TO: **Beth Callahan,** Project Manager
Dept. of Environmental Protection,
Bureau of Land and Water Quality Control - Portland

FROM: Department of Marine Resources (DMR)

DEP Number: L-
Applicant: Nordic Aquafarms
Location: Belfast
Type of Project: Construction of Intake and Discharge pipes

The above proposed project has been carefully reviewed and considered by DMR personnel. The following are DMR's comments:

Nordic Aquafarms, Inc. is proposing to develop a land based recirculating aquaculture system (RAS) to raise Atlantic salmon in Belfast Maine. This facility will require the construction of intake and discharge pipes to operate the RAS facility. Seawater will be taking from and discharged to Belfast Bay. The two 30-inch intake pipes will be approximately 6000 feet long and draw in fresh seawater at approximately 70 feet of depth. The proposed intake pipes will be approximately 8 feet off the sea floor at its terminus. The single 36-inch discharge pipe will be approximately 3300 feet long and discharge in approximately 35 to 36 feet of water. The discharge pipe will have 12-inch diameter flexible duckbill diffuser valves. These wastewater diffuser valves will be spaced 50 feet apart.

The intake and discharge pipes will be buried across the inter-tidal and shallow sub-tidal to a maximum depth of 10 feet with a minimum of 5 feet of cover. The cover material in the trench will be the excavated marine sediments suitable for backfill directly on the pipes. All excess material will be loaded onto trucks and disposed of at an upland facility. A total of approximately 36,000 cubic yards of material will be excavated over approximately 108,000 square feet (2.4 acres).

At approximately 38 feet of mean low water depth the pipes will be laid directly on the sea floor. The pipes laid directly on the seafloor will be anchored with concrete pipe collars spaced every 15 feet on center. Every sixth concrete anchor and at any bend will require additional pile anchoring and - an approved marine helical anchoring system. Three different types of concrete pipe collars will be employed as the pipeline transitions from three to two and then down to one pipe. The total direct impact to the marine floor by the concrete anchors is 6,549 square feet. However, a much large area will be a direct loss to fishing activity.

The proposed construction time window is November through March. The inter-tidal and shallow sub-tidal section where the pipes will be buried would take place in the November through the December period. A 10-foot-wide open cut trench with side cast of material is proposed for the approximately 300-foot section across the inter-tidal. The trench will remain open for several tide cycles to allow washing of materials. The pipes will be installed by a float and sink method and backfilled as installed. It is expected to take 2-3 weeks to complete the inter-tidal construction work. Silt barrier will be employed along the trench and excavated material.

The submerged section the buried pipes will be done from a spud barge with and excavator for approximately 750 feet. A clam-shell crane dredge from the spud barge will be utilized at deeper depths

until approximately the 36 foot mean low water depth. The trench will be 8- 10 feet dep and approximately 16 feet wide. Dredge material will be side cast. Turbidity curtains will surround the immediate excavation and side cast locations for the temporary dredge spoils.

The RAS facility discharged wastewater will have a median temperature of 15-18 C and 20-25 ppt salinity year-round. All other effluent concentrations are similar or below the City of Belfast Wastewater discharge effluent.

Fisheries and Industry Impacts

The proposed RAS discharge pipe will be located within an area Prohibited to shellfish harvesting under the authority of 12 M.R.S.A. § 6172. Techno Post. There is limited shellfish resource present within the intertidal area. No significant shellfish resources are present along the proposed pipeline. Soft-shell

clams *Mya arenaria* are mapped in the general location but Normandeau Associates found no *Mya* present (Appendix 7a Natural Resources Report p19). Several species of marine worms were found but none of commercial value. With the use of silt curtains and the proposed work window there would be little to no long-term impact to bivalve or marine worms within the construction or general area.

Lobster fishing activity is present within the Belfast Bay general area. During the proposed construction window and at depth along the pipeline, lobsters would not be present due to water temperatures and natural migration to deeper offshore locations. Effluent temperatures and salinities do not appear to be of a concern. "Numerous studies have quantified temperature thresholds for H. americanus that suggest conditions optimal for recruitment are between 12 and 18ºC (ASMFC, 2015), below which eggs are less likely to hatch (Annis, 2005; Annis et al., 2013; MacKenzie, 1988) and above which juveniles and adults tend to actively avoid (Crossin et al., 1998). Temperatures above 20ºC induce physiological stress across all H. americanus life stages (Dove et al., 2005; Glenn et al., 2007; Powers et al., 2004; Steenbergen et al., 1978; summarized in ASMFC, 2015). ASMFC (2015) found that both juvenile indices, such as young-of-year abundance, and recruit size showed a strong, positive correlation to the number of days between 12 and 18ºC, but a strong, negative correlation to days above 20ºC. Warmer waters have also been linked to increased incidence of epizootic shell disease (Glenn & Pugh, 2006)." Rheuban et al 2017.

Adult lobsters have shown a preference for the high salinity environment (20-25 ppt). Lobsters moved away from their shelters as an avoidance response starting around ~18 ppt and undertook bigger movement to avoid salinities around 12 ppt. It was also found that adult females seemed to be the most sensitive to changes in salinity. *Summary of Jury et al., 1994*

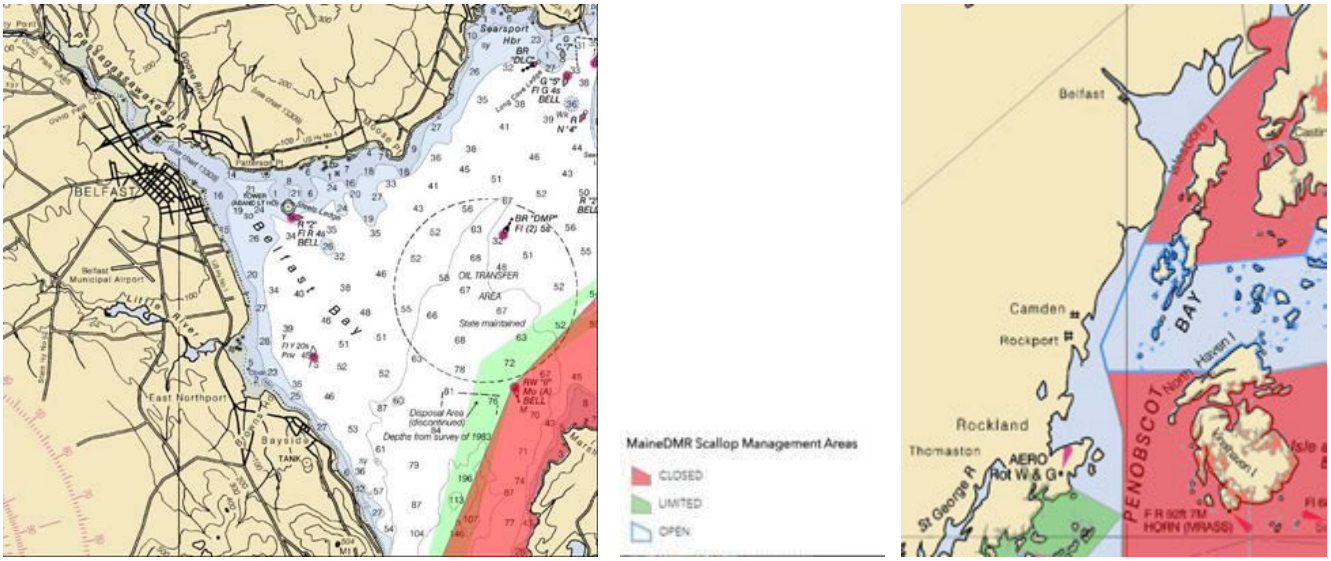
Reported lobster landings for the combined towns of Northport, Belfast and Searsport are considered confidential. There are less than three harvesters and/or dealers present in each of the landing ports. The landings data can only be reported on a County wide level. The landings for Waldo county are: (including Ports of Searsport, Belfast, Islesboro, Lincolnville and Stockton Springs) are;

Year	COMMON_NAME	Pounds	Value	Active_Harvesters	Total_Trips
2017	lobster american	791,731	$3,168,086	67	2,204
2018	lobster american	747,969	$3,018,605	59	1,774

The construction of the pipeline and effluent discharge should have little or no long-term impact to the Lobster Industry landings or biology. The physical structure setting on the bottom should also have little impact to the movement of lobsters. However, there could be potential concerns with setting of fishing gear directly on or beside the pipeline. The diffusers, intakes and concrete anchoring collar structures could cause entanglement of traps and possible loss of gear. DMR would recommend the accurate marking of the intakes and diffuser locations and the length of the exposed pipeline.

The Scallop fishery in the proposed pipeline area is located within DMR Scallop Zone 1. The area is open for scallop harvest. However, there are no recent historical landings or known harvest activities in the area of the proposed pipeline or the general Belfast Bay area. (Personal communications, DMR Scallop Coordinator, Maine Marine Patrol). The effluent discharge for temperature and salinity does not appear to be of concern to juvenile or adult Scallops. The general Belfast Bay area would not be considered a natural spawning location. (Mullen, 1986 Species Profile; Life Histories and Environmental Requirements of Coastal Fish and Invertebrates (North Atlantic) Sea Scallop)

Maine Department of Marine Resources Scallop Zone Map



Atlantic Salmon immigration and emigration are not of a concern during the construction time period. “Maine's Atlantic salmon exhibit two run timings that are in part influenced by genetic factors. “Early run” adults enter fresh water between May and mid-July, and “late-run” adults enter fresh water later in the summer.” (National Research Council (US) Committee on Atlantic Salmon in Maine. Genetic Status of Atlantic Salmon in Maine: Interim Report from the Committee on Atlantic Salmon in Maine. Washington (DC): National Academies Press (US); 2002. 2, Biology and Evolution of Atlantic Salmon). The primary route of passage for salmon is along the eastern side of Islesboro. This side of the Penobscot Bay is wider and deeper with higher current flows. Acoustic tracking of smolts showed seaward migration behavior preference. (Campbell, H.A., Watts, M.E., Dwyer, R.G., Franklin, C.E. 2012. V-Track: software for analyzing and visualizing animal movement from acoustic telemetry detections. Marine and Freshwater Research, 63:815–820 DOI:10.1071/MF12194.)

Short-nose and Atlantic Sturgeon presence at the proposed pipeline during construction is also unlikely. Short-nose move down river in the spring to the lower Penobscot Estuary for spawning. The Penobscot Estuary is defined as the head of the tide at the Veazie Dam to the Southernmost tip of Verona Island. It is greater than 12 miles from the proposed pipeline and the southern tip of Verona Island. There are no recoded reports of short-nose present in the area of the pipeline. (Fernandes et. al. Seasonal Distribution and Movements of Shortnose Sturgeon and Atlantic Sturgeon in the Penobscot River Estuary, Maine. Transactions of the American Fisheries Society 139:1436–1449, 2010). “Atlantic Sturgeon were rarely seen in the freshwater sections of the Penobscot River during the expected spawning season of late May through mid-June. Also, spawning has not been documented in the Penobscot River in 7 years of egg and early-life-stage sampling efforts.” (Altenritter, M. E. 2015. Shortnose Sturgeon (Acipenser brevirostrum) in the Gulf of Maine: local population dynamics and metapopulation implications. Doctoral dissertation. University of Maine, Orono). Atlantic Sturgeon are likely using the Penobscot estuary for foraging based on their very specific summer use. (Altenritter and Zydlewski 2017 Atlantic Sturgeon Use of the Penobscot River and Marine Movements within and

beyond the Gulf of Maine Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science 9:216–230)

This project, as proposed, should not result in significant adverse impacts to marine resources, recreation, navigation, or riparian access. Traditional fishing access could be a concern for lobster, crab and scallop fishing due to intake and discharge structures. These structures will be between 2 – 9 feet above the sea floor and would pose as a trap for fishing gear to become entangled upon. It is possible that an exclusion zone along the pipeline will need to be established. The loss of fishing bottom would be approximately 149,000 square feet or 3.4 acres. This calculation is based on Department of Conservation Submerged Land Lease of 40 feet wide by the length of the exposed pipeline of 3,725 feet. DMR would request the accurate marking of the entire length of the exposed pipeline along with the intake and diffuser locations. The accurate recording of the pipeline to the Coast Guard and NOAA Marine Navigation Charts. Further, DMR requests suitable sediment testing along the proposed pipes for potential contaminates. The collection and sampling should meet ACOE standards for testing on marine sediments.

Denis-Marc Nault
DMR Environmental Coordinator
Date: January 24, 2020

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