturgeon, shortnose sturgeon, and Atlantic tomcod. Some if not all of these may utilize the Nordic area of disturbance.

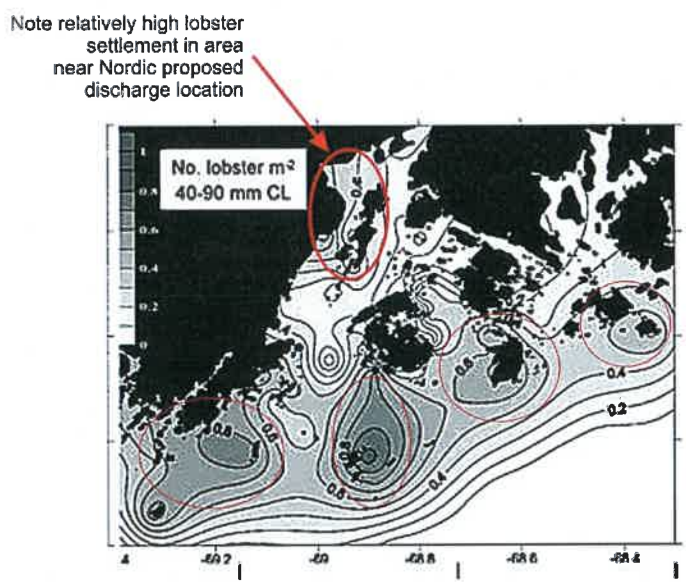
The nearby Passagassawakeag River is apparently so named because it was a place to fish for sturgeon (see Fannie Hardy Eckstrom, *Indian Place-Names of the Penobscot Valley and the Maine Coast*; University of Maine Press; Orono, Maine 1974 [original 1941]) and sturgeon have recently been found returning here (see Gayle Zydleski et. al., *Shortnose sturgeon of the Gulf of Maine: including the Passy*)

Researchers point to the importance of a healthy co-evolved diadromous complex in sustaining healthy ecosystem structure and function.

Therefore, it is essential that BEP protect the maritime environment in this area. Nordic Aquafarms carries the burden of proof that the proposed facility and the discharge identified in the application will not harm the Little River and Penobscot Bay environment. To do that, extensive seafloor and water column baseline assessments must be conducted in advance of permit ruling. Natural resource analysis by the applicant to date does not rise to a standard necessary for honest assessment of potential impacts.

Even with the technologically sophisticated wastewater treatment planned, Nordic Aquafarms acknowledges that discharge may include chemicals of high concern, nutrients, and antibiotics, in addition to total suspended solids (TSS), biochemical oxygen demand (BOD), total nitrogen (N), total phosphorus (P), and ammonia.

Given the significance of the marine environment near the proposed discharge and the real threat emergency discharge poses, it is critical to understand how components in the discharge will move throughout the bay area.



Small-scale patterns of settlement and juvenile lobster abundance (top two maps) and prerecruit (< 83 mm CL) catch per trap haul of lobsters in Penobscot Bay, Maine (from Steneck, R. S. and C. J. Wilson. 2001. Long-term and large scale spatial and temporal patterns in demography and landings of the American lobster, Homarus americanus, in Maine. Mar. Freshw. Res. 52: 1302–1319.).

The applicant's circulation model overly simplifies projected movement of discharge components throughout the aquatic system. The applicant further failed to model how effluent components may interact with the myriad marine species in the area.

Better modeling of circulation and impacts is necessary to determine the least environmentally damaging alternative for discharge. In addition, BEP must set appropriate limits on discharge elements and require, if approved, regular monitoring and reporting.

If a discharge permit is eventually approved, a highly rigorous regime of water testing through year-round monitoring and sampling by reputable, third-party scientists to determine whether and when toxics enter the marine environment in threatening concentrations must be a condition of that approval. The relatively unproven wastewater treatment technology being proposed, while theoretically outstanding, requires sophisticated internal management and oversight. The possibility for error or treatment system malfunction is great and calls for vigorous monitoring all aspects of that process, including the outfall.

The accomplishment of the Penobscot River Restoration bringing large numbers of alewives and other anadromous fish back into the Penobscot watershed, regulatory success leading to water classification upgrades in portions of the watershed, and other indicators of fisheries rejuvenation in the Penobscot system, as exemplified by the National Oceanic and Atmospheric Administration's *Penobscot Watershed Habitat Focus Area* (attached), all support both protection of the bay ecology and furtherance of restorative action. Nordic Aquafarms can and should support restoration of wild fish species in the bay ecosystem by installing appropriate, effective fish passages in Little River so that fish can again utilize the fresh/salt connection in this location.

The marine water chemistry of Penobscot Bay and the Gulf of Maine is changing. The recently released University of Maine's Climate Future 2020 Update from the University of Maine (http://climatechange.umaine.edu/climate-matters/maines-climate-future/) highlights in dramatic detail the need to protect existing environmental characteristics and services. Maintaining and improving water quality has never been more important to the citizens of Maine. At the same time, thoughtfully designed, carefully managed, appropriately scaled and sited aquaculture plays an important role in Maine's food production and recirculating systems will certainly play an important role in the growth of fish production for food. We urge BEP to utilize the best and set new standards of care in permitting the proposed aquaculture permits captioned above.

Thank you for your time.

Sincerely,

Stephen Miller
Executive Director

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Joseph Kelley June 9, 2015 Transcript

STATEMENT OF JOSEPH T. KELLEY, Ph.D.
Concerning The Proposal To
Dump Dredge Spoils From The Searsport Fnp
Into The Belfast Bay Pockmarks
June 9, 2015

I am a Professor of Marine Geology at the University of Maine, School of Earth and Climate Sciences, in Orono, Maine, where I teach graduate classes in Marine Geology and Coastal Zone Management and undergraduate classes in Beaches and Coasts and the Geology of Maine. I was a Marine Geologist with the Maine Geological Survey for 17 years and testified frequently to this Board on many aspects of our coastline, was on the executive committee of the Casco Bay Estuary Committee where I worked closely with the Army on dredging Portland Harbor and broadly reviewed all Corps of Engineers proposals to dredge along the Maine coast as part of Federal Consistency Review. I was the Governor's appointee to the Oil Spill Advisory Committee and worked several topics relating to petroleum movement. I am a past President of the Geological Society of Maine and remain active in many regional, national and international professional organizations. In both my academic and public service positions, I have conducted extensive studies on the Belfast Bay methane deposits and pockmarks.

I have given more than 200 professional talks on aspects of the Maine coast and published more than 100 peer-reviewed papers on subjects ranging from sea-level changes in Maine to coastal landslides, beach erosion and salt marsh eco-geomorphology. I literally spent years of my life mapping the seafloor of the Gulf of Maine. This work is summarized in an atlas by my PhD student and colleagues, and is available on line at a Maine Geological Survey web site: http://www.maine.gov/dacf/mgs/pubs/online/ics/ics.htm.

In my experience, the most widespread potential geohazard in the coastal Gulf of Maine is the natural gas, or methane, found in Maine's seafloor. Although it does not occur in economic quantities, natural gas is prevalent throughout Maine's muddy coastal embayments and within the Gulf of Maine's deep basins. In recent geologic history, fluid-escape events occurred, and giant craters have formed in the seabed. The frequency and magnitude of these escape events are uncertain, as are the mechanisms responsible for crater formation.

1. Evidence for Natural Gas, Origin of the Gas and Pockmarks

Geologists use acoustic energy (sound) to study ocean sediments. Acoustic signals travel into the seabed and are reflected from layers in the subsurface (seismic reflection) (Rogers et al., 2006). When more than 5% of the volume of the pore spaces between mineral grains is compose of gas bubbles, all the sound is reflected back and no stratigraphy, or layering, is imaged (Figure 1). By acquiring many survey lines, we map out the spatial distribution of the gas (Figure 2). Amounts of gas at greater depths cannot be determined. When < 5% of the volume of the sediment is taken up by gas, that layer strongly reflects back sound (gas-enhanced reflector), but the signal can continue, and reveal deeper stratigraphy. This method is used by oil companies prospect for gas at much greater depths. Thus, we have mapped the distribution of gas in Belfast Bay (and other bays) and observed indications that it has migrated.

How do we know it the gas is methane and not air? We have cored sediments containing gas and flamed off the gas coming from the core. We also had gas samples analyzed and found only methane, and no higher alkanes (propane, butane), suggesting this gas comes from bacterial breakdown of organic matter and not deep-seated petroleum (Barnhardt et al., 1997).

Why do we associate methane with pockmarks? Within a pockmark region, there is no gas evident beneath pockmarks, suggesting it vented to form the crater (Figure 1).

The recent geological materials above Maine's ancient bedrock are till (a deposit of sand, mud and gravel formed by glaciers about 15,000 years ago), glacial-marine mud (muddy material expelled from ice tunnels as the ice melted away) and modern sediment. The modern sediment rests above an erosional surface (unconformity) that was dry land when sea-level was lower. All of the gas we have observed is in the modern material, and not below the unconformity (Kelley et al., 2010, 2013). Pockmarks in nearshore waters do not extend below the unconformity, which has a relatively hard surface.

Although no one has yet pinpointed the specific source of methane in estuarine and coastal sediments, subsurface gas likely originates from organic matter deposited in marshes, lakes, and bogs between approximately 12,000 and 10,000 years ago, when sea level was as much as 200 feet lower than it is today (Rogers et al., 2006; Kelley et al., 2013). Following this low-sea-level interval, Maine experienced a rise in sea level, with the ocean washing inland and depositing tens of feet of mud and sand over these former marshes and bogs (Rogers et al., 2006). Buried under a growing mass of mud, the organic material became deprived of oxygen, anaerobic bacteria decomposed the organic matter and produced methane as a byproduct in a manner similar to how methane is produced in landfills today (Judd and Hovland 2007). Alternatively, the gas originated from organic matter in estuarine mud. Gas is known in most muddy estuaries (Chesapeake Bay, Delaware Bay), but only muddy areas that were formerly glaciated in the US contain pockmarks. Of all the estuaries studied, muddy estuaries in Maine contain gas (and no sandy bays because the gas bubbled out long ago), but only a few contain pockmarks. Many of our embayments are not mapped at all (Rogers et al., 2006).

Pockmarks occur as singular features, or in fields numbering thousands of depressions. Maine's pockmarks range in size from nine to 1,000 feet in diameter and may be up to 120 feet deep (Brothers et al., 2012) (Figures 3, 4). Based on our extensive studies of the Belfast Bay pockmarks, my colleagues and I propose that fluid escape (gas and pore water) created Maine's pockmarks. Seafloor fluid escape can occur steadily or abruptly. Evidence collected in Maine supports each of these pathways, so both may happen. For example, seafarers occasionally report bubbles and sediment plumes in Maine's coastal embayments and local residents have reported them from Belfast Bay (Kelley et al., 1994; Rogers et al. 2006). One geophysical survey imaged an expulsion event (Kelley et al. 1994). A later geochemical survey, however, found little methane in the uppermost sediment near the same field, suggesting that Maine pockmarks are not actively venting gas (Ussler et al. 2003).

There is uncertainty about the activity of the field today. We do not know what initially triggered formation of the field, but earthquakes are considered to be a potential trigger. However, these features also may form episodically with changes in environmental conditions such as changes in ocean temperature, storm- or tsunami-related sea-level changes, or by physical vibration from earthquakes or other sources. If the pockmarks are actively venting it is probably most common at low tide when storm waves roll across the bay (and few people are there to observe). It is an understatement to say that gas-escape pockmarks are enigmatic. They are the largest seabed landform on muddy seafloors, and we have only begun to study them. A fuller understanding of the origin(s) of pockmarks and the ability to predict seafloor expulsion events requires more study.

Belfast Bay, Maine, contains more than 2,000 pockmarks (Figure 4). The largest pockmark in the field could contain the entire University of Maine football stadium (Figure 5). They are segregated into two distinct fields separated by a glacial deposit; the northern field contains smaller pockmarks and the modern sediments are thinner than to the south. In Belfast Bay and all other bays in Maine and New Brunswick where they are mapped, many pockmarks occur as individuals, but others occur in chains of connected/adjacent pockmarks (Andrews et al., 2010). This may be an artifact of gas migration along more permeable layers until the overlying sediment cannot contain the pressure. This is not known, however, and requires study of the sediment strength in relation to the gas pressure (both unknowns).

Pockmarks occur exclusively in muddy sediment. In Belfast Bay, the size of the mud particles is within the clay size range (< 2 microns). This material is relatively impermeable and traps the gas and other fluids until gas pressure becomes too great or a disruption allows escape. It is remarkable that the pockmark inner wall slopes reach angles up to 40°. One would expect that such a slope of gassy, water-rich mud would fail and fill in the hole. We have conducted studies of the accumulation rate of sediment in the pockmarks using radioactive tracers that remain from bomb testing the 1950's and early 1960's (Cs-137). The distribution of the Cs-rich mud is chaotic, implying episodic landslides of younger and older material into the bottom of the craters (Brothers et al., 2011). Yet, bathymetric comparison of the pockmark field over a time frame of 9 years showed no change greater than 5 m (16 feet) in the pockmark field. A modeling study of the field with respect to tidal currents (Brothers et al., 2011) suggests that currents are capable of scouring the insides of pockmarks, resuspending sediment and possibly enlarging them. Greater confidence would exist following current meter studies within the pockmarks, but that has not been accomplished. While the Corps cites the lack of significant changes in the size and depth of these pockmarks over time to support the hypothesis that the pockmarks are not the site of actively methane venting, the more significant takeaway from the observations relating to known scouring in the Belfast Bay pockmarks is that the currents in this part of Penobscot Bay continually flushes sediment out of these pockmarks – scouring any significant sediment deposits within. In the absence of this scouring, these pockmarks would have filled up with sediment from natural attenuation and changed in depth over time.

II. History of Pockmark Use for Dredge Spoils Disposal

To the best of my knowledge, no permit has ever been issued for dredge spoils disposal into the methane vent pockmarks in Belfast Bay. In fact, I know of no place in the United States (or the world for that matter) where this has been deliberately attempted in a controlled manner. The Corps *claims* that there is "anecdotal" evidence of some dredge spoils disposal in Belfast Bay, and there is evidence on acoustic records that someone may have dumped dredge spoils in Belfast Bay. The nautical chart has an arrow with text that says that a part of Belfast Bay is "Disposal Area 67 depths from survey of 1872" (sic), but my memory is that the acoustic returns we interpreted as spoils were outside that area. It remains unclear if any earlier dredge spoils dumps were actually over gas or just near it; no one – including the Corps of Engineers or its contractors -

- has specifically tried to determine whether the prior Searsport dredge spoils disposal was over a methane deposit.

Indeed, in the late 1990s, the Corps proposed using pockmarks to dispose of dredge spoils for the earlier (abandoned) version of this same project. At that time, the area the Corps now calls the "Penobscot Bay Disposal Site" or "PBDS" became the subject of extensive, though unrelated, scientific assessment and study to map and understand the origins of the Belfast Bay pockmarks and methane deposits. As noted above, these studies funded by the National Science Foundation, Maine Sea Grant, the Minerals Management Service (now BOEM) and the National Environmental Satellite, Data, and Information Service, not the Corps of Engineers, were never focused on the impact of dredged spoils disposal. However, in the late 1990s, when the Corps first proposed dumping dredge spoils from deepening the Searsport FNP in the Belfast Bay pockmarks, the data obtained through these unrelated scientific studies was evaluated by the Corps' private contractor to determine and recommend *if* this area, and the Belfast Bay pockmarks, was a plausible or safe area to dispose dredge spoils.

At that time, during which I was the senior Marine Geologist for the State of Maine, the State and federal government officials that reviewed the scientific evidence compiled for this area, then expressly rejected disposal of dredged spoils in pockmarks. All of the scientific data that exists clearly states that the area in and around the Belfast Bay methane deposits and pockmarks formed by methane venting is too geologically unstable and unsafe for use as a site for dredge spoils disposal.

There was no understanding then (in the late 1990s), and there remains no understanding now, what sort of load the gas-rich sediment column could sustain, and no understanding of whether gas would migrate elsewhere within the field if it were disrupted, though turbidity and methane in possibly large quantities could be released to the water column if disrupted. Indeed, there is no evidence of any governmental entity in the U.S. or elsewhere intentionally using methane vent-formed pockmarks or areas of known methane deposits, like those found in the PBDS and "Belfast Bay," as a dredge spoils disposal site.

Further, the Belfast Bay pockmarks are not demonstrated as being capable of being used as a confined aquatic disposal site (CAD) as the Corps proposes. There are modeling observations that sediment in pockmarks are winnowed out and released by tidal currents and that this "scouring" is why the pockmarks have not filled in with sediment through natural attenuation over the years, but rather have remained essentially unchanged in size and depth for years. In addition, loading the inner walls of the pockmark with sediment might push them outward and induce more pockmarks around the original pockmark. There are many possible scenarios, but in the absence of focused study, we cannot predict the result of sediment loading of these features.

Accordingly, there is no reason to suppose, based on the currently known scientific evidence, that dredged spoils will remain in any of the Belfast Bay pockmarks – including the three pockmarks identified by the Corps for use in disposing spoils from the proposed project. It is also unclear why these three were chosen over thousands of others and what the selection criteria were. Significantly, despite knowing of these issues for more than 15-years since authorization for a Feasibility Study was provided by Congress, the Corps has undertaken *no study* of this "scouring" in the pock marks to be able to assess whether dredge spoils would or could remain in them even if successfully placed as planned, or to determine the level and effects of turbidity in the water column that would result from disposing of spoils in these pock marks and in these conditions and currents. Further, no effort has been made to assess the pressure of the gas or strength of the sediment confining it, nor any investigation of the capability of the gas to migrate.

Even the August 2013 DAMOS study conducted by the Corps, reported in 2014, ignored the greatest issue presented by the proposal to dispose of dredge spoils in the PBDS. Specifically, the Corps has failed to address the profound uncertainty that continues to exist about the relative stability of the field with respect to being loaded, even accidently, by dredge spoils (particularly in this volume). Until there is a physical/geological oceanographic study of sediment/tidal current interactions, we will not understand how long spoils will remain in place. Until there is an engineering/geotechnical study of the gas pressure and sediment strength and sediment column permeability, we cannot really be confident what will happen when gassy sediment is disrupted, including disrupted by the introduction of almost a million cubic yards of sediment through dredge spoils disposal.

The result could be significant and on-going turbidity in the water column that could have deleterious impacts on the ecology and fisheries in Penobscot Bay. This effect could be especially damaging to lobster settlement and survivability. Neither the 2013 FSEA, nor the 2013-2014 DAMOS study address or even consider the potential consequences of such a calamity of turbidity on the valuable fisheries in Belfast Bay and the surrounding Waldo County waters or in Penobscot Bay and the Penobscot Watershed that NOAA designated in 2014 as having special significance to U.S. fisheries.

III. Personal Knowledge Regarding This Corps' Proposal

In my role as Marine Geologist for the State of Maine, I was personally involved in the decision to reject the Belfast Bay pockmarks for use in dredge spoils disposal in the late 1990s. In fact, over the years I have referenced this proposal to use the pockmarks for this purpose in talks as an example of an absurd proposal that proper scientific study was able to avoid. The Maine Policy Review paper (Brothers et al., 2010) by my former PhD student, Laura Brothers, and colleagues was written specifically to call attention to the hazard that gas in sediments can pose to engineering operations.

In the Spring of 2013, the Corps contact Dr. Laura Brothers, now with the U.S. Geological Survey (USGS) and me to discuss this most recent proposal to expand and deepen the Searsport FNP and dump large amounts (almost a million cubic yards) of dredge spoils into the pockmarks off Islesboro. I was surprised by this proposal in light of the prior rejection of this area for this purpose and the known risks of using this area for this purpose.

Corps staff assured me that they could be more accurate in the method of placement with current equipment and could place the spoils in the center of a pockmark and asserted that, if that if this proved not to be the case when they started to dump the dredge spoils, they "would stop dumping." Based on my prior experience with working with the Corps of Engineers in other projects, in Maine and New Orleans, I am skeptical that this would actually be the case, no matter how sincerely staff believes these representations now.

When I queried staff about why this geologically unstable site was their preferred disposal site they stated that "it would cost too much" to use another disposal site, including the Rockland Disposal Site (RDS) that had previously been proposed for this purpose. While I do not believe that the Rockland Disposal Site is an appropriate disposal site for this or any other dredge spoils disposal, based on my own study of the RDS and its characteristics, currents and geologic features, the decision to place dredge spoils in the site the Corps is calling the "Penobscot Bay Disposal Site (PBDS) because of cost considerations is not sound. As stated above, this site is not appropriate for use as a CAD due to scouring and loading the pockmark walls and the presence of methane in the sediment.

The Corps has conducted no studies to suggest that the use of geologically unstable pockmarks in Belfast Bay can be safely accomplished, although the Corps has had fifteen years since obtaining Congressional authority in July 2000 to conduct a Feasibility Study of the proposal to deepen the Searsport FNP to conduct such studies. Based on the existing, extensive scientific data that is available however, in my opinion this site is not geologically suitable or safe for the proposed use in dredge spoils disposal and no permit should be issued for this purpose. The calamity of turbidity which scientific evidence suggests would result could be devastating even if all spoils disposed there are clean and free of contamination. However, the possibility of re-suspension of buried contaminants, including HoltraChem-contaminated material, makes the use of pockmarks in this area even more dangerous, and threatens the reputation for wholesomeness of all Penobscot Bay fishing resources.

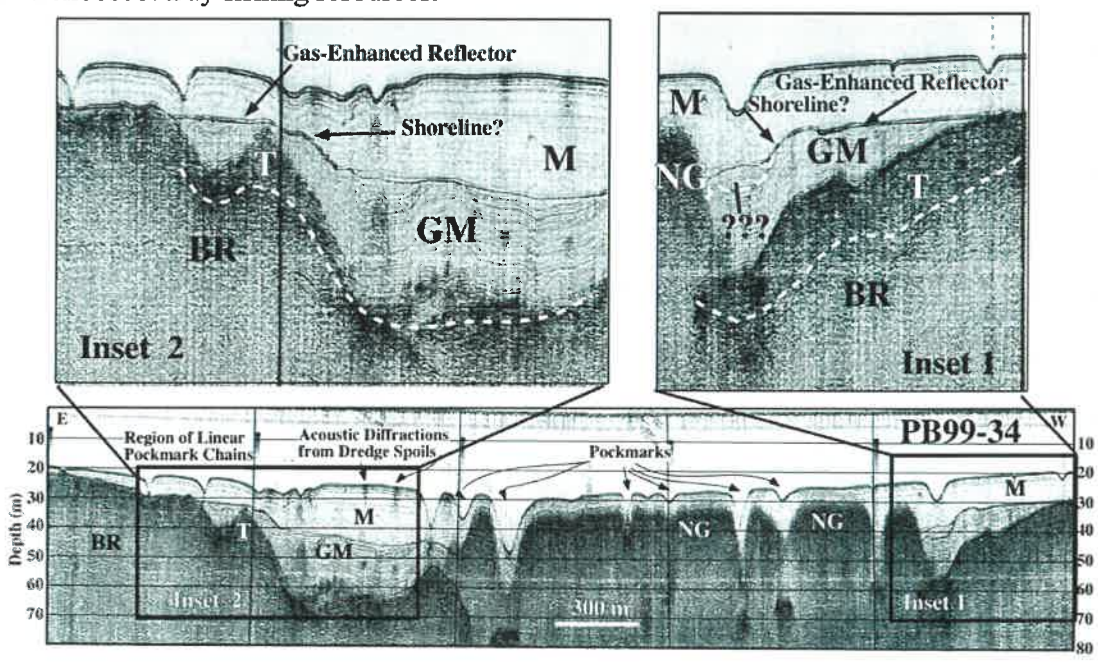

Figure 1. Seismic reflection profile across Belfast Bay (Rogers et al., 2006)

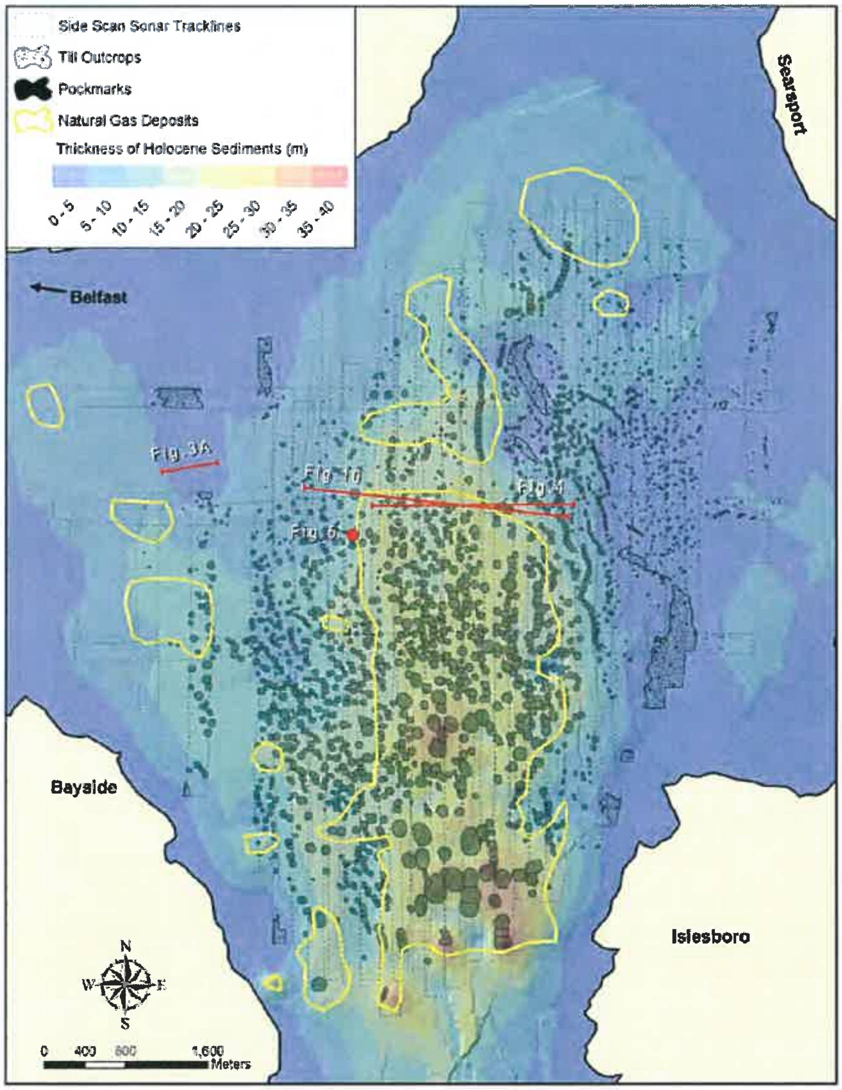

Figure 2. Gas field and associated pockmarks, Belfast Bay (Rogers et al., 2006).

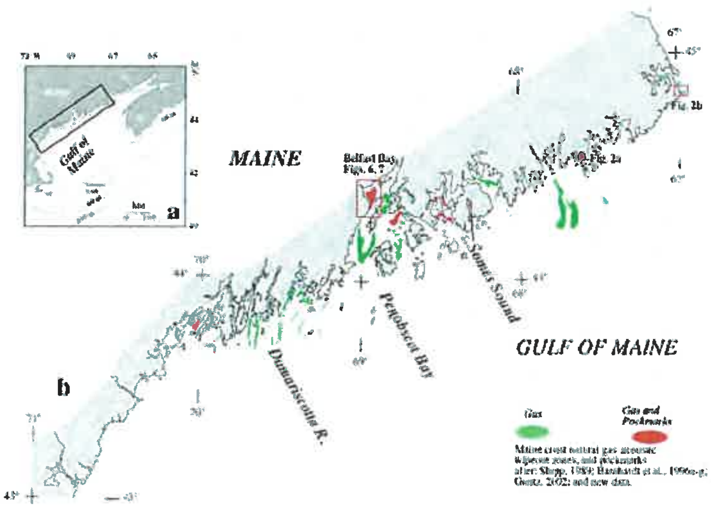

Figure 3. Extent of gas and pockmarks in Maine (modified from Rogers et al., 2006)

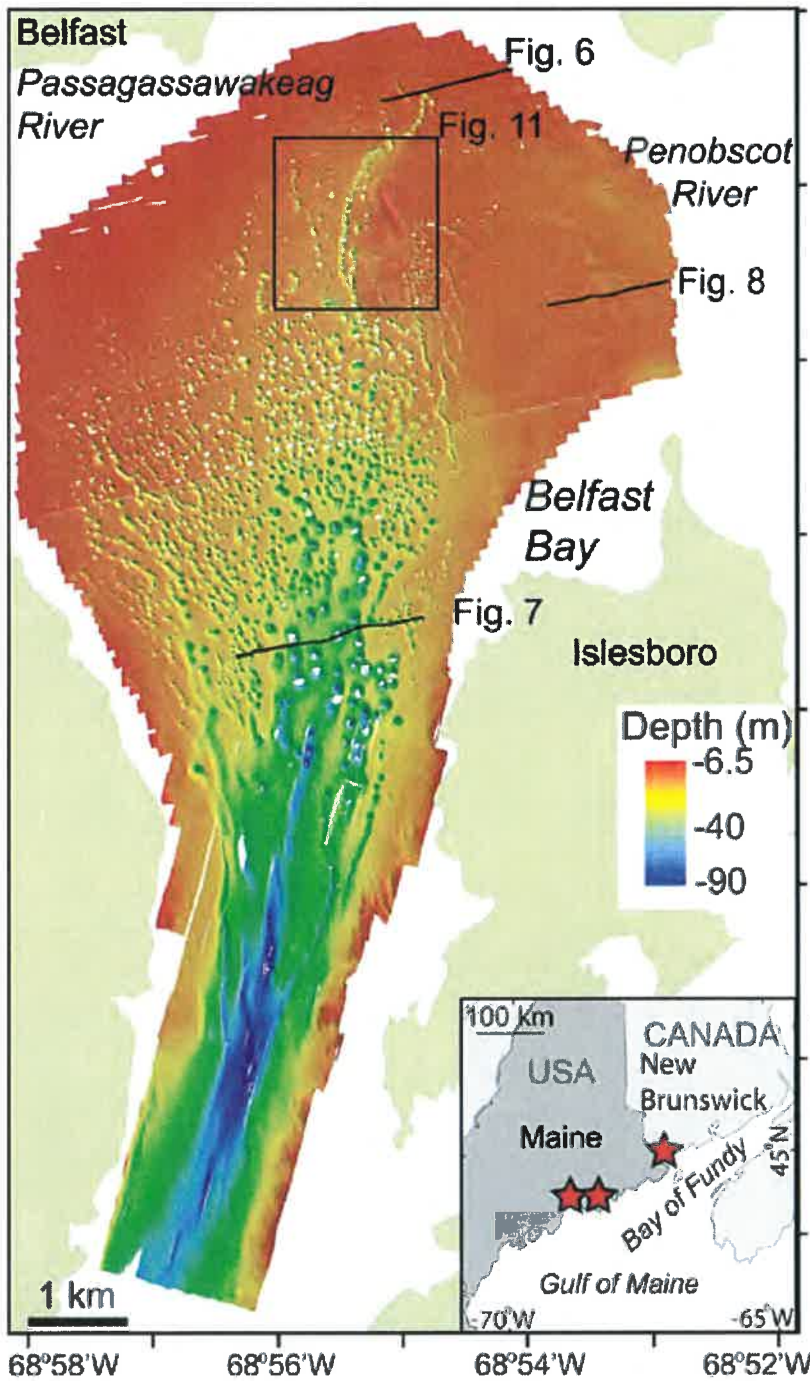

Figure 5. Belfast Bay pockmark field (Brothers et al., 2012).

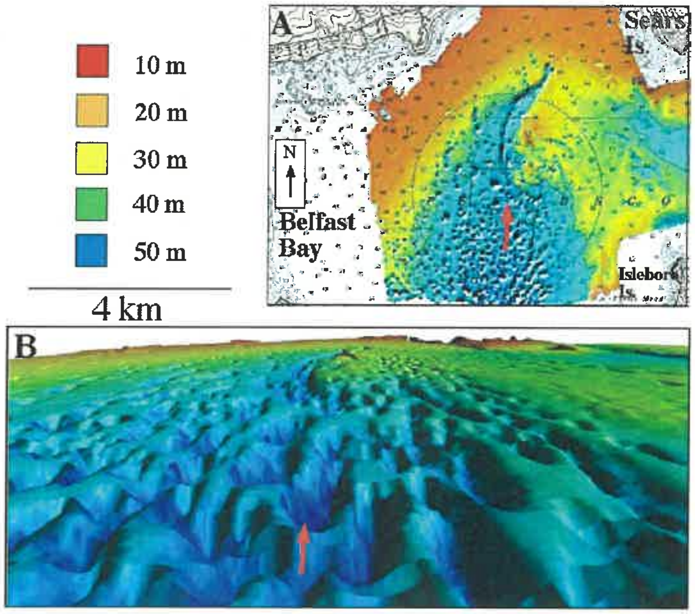

Figure 5. Oblique view of Belfast Bay pockmarks (Rogers et al., 2006).

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NOAA Penobscot Watershed Habitat Focus Area

NOAA
Habitat
Blueprint

Photo courtesy of the Penobscot River Restoration Trust

NOAA Selects Maine's Penobscot River Watershed as Next Habitat Focus Area

Maine's Penobscot River watershed has been selected as a Habitat Focus Area under NOAA's Habitat Blueprint.

A Rich Cultural Heritage

The largely forested Penobscot River watershed encompasses approximately 8,570 square miles. With many lakes and multiple tributaries, it offers important habitat for 11 sea-run—or migratory—fish species and other wildlife. Historically, the fish populations on the Penobscot River were bountiful. Population estimates ranged from 14 to 20 million alewives; 75,000 to 100,000 Atlantic salmon; and 3 to 5 million American shad.

The Penobscot River watershed has a rich cultural history of commercial, recreational, and sustenance fishing. It is home to the Penobscot Indian Nation, which occupies Indian Island—part of their ancestral homeland, surrounded by Penobscot waters.

NOAA worked with partners to remove the Great Works Dam (shown before, during removal and after). Photos courtesy of the Penobscot River Restoration Trust

A Habitat in Need

Dams, culverts, water pollution, and overfishing have nearly eliminated many sea-run fish species from this watershed. Improving access to habitat on this river is particularly important for the recovery of endangered Atlantic salmon. The Penobscot is the largest Atlantic salmon run in the U.S.

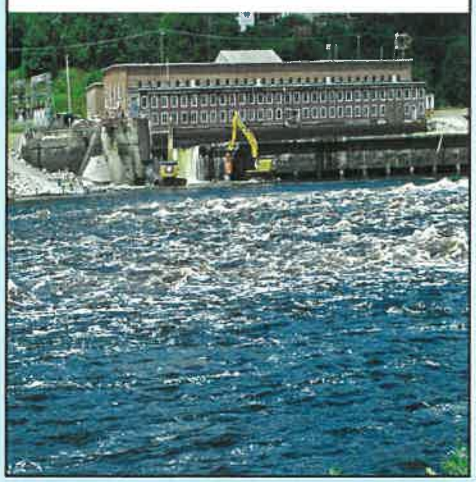
Dams on the river and the decline of sea-run fish have contributed to a loss of recreational activities and economic opportunities, such as white water rafting and sportfishing. Poorly maintained dams also pose a safety risk throughout the watershed.

Collaboration

NOAA and partners are committed to a watershed approach to conservation and restoration. We focus on the connections between river, estuary, and ocean habitats.

We are working together to better manage the Penobscot River ecosystem and recover threatened and endangered fish populations. NOAA's work on the Penobscot also supports America's Great Outdoors Initiative and the river is part of the Northern Forests and Waters of New England Landscape Demonstration Site which is focused on accelerating restoration work.

This collaborative effort offers a historic opportunity to improve access to nearly 1,000 miles of river and tributary habitat for fish, including the endangered Atlantic salmon, shortnose sturgeon, Atlantic sturgeon, and American shad, alewife, striped bass, and blueback herring.



Veazie Dam: built in 1912, taken down 101 years later, in 2013.

Partners

Penobscot Indian Nation
State of Maine
Penobscot River Restoration Trust
- -American Rivers
- -Atlantic Salmon Federation
- -Trout Unlimited
- -Natural Resource Council of Maine
- -The Nature Conservancy
- -Maine Audubon

U.S. Fish and Wildlife Service
Maine Sea Grant

Focus Area Objectives At a Glance

3-5 years

Sea-Run Fish – Identify priority areas for fish passage to increase access to habitat

Prey Species – Remove dams or construct fishways to allow access to thousands of acres of spawning habitat for alewives which are food for commercially important groundfish

Atlantic Salmon – Replace culverts in coldwater habitat

Water Quality – Continue pre- and post-dam removal project monitoring

Forecasting - Provide accurate and timely river flow forecasts for river-based recreational activities

Long-term

Improve river flow and restore sea-run fish

Increase fishing and recreational activities, generating jobs and revenues for Maine communities and preserving the cultural heritage of the Penobscot Indian Nation

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