



United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
408 Atlantic Avenue – Room 142
Boston, Massachusetts 02110-3334



July 24, 2009

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, DC 20426

RE: COMMENTS
Correction to Comments on the Pre-Application Document, Scoping Document, and
Submission of Study Requests, Half Moon Cove Tidal Power Project, FERC No. P-
12704, Washington County, Maine

Dear Secretary Bose:

The Department of the Interior respectfully resubmits our July 23 comments on the Pre-Application Document, Scoping Document, and Submission of Study Requests, Half Moon Cove Tidal Power Project, FERC No. P-12704, Washington County, Maine. The July 23 correspondence, appended immediately below, has been corrected to remove formatting errors. All substantive material remains unchanged.

Please pardon the inconvenience, and contact me at (617) 223-8565 if any further clarification is needed.

Sincerely,

Andrew L. Raddant
Regional Environmental Officer



United States Department of the Interior

OFFICE OF THE SECRETARY
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Boston, Massachusetts 02210-3334



July 23, 2009

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Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, DC 20426

RE: COMMENTS
Comments on the Pre-Application Document, Scoping Document, and Submission of Study Requests, Half Moon Cove Tidal Power Project, FERC No. P-12704, Washington County, Maine

Dear Secretary Bose:

The Department of the Interior (Department) has reviewed the Federal Energy Regulatory Commission (Commission) May 26, 2009, Notice of Intent to File License and the Pre-Application Document (PAD) for the licensing of the Half Moon Cove Project (Project), located in Washington County, Maine. Representatives from our Bureau of Indian Affairs attended a scoping meeting on June 24, 2009. The Commission issued a draft scoping document for this Project on May 26, 2009. The Department comments on the Scoping Document in this letter. The Department will primarily be represented in the licensing proceeding by the Bureau of Indian Affairs (BIA) and the U.S. Fish and Wildlife Service (FWS) as both Bureaus have a significant interest in the proposed Project.

The Half Moon Cove Tidal Power Project would be located in Half Moon Cove (also known as Bar Harbor), a cove in the outer part of Cobscook Bay. The Cobscook Bay region is known to contain some of the highest levels of marine biodiversity in eastern North America (Larsen 2004) and provides aquatic and terrestrial habitat for significant populations of migratory birds, diadromous and marine fish, and threatened and endangered species. The development of a tidal project in this location may affect these fish and wildlife resources. Therefore, the Department has an interest in the licensing of the Project and the measures to protect, mitigate damages to, and enhance fish and wildlife resources that will be included as elements of the federal license.

The lands of the federally recognized Passamaquoddy Tribe (Tribe) comprise a portion of the proposed Project boundary so the development will directly impact these lands. The Department, primarily through the Bureau of Indian Affairs, works with Indian tribes to protect and enhance their lands and natural resources. Because the Project may affect tribal lands, government-to-government contact with the Passamaquoddy Tribe must be an integral part of this licensing process.

The Half Moon Cove Tidal Power Project is proposed by Tidewalker Associates (Applicant). As we understand it, the proposed Project is a tidal barrage that includes: 1) a generally described 1,200-foot-long dam or tidal wall that would impound Half Moon Cove; 2) two undefined turbines that would be incorporated in the dam or tidal wall; 3) an 880-acre impoundment that would encompass the entirety of Half Moon Cove with a maximum water surface elevation of +27 feet (MHW); 4) a potential gate structure incorporated into the SR 190 causeway, and 5) a 7.1-mile-long 34.5 kV transmission line. The Project boundary was generally described in the PAD but a boundary map does not appear to be provided in the PAD. The Project would be operated to provide power on both the ebb and flood tides and it may incorporate a turbine design that could also pump water into the impoundment during certain periods. The Applicant has described the Project operation as modifying the tidal amplitude by 2 to 3 feet and releasing water out of phase with the tidal amplitude.

The following comments and recommendations are provided under the authority of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. § 1531 *et seq.*), the Fish and Wildlife Coordination Act (48 Stat. 401, as amended, 16 U.S.C. § 661 *et seq.*), and the Federal Power Act (FPA) (16 U.S.C. § 791a, *et seq.*). Our comments and study requests are intended to facilitate the collection of information necessary to conduct effects analyses and to develop conservation measures, reasonable and prudent measures, prescriptions, and protection, mitigation, and enhancement measures pursuant to these authorities.

Department of Interior Goals and Objectives

We seek to accomplish several resource goals and objectives through this licensing process. The Department's general licensing goals are to:

1. Fulfill the Federal trust and statutory responsibility to protect the lands and resources of the Passamaquoddy Tribe;
2. Ensure that protection, mitigation and enhancement measures are commensurate with the Project's effects and contribute to meeting state and federal fish and wildlife objectives;
3. Recover federally proposed and listed species and prevent the listing of additional species;
4. Conserve, protect, and enhance the habitats for fish, wildlife, and plants that may be affected by the Project into the future;
5. Ensure that the public is afforded the opportunity for recreation on Project lands, including fishing, hunting, bird watching and other forms of outdoor recreation; and
6. Ensure that once the licensing process is complete, there is an adaptive management plan to allow the use of new information or new management strategies over the term of the license, bringing us closer to the desired level of protection for fish and wildlife resources.

Our specific objectives for aquatic ecosystems, terrestrial resources, threatened and endangered species and tribal resources are to:

Objectives for Aquatic Ecosystems

1. Protect, enhance, or restore diverse high quality aquatic and riparian habitats for plants, animals, food webs, and communities in the bay and mitigate for loss or degradation of these habitats;
2. Maintain aquatic habitat connectivity in the bay to provide movement, migration, and dispersal corridors for estuarine and marine fish and other aquatic organisms and provide connectivity for nutrient cycling processes;
3. Maintain and restore naturally reproducing stocks of anadromous, estuarine and marine fish to the bay and its tributaries;
4. Provide a tidal flow regime that meets the spawning, incubation, rearing, and migration requirements of estuarine and marine fish and benthic invertebrate species in the vicinity of the Project area;
5. Meet or exceed federal and state regulatory standards and objectives for water quality in the impoundment;
6. Minimize Project operation effects on water temperature, salinity and tidal amplitude and the potential negative effects in the bay outside the impoundment;

Objectives for Terrestrial Resources

7. Protect, enhance and restore wetlands, wetland functions and wetland buffer areas in the impoundment, and mitigate for loss or degradation due to Project impact;
8. Protect, enhance and restore terrestrial and riparian habitats and associated wildlife populations in the Project area and mitigate for loss or degradation due to Project impact;
9. Reduce the effect of the change in tidal amplitude on migratory bird habitat and seek opportunities to enhance this habitat;
10. Reduce Project induced recreation disturbance to terrestrial habitat and wildlife species;

Objectives for Endangered, Threatened, Proposed and Sensitive Species

11. Reduce Project effects on state and federal threatened, endangered, proposed and sensitive species;
12. Explore opportunities for potential protection, mitigation and enhancement measures for threatened, endangered, and proposed species;

Objectives for Federal Trust and Statutory Responsibility to Indian Tribes

13. Protect the aboriginal fishing and use rights of the Passamaquoddy Tribe and its members;
14. Conserve, protect, and enhance the natural and cultural resources of the Passamaquoddy Tribe and its members;
15. Protect and enhance the economic and recreational resources of the Passamaquoddy Tribe and its members; and
16. Protect the lands of the Passamaquoddy Tribe.

Comments on the Notice of Intent

In the Notice of Intent, the Commission initiated consultation with the State Historic Preservation Officer, however the Commission did not initiate consultation with the Tribal Historic Preservation Officer of the Passamaquoddy Tribe. The lands of the Passamaquoddy Indian Reservation at Pleasant Point comprise a portion of the eastern side of Half Moon Cove. The proposed operation of the proposed Project would change the timing and duration of water coverage of tidal lands of the Passamaquoddy Indian Reservation and permanently submerge a number of acres that are currently intertidal. The temporarily retained waters operate as impoundment and will be referred to as such in these comments. The impoundment needed to provide generation capacity for the Project would submerge and transiently flood Passamaquoddy lands. The Commission should initiate consultation with the Tribal Historic Preservation Officer on the same basis as the State Historic Preservation Officer to determine possible impacts to the Tribe's historical resources.

Sensitive and Threatened and Endangered Species

The Notice of Intent also initiated informal consultation with the U.S. Fish and Wildlife Service under section 7 of the Endangered Species Act. Attachment A includes a table of threatened, endangered and candidate species for Maine listed under the Endangered Species Act (16 U.S.C. § 1531 *et seq.*). The list should be used to identify those species that may be impacted by the proposed Project so suitable studies can be developed to identify any concerns.

The Gulf of Maine Distinct Population Segment (DPS) of Atlantic salmon encompasses all naturally reproducing remnant populations of Atlantic salmon from the Kennebec River northward to the mouth of the St. Croix River. The DPS includes several extant populations of Atlantic salmon in Cobscook Bay on the Dennys River. It is the only species under the jurisdiction of FWS that may occur in the vicinity of the Project.

Bald eagles are known to use the Project area for breeding and foraging. The bald eagle was removed from the Federal List of Endangered and Threatened Wildlife on August 8, 2007 (72 FR 37345). However, the protections provided to the bald eagle under the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d, 54 Stat. 250) and the Migratory Bird Treaty Act (16 U.S.C. 703-712; Ch. 128; July 13, 1918; 40 Stat. 755) continue to remain in place for the species. These protections prohibit the take of bald eagles. The Department recommends that the applicant consult the National Bald Eagle Management Guidelines when planning the Project

(see <http://www.fws.gov/migratorybirds/baldeagle.htm>). These guidelines were developed to assist applicants in meeting the intent of the Bald and Golden Eagle Protection Act and to avoid disturbing bald eagles.

Comments on the Pre-Application Document

The purpose of the PAD is to provide existing and relevant information intended to enable participants in the licensing proceeding to identify issues and related information needs and to develop study requests. We provide the following specific comments to raise awareness of particular issues and to facilitate future discussions with the Commission and the Applicant in the development of studies and of the license application.

General Comments

Passamaquoddy Tribe. As of the filing of these comments, the BIA does not possess information showing that the Tribe, through its Tribal Council, has taken a formal position regarding the Project. The Tribal Historic Preservation Officer did submit comments to the Commission on July 20, 2009, noting several concerns regarding the Project's possible impacts. The Tribe's past proposal to construct a tidal power project does not constitute support for the current Project. The Department recommends that the Applicant engage in formal consultation with the Tribal Council or their designated representative(s) to ascertain the Tribe's interest.

The economic and cultural resources of the Tribe may be impacted by construction and operation of the Project through the artificial elevation of the low tide mark, the submergence of economically important intertidal lands, and the restriction on ingress and egress from Half Moon Cove. It is unclear whether this last impact will be mitigated by the construction of parallel boat ramps.

There is insufficient information to support the PAD's conclusion that the construction and operation of this Project will have no effect on the aboriginal fishing and use rights of the Tribe. The Project will alter the environment of Half Moon Cove. A study is warranted to determine the degree of Project impact to aboriginal rights since the Tribe has fishing and natural resource use rights in Half Moon Cove.

Untested Project. The Project, if constructed, will be the first tidal power project built in the United States. Only three modern tidal power projects exist, one of which is located in North America, the Annapolis Royal Generating Station in Nova Scotia, Canada. The limited technical experience with tidal power projects will require a more thorough environmental analysis than may be needed for typical hydroelectric projects where there is a significant body of knowledge.

Limited Updated Environmental Information. Much of the information available for the site is decades old and of a more qualitative than quantitative nature. The recent work by Larsen (2004) and others to create an ecosystem model of Cobscook Bay indicated the general paucity of information for the region. While this recent work was significant in describing the biodiversity of the bay and the ecological relationships, it provides little site specific information that could be used in this licensing proceeding. The Commission should consider the novelty of this Project and the lack of current site specific information when deciding whether to grant

study requests or in providing the full two years of study (or more) available under the Integrated Licensing Process.

Deficient PAD. The Project description in the PAD is deficient and the licensing process should be suspended until a more complete description is provided with supportive information. Few engineering details are provided on the dam or tidal wall and those that are provided appear to be from projects proposed in the early 1980s. No reversible or pump turbine design has been selected or designed to support the operation proposed by the Applicant nor are there any studies to support the design. No design has been presented for the gate structure and size at the primary dam nor has any design been presented for the gate structure between Half Moon Cove and Passamaquoddy Bay. No drawings adequately depict the Project boundary or transmission line corridor. Information is copied directly from other proposals or studies, without adequate synthesis, resulting in a disparate and confusing presentation. The Department believes that the PAD does not provide a Project description that is fully reviewable because the Project design that should have been completed in the Preliminary Permit phase is insufficient.

Entrainment of Fish and Wildlife. A variety of macroinvertebrates, estuarine and marine fish, and marine mammals are known to use Half Moon Cove for all or part of their life history. They currently have free access to and from the site. The proposed mode of operations may involve the capacity for reversible turbines that operate on both the flood and ebb tide and for pumping water into the impoundment to increase the hydraulic head. This operation has the potential to either entrain organisms leading to an increased risk of mortality or exclude them from the habitat available in the impoundment. Gibson and Myers (2002) assessed the entrainment and estimated the mortality of fish at the Annapolis Royal Generating Station in Nova Scotia. They found that the project entrained 21 fish species and estimated turbine-related mortality of between 0.1 and 15.7 percent, depending upon species.

The frequency of entrainment in the estuarine and marine environment will also be greater than other environments since organisms are more likely to move in response to the tidal cycle. The high numbers and types of organisms and their mobility associated with the tidal cycle, creates a unique ecological hazard that is much different from the risk associated with a hydroelectric facility operated in the freshwater environment. The unique hazard associated with this Project from entrainment, impingement or exclusion warrants significant study.

Comments Attributed to the Tribe or U.S. Fish and Wildlife Service. The PAD cites previous positions on past projects or studies of the Tribe and U.S. Fish and Wildlife Service (FWS). Any comments attributed to either the Tribe or FWS are not appropriate for the proposed Project because they are based on outdated or historic information.

Specific Comments

Page 1-5. The PAD describes the two data sources primarily relied on in its preparation. The first source is information collected for the Quoddy Bay Liquefied Natural Gas (LNG) Project (FERC No. CP07-35). The project was cancelled by the Commission in October 2008. The Bureau of Indian Affairs was a cooperating agency for the Quoddy Bay LNG Project. The Quoddy Bay studies contain useful information, but those studies focused on Passamaquoddy Bay and only considered the impacts of project infrastructure passing underneath the submerged and intertidal lands of Half Moon Cove. The impacts of the proposed Project are dissimilar to

those of the Quoddy Bay Project. The Quoddy Bay studies are of limited use in the evaluation of the Project and should not be considered a substitute for the studies necessary to gauge the Project's impacts.

The second source seems to be material related to the Passamaquoddy Tribal Council's 1983 application to construct a tidal power project in Half Moon Cove (FERC No. P-3035). The submissions related to this proposed Project are largely inaccessible through the Commission's website due to their age. The studies related to this former project provide historical background information that is of limited use in determining the Project's impacts.

The Department asks that the Applicant circulate to the resource agencies and Tribe all of the reference materials referred to in the PAD. The PAD's extensive reliance on the information from these sources makes them essential to the evaluation of the Project. The Department appreciates the Applicant's willingness to respond to individual requests for information, but believes that circulation of the information in advance of a specific request would be preferable. As of early July, the Department was unable to access these sources through the Applicant's website, as suggested in the PAD.

Section 5.6(a)(2) List of Contacted Agencies and Appendix HMC-01. The PAD lists BIA as among those of the federal agencies that should be consulted in a Commission licensing process, but does not indicate that any attempts were made to contact the BIA. The PAD also includes a copy of an email distributed to resource agencies in its materials, but the recipient list does not indicate whether it was sent to the BIA. The proposed Project would be partially located on tribal lands and has the potential to impact the cultural and natural resources of the Tribe. The BIA works in concert with the Tribe to protect these resources and is an important participant in the licensing process. The Commission, and presumably the Applicant, was informed in a September 19, 2006, filing as to the point of contact for the BIA. The BIA asks that it be added to the Applicant's distribution list for future communications regarding this Project.

Section 5.6(b) Purpose of Pre-Application Document. The PAD appears to conclude that the proposed Project will have "limited impact on the existing environment." There is insufficient information to make such a conclusion at this time. This proposed Project may have a significant impact on the environment over a wide variety of issues. It is too early to evaluate this Project without first performing several studies on the resource issues implicated by this Project.

Section 5.6(b)(1) Existing Project Information. The PAD refers to Appendix HMC-03. as containing a list of current information regarding the Project. A review of this appendix does not show any sources additional to the two discussed above. Though valuable as background material, no current work has been presented to support the application. Current studies appropriate to a new hydropower project are warranted. Although this proposed Project would not be located on a river, it should be treated and evaluated as a "first-on-the-river" project that will block what are now free-flowing tidal waters and the only remaining entry point to Half Moon Cove.

Section 5.6(b)(2) Summary of Due Diligence Process. In response to the Commission notice on the preliminary application for this Project, dated July 25, 2006, the Department, by letter dated September 19, 2006, provided specific contact information for the BIA and the FWS. Both

of these Bureaus are major stakeholders and federal resource agencies with important resource protection responsibilities relating to the resources that may be impacted by this proposed Project. The BIA was not contacted regarding this Project before receipt of the PAD. The Department requests that BIA and FWS be included in future communications regarding this Project.

Furthermore, there is inadequate evidence to support the conclusion in the PAD that the proposed Project is more “environmentally acceptable” than past projects. The Department has serious concerns regarding the impacts this Project may have on tribal intertidal lands, the economic well-being of the Tribe and its members, and the many unstudied cultural, environmental, and ecological impacts of this proposed Project.

Page 2-3. The table located on this page is in error in two items. First, tribal lands do not just border the northeastern segment of Half Moon Cove. Tribal lands would be both permanently submerged and intermittently inundated.¹ Some of the Tribe’s tidal lands will be submerged under the waters of the Project because the Project would raise the low tide mark two to three feet. The artificial elevation of a water level does not change the property boundary. Second, the PAD is incorrect in stating, without qualification, that the Project would not affect federal lands. There may be lands held in trust by the United States for the benefit of the Tribe that could be impacted by this Project.

Section 5.6(d)(2)(iii). The explanation of the proposed operating regime demonstrates how the Project could alter the environment from the current baseline conditions. While the upper tidal levels may not change appreciably, the duration of the tidal surge within Half Moon Cove will change significantly. This changed duration may affect sediment retention, the biota of the intertidal and submerged zones, the size of the tidal zone, the physical and chemical nature of Half Moon Cove’s ecosystem, and the cultural and socioeconomic uses and benefits derived from the current tidal regime. The PAD also does not provide enough supporting information to conclude that the operating regime is feasible since the PAD does not provide a turbine or gate design, which the Department believes is necessary to determine whether the operating regime is possible.

Section 5.6(D)(iii)(B) Water Surface Area. As proposed in the PAD, construction of the Project would reduce the intertidal area by approximately 75 percent, shift the timing of the wetted period from what exists today, increase the depth of water in areas that are currently permanently submerged, and create an entrainment and mortality risk during a significant portion of the tidal cycle. These changes may have a significant adverse impact on fish and wildlife resources. The shifting of the wetted period may alter an intertidal environment from an area that today may only be inundated a few minutes to being inundated several hours while the water is held to create the hydrologic head for power generation. The reduction in intertidal zone could have an economic effect if it impacts fauna and flora of the intertidal lands used by the Tribe and others for commercial, recreational, and cultural purposes. These possible impacts warrant new and updated studies focusing on the configuration of the proposed Project.

¹ In Maine, the private ownership of land extends to mean low water, and the intertidal zone is not in the public domain, though the public enjoys rights of “fishing, fowling, and navigation” over such lands. *See Bell v. Wells*, 557 A.2d 168, 173 (Me. 1989).

Page 2-13. The PAD distinguishes between impounded and detained waters but from an ecological and operational standpoint there is little distinction. This Project would operate similar to a storage/peaking facility; the only difference being that the input will be tidal in nature and more predictable. From an ecological standpoint there is little difference between this Project and a peaking hydropower project where water is retained for 12 hours to create an 18-foot hydrologic head and released through the power-generating turbines. The PAD characterizes this proposed Project like a “run-of-river” project but it is more similar in character to a storage/peaking project. The mode of operation proposed will change the existing water regime of Half Moon Cove.

Section 5.6(d)(2)(iv) Proposed Operation of the Project. The PAD states there will be no need for maintenance exercises associated with flushing sedimentation from the impoundment. The basis for this conclusion is that tidal waters will be allowed to flow in both directions. This conclusion is partially accurate, but the proposed Project will alter the timing and force of these flows. These waters will be retained for some unspecified period of time; this creates the possibility that more sediment will be deposited or the existing amount of sediment will be distributed differently. The same processes that may affect sediment distribution may also affect ice formation and retention. The degree and composition of sedimentation and ice formation warrants study.

Section 5.6(d)(3)(i) General Requirements. The PAD refers to reports generated during the 1970s and 1980s by the Tribe for a different project. The PAD refers to this information as being in the public record, but it is not clear where these studies may be obtained. They are currently unavailable through the Commission or the Applicant. The Department requests that the Applicant identify an accessible source for these studies or provide complete copies of this information to all resource agencies.

Page 3-2. The PAD uses descriptions of the area apparently from outdated reports that should be considered historic information rather than information that is reflective of current conditions. Furthermore, the portions of the reports copied in the PAD cite plates, figures and tables not included in the PAD. In order to effectively evaluate the information presented, resource agencies need the plates, figures and data tables associated with these reports. The Department asks that the supporting materials for these reports be made available and that the PAD is revised to synthesis this information.

Section 5.6(d)(3)(i)(B) Summaries of Data and Studies. The PAD states in the conclusion of this section that the environmental impacts of the current proposal have been substantially reduced from a previous proposal. There is insufficient information to support such a conclusion at this time. There is not enough information presented on the design of the former project to compare it to the currently proposed Project to determine whether their impacts would be similar or different. The information that the Applicant uses to reach this conclusion is historical in nature and cannot be used to establish current environmental baseline conditions. None of the references cited are evaluations of the current proposal. While these references may serve as historical background, they cannot serve as the basis for evaluating the current proposal. A full range of studies – including those described in the study requests attached to this letter– should be performed.

Page 3-8. The proposed Project represents a modification of 3.2 percent of the surface area of Cobscook Bay based on the area of Half Moon Cove provided in the PAD and the estimate of the area of Cobscook Bay provided in Brooks (2004). No existing information is available to assess whether the Project will impact the hydraulic or sedimentation conditions in other parts of the bay.

(2) Operation: (A) Effect on Tidal Range. Construction of this Project may appear to have little impact on Half Moon Cove's water regime but ecologically the operations would represent a dramatic shift. Areas that are now intertidal would become submerged. Remaining intertidal areas would have the water retention period increased. Currently submerged areas would be covered with more water. And the Project poses a risk of entrainment and mortality for fish and wildlife that is not currently present. Current biota of Half Moon Cove may have adapted to the existing tidal range and duration, but it does not necessarily follow that these biota will successfully adapt to the new water regime proposed in the PAD. Studies are needed to address what changes could be anticipated and what the short and long term implications of these changes are on the environment.

Page 3-14. The PAD includes a description of the hydrological conditions in Half Moon Cove but fails to assess how the modification of wave action from the decrease in fetch may impact sedimentation and beach formation and maintenance. This issue warrants study.

(2) Obstruction of Passage: (B) Operational Impacts

Page 3-17. The PAD cites a past FWS study to conclude that the proposed operating regime would potentially decrease the intertidal zone from 505 acres to 124 acres with a loss of 381 acres (75 percent) of intertidal shorebird habitat. An alteration of this amount of shorebird habitat could have major impacts on shorebirds and warrants study.

Page 3-19. The PAD reproduces a section entitled "Social and Economical" from a historic report concluding that a previously proposed project would have been economically beneficial to the Tribe. It is unclear what, if any, benefit the Tribe would realize from the Project currently being proposed. It is possible that the Tribe could suffer economic harm because of Project impacts on natural resources upon which the Tribe relies. The proposed Project could also impede the ability of the Tribe and the State of Maine to replace the causeways connecting the Tribe to Eastport with more ecologically friendly bridges or culverts. These issues warrant study.

Section 5.6(d)(3) Description of Existing Environmental Impacts

Page 5-1. The conclusions in the PAD regarding impacts to the water resources of Half Moon Cove are not supported by the information available at this time. The Project will alter the size of the low tide pool and the duration of the high tide pool. Both of these alterations could have a significant impact on the ecology of Half Moon Cove.

The results of a hydrodynamic model for Cobscook Bay suggest that the average particle residence period for Half Moon Cove may be 7 or more days (Brooks 2004). The Project will likely increase this residence period due to an increase in the low tide pool elevation. The influence of freshwater runoff from rain, solar heating, contaminant sources and point source

discharges may become more significant under Project conditions that may increase the residence period. This possible impact warrants study.

Section 5.6(d)(3)(iv) Fish and Aquatic Resources

Page 6-2. Excerpts of the Quoddy Bay report reproduced here concluded that the current isolation of Half Moon Cove has resulted in a detrimental effect on its invertebrate and vertebrate fauna. The existing causeway isolates Half Moon Cove from the large volume tidal exchanges associated with the Western Passage. The Project would likely further isolate Half Moon Cove compounding this condition. The impacts of increasing the isolation of Half Moon Cove warrants further study.

Page 6-3. Material reproduced here from a Quoddy Bay report indicates that the Passamaquoddy Bay and Half Moon Cove are differing marine environments. This material shows the limits of using information pertaining to Passamaquoddy Bay to evaluate the impact to Half Moon Cove and highlights the need for new studies.

Table HMC-03. This table refers to species distribution with numbers and densities, but it is unclear what species are discussed in the table, where the samples were taken, and whether the table refers to benthic species.

Table HMC-04. This table is for fish distribution in Passamaquoddy Bay, not Half Moon Cove. The Quoddy Bay studies indicate that Half Moon Cove and Passamaquoddy Bay are distinct environments and data from one should not be used to describe the other.

Section 5.6(d)(3)(v) Wildlife and Botanical Resources Including Invasive Species. The PAD indicates that the Project boundary will encompass only the wetted portions of the Project impoundment and appears to diminish the importance of this area for wildlife. A riparian setback and/or buffer area of the wetted portions of the Project may serve to protect the impoundment's water quality, act as a wildlife movement corridor and in some locations, provide foraging and breeding habitat for neotropical migratory birds and protect sensitive upland habitats adjacent to the Project, such as bald eagle nest sites. The Applicant should survey and map the types of habitat within 1,000 feet of the impoundment so that its wildlife function and value can be understood.

Page 7-13. The PAD concludes that, except for boat access for commercial fishermen, the impact on wildlife and botanical resources will be insignificant. There is insufficient information to support this conclusion. Half Moon Cove represents a traditional cultural and economic resource for the Tribe. Construction of the Project would alter the Tribe's ability to use Half Moon Cove to some degree, warranting future study.

Section 5.6(d)(3)(vi) Wetlands, Riparian, and Littoral Habitat

Page 8-1. The PAD states that the questions associated with the ownership of the intertidal zones will be addressed by the State of Maine during negotiations for a submerged lands lease. But the State of Maine cannot issue a lease for the intertidal zone lands held by the Tribe. These intertidal zone lands include lands that would become submerged as a result of construction of the Project. Easements can be obtained but these require negotiations with the Tribe and the

BIA. Artificially moving the low tide mark does not change property boundaries. The property boundary of the Tribe's lands remains at the natural mean low tide mark.² The Applicant will need to acquire from the Tribe, with the BIA's concurrence, the property interest(s) necessary to accommodate the Project's occupation of tribal lands.

Section 5.6(d)(3)(xi) Socio-Economic Resources

Page 13-7. The conclusions in the PAD regarding socio-cultural benefits are not supported by information available at this time. A study is needed to determine whether or not there will be a positive or negative impact on these resources. If the impact will be a combination of both positive and negative impacts, then studies should be designed to determine which specific populations benefit and which do not since the Passamaquoddy Indian Tribe at Pleasant Point is one of the environmental justice communities identified in the recently Commission-noticed draft Environmental Impact Statement for the Downeast Liquefied Natural Gas Project (FERC Nos. CP07-52 and CP07-53).

Section 5.6(d)(3)(xii) Appendix HMC-04. The protocol for dissemination of information is incomplete as it should include a protocol on general communications, meetings, documents, public reference file, restricted documents, document distribution, mailing list and documentation of telephone contacts. The goal of the communication protocol should be to provide the participants in the licensing process with easy access to information relating to the proceeding. The Department recommends the following changes or additions to communications protocol:

1. Schedule of meetings in practical locations and during times that accommodate the majority of participants;
2. Schedule meetings between 9:00 a.m. and 4:00 p.m.;
3. Periodically include evening meetings to engage and encourage public participation;
4. Notify the participants two weeks in advance of a meeting and provide a meeting agenda and discussion materials at that time. If the information that will be subject to the meeting discussion is lengthy or technically-oriented, then we recommend that it is distributed at least three weeks prior to the meeting so that it can be adequately reviewed.
5. Maintain copies of all formal and informal document produced during the licensing process in a public file that will be updated regularly and available upon request;
6. Distribute small documents electronically and larger documents as a hard copy;
7. Maintain a public reference file on a website that includes electronic copies of all important materials pertaining to the licensing process. Hard copies of these materials should be provided upon request; and
8. Develop guidelines for restricted materials, including those related to protecting sensitive archaeological or other culturally important information.

Section 5.6(d)(4)(ii) Potential Studies or Information Gathering Associated with the Identified Issues. The Applicant has provided a listing of potential studies and information that may be needed to evaluate preliminary issues identified in the PAD. We have limited our comment on this section because our review of the PAD indicates a need for a number of studies many of which the Licensees have determined are not necessary. The PAD also provides insufficient study detail so we assume that the studies will be developed more fully in the draft

² See, e.g., *Emerson v. Taylor*, 9 Me. 42, 43 (1832).

study plan. The Department will provide a review through the BIA and FWS of the Applicant's proposed studies later in the licensing process pursuant to 18 C.F.R. § 5.12.

Comments on the Scoping Document

The Commission's Scoping Document suggests that no alternatives have yet been proposed to the project. This is not entirely correct. The applicant itself, in the PAD at p. 13-1 and 16-3, discusses an alternative project design involving breaching the Route 190 Causeway and installing culverts. This may lead to a very different hydrologic regime than the base Project, and should be treated as an alternative. The Department's study requests should therefore each be understood to request study of the potential effects of the Project both with and without the culverts under Route 190.

Study Requests

The Department, through the U.S. Fish and Wildlife Service and Bureau of Indian Affairs, will play a central role in working with the Applicant to develop the studies to evaluate potential effects of the Project on fish, wildlife and tribal resources. We request the opportunity to review and provide comments on all draft study plans. We have also attached study requests (see Attachment B) as required by 18 C.F.R. § 5.9(b) using the guidance that the Commission has provided for requesting studies during this phase of the relicensing process.

Thank you for the opportunity to comment during the early planning stages of this proposed Project. If you have any questions regarding this response, please Dr. James Kardatzke of the Bureau of Indian Affairs at (615) 564-6830 or Frederic Seavey of the U.S. Fish and Wildlife Service at (207) 827-5938 extension 16.

Sincerely,



Andrew L. Raddant
Regional Environmental Officer

cc: Service List

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ATTACHMENT A.
THREATENED, ENDANGERED AND CANDIDATE SPECIES IN MAINE
Endangered Species Act

ENDANGERED (E) – Any species that is in danger of extinction throughout all or a significant portion of its range.

THREATENED (T) – Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

CANDIDATE (C) – Those taxa for which the Service has sufficient information on biological status and threats to propose to list them as threatened or endangered. We encourage their consideration in environmental planning and partnerships, however, none of the substantive or procedural provisions of the Act apply to candidate species.

* Principal responsibility for these species is vested with the National Marine Fisheries Service.

COMMON NAME	SCIENTIFIC NAME	DISTRIBUTION	STATUS	
Fishes:	Atlantic salmon	<i>Salmo salar</i>	Kennebec, Lincoln, Sagadahoc, Waldo, Penobscot, Hancock, Washington Counties	E
	Shortnose sturgeon*	<i>Acipenser brevirostrum</i>	Kennebec, Lincoln, Sagadahoc, Waldo, Penobscot, Hancock, Androscoggin Counties	E
Reptiles:	Atlantic ridley turtle*	<i>Lepidochelys kempii</i>	Pelagic, summer resident	E
	Leatherback turtle*	<i>Dermochelys coriacea</i>	Pelagic, summer resident	E
	Loggerhead turtle*	<i>Caretta caretta</i>	Pelagic, summer resident	T
Birds:	Piping plover	<i>Charadrius melodus</i>	Coastal Sagadahoc, Cumberland, and York Co.	T
	Roseate tern	<i>Sterna dougallii dougallii</i>	Coastal statewide	E
Mammals:	Gray wolf	<i>Canis lupus</i>	Possibly northern and western Maine	E
	Eastern cougar	<i>Felis concolor cougar</i>	Possibly statewide	E
	Canada lynx	<i>Lynx canadensis</i>	Franklin, Somerset, Piscataquis, Aroostook, Penobscot Counties	T
	Blue whale*	<i>Balaenoptera musculus</i>	Pelagic	E
	Finback whale*	<i>Balaenoptera physalus</i>	Pelagic	E
	Humpback whale*	<i>Megaptera novaeangliae</i>	Pelagic	E
	Right whale*	<i>Eubalaena spp. (All species)</i>	Pelagic	E
	Sei whale*	<i>Balaenoptera borealis</i>	Pelagic	E

	Sperm whale*	<i>Physeter catodon</i>	Pelagic	E
	New England cottontail rabbit	<i>Sylvilagus transitionalis</i>	York, Cumberland, Androscoggin, Kennebec, Sagadahoc, Lincoln Counties	C
Plants:	Furbish's lousewort	<i>Pedicularis furbishiae</i>	Aroostook County	E
	Eastern prairie fringed orchid	<i>Plantanthera leucophaea</i>	Aroostook County	T
	Small whorled pogonia	<i>Isotrea medeoloides</i>	York and Cumberland Counties	T

ATTACHMENT B.
DEPARTMENT OF INTERIOR STUDY REQUESTS

A list of suggested study protocols and methods for these study requests can be found in Poehle (2009), Simenstad et al. (1991) and the special issue on Cobscook Bay in Larsen (2004).

- I. Effect of Alteration of the Intertidal Zone on Shellfish Industry and Harvesting with Special Emphasis on the Passamaquoddy Indian Tribe's Use of these Resources.
- II. Effect of Alteration of the Intertidal Zone on the Physical and Chemical Characteristics of Half Moon Cove
- III. Effect of Alteration of Entry to Half Moon Cove through the Construction of the Project on Tribal Economic, Recreational and Cultural Use of Half Moon Cove and its Current Access to Coastal Waters
- IV. Effect of Alteration of the Intertidal Zone and Construction of the Dam Across the Entrance to Half Moon Cove on the Traditional Cultural Uses of the Cove by the Passamaquoddy Indian Tribe
- V. Effect of Alteration of the Intertidal Zone on Migratory and Resident Shorebirds with Special Emphasis on the Passamaquoddy Indian Tribe Use of these Resources
- VI. Effect of Alteration of the Intertidal and Submerged Zones on Fish and Mammalian Populations with Special Emphasis on the Passamaquoddy Indian Tribe Use of these Resources
- VII. Effect of Alteration of the Intertidal and Submerged Zones on Flora and Fauna of Half Moon Cove with Special Emphasis on the Passamaquoddy Indian Tribe Use of these Resources
- VIII. Shoreline Pollution Survey
- IX. Effect of Alteration of the Intertidal Zone and Construction of the Dam Across the Entrance to Half Moon Cove on the Economic and Social uses of the Cove by the Passamaquoddy Indian Tribe
- X. Effect of Alteration of the Intertidal Zone and Construction of the Dam Across the Entrance to Half Moon Cove on Shoreline Erosion of Half Moon Cove
- XI. Effect of Alteration of the Intertidal and Submerged Zones and Construction of the Dam Across the Entrance to Half Moon Cove on the Benthic Fauna of Half Moon Cove
- XII. Effect of Half Moon Cove Tidal Project on Cultural Sites and Activities of the Passamaquoddy Indian Tribe
- XIII. Waterfowl, Wading Bird, Shorebird and Seabird Survey in the Intertidal and Subtidal Zone
- XIV. Fish and Wildlife Habitat Evaluation Assessment
- XV. Fish, Marine Mammal and Macroinvertebrate Behavior and Potential Turbine Entrainment
- XVI. Fish Survey in the Intertidal and Subtidal Zone
- XVII. Aquatic and Terrestrial Habitat and Land use Mapping
- XVIII.** Hydrodynamic Model of Half Moon Cove

Study Request I: Effect of Alteration of the Intertidal Zone on Shellfish Industry and Harvesting with Special Emphasis on the Passamaquoddy Indian Tribe's Use of these Resources

1. Goals and Objectives: The goal of this study is to produce the data necessary to develop operational parameters for the management of the Project in conjunction with best management practices that protect the economic and cultural utilization of Half Moon Cove for shellfish harvesting by the Passamaquoddy Indian Tribe in the Project area. The objective of the study is to help determine the Project management regime necessary to balance the need to preserve and protect shellfish against energy production.

2. Agency Goals: Department of Interior licensing goals 1, 2, 3 and 5 and objectives 4, 6, 13 and 15.

3. Existing and Additional Information: The reports cited in the PAD provide historical background ,but updated studies are needed to accurately map the current presence of shellfish in the Project area and determine what impacts Project operations could have on the population and distribution trends of scallops, a variety of clams, and other economically important marine invertebrates.

4. Project Nexus: The operational parameters of the Project directly affect the environment of Half Moon Cove since the alteration of tidal water level fluctuations and the duration of water retention will change to the location and extent of intertidal habitats. The requested study will address this problem by helping the Department make decisions about how to best mitigate the Project's impacts on Tribal shellfish usages. The data collected may lead the Department to recommend mitigation measures for these resources.

5. Study Methodology: Standard scientific survey methods should be used to map and assess marine invertebrate populations. Impacts would then be projected based on comparisons with similar areas where man-made actions have altered the intertidal environment.

6. Level of Effort: Level of effort necessary to complete this study is expected to be moderate. At a minimum, two years of study (2010 and 2011) would be required to map the populations' distribution and composition. The projected total cost to complete this study is \$250,000.

Study Request II: Effect of Alteration of the Intertidal Zone on the Physical and Chemical Characteristics of Half Moon Cove

1. Goals and Objectives: The goal of this study is to produce the data necessary to determine the effect the Project will have on the physical and chemical parameters of the waters of Half Moon Cove. The objective is to determine if the Project will cause chemical and/or physical changes that could have impacts on the biota of Half Moon Cove.

2. Agency Goals: Department of Interior licensing goals 1, 2 and 4 and objectives 4, 5, 6, 13 and 14.

3. Existing and Additional Information: The reports cited in the PAD provide historical background but updated studies are needed to determine what impacts Project operations will have on the salinity, water temperature, sediment rate, nutrient level, and general water chemistry of the waters of Half Moon Cove.

4. Project Nexus: The operational parameters of the Project directly affect the environment of Half Moon Cove. The alteration of tidal water level fluctuations and duration of retention may change the chemical and physical parameters of the waters of Half Moon Cove. The creation of a dam at the entry to Half Moon Cove will alter the tidal flow which may in turn alter the sediment erosion and deposition patterns. The requested study will address these problems by helping the BIA make decisions about how to best mitigate the Project's impacts on Tribal natural resource usage and preservation.

5. Study Methodology: Standard scientific water chemistry methods should be used to determine current conditions. Impacts would then be projected based on comparisons with similar areas where man-made actions have altered the intertidal environment.

6. Level of Effort: The level of effort necessary to complete this study is expected to be moderate. At a minimum, two years of study (2010 and 2011) would be required for data collection and analysis. The projected total cost to complete this study is \$100,000.

Study Request III: Effect of Alteration of Entry to Half Moon Cove through the Construction of the Project on Tribal Economic, Recreational and Cultural Use of Half Moon Cove and its Current Access to Coastal Waters

1. Goals and Objectives: The goal of this study is to produce the data necessary to develop operational parameters for the management of the Project in conjunction with best management practices that protect the economic, recreational, and cultural use of Half Moon Cove and its passage to the large area of coastal waters by Tribal members. The objective of the study is to help determine what Project management regime appropriately balances the needs to preserve and protect current economic, recreational and cultural uses of Half Moon Cove and its neighboring waters and energy production.

2. Agency Goals: Department of Interior licensing goals 1 and 5 and objectives 13, 14 and 15.

3. Existing and Additional Information: The reports cited in the PAD provide historical background but updated studies are needed to accurately map the current usage of the Project area and waters and determine what impacts Project operations will have on the Tribal economic, recreational, and cultural uses of Half Moon Cove and its entrance.

4. Project Nexus: The operational parameters of the Project directly affect the use of Half Moon Cove because the generation structure will block the only existing inlet to the Cove and limit the ingress and egress from the Cove. The requested study will address this problem by helping the BIA make decisions about how to best mitigate the Project's impacts on Tribal economic, recreational and cultural usages.

5. Study Methodology: Standard scientific survey methods should be used to determine current usage patterns for Half Moon Cove and its entry.

6. Level of Effort: The level of effort necessary to complete this study is expected to be minor. At a minimum, one year of study (2010 or 2011) would be required to study the various usage patterns of the Half Moon Cove entry by tribal members and other individuals. The projected total cost to complete this study is \$40,000.

Study Request IV: Effect of Alteration of the Intertidal Zone and Construction of the Dam Across the Entrance to Half Moon Cove on the Traditional Cultural Uses of the Cove by the Passamaquoddy Indian Tribe

1. Goals and Objectives: The goal of this study is to produce the data necessary to evaluate the environmental impact of the placement of this Project and its reservoir operations on known and unknown cultural and historic properties, including traditional cultural uses of the waters. The objective is to establish a baseline of cultural and historic properties from which the worth and environmental impact of this Project should be measured.

2. Agency Goals: Department of Interior licensing goals 1 and 4 and objectives 13, 14, 15 and 16.

3. Existing and Additional Information: A significant amount of information should exist on known cultural and historic properties located in this area from the studies performed by the State of Maine, the Tribe, and the defunct Quoddy Bay LNG Project (CP07-35). Additional specific information and surveys will be required to search for currently unknown cultural and historic sites and to identify traditional cultural uses of the area by members of the Tribe. Coordination and cooperation with the Passamaquoddy Indian Tribe will be required to determine any traditional cultural properties and/or practices that may be associated with the Project area.

4. Project Nexus: The placement of the Project will change the environment of Half Moon Cove by altering the intertidal zones and the duration of retention of tidal waters. This in turn may have an impact on the traditional cultural practices of tribal members along these waters

5. Study Methodology: The majority of effort for this study request will be through an initial Phase I study of the affected area of Half Moon Cove and consultation with the Tribal Historic Preservation Office of the Tribe.

6. Level of Effort: The level of effort necessary to complete this study is expected to be moderate and involve a single year. The projected total cost to complete this study is \$60,000.

Study Request V: Effect of Alteration of the Intertidal Zone on Migratory and Resident Shorebirds with Special Emphasis on the Passamaquoddy Indian Tribe Use of these Resources

1. Goals and Objectives: The goal of this study is to produce the data necessary to develop operational parameters for the management of the Half Moon Cove Project in conjunction with best management practices to protect migratory and resident shorebirds. The objective of the study is to help determine what Project management regime appropriately balances the needs to preserve and protect shorebirds and energy production.

2. Agency Goals: Department of Interior licensing goals 1, 2, 4 and 5 and objectives 1, 7, 9, 13 and 14.

3. Existing and Additional Information: The reports cited in the PAD provide historical background but updated studies are needed to accurately map the current presence of migratory and resident shorebirds in the Project area and determine what impacts Project operations may have on the population and distribution trends of these avian species.

4. Project Nexus: The operational parameters of the Project directly affect the environment of Half Moon Cove because the alteration of tidal water level fluctuations and duration of retention will change the location and extent of intertidal habitats. The requested study will address this problem by helping the Department make decisions about how to best mitigate the Project's impacts on fish and wildlife resources and Tribal use of natural resources.

5. Study Methodology: Standard scientific survey methods should be used to map and assess shorebird populations and distribution. Impacts would then be projected based on comparisons with similar areas where man-made actions have altered the intertidal environment.

6. Level of Effort: The level of effort necessary to complete this study is expected to be moderate. At a minimum, two years of study (2010 and 2011) would be required to map the populations' distribution and composition. The projected total cost to complete this study is \$130,000.

Study Request VI: Effect of Alteration of the Intertidal and Submerged Zones on Fish and Mammalian Populations with Special Emphasis on the Passamaquoddy Indian Tribe Use of these Resources

- 1. Goals and Objectives:** The goal of this study is to produce the data necessary to develop operational parameters for the management of the Half Moon Cove Project in conjunction with best management practices to protect the economic and cultural utilization of marine fish and mammals by the Passamaquoddy Indian Tribe in the Project area. The objective of the study is to help determine what Project management regime appropriately balances the needs to preserve and protect these natural resources and energy production.
- 2. Agency Goals:** Department of Interior licensing goals 1, 2, 4, 5 and objectives 1, 2, 3, 4 and 13.
- 3. Existing and Additional Information:** The reports cited in the PAD provide historical background but updated studies are needed to accurately map the current presence of marine fish and mammals in the Project area and determine what impacts Project operations have on the population and distribution of these species.
- 4. Project Nexus:** The operational parameters of the Project directly affect the environment of Half Moon Cove since the alteration of tidal water level fluctuations and duration of water retention will change to the location and extent of intertidal and submerged habitats. The requested study will address this problem by helping the Department make decisions about how to best mitigate the Project's impacts on piscine and mammalian populations.
- 5. Study Methodology:** Standard scientific survey methods should be used to map and assess marine vertebrate populations. Impacts would then be projected based on comparisons with similar areas where man-made actions have altered the intertidal environment.
- 6. Level of Effort:** The level of effort necessary to complete this study is expected to be moderate. At a minimum, two years of study (2010 and 2011) would be required to map the populations' distribution and composition. The projected total cost to complete this study is \$250,000.

Study Request VII: Effect of Alteration of the Intertidal and Submerged Zones on Flora and Fauna of Half Moon Cove with Special Emphasis on the Passamaquoddy Indian Tribe Use of these Resources

- 1. Goals and Objectives:** The goal of this study is to produce the data necessary to develop operational parameters for the management of the Project in conjunction with best management practices to protect the economic and cultural utilization of Half Moon Cove, by the Passamaquoddy Indian Tribe in the Project area. The objective of the study is to help determine what Project management regime appropriately balances the needs to preserve and protect the biota of Half Moon Cove and energy production.
- 2. Agency Goals:** Department of Interior licensing goals 1, 2, 4 and 5 and objectives 1, 2, 4, 7, 13 and 14.
- 3. Existing and Additional Information:** The reports cited in the PAD provide historical background but updated studies are needed to accurately map the current biota in the Project area and determine what impacts Project operations will have on the population and distribution trends of fauna and flora, particularly those important to the Passamaquoddy Indian Tribe.
- 4. Project Nexus:** The operational parameters of the Project directly affect the environment of Half Moon Cove since the alteration of tidal water level fluctuations and duration of retention will change to location and extent of intertidal and submerged habitats. The requested study will address this problem by helping the Department make decisions about how to best mitigate the Project's impacts on fish and wildlife resources in the intertidal and submerged zones, particularly those used by the Passamaquoddy Indian Tribe. The data collected concerning effects on marine mammals will be used by the Department in developing measures to be recommended to the Commission under the Federal Power Act for the protection of fish and wildlife resources - particularly those used by the Passamaquoddy Indian Tribe. The data so gathered will also be essential for consultation with NMFS concerning the proposed project's effects on any endangered marine mammal species that may be present.
- 5. Study Methodology:** Standard scientific survey methods should be used to map and assess the biota of Half Moon Cove. Impacts would then be projected based on comparisons with similar areas where man-made actions have altered the intertidal environment.
- 6. Level of Effort:** The level of effort necessary to complete this study is expected to be moderate. At a minimum, two years of study (2010 and 2011) would be required to map the populations' distribution and composition. The projected total cost to complete this study is \$175,000.

Study Request VIII: Shoreline Pollution Survey

- 1. Goals and Objectives:** The goal of this study is to produce data necessary to evaluate the environmental impact of placement of the Project on known and unknown shoreline pollution sources. The objective is to establish a baseline of polluted properties from which the environmental impact of this Project can be determined.
- 2. Agency Goals:** Department of Interior licensing goals 1 and 2 and objectives 1, 5, 14 and 15.
- 3. Existing and Additional Information:** A significant amount of information should exist on known pollution sources located in this area from State of Maine and local government records. Additional research and surveys will be required to search for currently unknown pollution sources.
- 4. Project Nexus:** The placement of this Project will alter the environment of Half Moon Cove from one of an open free-flowing tidal cove to a frequently fluctuating reservoir retaining more tidal waters than previously. This retention has the potential to concentrate pollutants from previously minor point and non-point source pollution sites, thus raising the potential for environmental impacts.
- 5. Study Methodology:** The majority of effort for this study request will be through analysis of state records and conducting a level one environmental survey. Based on the results of the level one surveys, additional studies may be warranted.
- 6. Level of Effort:** The level of effort necessary to complete this study is expected to be moderate and take approximately one study year. Additional years may be needed dependent on the results of the first year of study. The projected total cost to complete this study is \$75,000.

Study Request IX: Effect of Alteration of the Intertidal Zone and Construction of the Dam Across the Entrance to Half Moon Cove on the Economic and Social uses of the Cove by the Passamaquoddy Indian Tribe

- 1. Goals and Objectives:** The goal of this study is to produce the data necessary to evaluate the environment impact of placement of the Project and its reservoir operations on the economic and social uses of Half Moon Cove. The objective is to establish a baseline of the socioeconomic impacts of this Project.
- 2. Agency Goals:** Department of Interior licensing goals 1, 2 and 5 and objectives 13, 14, 15 and 16.
- 3. Existing and Additional Information:** A significant amount of information should exist on the current socioeconomic situation of the Project area. Additional specific information and surveys will be required to determine what socioeconomic aspects of cove use may be lost, modified or gained by construction of the proposed Project. Coordination and cooperation with the Passamaquoddy Indian Tribe will be required to determine current socioeconomic practices that may be associated with the Project area.
- 4. Project Nexus:** The placement of this Project will change the environment of Half Moon Cove altering the intertidal zones and the duration of retention of tidal waters. This in turn may have an impact on the socioeconomic practices of tribal members along these waters.
- 5. Study Methodology:** Standard socioeconomic study techniques common to most Commission licensing efforts should be used.
- 6. Level of Effort:** The level of effort necessary to complete this study is expected to be minimal and involve a single year. The projected cost necessary to complete this study is \$50,000.

Study Request X: Effect of Alteration of the Intertidal Zone and Construction of the Dam Across the Entrance to Half Moon Cove on Shoreline Erosion of Half Moon Cove

- 1. Goals and Objectives:** The goal of this study is to produce the data necessary to evaluate the environmental impact of placement of this Project and its reservoir operations on shoreline erosion of Half Moon Cove. The objective is to establish a baseline on the current shoreline erosion resulting from natural tidal flows and the impact that the Project could have on this baseline.
- 2. Agency Goals:** Department of Interior licensing goals 1, 2 and 4 and objectives 1, 7, 8, 14, 15 and 16.
- 3. Existing and Additional Information:** Some information should exist on known shoreline erosion located in this area from the studies performed by the State of Maine and the defunct Quoddy Bay LNG Project (CP07-35). Additional specific information and surveys will be required to delineate current erosion points along Half Moon Cove shoreline.
- 4. Project Nexus:** The placement of the Project will alter the environment of Half Moon Cove by altering the intertidal zones and the duration of retention of tidal waters. This in turn may have an impact on the mechanism and location of shoreline erosion in Half Moon Cove.
- 5. Study Methodology:** The majority of the effort required to complete this study will be an on-site survey of the shoreline and Half Moon Cove to identify the locations and extent of current tidal erosion. Correlations should be made to the proposed Project, through modeling, to ascertain how the placement of the barrier across the Half Moon Cove entry will affect shoreline erosion.
- 6. Level of Effort:** The level of effort necessary to complete this study is expected to be moderate and involve a single year. The projected cost necessary to complete this study is \$50,000.

Study Request XI: Effect of Alteration of the Intertidal and Submerged Zones and Construction of the Dam Across the Entrance to Half Moon Cove on the Benthic Fauna of Half Moon Cove

- 1. Goals and Objectives:** The goal of this study is to produce the data necessary to evaluate the environmental impact of the Project and its reservoir operations on the benthic fauna of Half Moon Cove.
- 2. Agency Goals:** Department of Interior licensing goals 1, 2 and 4 and objectives 1, 2, 4, 14 and 16.
- 3. Existing and Additional Information:** Some information should exist on the benthic fauna of Half Moon Cove from the studies performed by the defunct Quoddy Bay LNG Project (CP07-35). Additional specific information and surveys will be required to search the entire cove in areas not under consideration for use by the Quoddy Bay applicant.
- 4. Project Nexus:** The placement of the Project will change the environment of Half Moon Cove altering the intertidal zones and the duration of retention of tidal waters. This in turn may have an impact on the benthic fauna of these waters
- 5. Study Methodology:** Standard benthic sampling techniques should be used. In deeper water, sampling dredges would be deployed. In intertidal and shallow zones, area analysis would be appropriate.
- 6. Level of Effort:** The level of effort necessary to complete this study is expected to be moderate and involve two years. The projected cost to complete this study is \$100,000 per annum.

Study Request XII: Effect of Half Moon Cove Tidal Project on Cultural Sites and Activities of the Passamaquoddy Indian Tribe

- 1. Goals and Objectives:** The goal of this study is to produce the data necessary to evaluate the environment impact of the Project and its reservoir operations on cultural sites and activities in Half Moon Cove.
- 2. Agency Goals:** Department of Interior licensing goals 1 and objectives 14 and 16.
- 3. Existing and Additional Information:** The Passamaquoddy Indian Tribe Tribal Historic Preservation Office has identified several cultural sites within the projected Project Boundary. It is unclear whether archaeological surveys or official tribal consultations have been performed.
- 4. Project Nexus:** The placement of this Project will change the environment of Half Moon Cove by altering the intertidal zones and the duration of retention of tidal waters. This in turn may have an impact on the cultural sites and activities within Half Moon Cove.
- 5. Study Methodology:** Standard archaeological Phase I and II techniques should be used.
- 6. Level of Effort:** The level of effort necessary to complete this study is expected to be moderate and involve two years. The projected cost to complete this study is \$75,000 per annum.

Study Request: XIII: Waterfowl, Wading Bird, Shorebird and Seabird Survey in the Intertidal and Subtidal Zone

1. Goals and Objectives: The PAD documents the general lack of basic inventories for fish and wildlife resources. It includes little recent site specific information on types of waterfowl, wading birds, shorebirds and seabirds within the Project boundary so the current distribution and abundance and the habitat quality of these species is unknown.

The goals of the study would be to: 1) inventory waterfowl, wading birds, shorebirds and seabirds that utilize the vicinity of the proposed Project sufficient to describe the species composition, density and the quality of the habitat; and 2) assess the proposed Project construction and operation on these bird species and their habitats. The study should also include a comparison of the above data with other water bodies in the region

2. Agency Goals: Department of Interior licensing goals 2 and 4 and objectives 1, 7 and 9.

3. Existing and Additional Information: The PAD documents a lack of current site specific information on the distribution and abundance of waterfowl, wading birds, shorebirds and seabirds within the Project boundary. Cobscook Bay is known a significant fall and spring migratory staging area for many species as well as a breeding, roosting and foraging area for resident species. Given their life history requirements, the operation of the Project could affect the quality of their breeding, foraging or migratory habitat. Therefore, information on species, distribution and abundance in the vicinity of the proposed Project boundary is needed to evaluate any potential effects of Project construction on these species. Existing data exist from studies conducted decades ago however little current site specific information is available

4. Project Nexus: The PAD indicates that changes will occur to the phase and extent of the tidal cycle. These changes may affect the intertidal and subtidal habitat for a variety of life stages of aquatic resources

The information collected by the study will answer the following questions:

1. What species are present in the vicinity of the Project;
2. What habitats are the species associated with and what important elements are found in those habitats?
3. Are species present in habitat that will be influenced by Project operations;
4. What effects may the Project operation have on waterfowl, wading birds, shorebirds and seabirds and their habitats?

5. Study Methodology: Methods to sample waterfowl, wading birds, shorebirds and seabirds their habitats are well established and have been used successfully in other FERC licensing proceedings. This work will require seasonal surveys, depending upon the species that may be present.

6. Level of Effort: This work will require two field seasons to complete. Some of these species may be present seasonally or at low densities so the level of effort could require many frequent surveys of short duration. Cost would depend on the species that are present and the type of methodology chosen.

Study Request: XIV: Fish and Wildlife Habitat Evaluation Assessment

1. Goals and Objectives: The PAD provides no process to evaluate the affect of Project operation on fish and wildlife. However a systematic process is useful and sometimes the only way to compare the impacts of difference alternatives. A systematic process for comparing alternatives is consistent with NEPA and is one method of communication the effects of continued Project operation on wildlife species. The objective of this study is to assess the effects of Project construction and operation on fish wildlife, using a standard and accepted methodology, such as the Habitat Evaluation Procedure (HEP). The goals of the study would be to: 1) determine the fish and wildlife species that are representative of the habitat that may be affected by the Project operation; and 2) use HEP to assess the existing habitat value in the vicinity of the Project and those that may result from alternative operating regimes.

2. Agency Goals: Department of Interior licensing goals 2, 3 and 4 and objectives 1 and 3.

3. Existing and Additional Information: Half Moon Cove provides habitat for a variety of fish and wildlife that use the intertidal and subtidal zones. The construction and operation of the Project includes changes to the tidal cycle that may affect the quality and quantity of habitat. It may be very difficult to determine the full effect of Project construction and operation without a long period of study, which is often not timely or feasible. Therefore, it is necessary to use a process, like HEP, to evaluate any potential effects of Project construction and operation on fish and wildlife species for different alternatives or operating regimes.

4. Project Nexus: The PAD describes the proposed operation of the Project as water storage and generation facility. The PAD indicates changes will occur to the amplitude and phase of the tidal cycle. These changes may affect the habitat for fish and wildlife species that utilize intertidal and subtidal habitats.

5. Study Methodology: Methods to conduct HEP are well established and have been used successfully in other FERC licensing proceedings. The work will likely require one field season to complete.

6. Level of Effort This work will require one field season to complete. The scope of the study is limited to fish and wildlife and their habitats in the intertidal and subtidal zones.

Study Request: XV: Fish, Marine Mammal and Macroinvertebrate Behavior and Potential Turbine Entrainment

1. Goals and Objectives: The goal of the study is to evaluate the potential for fish, marine mammal and macroinvertebrate entrainment at the Project its effects.

The objectives of this study, at a minimum, would be to describe: 1) the movements of fish, marine mammals and macroinvertebrates to and from Half Moon Cove; 2) describe the physical characteristics of the proposed intake structure, gates and turbine including the location and dimension; the velocity distribution at the intake structure; the design of any trashracks or screens, and if included, the size of the clear spacing between bars; 3) the potential effects of Project induced entrainment or impingement on the fish, marine mammals and macroinvertebrates based on the physical characteristics of the Project and known literature regarding turbine entrainment and impingement; and 4) develop alternatives to minimizing and mitigating for the effect to entrainment and impingement from Project operations.

2. Agency Goals: Department of Interior licensing goals 2, 3 and 4 and objectives 1, 2 and 3.

3. Existing and Additional Information: A list of invertebrate and vertebrate species presence or absence is available for the Project vicinity based on past studies, however no information is available on movement of individual species to and from Half Moon Cove. The information in the PAD is not sufficient to evaluate the potential for Project induced entrainment or impingement of these species at the proposed intake. The results of this study would provide specific information into whether entrainment or impingement at the Project intakes is likely, how it may impact the populations of macroinvertebrates, fish and marine mammals, and what passage protection measures are needed.

4. Project Nexus: Mobile invertebrate and vertebrate species exists in the vicinity of the Project and could be susceptible to impingement on Project trashracks or entrainment through the Project's turbine when the Project is operating. Evaluation of the physical characteristics of the Project's intake and gate structures along with behavioral studies that describe movements would help inform a decision on the need for passage measures in the license.

5. Study Methodology: A number of different telemetry methodologies used to study movement behavior are well established, such as radio or acoustic telemetry. These methods have been used successfully in other Commission licensing proceedings. The methodologies for a desktop analysis of the risk of entrainment and impingement based on intake and turbine characteristics are also well developed and have been used frequently in Commission proceedings. The study would involve a desktop analysis evaluating the likelihood and risk of entrainment and impingement based on the physical characteristics of the Project and the results of the field investigations.

6. Level of Effort: Field work would be required to collect movement data on the species that may be entrained or impinged and may require up to two years of data collection.

Study Request: XVI: Fish Survey in the Intertidal and Subtidal Zone

1. Goals and Objectives: The PAD documents the general lack of basic inventories for fish and wildlife resources. It includes little recent site specific information on types and seasonal occurrences of fish within the vicinity of the Project so the current distribution and abundance and the habitat quality of these species is unknown.

The goals of the study would be to: 1) inventory fish that utilize the intertidal and subtidal zone in the vicinity of the proposed Project sufficient to describe the species composition, density, seasonal abundance and the quality of the habitat; and 2) assess the proposed Project construction and operation on these fish species and their habitats. The study should also include a comparison of the above data with other similar locations in the region

2. Agency Goals: Department of Interior licensing goals 2 and 4 and objectives 1, 2, 3 and 4.

3. Existing and Additional Information: The PAD documents a lack of current site specific information on the distribution and abundance of fish within the Project boundary. Cobscook Bay provides a wide range of habitat for fish that may be used for spawning, rearing and foraging. Given their life history requirements, the operation of the Project could affect the quality of their spawning, rearing or foraging habitat for fish. Therefore, information on species, distribution and abundance in the vicinity of the proposed Project boundary is needed to evaluate any potential effects of Project construction on these species. Existing data is available from studies conducted decades ago however little current site specific information is available

4. Project Nexus: The PAD describes the proposed construction and operation of the Project that would obstruct the movement of fish or potentially modify existing habitat from changes in the amplitude or phase of the tidal cycle. These changes may affect the intertidal and subtidal habitat for a variety of life stages of aquatic resources

The information collected by the study will answer the following questions:

1. What species are present in the vicinity of the Project;
2. What habitats are the species associated with and what important elements are found in those habitats?
3. Are species present in habitat that will be influenced by Project operations;
4. What effects may the Project operation have on fish and their habitats?

5. Study Methodology: Methods to sample fish are well established and have been used successfully in other FERC licensing proceedings. This work will require seasonal surveys, depending upon the species that may be present. Accepted methods would include those that utilize beach seines or beam trawls.

6. Level of Effort: This work will require two field seasons to complete. Some of these species may be present seasonally or at low densities so biweekly seasonal surveys should be

undertaken throughout the year. Cost would depend on the species that are present and the type of methodology chosen.

Study Request: XVII: Aquatic and Terrestrial Habitat and Land use Mapping

1. Goals and Objectives: The mapping of aquatic and terrestrial habitat is essential to evaluate the affect of Project operation on fish and wildlife and to develop proposed terms and conditions for the current license. The objective of this study is to map the current aquatic habitat (wetlands, macroalgae, and substrate) and terrestrial habitat within 1,000 feet of the impoundment. The goals of the study would be to: 1) develop a map of the aquatic and terrestrial habitat at a scale that would be sufficient to evaluate Project effects; and 2) to develop a map of land use that could be use to develop a comprehensive land management plan that would identify lands adjacent to the Project boundary for protection for the purposes of recreation, providing a buffer to protect water quality and aquatic resources, and for providing wildlife habitat.

2. Agency Goals: Department of Interior licensing goals 2 and 4 and objectives 1, 2, 7, 8, 9, 11 and 12.

3. Existing and Additional Information: Half Moon Cove provides habitat for a variety of fish and wildlife that use the intertidal and subtidal zones. The construction and operation of the Project, including changes to the tidal cycle, could affect the quality or quantity of this habitat. Recent aquatic mapping was completed by Larsen et al. (2004), however it was created using satellite imagery so the resolution is coarse. Terrestrial and land use mapping was completed in previous studies decades ago and are currently outdated.

4. Project Nexus: The PAD indicates changes will occur to the amplitude and phase of the tidal cycle, which may change aquatic habitat depending upon the location and type. These changes may affect the habitat for fish and wildlife species that utilize intertidal and subtidal habitats. The Commission also routinely orders the development of a comprehensive land management plan around impoundments to protect the quality of the aquatic habitat, enhance wildlife habitat and to provide opportunities for recreation. The land use element of this study will provide the information needed to consider and develop the plan

5. Study Methodology: Methods to conduct aquatic and terrestrial habitat and land use mapping are well established and have been used successfully in other FERC licensing proceedings.

6. Level of Effort This work will require one field season to complete.

Study Request: XVIII: Hydrodynamic Model of Half Moon Cove

- 1. Goals and Objectives:** The PAD indicates that the proposed Project construction and operation will affect the hydraulic conditions in Half Moon Cove. The change in hydraulic condition will include a modification of the cross-sectional area that controls the flow, a potential hydraulic connection to Passamaquoddy Bay, a change in the tidal amplitude and a change in the phase of the tidal cycle. These hydraulic influences have the potential to cause erosion and deposition of sediments, reduce or increase tidal currents, influence the duration of wetted area and change the residence and flushing period of water. The objective of this study is to create a three-dimensional hydrodynamic model of Half Moon Cove that can simulate the current condition and alternative operating regimes to understand the Project effect on hydraulic conditions.
- 2. Agency Goals:** Department of Interior licensing goals 2 and 4 and objectives 2, 4, 5, 6 and 9.
- 3. Existing and Additional Information:** A three-dimensional hydrodynamic model of Cobscook Bay was created by Brooks (2004) that was used for bay-wide ecological modeling. This model indicated that the water residence time for particles was up to 7 days in Half Moon Cove, however the model was designed for Cobscook Bay and its resolution appears to be too coarse to apply to the Project area.
- 4. Project Nexus:** The PAD indicates that the proposed Project construction and operation will affect the hydraulic conditions in Half Moon Cove. The change in hydraulic condition may influence the processes of erosion and deposition of sediments, reduce or increase tidal currents, influence the duration of wetted area and change the residence and flushing period of water. These physical factors control many of the parameters that influence habitat conditions, like temperature, salinity and nutrient cycling.
- 5. Study Methodology:** The modeling methods developed by Brooks (2004) are well documented but require a high level of expertise.
- 6. Level of Effort:** This work may require up to two years to completed since the model would have to be developed and calibrated from field collected data (bathymetry and current studies), which may currently be unavailable for Half Moon Cove.