CONSUMERS ENERGY COMPANY
JACKSON, MICHIGAN

DTE ELECTRIC COMPANY
DETROIT, MICHIGAN

PROPOSED STUDY PLAN FOR THE LUDINGTON PUMPED STORAGE HYDROELECTRIC PROJECT (FERC NO. 2680-108)

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JUNE 2014

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PROPOSED STUDY PLAN

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DEFINITIONS OF TERMS, ACRONYMS, AND ABBREVIATIONS

APE	Area of Potential Effect as pertaining to Section 106 of the National Historic Preservation Act
Applicant	Consumers Energy Company and DTE Electric Company
°C	Temperature in Degrees Celsius
CFR	Code of Federal Regulations
Commission	Federal Energy Regulatory Commission
DTEE	DTE Electric Company, formerly known as The Detroit Edison Company
FEA	Final Environmental Assessment
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
FPC	Federal Power Commission
GIS	Geographic Information Systems
GLFT	Great Lakes Fisheries Trust
HPMP	Historic Properties Management Plan
ILP	Integrated Licensing Process
Installed Capacity	The nameplate MW rating of a generator or group of generators
Interested Parties	The broad group of individuals and entities that may have an interest in a proceeding
License Application	Application for New License submitted to FERC no less than two years in advance of expiration of an existing license.
Licensees	Consumers Energy Company and DTE Electric Company
LPSP	Ludington Pumped Storage Project
LRBOI	Little River Band of Ottawa Indians
LTBB	Little Traverse Bay Band of Odawa Indians
Michigan DNR	Michigan Department of Natural Resources
MNFI	Michigan Natural Features Inventory
MW	Megawatt
NEPA	National Environmental Policy Act

DEFINITIONS OF TERMS, ACRONYMS, AND ABBREVIATIONS

NGO	Non-governmental Organization
NPS	National Park Service
NOI	Notice of Intent
NRHP	National Register of Historic Places
PAD	Pre-Application Document
PDF	Portable Document Format
Project	Ludington Pumped Storage Project
Project Area	The area within the FERC Project boundary.
Project Boundary	The boundary line defined in the Project license issued by FERC that surrounds those areas necessary for safe and efficient operation and maintenance of the Project or for other specified Project purposes.
Pumped Storage	A hydroelectric system in which electricity is generated during periods of high demand by the use of water that has been pumped into a reservoir at a higher altitude during periods of low demand.
Relicensing	The process of acquiring a subsequent FERC license for an existing hydroelectric Project upon expiration of the existing FERC license.
RTE Species	Rare, threatened, and endangered species, is defined to include (1) all species (plant and animal) listed, proposed for listing, or candidates for listing under the Federal and State Endangered Species Acts and (2) those listed by the USFWS as sensitive, special status or watch list.
SAT	Scientific Advisory Team
SCORP	State Comprehensive Outdoor Recreation Plan
SD	Scoping Document
Service List	A list maintained by FERC of parties who formally have intervened in a proceeding.
SHPO	State Historic Preservation Officer
Tailrace	Channel through which water is discharged from the powerhouse turbines.
USDA	United States Department of Agriculture

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DRAFT PROPOSED STUDY PLAN

1.0 INTRODUCTION

Consumers Energy Company (Consumers Energy) and DTE Electric Company (DTEE), Licensees of the Ludington Pumped Storage Project (FERC No. 2680), are in the process of relicensing the existing 1,785 megawatt (MW)[1] Ludington Pumped Storage Project (Project) with the Federal Energy Regulatory Commission (FERC). The Project is located along the Lake Michigan shoreline, in the townships of Pere Marquette and Summit in Mason County, Michigan and in Port Sheldon in Ottawa County, Michigan. The Ottawa County portion of the Project is limited to a 1.8 acre satellite recreation site (established as part of the Settlement Agreement approved by Commission Order on January 23, 1996 (74 FERC ¶ 61,055)). The Licensees are not proposing any changes to the Project.

The Licensees are using FERC's Integrated Licensing Process (ILP) as established in regulations issued by FERC July 23, 2003 (Final Rule, Order No. 2002) and found at Title 18 CFR, Part 5. The Licensees filed a Pre-Application Document (PAD) and Notice of Intent (NOI) to seek a new license for the Project on January 21, 2014. The PAD provides a complete description of the Project, including its structures, operations, and potentially affected resources. Electronic copies of the PAD are available on FERC's website (www.ferc.gov) and on the Ludington facility Relicensing website (http://www.consumersenergy.com/content.aspx?id=6976).

[1] On May 7, 2012, FERC issued an Order Amending License to upgrade and overhaul all six pump-turbine/motor generating units at the Project, one unit at a time over the years 2013 through 2019. The proposed overhaul will increase the authorized installed capacity of the Project from the current 1,657.5 MW to 1,785 MW.

Prior to the filing of the PAD, the Licensees began preparations for the relicensing of the Project by contacting and soliciting information from potential stakeholders, including the relevant Native American tribes and state, federal and local agencies regarding the Project and its potential effect on the environment. The Licensees distributed the PAD and NOI simultaneously to Federal and state resource agencies, local governments, Native American tribes, members of the public, and others thought to be interested in the relicensing proceeding. Following the filing of the PAD, FERC prepared and filed Scoping Document 1 (SD1) on March 20, 2014. FERC also held two agency and public scoping meetings on April 17, 2014, and has scheduled a site visit for July 30, 2014. FERC also provided agencies and interested parties an opportunity to file comments on the PAD and the SD1 and request studies by May 21, 2014. The ILP requires the Licensees to file a Proposed Study Plan (PSP) within 45 days following the deadline for filing comments on the PAD, or by July 5, 2014. This document contains Licensees' PSP to address deficiencies associated with existing information or to provide additional information.

Section 7.0 of this PSP provides all of the individual studies proposed by the Licensees to gather additional information needed to adequately analyze the potential effects of the continued operation of the Project on Project-related developmental and non-developmental resources. The following studies are included in this PSP for implementation during the 2015 and 2016 field seasons, as appropriate:

1. Wildlife Resources Survey – reconnaissance level surveys to document the wildlife resources in the Project area and to search for rare, threatened or endangered species or unique habitat.
2. Botanical Resources Survey – reconnaissance level surveys to document the botanical resources in the Project area and to search for rare, threatened or endangered species or unique habitat, verify areas of wetlands, and will include a survey for terrestrial invasive plant species.
3. Recreational Resources – A Recreational Use survey, which is also intended to address compliance with the current FERC Form 80 survey requirements. The recreational use survey will include a survey of all current Project recreation areas and a questionnaire to identify potential recreational needs in the area of the Project.
4. Cultural Resources Survey – Based on consultation with the Michigan State Historic Preservation Officer (SHPO), federally recognized Indian tribes with an active interest in the Project and any other interested parties, the Area of Potential Effect (APE) will be defined and mapped. Also, appropriate areas within the APE will be identified for

conducting a Phase I Archaeological Resources and Historic Resources surveys. In addition, a Historic Properties Management Plan (HPMP) will be developed in consultation with the same parties involved in the cultural resources survey, and will be submitted with the Preliminary Licensing Proposal (or draft application).

5. Fishery Resources – A study to comprehensively identify and evaluate the feasibility and effectiveness of all available fish protection measures, including additional technologies, enhancements to the barrier net, Project design and/or operational changes that would reduce to the greatest extent practicable fish entrainment and mortality caused by operation of the Project.

Section 7.0 provides information on the goals and objectives of each study; the relationship of the study plan to the issues identified in the PAD, SD1 and scoping process; known resource management goals; methodology; and scope, schedule and budget information as per the requirements of 18 CFR § 5.11. This purpose of this PSP is to provide FERC and the agencies with a draft plan providing descriptions of studies proposed by the Licensees with the intent that goals, methodology, scope, and schedule will be refined in consultation with agencies during the next several months and finalized in a final study plan document that Licensees will file by November 2, 2014 for FERC approval.

2.0 COMMENTS ON THE PROPOSED STUDY PLAN

Comments on the Licensees' PSP (including any revised information or study requests) must be filed within 90 days of filing the PSP, by October 3, 2014. Comments must also include "an explanation of any study plan concerns and any accommodations reached with [the Licensees] regarding those concerns." 18 CFR § 5.12. Further, any proposed modifications to the Licensees' PSP must address the criteria in 18 CFR § 5.9(b).

3.0 INITIAL STUDY PLAN MEETING AND ADDITIONAL MEETINGS

The Licensees plan to hold the Initial Proposed Study Plan Meeting pursuant to 18 CFR § 5. 11 on July 31, 2014 at 10:00 a.m. at the Pere Marquette Township Hall located at 4879 West Deren Road, Ludington, Michigan. The purpose of the Initial Proposed Study Plan Meeting will be to clarify the intent and contents of the Licensees' PSP, share any initial information or study responses, and identify any outstanding issues with respect to the PSP. Additional meetings may be scheduled after the initial meeting, as necessary. The Licensees will file with the Commission additional meeting notifications.

4.0 PROGRESS REPORTS, STUDY REPORTING, MEETINGS

Periodic progress reports for studies implemented during the 2015 field season will be filed with the FERC and provided to agencies and stakeholders, approximately on a quarterly basis, starting after FERC's study plan determination. The formal Initial Study Report is scheduled for preparation following the 2015 field season but in no case later than one year following FERC's study plan determination, which is anticipated by December 2, 2014. The Licensees will schedule the Initial Study Report meeting once the date for the availability of the Initial Study Report is known. Using the schedule in Scoping Document 1, the Licensees anticipate that the Initial Study Report will be available by December 2, 2015 and the Initial Study Report meeting will occur prior to December 17, 2015. As needed, the Licensees will file updated study reports within the time limits provided in 18 CFR § 5.15(f). The estimated start and completion dates for studies are provided in Table 4-1.

Table 4-1: Estimated Dates for Commencement and Completion of Field Work

Proposed Study	Estimated Start Date	Estimated Completion Date
Wildlife, including RTE (wetland, littoral and riparian surveys as they pertain to Lake Michigan) Surveys (meander surveys)	April, 2015	October 2015
Botanical, including RTE (wetland, littoral and riparian as they pertain to Lake Michigan) and IS Surveys	April, 2015	October 2015
Recreation Survey	April/May 2015	April 1, 2016
Cultural Resources Surveys	January 2015	July 2015
Fish protection options and evaluation	January 2015	December 2015

5.0 REQUESTED STUDIES NOT ADOPTED

As required by 18 CFR § 5.11(b)(4), if the Licensees do not adopt a requested study, an explanation of why the request was not adopted, with reference to the criteria set forth in § 5.9(b) must be included in the PSP. The Licensees have not adopted the following study requests:

1. Recreational Use survey (in the form requested by Pere Marquette Charter Township)
2. Adult Sturgeon Winter entrainment (Little River Band of Ottawa Indians)
3. Shoreline Fish Monitoring (Little Traverse Bay Bands of Odawa Indians)

5.1 Study Request Related to Recreational Use

Recreational Use Survey

In its letter dated May 7, 2014, Pere Marquette Charter Township (PMCT) requested a recreational use survey intended to adequately characterize existing and potential recreational use at the Project and in the surrounding vicinity of the Project. PMCT's comments were supported by the Mason County Park and Recreation Commission (letter dated May 14, 2014) and by state of Michigan, Michigan Department of Natural Resources (letter dated May 21, 2014). The Licensees are not adopting portions of the requested study as discussed below.

FERC application requirements for addressing recreation resources are outlined in 18 CFR § 4.51(f)(5), which includes a description of existing Project facilities and an estimate of recreation use of the Project area. The Licensees have modified the study plan proposed in the PAD to address FERC requirements for recreational use surveys, including user surveys, an inventory of Project recreation facilities and a description of the condition of these facilities. These modifications should address many of the issues in the study requested by PMCT.

The PMCT requests that the Licensees characterize recreational use at the Project and in the surrounding vicinity of the Project, including various non-Project recreation sites and facilities outside the Project boundary, and specifically notes several non-Project recreation sites and facilities that are not mentioned in the PAD. The Licensees will comply with 18 CFR § 4.51(f)(5) for reporting recreational use within the Project for the application, but will not determine the level of use of non-Project recreation sites and facilities. The PAD provided a

selective sampling of other recreation sites within the Project area, but it was not intended to be an all-encompassing list and description. The Licensees will provide an abbreviated inventory (location, type, amenities) of other public recreation sites and facilities within two (2) miles of the Project boundary, including non-Project sites and facilities within 2 miles of the satellite recreation area at Pigeon Lake, in its report on recreation resources.

The PMCT states that additional analysis of how the project might participate in the recreation goals and needs of Mason County is warranted and should be part of the recreation study. The Project already contributes to the area's recreational needs by supporting several recreational sites in the vicinity of the Project. The Licensees will review the Michigan Statewide Comprehensive Outdoor Recreation Plan (SCORP) and other regional and local recreation plans that may provide data on local and regional recreational needs in proximity to the Project and will compare recreational needs identified in the plans with recreational opportunities provided by the Project. The Licensees feel it is premature to determine Project-related recreational needs until the recreation study is complete and the results are available.

PMCT's support for its study request implies that survey of these non-Project sites is directly related to cooperation with the local units of government. The Licensees support cooperation with local units of government and, as an example, have worked with Mason County on recreation planning. However, the Licensees do not agree that cooperation necessarily means including sites in its recreation survey for which the Licensees do not have control or responsibility. Based on past relicensing processes, FERC has not required a licensee to include non-Project recreational sites in a Project's use survey for relicensing and the Licensees do not believe FERC should do so in this case because the Licensees do not have ultimate responsibility for the type and quality of recreation offered as well as access to and maintenance of these non-Project sites.

PMCT also suggests that FERC has established prior precedent for providing recreational access beyond the Project boundary, and uses the Pigeon Lake fishing access site as an example of this precedent. The Pigeon Lake fishing access was identified as a means of providing access to the Lake Michigan fishery as part of the 1996 Settlement Agreement (to resolve issues associated

with providing fishing access from the jetties at the Project), and is located on land owned by Consumers at its J.H. Campbell generation facility, and was chosen in lieu of providing such Lake Michigan access in the Project's tailrace due to public safety concerns. The Licensees do not agree that FERC's approval of this off-site recreational access through the Settlement Agreement represents such precedent. Access was identified by the Settlement Agreement signatories, and offered by the Licensee. FERC approved the addition of the land associated with the Pigeon Lake facility to the Project boundary, and FERC did not order the Licensees to identify this facility.

The PMCT also requests the Licensees conduct user interviews at the Pigeon Lake facility to determine the level of fishing access being utilized, angler success rate, and if Lake Michigan species fishery access can more effectively be provided near the Project. The Licensees will include the Pigeon Lake facility in its comprehensive recreation facility inventory of Project facilities.

5.2 Study Request Related to Fish Entrainment and Mortality

Two studies related to fish entrainment and mortality have been requested by interested parties. The Little River Band of Ottawa Indians (LRBOI) requested a study of winter entrainment of Lake Sturgeon and the Little Traverse Bay Band of Odawa Indians (LTBB) requested a study of potential impacts of Project operation on shoreline larval, juvenile and small bodied fish assemblages. These will be addressed separately in this section.

Proposed study of potential lake sturgeon entrainment-LRBOI

In its study request, filed with FERC on May 20, 2014, the LRBOI requested that the Licensees quantify the adult lake sturgeon entrainment during the winter months (i.e., October 15 through April 15) when the barrier net is not deployed, and to determine the need and potential for further sturgeon abatement measures. The LRBOI proposed methodology included several techniques that could potentially be used to estimate entrainment of sturgeon during the winter months. These techniques include impoundment netting, hydroacoustic technology, video monitoring and SCUBA, and DNA/morphological fish identification. The reasons provided by the LRBOI for the study request include (1) the period of spawning migration when sturgeon are known to stage

in drowned river mouths during early spring (March – May); (2) the Project is located within the migration corridor of the two largest remnant sturgeon populations on Lake Michigan's eastern shoreline; (3) sturgeon populations are likely increasing due to stocking activities, habitat restoration and harvest restrictions; (4) mortality during winter operation of the Project may diminish cumulative spawner abundance and subsequent recruitment; (5) both the Muskegon and Manistee populations are identifiable through genetic evaluation.

While there is little known about over winter lake sturgeon movement in the vicinity of the Project, it is well documented that very few sturgeon frequent the Project area during other times of the year. During the past 25 years of intensive fisheries monitoring, only 70 lake sturgeon have been collected. Over 70% (50 fish) were found during the months of July through September. Lake sturgeon catches have historically and continue to be processed using the USFWS protocol which includes collection of a tissue sample as well as tagging prior to release (Passive Integrated Transponder tagging since 2010, Floy tagging prior to 2010). This continued effort will contribute to sturgeon research over time and will provide opportunities to gather information on genetic stock and movement patterns.

In addition, lake sturgeon research conducted by others provides insight that can be applied to the Project. For example, an ongoing Michigan DNR telemetry study has been tracking populations of spawning, sub-adult, and juvenile lake sturgeon year-round using an array of fixed submersible receivers deployed at graduated depths from 5' to 100' in offshore waters of Lake Michigan spanning from St Joseph to Silver Lake (20 miles south of the Project.) A brief summary is that during the winter and fall, lake sturgeon tend to occur in deeper water in the offshore areas of Lake Michigan. In spring and summer, they occur in the near shore areas and within 2-5 km from their river of origin/spawning river." (Personal communication between Kregg Smith and Scott DeBoe, June 2, 2014.) The Muskegon River, located about 60 miles (about 97 km) south of the Project and the Manistee River, about 20 miles (about 32 km) north of the Project, are the two known sturgeon spawning rivers in the vicinity of the Project. Winter movement patterns identified by others are consistent with the Michigan DNR's observations.

Typical lake sturgeon movement patterns as suggested by Scott and Crossman (1998) consist of movement from shallow waters in fall to deep areas in winter. This is consistent with a study in the Namakan River in Ontario which found a preference for lake habitat during the winter with no movement through swift moving (though shallow) areas at water temperatures less than 11°C (McLeod and Debruyne, 2009). Additionally, post-spawning movements have been reported to include lake sturgeon returning to home areas and/or feeding areas followed by a late summer migration to areas where they spend the winter (Thuemler, 1997; Rusak and Mosindy, 1997; Scott and Crossman, 1998; Sandilands, 1986; Block, 2001; Adams et al., 2006). The small number of sturgeon being documented as passing through the Project vicinity during post-spawn and late summer movements (70 over 25 years) indicates that a return migration through this area in early spring would also be uncommon, as would be the potential for entrainment.

While substantial travel distances in excess of 100 km or more have been observed by some researchers, many lake sturgeon exhibit more sedentary behavior with movement ranges of less than 20 km as indicated by the Michigan DNR's observations as well as other researchers (Sandilands, 1986; Nowak and Jessop, 1987; and Block, 2001). Since the Project was not constructed at a river, there is no historic lake sturgeon spawning in the vicinity of the Project.

Therefore, based on the distance between the Project and these important lake sturgeon spawning rivers coupled with information from MDNR's ongoing research, and insights from other researchers, the likelihood of Lake Sturgeon moving into the Project intake area when the barrier net is not deployed is expected to be low.

In addition to the above information which indicates that the requested study is not warranted, there are also serious concerns about the potential cost and schedule associated with the study proposed by the LRBOI. The LRBOI did not provide an estimated cost. Rather it justified a potential cost of millions of dollars by comparison to that spent by various federal, state and tribal agencies in restoration efforts. The Licensees, however, believe the general study requested by the LRBOI is a multi-year effort that could extend beyond the relicensing process. As such, the complexities of conducting this type of research as discussed below would likely

involve a substantial learning process and the development of innovative techniques in order to collect reliable information. The cost of these efforts would be hundreds of thousands of dollars.

Absent from their discussion is the fact that the Licensees continue to fund the Great Lakes Fishery Trust (GLFT), a major contributor to these restoration efforts. The GLFT was established in 1996 as a result of the Licensees' Settlement Agreement to compensate for the lost use and enjoyment of the Lake Michigan fishery resulting from the continued operation of the Ludington Pumped Storage Project. The GLFT provides funding to nonprofit organizations, educational institutions, and government agencies to enhance, protect, and rehabilitate Great Lakes fishery resources. The GLFT pursues its mission and vision through investments in three broad categories: Access to the Great Lakes Fishery, Ecosystem Health and Sustainable Fish Populations, and Great Lakes Stewardship. As it celebrated 10 years of grant making on October 8, 2008, the GLFT noted it has provided more than $40 million to fulfill its mission. (GLFT web page, https://www.glft.org/about/history/10th-anniversary.) The Licensees' annual fish mitigation contributions, as well as interest earned on the GLFT fund make these grants possible.

The Licensees recognize both the cultural and environmental importance of lake sturgeon and continue to support lake sturgeon research and recovery effort. This support has primarily come through the GLFT. Since 1999, the GLFT has awarded 31 grants totaling more than $5 million pertaining to lake sturgeon research and recovery.

The Licensees also have serious concerns regarding safety associated with completing the requested surveys in and near Lake Michigan during the winter, including the upper reservoir. While some methods, such as hydroacoustic monitoring, are being used by others to collect data during winter, some of the methods suggested by the LRBOI (e.g. SCUBA and impoundment netting) do not seem to be feasible, safe, and reliable methods to monitor this dynamic and hazardous environment during the winter. Temperatures well below freezing are compounded by the wind in this exposed lakeshore location and result in dangerous wind chills. These temperatures are extremely dangerous for anyone working near or on the Lake. Icing is another danger both in terms of boat launches that might be used to access the water and the vessels used to conduct the study. During the winter, Lake Michigan often freezes to varying degrees

depending on air/water temperatures, and near shore areas can contain large amounts of ice. Nets can become iced over easily, becoming heavy and dangerous to maneuver. LRBOI specifically suggests monitoring of the impoundment which is completely encompassed by steep slopes of asphalt limiting any access to a boat ramp, and which is subject to extreme ice conditions.

In addition, studies pertaining to the assessing winter entrainment risk for lake sturgeon have not been raised by other researchers or the GLFT of which the LRBOI is a member. As stated above, no current information suggests that winter entrainment of lake sturgeon is an issue and conducting an expensive, long-term study as described will not provide information needed for the relicensing process. Given the above factors, the Licensees do not believe the study requested by the LRBOI is necessary to assess Project impacts on sturgeon populations.

Proposed characterization of shoreline larval, juvenile, and small-bodied fishes-LTBB

In a May 21, 2014 filing with FERC, the LTBB requested a shoreline fish monitoring study to characterize shoreline larval, juvenile and small-bodied fish assemblages in close proximity to the Project and to evaluate the potential impact of Project operations on these fishes. LTBB proposes weekly beach seining during the ice-free period of the year at three stations north and three stations south of the Project to sample juvenile and small-bodied fish, about 1.5 inches and larger in total length. Date, weather, wave height, water temperature and other pertinent site characteristics would be recorded during each sampling event. Additionally, the LTBB proposes adding a weekly neuston net tows at the seining stations and, if technically feasible, two neuston net tows in the intake area of the Project. All larval, juvenile and small-bodied fish captured during this sampling effort would be identified, counted, and measured. The volume of water sampled by the neuston net and areas sampled by the seine net would be estimated to determine the relative fish density. The number of fish measured could be sub-sampled if catches are relatively high. All captured fish would be identified and counted. LTBB propose that the study is needed because the shoreline fish and use of shoreline habitat by larval and juvenile fish is relatively understudied. Additionally, LTBB propose that this study is needed to understand the impact of Project operations on larval and juvenile fish as these are vulnerable to entrainment by

strong currents and may be transported to the Project even though they may have hatched miles away. Additionally, LTBB states that while entrainment of some larval and juvenile species have been studied, other species have been ignored, including shiners and whitefish.

LTBB estimates an annual budget of $80,400 to complete the work and does not provide a timeframe for completing these studies. The Licensees acknowledge that the data collection methodology is presented in a logical format but such a study would only document the life stages and relative abundance of the species present at a specific sampling location. Accurate estimates of entrainment would be very difficult given the immense area, flows and non-uniform spatial distributions. Moreover it is not clear how this information could then be used to determine population level impacts, if any, due to Project operations[2]. Should this be a multi-year effort, variations in relative abundance and species composition would be illustrated and, again, it is not clear how this would relate to Project operations. The annual study cost provided by the LTBB appears to be low. Based on our estimates, such a study would likely cost $150,000 to $225,000 annually. Additionally, the Licensees and other settlement parties, of which the LTBB is included acknowledge that larval and juvenile fish are entrained at the Project and some level of mortality occurs. In order to compensate for these losses, approximately 43%[3] of the annual compensation payment to the GLFT is intended to represent small-bodied, juvenile and larval fish not protected by the barrier net. Therefore, of the estimated $100 million in payments to the GLFT that will be provided by the end of the current FERC license, a very substantial amount will have been based on compensation for lost juvenile and larval fish resources.

In summary, the LTBB-proposed study is being requested to quantify entrainment and potential mortality of larval, juvenile and small-bodied fish. Presumably the information gathered from the study LTBB proposed would be used to further inform and possibly change the compensation model that is currently used to calculate the value of fish lost due to the continued operation of the Project under the existing State Settlement Agreement. The model used currently for

[2] Population-level losses are the appropriate threshold used by FERC when evaluating appropriate mitigation measures for entrainment losses at hydroelectric projects, as determined by the *City of New Martinsville, West Virginia v. FERC*, 102 F. 3d 567, 571-572 (D.C. Cir. 1996).
[3] 43% represents the average over the past five years. The range for the past five years was 42-46%

determining compensation was developed and agreed to by the Settlement Parties. As a member of the GLFT, LTBB has had input into this model and continues to have influence regarding how compensation is calculated.

5.3 Agency Study Requests That Do Not Meet The Requirements of 18 CFR § 5.9(b)(7)

FERC's Study Request criteria require that the requester describe considerations of the level of effort and cost, and why any proposed alternative studies would not be sufficient to meet the stated information needs. 18 CFR § 5.9(b)(7). FERC's handbook "A Guide to Understanding and Applying the Integrated Licensing Process Study Criteria," issued March 2012, provides explanation of how FERC applies the study plan criteria in evaluating study requests. With respect to the level of effort and cost criteria, FERC explains that to estimate the level of effort and cost, a study proponent should, at a minimum, estimate the number of hours or person-days that would be required to conduct the requested study and identifiable tasks (e.g., report preparation). FERC states that the information gained under this criterion is also useful weighing the costs and benefits of different methods for obtaining the needed information. While FERC may not reject a study based on cost alone, information on cost and level of effort is necessary for FERC to determine whether the requested information is in line with the magnitude of the potential effect of the Project on particular resources.

The majority of the agency study requests, including those study requests that the Licensees are adopting, do not provide an estimate of the number of hours or person days that would be required to conduct the requested study and identifiable tasks, such as report preparation or an adequate explanation of whether the level of effort and cost of the study to obtain the requested information is in line with the magnitude of the potential impact.

The study request from Joint Commenters (Michigan Department of Natural Resources, Michigan Attorney General, US Fish and Wildlife Service, Grand Traverse Band of Ottawa and Chippewa Indians, Little Traverse Bay Bands of Odawa Indians, National Wildlife Federation, Michigan United Conservation Clubs) provided neither a level of effort or cost for the study to identify and evaluate feasibility and effectiveness of all measures to eliminate or reduce fish entrainment and mortality caused by Project operation. The implication is that the potential

magnitude of fish 'kills' should warrant a study at any cost. The Licensees do not agree that the cost and level of effort are irrelevant in determining whether a study should be adopted. The Licensees are, however, willing to develop a limited, table-top evaluation that would address the fundamental goal of the requested study.

The LRBOI requested a study without a specific level of effort or costs, and tie the potential cost of the proposed study to the millions of dollars spent by Tribal, state and federal agencies for sturgeon restoration. The Licensees do not agree that a winter lake sturgeon study costing as much as restoration efforts conducted by others to mitigate long-standing impacts wholly unrelated to the operation of this Project is an acceptable level of expected effort when compared to what appears to be, based on existing local research and the literature, a very small potential effect of continued Project operations. As stated above, studies in the area suggest that lake sturgeon remain within 2 to 5 km of the mouths of the rivers where they will spawn in early spring. The Project is more than 32 km from the Manistee River and about 97 km from the Muskegon River. Further, the barrier net has almost always been installed by or before April 15. Additionally, the methodologies proposed by the LRBOI, while conceptual at this time, do not appear to be suitable for the safe and reliable collection of meaningful data in this harsh winter environment.

The LTBB provided a detailed cost estimate for the proposed study, but couched this in terms of an annual budget and without an associated timeframe. As stated above, the proposed study would document the relative abundance and life stages of species occurring in the vicinity of the Project. It would not, however, measure or estimate entrainment, a very difficult if not impossible task under winter conditions, or delineate population level effect to these species. Additionally, the Licensees are unaware of any hydroelectric project where entrainment of larval fish has been identified as an issue that has been intensively studied or where entrainment of this life stage was determined to have an impact. Further, the LTBB estimates an annual cost of this effort to be approximately $80,000. The Licensees believe this estimate to be low and estimate annual costs ranging from $150, 000 to $225,000.

Recreational Assessment-PMCT

PMCT proposes a recreation study cost of $15,000 to $25,000. The Licensees have modified the recreation study proposed in the PAD to address the FERC requirements and have estimated the Licensees' proposed study to be about $70,000 to $80,000. This estimate does not include the non-Project sites that PMCT requested for inclusion in the recreation study, and is three to four times greater than the estimate provided by PMCT.

6.0 ADDITIONAL INFORMATION REQUESTED

Comments submitted by FERC, agencies, or interested parties also requested additional information on the Project or clarification of information presented in the PAD. The Licensees' responses to these requests are contained herein.

6.1 General

There are no general comments to which the Licensees are responding.

6.2 Geology and Soils Resources

No comments regarding Geology and Soils were received.

6.3 Water Resources

No comments regarding Water Resources were received.

6.4 Fish and Aquatic Resources

6.4.1 Joint comments of Michigan Department of Natural Resources, Michigan Attorney General, US Fish and Wildlife Service, Grand Traverse Band of Ottawa and Chippewa Indians, Little Traverse Bay Bands of Odawa Indians, National Wildlife Federation, Michigan United Conservation Clubs

The Licensees acknowledge the joint comments provided by the above listed entities. Further, the Licensees look forward to continuing a working relationship whereby issues are evaluated and as necessary, sources of fish mortality are eliminated, reduced and/or mitigated. As such, the Licensees are proposing a study to address the request for a thorough evaluation of potential methods to eliminate fish entrainment mortality at the Project.

However, the Joint Commenters state that "re-licensure of the Project should be conditioned upon the Licensees' (a) implementing all feasible measures to minimize fish mortality caused by the Project; and (b) mitigating and appropriately compensating the public and their respective members for any continuing unavoidable impairment or lost use of fishery resources caused by the operation of the Project." While the Licensees agree with much of this statement it is important to note (1) per the decision in *City of New Martinsville, W. Va. v. FERC*, 102 F. 3d 567 (D.C. Cir. 1996), appropriate mitigation measures for fish entrainment at FERC hydroelectric

facilities are based on *population level impacts*, and (2) FERC's obligation in issuing a new license is to balance all public resources, including fisheries, wildlife, and recreation but also the public's need for affordable power.

6.4.2 Little Traverse Bay Bands of Odawa Indians (LTBB)

As provided in Section 5, the Licensees do not support conducting a study to document the presence of larval fish in the vicinity of LPSP. Species composition is well documented and relative abundance in a given year is likely primarily influenced by factors other than Project operation (i.e. environmental conditions, changes to the Lake Michigan ecosystem, etc.).

6.4.3 Little River Band of Ottawa Indians (LRBOI)

As provided in Section 5, the Licensees do not support a study of potential winter entrainment of lake sturgeon. Lake sturgeon research conducted by others does not indicate this to be an issue.

6.5 Wildlife (including RTE) Resources

6.5.1 Pere Marquette Charter Township (PMCT)

Comment on the Double Crested Cormorant

PMCT commented on PAD Section 5.4.2 stating that the Double Crested Cormorant (DCCO) is listed in the wildlife table but there is no discussion of the USDA's Final Environmental Assessment (FEA) (Double Crested Cormorant damage assessment in Michigan, issued June 2011 and prepared in cooperation with USFWS and NPS). The FEA lists Cormorant use of LPSP reef (breakwater), impact on fish populations in the Ludington area, and control strategies.

PMCT comments that since the reef is a constructed part of the Ludington Project and the cormorant is a known issue, the FERC EA should include a discussion of the issue and possible ways the Project can participate in or contribute to management efforts.

PMCT further comments on Section 6.2.4.3, noting the PAD notes historical operation of the Project has had little to no effect on wildlife resources. PMCT suggests that this cannot be a true statement in light of the LPSP constructed barrier reef and resulting cormorant issue and impacts to Lake Michigan fishery.

Response

The Licensees will add a reference to the USDA FEA to the discussion of Wildlife resources in the application. As discussed below, the Licensees currently provide access to the reef (breakwater) to support USDA's current control and management efforts.

The Licensees disagree that the FERC Environmental Assessment must contain a discussion of this issue and that the PAD incorrectly characterizes the Project's effects on wildlife. In 2011, the USDA's Environmental Assessment addressed the issue from a state perspective and was unable to tie Double Crested Cormorant populations to fishery degradation. While the Cormorants' use of the Project breakwater is identified in the USDA's Final Environmental Assessment, the presence of the breakwater is not the sole reason for increased populations over the past 30 years. The USDA Environmental Assessment identifies many other factors which have contributed to the increase in nesting and population, including protection under the Migratory Bird Act and the Endangered Species Act, as well as ceasing the use of the pesticide DDT. The breakwater is a necessary part of the Project, protecting the facility from Lake Michigan wave action. The USDA currently has a control program, which the Licensees support logistically, to reduce cormorant populations by killing adult birds and oiling eggs. Consumers' Director of Hydro Operations annually gains corporate approval for an exception to the company's use of weapons restriction policy to allow USDA Staff onto the Project with firearms. Consumers provides the USDA staff access to the boat launch/tailrace area. A guard and a plant employee (typically a technician) oversee the USDA operation while they are on site. The Licensees are cooperating and plan to continue to cooperate with the USDA and MDNR with their control efforts, and do not believe it is appropriate to take, and will not take, a more active role in the control efforts.

6.6 Botanical (including RTE) Resources

6.6.1 Pere Marquette Charter Township (PMCT)

Comments on Autumn Olive

In its comments on PAD section 5.5.4, PMCT discusses Autumn Olive, which is listed in Table 5-11. PMCT has observed that this Invasive Species (IS) is heavily present in the Project Area, much more so than in other areas of the Township. It is their belief that this species was planted by the Co-licensees for quick stabilization and cover purposes following construction of LPSP in the 1970's. PMCT asserts that the LPSP is heavily infested with this IS and post-construction planting was most likely a major, if not the primary source, of its establishment in the area. As such, PMCT believes FERC should address this species in the EA. PMCT further asserts that some control efforts should be considered to minimize the potential spread of this IS throughout the term of the new license.

Response

Along with many plant species now found to be invasive, Autumn Olive was commonly used in the 1960's and 1970's for stabilization and decorative planting. It was preferred by soil conservationists for rapid establishment and wildlife habitat. While the Autumn Olive is present in the Project area, its presence was not the result of the Licensees planting this species following construction of the Project. The original Project landscape plan dated October 1972, was provided to the Commission in a report titled "Environmental Considerations in Transmission Line Development and Site Property Treatment." The plan identified the species of plants used on the Project after construction was completed. Autumn Olive is not listed in this plan.

The Licensees intend to include invasive species in its botanical survey of Project land and will identify the locations and relative density of any stands of this species as part of the survey.

From a land management perspective, control of invasive species that are pervasive can result in clear corridors or sections of land within a degraded landscape. There is little utility in removing invasive species from Project lands when these lands are surrounded by lands that are also infested and provide a ready seed source for re-infesting Project lands. Such an invasive species

control plan would only be viable if it involved local governments and private landowners to control the invasive species on a landscape level. If such a comprehensive effort were instituted, an Invasive Species Management Plan for the Project would likely be part of a Land Management Plan and focus on Project land. For such a plan to be successful, it must be sensible, avoid a 'clear area' approach, and focus on management goals and best management practices rather than specific results. The need for and details of a management plan would be developed after invasive species surveys and consultation are complete.

6.7 Recreation and Land Use

6.7.1 Pere Marquette Charter Township (PMCT)

Clarification of the amount of land within the Project boundaries

In its letter dated May 7, 2014, PMCT requests clarification of the amount of land contained in the Project boundary, the distribution of acres between the Pere Marquette Township and Summit Township, and the number of acres of Project land that is unfenced and available for unrestricted public access. PMCT believes it is important to know the total acres, distribution of acres (between PMCT and Summit Townships) and the acres unfenced and with unrestricted public access. PMCT believes that a very small amount of Project boundary is unfenced and open to the public. PMCT also expressed its belief that this clarification is necessary for FERC to carry out its recreational responsibilities under 18 CFR § 2.7.

Response

In the PAD, the Project boundaries encompass 965 Acres, including the 842 acre upper reservoir and the 95 acre Michigan DOT easement for the US-31 highway. At the time the PAD was filed, FERC was considering an application filed by Licensees to modify the Project boundaries by removing the Michigan DOT easement land. Since the submittal of the PAD, FERC approved the removal of approximately 95 acres from the Project boundary.

In advance of the application documents, acreages will be recalculated and figures revised to reflect recent property removal from the Project boundary. The Licensees will also provide breakdowns of acreage by township and by lands that are available to the public and lands that

are not. This information will be filed with the application documents. Any changes to recreational access should be determined by FERC through the licensing process using recreation study and consultation results to guide their decision.

Clarification of the Pigeon Lake pier ownership

The PMCT states the pier associated with the Pigeon Lake north pier is owned by the Licensees, and not the US Army Corps of Engineers (USACE).

Response

This is correct. The pier is a USACE regulated navigation structure built and maintained for non-Project purposes. With respect to the pier, only the surface of the pier and the recreation/access facilities on the pier specified in the Exhibit R are part of the Ludington Project. Licensees note, however, that ownership of the pier should not be an issue in this relicensing so long as the Pigeon Lake north pier remains within the Project boundary.

Comment on the validity of FERC Form 80 data

The PMCT questions the validity and accuracy of the 2009 FERC form 80 recreation use data included in the PAD, and adds that the Form 80 does not provide information of potential recreational use.

Response

FERC requires licensees to include existing and readily available information in developing a PAD. The 2009 FERC Form 80 data is the most recent and readily available data that is specific to Project recreation facilities, and is required to provide an estimate of recreational use for the prior year (2008), and not make projections for potential or future use. The 2009 FERC Form 80 report was accepted by FERC. Further, the accuracy of the 2009 FERC Form 80 report should not be a significant issue because Licensees will be conducting a new recreational study to provide more up-to-date information, and will not be relying on the 2009 data as part of its

application. The Licensees will conduct a recreation use study as part of its relicensing studies that will address the FERC licensing requirements under 18 CFR § 4.51(f)(5).

Comments on recreation discussion in PAD

PMCT has numerous comments about PAD Section 6.2.6 regarding the recreation located in the area of the Project, listing several local recreational access points and stating that these should have been noted in the PAD and should also be part of the recreational use study. PMCT further identifies a recreation plan it is currently updating as a plan that should have been identified in the PAD.

Response

In a PAD, the list of non-Project recreation sites is not intended to be all encompassing, but is intended to be a representative sample of recreation in the Project area. This was the approach used for the Project's PAD. The Licensees note that the sites PMCT identified, Buttersville Park and its Lake Michigan Beach, Father Marquette Shrine, and Sutton's Landing on the east end of Pere Marquette Lake, are among many recreation sites in the vicinity of the Project.

The Licensees will acknowledge various recreation sites in the vicinity of the Project when completing the Recreation Study, but are not proposing to include non-Project recreation sites in the recreation use survey.

The PMCT recreation plan was not and is currently not readily available. Should this plan be completed in June 2014 as scheduled, the Licensees will review the plan and may reference it in the study.

6.8 Aesthetic Resources

No comments were received regarding aesthetic resources.

6.9 Cultural Resources

No comments were received regarding cultural resources.

6.10 Socioeconomic Resources

No comments were received regarding Socioeconomic Resources.

6.11 Tribal Resources

No comments were received regarding Tribal resources.

7.0 INDIVIDUAL STUDY PLAN PROPOSALS

The Licensees are proposing several studies to address resources for which insufficient information was previously available for the PAD or for which specific issues have been identified through agency comments. The individual study plans detailed below are proposed for the Project and most will commence in the spring of 2015. The Licensees propose that the studies, unless otherwise noted in individual plans, be completed in a single field season and that a second field season for individual studies may only be required after evaluation of the Initial Study Report.

7.1 Fish and Aquatic Resources

On May 21, 2014, the Michigan Department of Natural Resources (DNR), the Michigan Attorney General (MAG), the United States Fish and Wildlife Service (USFWS), the Grand Traverse Band of Ottawa and Chippewa Indians (GTB), the Little Traverse Bay Bands of Odawa Indians (LTBB), the National Wildlife Federation (NWF), and the Michigan United Conservation Clubs (MUCC), collectively the Joint Commenters, filed a study request to "comprehensively identify and evaluate the feasibility and effectiveness of all available measures, including additional technologies and Project design and operation changes, to eliminate or reduce to the greatest possible extent, fish entrainment and mortality caused by operation of the Project." The Licensees acknowledge this request and propose an appropriate level of study as described below.

7.1.1. Goals and Objectives

Evaluate existing technologies available to protect fish from entrainment mortality and consider their applicability, feasibility, effectiveness and cost (Capital and O&M) when applied to the Project. To the degree required for decision making purpose for the relicensing process, this evaluation will include physical, behavioral, operational, and structural fish protection options.

7.1.2 Known Resource Management Goals

The Joint Commenters' stated goal is to minimize all fish entrainment mortality associated with the operation of the Project and appropriately compensate the public for any continuing unavoidable impairment or lost use of fishery resources caused by Project operations.

7.1.3 Background and Existing Information

Potential effects of Project operations on the Lake Michigan fishery have been a consideration since the Project was first constructed. Several agencies and non-governmental organizations (NGOs) identified this issue as of primary concern. Over the past 30 years, this issue has been intensively studied with the results of these studies evaluated by FERC, the Licensees, resources agencies, tribes, NGOs and other stakeholders. As such, a synopsis of this issue's history at the Project is warranted.

The Licensees were unable to completely prevent fish entrainment mortality at the Project. In 1986, stakeholders, including the Michigan United Conservation Clubs (MUCC) and the National Wildlife Federation (NWF) initiated legal actions against the Licensees for their perceived failure to identify and install fish barrier facilities to protect the fishery resources in the vicinity of the Project under Article 38 of the FERC license. The State of Michigan, which filed a separate action in state court seeking compensation for fish losses, also intervened in the federal licensing proceeding to require installation of devices to minimize future fish losses. At the time, the Licensees were actively evaluating measures to prevent fish losses. Evaluations included in-situ testing, consultation with fisheries experts, and consideration of engineering alternatives.

Since 1989 the Licensees have annually installed a seasonal barrier net around the Project jetties and breakwater to minimize fish losses at the Project due to entrainment. In 1991, after considerable testing of the barrier net, the Licensees submitted the "Plan for Permanently Mitigating Fish Mortality." The Plan consisted of continued operation and effectiveness monitoring of the seasonal barrier net, mitigation for unavoidable fish losses, and funding for additional recreational facilities. The barrier net was eventually selected by the parties to the Settlement (discussed below) as the most effective fish protection measure available at the time,

based on a detailed Stone and Webster engineering evaluation titled "Fish Mortality Mitigation Study: Ludington Pumped Storage Project" (1988). The report evaluated a number of potential alternatives, considering biological and economic factors. The PAD for the Ludington Project, filed on January 20, 2014, provides details regarding the existing measures employed by the Project to prevent and reduce fish entrainment and mortality (see Section 5.3.3).

After nearly ten years of working toward a resolution of this issue, the MUCC, NWF, the U.S. Department of the Interior, and several Indian tribes joined the state of Michigan in a comprehensive settlement with the utilities in 1996. The comprehensive settlement involves separate FERC and State Court settlement components, including the installation and monitoring of the seasonal barrier net to reduce future losses of fish at the Project as part of the FERC Settlement, and compensation for past damages to the fishery resource and annual payments for unavoidable future losses as part of the State Settlement. The FERC and State Court settlement agreements remain in place for the term of the FERC license that expires in 2019.

Essential components of the State Court settlement, approved by the Michigan Public Service Commission in 1996, included the creation of the Great Lakes Fishery Trust (GLFT). The GLFT allocates funds provided by the Licensees for mitigation of unavoidable fish losses. Initial formation of the GLFT included a cash payment by the Licensees of $5 million and the transfer of approximately 10,800 acres of company properties. The settlement also included annual compensation payments to the GLFT for unavoidable future fish losses occurring at the Project, the transfer of over 15,600 acres of undeveloped company lands to the State of Michigan, funding of seven fishing access improvements near other Great Lakes shoreline generating facilities individually owned by the Licensees, and annual payments to support the work of a Scientific Advisory Team (SAT).

The SAT is composed of representatives of the organizations serving on the GLFT Board of Trustees (except for the Michigan Department of Attorney General) and includes representatives from Consumers Energy and the DTE Energy, the Chippewa Ottawa Resource Authority, and one representative selected by mutual agreement of the NWF, MUCC, and Michigan DNR. The

SAT not only serves in an advisory role but also has some independent responsibilities with respect to overseeing and approving certain technical provisions of the FERC license requirements for the Project and fish-loss prevention strategies. The SAT meets regularly to review current data and to direct the next round of research. An important role is monitoring developments in fish entrainment abatement technology, and evaluating whether current mitigation measures are sufficient. As part of this ongoing effort, the Licensees have also monitored performance of the barrier net against established performance standards since 1989, and in consultation with the SAT since its inception following approval of the Settlement. The annual barrier net monitoring program undertaken by the Licensees consists of weekly gill net sets at eight locations, four inside the barrier net and four proximally outside. Data collected by this effort is provided to the SAT and reviewed on at least an annual basis.

The Licensees agree with the Joint Commenters that the current relicensing process provides an opportunity to consider alternatives to the current fish entrainment abatement measures, i.e., the seasonal barrier net. However, the Licensees wish to note that the current measures were developed in close consultation with the organizations represented by the Joint Commenters, and that these measures have been reviewed by the Joint Commenters on a regular basis since implementation and consistently found to be the most viable entrainment abatement option at the Project. Reviews of entrainment abatement technologies are conducted every 5 years, under the FERC approved settlement, and were conducted in 2001, 2006, and 2011. Pursuant to the FERC approved settlement, the next review is scheduled for 2016. These periodic reviews include an evaluation of current technologies, and provide conclusions and recommendations pertaining to the utilization of any new technologies at the Project. None of the past reviews have recommended additional or alternative entrainment abatement measures nor have the Joint Commenters indicated the past reviews were lacking in any respect.

Considered in the periodic entrainment abatement reviews, among other things, is the current effectiveness of the existing barrier net. Data collected from 1991 through 2012 demonstrate that the barrier net effectively excludes the majority of target species. From 1991 through 2012, target species effectiveness has averaged 92 percent. Effectiveness for the large game fish (>5 inches) component has averaged 83 percent with annual values historically ranging between 70

and 90 percent for salmonids and 80 to 100 percent for yellow perch. Effectiveness for large forage (alewife and smelt >5 inches) has averaged about 94 percent. Some fish, however, are subject to entrainment given the seasonal nature of the barrier net's installation, the net's design and the dynamic environment in which it is deployed. The Settlement parties, including the Licensees, acknowledged this reality and agreed upon a monetary mitigation plan as part of the State Court settlement which provides for annual payments by the Licensees to the GLFT for the unavoidable losses as discussed above.

The initial and annual payments to the GLFT are anticipated to reach a value of approximately $100 million by the end of the current license term in 2019. Approximately $50 million in grants have been awarded to date. Funded grant projects and related activities focus on the types of projects specifically identified in the State Court settlement and discussed in more detail below. The GLFT has worked cooperatively with research institutions; state, tribal, and federal management agencies; regional authorities; non-governmental organizations; and private foundations to maximize the effectiveness of its grant programs and to encourage collaboration to address issues of common concern. The GLFT has also contributed resources to seminars, forums, and conferences to encourage collaboration and transfer of information on the Great Lakes fishery and ecosystem among researchers, managers, funders, and stakeholders (GLFT 2008).

GLFT grants give preference to Lake Michigan projects with a focus on the following activities:

- Research directed at increasing the benefits associated with Great Lakes fishery resources;
- Rehabilitation of lake trout, lake sturgeon, and other native fish populations;
- Protection and enhancement of fisheries habitat, including Great Lakes wetlands;
- Public education concerning the Great Lakes fisheries; and
- Acquisition of real property for the above purposes, or to provide access to the Great Lakes fisheries.

Under the terms of the settlement, the GLFT trustees are also authorized to grant funds for other purposes consistent with the types of projects outlined above (GLFT 2008).

The GLFT is administered by a board of trustees representing the parties to the State Court settlement. The board consists of six members plus two provisional members. The Michigan DNR director is the permanent chair of the board. Detailed information on the GLFT, its' history, goals, accomplishments as well as the grants funded to date can be found at: www.glft.org.

7.1.4 Project Nexus

As noted above, fish entrainment mortality and fish protection are on-going issues that have been identified throughout the life of the Project. Currently fish protection is provided by the seasonal barrier net and unavoidable loses are mitigated by funding of the GLFT. The resource management goal is to minimize and mitigate adverse impacts to and uses of fishery resources of Lake Michigan and connected waters caused by the operation of the Project.

7.1.5 Methodology

The general methodology proposed to achieve the study goals and objectives is to conduct a desktop evaluation based on existing information to assess potential fish entrainment abatement measures and engineering alternatives as they may apply to the Project. Components of the evaluation are provided below.

Study Components

The study will be based on existing information as applied to the Project and consist of two major components:

1) An evaluation of fish entrainment abatement technologies; and
2) An engineering alternatives evaluation.

The study will be conducted in consultation with the SAT to ensure that the concerns of the Joint Commenters are addressed as intended. The following provides a stepwise progression of the study path.

Task 1: Commencement of the study will begin by meeting with the SAT. The purpose of the meeting will be to identify fish entrainment abatement and engineering alternatives that should be considered, professional organizations and/or individuals with specific expertise that should be consulted, as well as expectations of study deliverables. Attendance at this meeting will include members of the SAT, the Licensees, and the consultants conducting the study. The deliverable for this task will be a memo identifying potential data sources and study expectations identified at the meeting.

Task 2: The fish entrainment abatement technology evaluation will be modeled after the 2011 evaluation previously reviewed and accepted by the SAT. The current evaluation will build on the 2011 report to the extent possible by including information on new technologies and research that may have been developed since the publication of that document. Technologies that would enhance the current barrier net effectiveness will also be considered. Sources for new information, in addition to those identified by the SAT, may include the Electric Power Research Institute, FERC, other hydroelectric facility owners, steam electric facility operators, scientific organizations and universities. The deliverable for this task will be a memo identifying the potential data sources explored and availability of additional information available from those sources.

Task 3: Complete the fish entrainment evaluation per the format of the 2011 report. Include identification of new methodologies, results or conclusions relative to the 2011 report. The deliverable will be a report consistent with the comprehensive effort conducted in 2011.

Task 4: Concurrent with the entrainment abatement evaluation, an engineering alternatives evaluation will be conducted. It is assumed that while many of the information sources identified during the completion of Tasks 1-3 will be the same, additional sources are expected to be included. These sources may consist of, but not be limited to, hydro and water intake design engineers, and hydro turbine manufacturers. The deliverable for this task will be a memo identifying the potential data sources explored and availability of additional information available from those sources.

Task 5: The engineering alternatives evaluation will use the 1988 Stone and Webster Report as a starting point for the current evaluation. In addition to the engineering alternatives provided in the 1988 report, new concepts will be included as appropriate.

The concepts considered in the 1988 report will be evaluated in terms of currently accepted engineering knowledge and practices as well as the current aquatic community to determine the current validity of the conclusions made over 25 years ago.

The engineering alternatives identified will be evaluated in terms of:

- Applicability to the Project;
- Engineering feasibility and practicality;
- Biological effectiveness for the species and lifestages present;
- Order of magnitude capital costs;
- O&M costs; and
- Potential impacts to Project operations and reliability.

The results of this evaluation will be described and documented in the text of the report. Additionally, a matrix summarizing the major components of each alternative as well as the current barrier net program will be provided. This will readily allow comparisons of the alternatives for decision making purposes during the relicensing process.

7.1.6 Consistency with Generally Accepted Scientific Practice

Fish protection at water intakes of all sizes has been an issue considered at facilities around the world for decades. As such, many different measures have been considered, tested and implemented. These measures can be quite expensive and effectiveness can be site and/or species specific. Therefore, conducting a desktop evaluation on the volume of work completed on this topic along with site-specific considerations including theoretical effectiveness, costs, and feasibility are consistent with commonly accepted practices in the hydroelectric industry and is particularly appropriate for the Project where this issue has been extensively evaluated throughout the Project's history.

7.1.7 Deliverables and Schedule

The deliverables for each study task are provided above. It is anticipated that the study will commence in January 2015 with selection of a consultant to perform the study following final FERC approval of the study plan. As such, the draft entrainment abatement study report will be completed by July 1, 2015. (Note: Per the terms of the Settlement Agreement this evaluation was originally due in 2016). The draft engineering alternatives evaluation will be completed by December 31, 2015.

7.1.8 Cost and Level of Effort

The estimated cost for the desktop evaluation using existing information is $150,000 to $200,000. The Licensees believe that the proposed level of effort is adequate to obtain information on fish entrainment abatement for decision making purposes during the relicensing process.

7.1.9 References

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7.2 Wildlife Resources

The Licensees propose to conduct reconnaissance level surveys to document the wildlife habitat in the Project area and to search for rare, threatened or endangered species habitat or unique habitat. Lists of Federal and State Rare, Threatened and Endangered (RTE) and special concern species with documented occurrences in Mason County and Ottawa County and the potential to occur in the Project vicinity were provided in the PAD.

7.2.1 Goals and Objectives

A reconnaissance level field survey of the Project area with respect to wildlife resources will be undertaken. The survey is designed to provide information pertinent to:

1. Existing wildlife (bird and mammal) habitats in upland areas of the Project and along the Lake Michigan shoreline.
2. The presence of RTE species or associated habitats.

7.2.2 Known Resource Management Goals

Michigan DNR and USFWS have responsibilities for protecting wildlife resources. FERC must consider the effects of continued Project operations on natural resources and must balance the uses of the Project. This study will provide the necessary information to assess wildlife resources (species and habitats) within the Project boundary.

This study is consistent with the Michigan DNR goals to protect natural and cultural resources, ensure sustainable recreation use and enjoyment, enable strong natural resource-based economies, improve and build strong relationships and partnerships, foster effective business practices and good governance.

This study is consistent with USFWS relicensing goal of working with others to conserve, protect and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people, as well as their roles and responsibilities under federal law.

7.2.3 Background and Existing Information

The Project is located along the eastern shore of Lake Michigan, near the towns of Ludington and Port Sheldon located in Mason and Ottawa counties, respectively. The Project facilities and most recreational facilities are located in Mason County. One satellite recreation facility is located near Pigeon Lake in Port Sheldon. Other than the Project's associated structures and facilities, development is limited in the immediate vicinity of the Project. The majority of lands in and around the Project are forested with scattered agricultural fields, very few residences, and a few businesses adjacent to the Project area. Wildlife habitats and associated wildlife resources in the vicinity of the Project are determined primarily by the influences of the surrounding lands and associated uses.

The Michigan Natural Features Inventory (MNFI) database does not identify any threatened or endangered wildlife species within the Project boundary (MNFI, 2013). Correspondence received from the USFWS, dated July 1, 2011, indicate that while federally listed threatened and endangered species occur within the vicinity of the Project in Mason County, no impacts from continued hydroelectric pumped storage operations were anticipated (USFWS, 2011). A portion of Lake Michigan and the upper reservoir are located within the Project boundary, with Pigeon Lake located about 70 miles south of the Project; however, no alterations to these waterways are planned or anticipated. Based on publically available information and anticipated ongoing Project activities, no issues have been identified relative to wildlife resources. Comments on the PAD, received from the previously mentioned Joint Commenters do not provide any comments on wildlife resources. Comments on the PAD, filed by PMCT, note that the double-crested cormorant (DCCO) (*Phalacrocorax auritus*), listed in the species table in the PAD, utilizes the Project breakwater. PMCT cites the report "Final Environmental Assessment: Double-crested cormorant damage management in Michigan (USDA, et al. 2011), and states that use of the breakwater is discussed at length in the report. This report presents an assessment of alternatives for management of DCCO damage in Michigan. The Licensees currently provides for access to the breakwater for the USDA for a DCCO control program, and will continue supporting this program, which is consistent with the proposal in the report for control of DCCO.

Based on the available information on habitats within proximity of the Project, a diverse array of wildlife species may occupy or have the potential to occupy the immediate vicinity of the Project. The immediate area provides forested, early successional, wetland and lake shoreline habitats. A generalized list of wildlife occurring or potentially occurring within the vicinity of the Project is included in the PAD.

7.2.3.1 Wildlife Resources and Habitats in the Project Vicinity

Habitats

In general, the area around the Project in Mason and Ottawa Counties provides a diversity of habitats such as mixed hardwood and pine forests, wetlands, agricultural land, and the Lake Michigan shoreline. These mixed habitats are characterized by a dense canopy and often have well-established shrub and sapling layers. Project lands in Mason County are relatively well distributed around the perimeter of the reservoir and discrete habitat types within these lands are relatively small in area and disjointed. The Project boundary itself encompasses only a small amount of habitat outside of the wetted portions of the Project impoundment. Most of the upland habitats and the associated wildlife resources surrounding the impoundment occur outside of the Project boundary on private lands. They are distributed in a patchwork around the impoundment and tailrace, interspersed with open habitats which include agricultural areas and features associated with the Project such as the impoundment dike slopes and transmission line corridors.

Land associated with the satellite recreation site located in Ottawa County is part of Consumers Energy's J. H. Campbell Generating Complex, containing a mix of industrial (fossil power generation) and forest, while the area along Lake Michigan is primarily residential.

A portion of the lands surrounding the Project in both Mason and Ottawa counties contains open dunes. No known significant wildlife habitats are associated with the Project. Investigation of potential RTE species habitat in the Project area will include consultation with Michigan DNR and the USFWS to determine if these agencies are aware of any newly identified (since preparation of the PAD) state or federal RTE wildlife species in or adjacent to the Project area.

Wildlife

The wildlife species assemblage known or considered likely to occur in the area surrounding the Project is typical of those found in Mason and Ottawa counties. A representative listing of vertebrate wildlife species known or considered likely to occur in the vicinity of the Project based upon habitat and life history information was included in the PAD.

The Licensees propose a wildlife habitat survey within the Project boundary to identify any terrestrial or potential RTE habitat. This survey will be conducted using a meander approach on lands within the Project boundary. No species-specific surveys are planned at this time.

7.2.3.2 Temporal and Spatial Distribution of Wildlife Resources

Many of the species occurring in the vicinity of the Project are seasonal migrants that travel substantial distances between breeding and wintering areas. Examples of this are avian species that breed in the area, but then winter elsewhere. Other species may have life history and habitat requirements that result in seasonal shifts of habitat usage within the Project area or region, such as deer movement to preferred wintering habitats. At the most limited end of the species movement spectrum, certain other species will simply remain in the immediate area of the Project year round, or make only very limited movements between closely associated habitats, as dictated by their life history, overall mobility, and occurrence of acceptable habitat conditions within a relatively small area.

7.2.4 Project Nexus

The Ludington Project area provides habitat for a variety of wildlife species. An understanding of the habitat in the Project area would provide the best information on the wildlife species potentially affected by Project operation.

7.2.5 Methodology

The habitat survey will involve three phases of work. The first two phases will identify general cover types through photo interpretation and field verification. The third phase will be the production of a cover type map. Vegetation types and land use classifications will also be

assigned. Additional data collected during the field verification will describe the characteristics of each mapped cover type including species composition, stand structure, habitat quality and land use. Information collected during desktop analysis and field surveys will include:

- plant species composition, including the dominate and more prominent associated species in each vegetation layer (tree, shrub and herbaceous layers);
- structure data, including estimates of aerial cover of the dominant cover types;
- predominant land use(s) associated with each cover type; and
- rare, unique, and particularly high quality habitat.

In general, the field survey will be conducted with a "wander" methodology, which is a visual inspection of habitats. This will include closer inspection of any potential microhabitats that might support individuals or populations of rare species as noted by USFWS or MDNR as potentially present but may not have been previously identified within the Project boundary. This type of "Lévy-walk" search has been found to "optimize the intermittent search strategy in the critical situation of rare targets" (Lomholt et al. 2008). Field crews will document RTE species observed and/or suitable habitats identified with a GPS unit.

7.2.6 Consistency with Generally Accepted Scientific Practice

Documentation of wildlife species and habitats and potential RTE species and habitats, observed during the proposed survey is an accepted means of documenting species use of the Project.

7.2.7 Deliverables and Schedule

The Initial Study Report will summarize the wildlife habitats encountered at the Project. Captioned photographs of typical and/or significant habitat conditions will also be included in the report. The report will also include habitat mapping and descriptions.

Consultation with USFWS and Michigan DNR regarding rare species occurrence will take place in early 2015. Desktop analysis will also be performed during early 2015, prior to field work. The field work will be performed during June or July of 2015.

7.2.8 Cost and Level of Effort

The estimated cost for the reconnaissance-level survey is $30,000. The Licensees believe that the proposed level of effort is adequate to obtain information on wildlife habitat in the Project vicinity.

7.2.9 References

Lomholt, M.A., K. Tal, R. Metzler, and K. Joseph. 2008. Lévy strategies in intermittent search processes are advantageous. Proc. Natl. Acad. Sci. 105(32): 11055-11059.

USDA, USFWS, and NPS. 2011. Final Environmental Assessment: Doube-crested cormorant damage management in Michigan. Prepared by United Stated Department of Agriculture Animal and Plant Health Inspection Service Wildlife Services, In Cooperation with United States Department of the Interior Fish and Wildlife Service and the United States Department of the Interior National Park Service Sleeping Bear Dunes National Lakeshore. June 2011. Available on-line at: http://www.aphis.usda.gov/regulations/pdfs/nepa/MI_2011_Final_DCCO_EA.pdf

7.3 Botanical Resources

The Licensees propose to conduct a botanical survey within the Project boundary to identify and document invasive species, rare, threatened or endangered species (RTE), and potential RTE habitat. This survey will be conducted using an intuitive meander approach, focusing on areas of invasive species infestations and potential habitat for ginseng and pitcher's thistle.

7.3.1 Goals and Objectives

A meander survey within the existing Ludington Project boundary is designed to provide information pertinent to:

1. The location and extent of invasive botanical species.
2. The presence of RTE botanical species or potential RTE habitat.

To provide information pertinent to Project effects on botanical resources, a field survey of botanical species (including invasive and RTE species) within the Project boundary will be conducted. This field survey will document the location and general abundance of invasive plant species present in the Project boundary. The presence of RTE species or habitats, if observed, will also be documented. A general habitat assessment will be conducted during the Wildlife Survey as described in Section 7.3. This survey will help guide search areas for the botanical survey.

The results of this survey will provide the information necessary to:

- Delineate, describe, and map invasive species infestations within the Project boundary.
- Identify and map occurrences or likely habitat for RTE species, including ginseng and pitcher's thistle.

7.3.2 Known Resource Management Goals

Michigan DNR and USFWS have responsibilities for protecting terrestrial resources such as native habitat and wildlife. FERC must consider the effects of continued Project operations on natural resources. This study will provide the necessary information to assess botanical resources (invasive species and RTE species and habitats) within the Project boundary.

This study is consistent with the Michigan DNR goal of ensuring that wildlife and natural resources in the State of Michigan are maintained and perpetuated for their intrinsic and ecological values, for their economic contribution, and for their recreational, scientific and educational use by the people of the State.

This study is consistent with USFWS goals to evaluate the need for protection, mitigation and enhancement measures necessary to meeting state and federal fish and wildlife objectives; and conserve, protect, and enhance the habitats for wildlife and plant species that may be affected by the Project.

7.3.3 Background and Existing Information

7.3.3.1 Overview

The Project lies within the Michigan Lake Plain Level IV Ecoregion (USEPA 2012) on the eastern shore of Lake Michigan in Mason and Ottawa counties. This sandy coastal strip region has beaches, high dunes, beach ridges, mucky interior-dune depressions, and swales. The climate moderation by Lake Michigan, as well as the beach and dune plant communities, differentiates it from inland areas of Michigan. Plant communities include oak and pine forest found on stabilized dunes and beech-sugar maple forest on dunes and moraines. The relatively moderate climate has also made this area a center for fruit and vegetable farming in Michigan (USEPA 2012), and it is the most heavily farmed region in the state. The Project satellite recreation area in Ottawa County is limited to the parking area, walking path and boardwalk; botanical resources associated with this site are located outside of the Project boundary.

7.3.3.2 Upland Habitat Communities and Species

Much of the upland habitat abutting the Project boundary has been altered by agricultural practices. Agricultural uses include fruit orchards and row crops.

Upland plant communities within the Project area are dominated by second growth of hardwood mixed with eastern white pine, successional communities, open field and maintained lawn. Natural communities found in this region include dry-mesic northern forest, Great Lakes barrens,

and open dunes (Michigan 2007). Each of these upland plant communities are generally described in the PAD.

Invasive species have become a part of the landscape throughout the Project area. The Michigan DNR has published a plan that describes and documents the status and distribution of invasive plants within the State of Michigan (Michigan DNR 2009). A generalized list of invasive plants occurring or potentially occurring within the vicinity of the Project is included in the PAD, Table 5-11. Due to the land use history in Mason and Ottawa Counties, many of these terrestrial invasive species are likely present in the Project area.

7.3.3.3 Unique Plant Communities and Botanical Resources

The Project area and immediate vicinity includes upland and shoreline habitat associated with Lake Michigan and Pigeon Lake. No records for rare or exemplary natural communities within the Project boundary were found. A review of the Michigan Natural Features Inventory (MNFI) indicated that pitcher's thistle and ginseng have been documented within the Project vicinity (MNFI 2013); however, these species have not been documented within the Project boundary.

Pitcher's thistle (*Cirsium pitcheri*) is endemic to the shoreline and sand dunes of the Great Lakes. It requires open, sparsely vegetated habitat on sand dunes or beach ridges (MDNR 2014). Pitcher's thistle is characterized by its blueish-green vegetation, numerous white-wolly hairs, few spines, and cream colored flowers (MNFI 2014). Mature plants may reach a height up to 3.5 feet before producing pale cream colored to pinkish flowers (MDNR 2014). Flowers bloom between June and September, which coincides with the best time to conduct surveys for this species (third week of June through the third week of September) (MNFI 2014). Native plants associated with appropriate Pitcher's thistle habitat include, but are not limited to dune willow, balsam poplar, ground juniper, sand cherry, beach heath, sea rocket, wormwood, beach pea, sand cress, Lake Huron tansy, hairy puccoon, beachgrass, dune grass, fescue, wood lily, horizontal juniper, northern white cedar, and moonworts (MNFI 2014). According to the MNFI (2014) pitcher's thistle has last been documented in Mason County in 2006 and Ottawa County in 2012.

Ginseng (*Panax quinquefolius*), is an herbaceous plant found in high quality forest areas. Appropriate habitat includes shady woodlands with dense canopies and loamy soil (MNFI 2014).

Plants are characterized by palmately compound leaves with five leaflets, greenish-white stalked flower clusters, and red berries. Surveys may be conducted between the first week of June and the fourth week of October (MNFI 2014). Native plants associated with appropriate ginseng habitat include, but are not limited to sugar maple, eastern hemlock, beech, yellow birch, white pine, red oak, white cedar, ironwood, balsam fir, baneberry, baneberry, wild leek, wild sarsaparilla, jack-in-the-pulpit, blue cohosh, blue-bead lily, twisted stalk, nodding trillium, common trillium, maiden hair fern, and clubmoss (MNFI 2014). Plants have been threatened due to aggressive collection of root material for medicinal purposes. According to the MNFI (2014) ginseng has last been documented in Mason County in 1985 and Ottawa County in 2010.

7.3.4 Project Nexus

The Ludington Project provides habitat for a variety of wildlife and botanical species. An understanding of the botanical resources within the Project boundary would provide information on the type and quantity of habitat potentially affected by Project operations.

7.3.5 Methodology

The botanical survey will be conducted using an intuitive meander approach within the Project boundary. Surveys at the Pigeon Lake Facility will be limited to those areas visible and accessible from the boardwalk. The invasive species survey will focus on non-native species listed in Table 5-11 in the PAD, examining disturbed habitats (including areas adjacent to infrastructure and roadside ditches) and natural terrestrial habitats (woodlands, meadows, Lake Michigan shoreline) where invasive species are observed or likely to occur. Surveys will be conducted during the summer months (June 21 through September 23) to maximize invasive species detection. Each invasive species occurrence will be mapped with a handheld GPS unit and depicted on an aerial photograph. For the purpose of this survey, an invasive species occurrence is defined as an individual plant or patch of plants of the same species within a defined geographic area. Data will be recorded for each invasive species occurrence, including species name, approximate density, and area covered. Representative photos will be taken and general observations will be noted regarding habitat and site conditions. Findings will be summarized in the botanical survey report.

Information collected for each invasive species occurrence during field surveys will include:

- Species name
- GPS location
- Approximate density (number of plants / square foot)
- Area of infestation (square feet)
- Site photographs
- Notes on habitat type and quality

The RTE species survey will focus on appropriate habitat for Pitcher's thistle and ginseng. The survey will be conducted using an intuitive meander approach, focusing on the shoreline of Lake Michigan and woodland areas within the Project boundary. Surveys at the Pigeon Lake Facility will be limited to those areas visible and accessible from the boardwalk. Surveys will be conducted during the summer months (June 21 through September 23) to maximize RTE species detection. If observed, RTE species occurrences will be mapped with a handheld GPS unit and depicted on an aerial photograph. Data will be recorded for each RTE species occurrence, including species name, number of individuals, approximate density, area covered, and dominant species within the vicinity of the RTE. Each RTE species occurrence will be photo documented and general observations will be noted regarding habitat and site conditions. Areas of appropriate RTE habitat will also be documented, even if no RTE species are observed. Documentation will include site photos, GPS mapping, size of appropriate habitat, notes on habitat type, habitat quality, and dominant species. Findings will be summarized in the botanical survey report and RTE species occurrences will be reported to the MNFI.

Information collected for each RTE species occurrence during field surveys will include:

- Species name
- GPS location
- Number of individuals
- Approximate density (number of plants / square foot)
- Area of occurrence (square feet)
- Dominant species within the vicinity of the RTE

- Site photographs
- Notes on habitat type and quality

7.3.6 Consistency with Generally Accepted Scientific Practice

Documentation of invasive and RTE plant species and potential RTE species habitats observed during the meander survey is an accepted means of documenting species in the Project area.

7.3.7 Deliverables, and Schedule

The Initial Study Report will summarize the botanical invasive and RTE species and potential RTE habitats encountered within the Project boundary. The report will include invasive species occurrence data, mapping of invasive and RTE resources, and habitat descriptions. Captioned photographs of typical and/or significant habitat conditions will be included in the report.

7.3.8 Cost and Level of Effort

The estimated cost for the reconnaissance-level survey is $40,000. The Licensees believe that the proposed level of effort is adequate to obtain information on botanical species and habitat in the Project vicinity.

7.3.9 References

Michigan DNR. 2007. Natural Communities of Michigan: Classification and Description. Prepared by Michigan Natural Features Inventory. Report No. 2007-21. September 30, 2007, Updated July 9, 2010.

Michigan DNR. 2009. Meeting the Challenge of Invasive Plants: A Framework for Action. Michigan Department of Natural Resources. Prepared by Michigan Natural Features Inventory. Report No. 2009-11. March 9, 2009.

Michigan DNR. 2014. MDNR Endangered and Non-game Wildife. http://www.michigan.gov/dnr/0,4570,7-153-10370_12141---,00.html [Accessed June 3, 2014]

Michigan Natural Features Inventory. 2013. Michigan Natural Features Inventory Database (GIS Application). [Accessed Oct 9, 2013]

Michigan Natural Features Inventory. 2014. Michigan's Special Plants. http://mnfi.anr.msu.edu/ [Accessed June 3, 2014]

Michigan State University Extension. 2013. Michigan Natural Features Inventory. http://mnfi.anr.msu.edu/.

USEPA. 2012. Level III Ecoregions of Michigan. U.S. EPA Office of Research and Development (ORD) - National Health and Environmental Effects Research Laboratory (NHEERL). Corvallis, OR. [Online] URL: ftp://ftp.epa.gov/wed/ecoregions/mi/mi_eco_l3.zip.

USEPA. 2012. Level IV Ecoregions of Michigan. U.S. EPA Office of Research and Development (ORD) - National Health and Environmental Effects Research Laboratory (NHEERL). Corvallis, OR. [Online] URL:ftp://ftp.epa.gov/wed/ecoregions/mi/mi_eco_l4.zip.

U.S. Fish and Wildlife Service. 2013. Michigan County Distribution of Federally-Listed Threatened, Endangered, Proposed, and Candidate Species. http://www.fws.gov/midwest/endangered/lists/michigan-cty.html [Accessed Nov 21, 2013]

7.4 Recreation Resources

7.4.1 General Description of Proposed Study

As stated in the PAD, the Licensees originally proposed to submit the FERC Form 80 report in 2015 to address recreation resources in the license application. In its "Study Requests and Comments of Preliminary Study Plan" letter of May 16, 2014, FERC requested the Licensees to provide the method(s) to be used for the Form 80 data collection (excluding estimation), and suggests the Licensees conduct visitors surveys during the recreation season to determine adequacy of sites and if changes or upgrades to the sites would be needed to meet current or future recreation needs. FERC states that in addition, the Licensees should address: the condition of the recreation facilities; who will own, operate and maintain the recreation facilities through the term of any license issued; the hours of operation; a description of the location of the existing recreation facilities in relation to the Project boundary; and the current and projected capacity of the existing recreation facilities.

The Licensees propose to conduct a comprehensive recreation study pursuant to the requirements contained in 18 CFR § 4.51(f)(5). This regulation requires the Licensees' application to include a report of recreation resources discussing existing and proposed recreational facilities and opportunities at the Project, prepared in consultation with local, state, and regional recreation agencies and planning commissions, NPS, and any other state or Federal agency with managerial authority over any part of the Project lands. The report must contain:

- a description of existing recreational facilities at the Project;
- an estimate of existing and potential recreational use of the Project area in daytime and overnight visits;
- a description of measures or facilities recommended by agencies consulted for the purpose of creating, preserving, or enhancing recreational opportunities at the Project and in its vicinity, and for the purpose of ensuring safety of the public in its use or Project lands and waters;
- a statement of the existing measures and facilities to be continued or maintained and new measures or facilities proposed for the purpose of creating, preserving, or enhancing recreational opportunities at the Project and in its vicinity, and for the purpose of ensuring the safety of the public in its use of Project lands and waters, including an explanation of why any measures or facilities recommended by an agency was rejected;

- identification of the entities responsible for implementing, constructing, operating, or maintaining any existing or proposed measures or facilities;
- a schedule showing the intervals following issuance of a license at which implementation of the measures or construction of facilities would be commenced and completed;
- an estimate of the costs of construction, operation, and maintenance of any proposed facilities;
- a map or drawing that conforms with FERC standards that show the location and identity of any facilities, and whether each facility is proposed or existing; and
- a description of any areas within or in the vicinity of the Project boundary that are included in, or have been designated for study for inclusion in, the National Wild and Scenic Rivers System, or that have been designated as a wilderness area, recommended for such designation, or designated as a wilderness study area under the Wilderness Act.

7.4.2 Goals and Objectives

The goal of the study is to compile existing data and develop additional information to support a new FERC license application for continued future operation of the Project.

The objectives of the study are:

- Determine the specific amenities, and their condition, and the amount and type of recreation use and demand at the Project recreation sites and facilities;
- Interview the recreating public to determine user opinions and goals with regard to the recreation sites, including the perceived adequacy of recreation facilities and access at the Project.

7.4.3 Known Resource Management Goals

The resource management goals are to enhance the recreational opportunities associated with the operation of the Project.

7.4.4 Background and Existing Information

Existing Information:

Section 5.8 of the PAD provided information regarding recreation resources within the Project and surrounding area. Recreation use at the Ludington Pumped Storage Project includes fishing, camping, sightseeing, walking, picnicking, disc golf, and flying remote control aircraft. In general, areas associated with the Ludington Pumped Storage Project are open to the public for

recreation use. Although there is no public access to the powerhouse and upper reservoir, both can be viewed from observation platforms.

There are five formal recreation facilities located within the Project boundary: Mason County Campground, Mason County Picnic Area, Upper Reservoir Observation Platform, Lake Michigan Overlook, and Pigeon Lake North Pier. These facilities provide a variety of amenities, including but not limited to camp sites, picnic tables and pavilion, disc golf courses, angler access, remote control aircraft airfield, and interpretive displays.

The 2009 Form 80 for the Project reported that the total annual daytime use was 13,411 recreation days, and the total annual nighttime use was 8,245 recreation days. The peak weekend daytime average use was 485 recreation days, and the nighttime average was 27 recreation days. Project facility use capacities are low and range from 25% (playground areas and trails) to 60% (camping areas and tent/trailer/RV sites).

Need for Additional Information:

Information on current use and whether existing access facilities in the area are meeting recreation demand would inform a decision on whether additional public access and/or facilities at the Project are necessary to meet existing and future recreation demand at the Project.

7.4.5 Project Nexus

FERC regulations require that the license application include a statement of the existing recreation measures or facilities to be continued or maintained and the new measures or facilities proposed by the applicant for the purpose of creating, preserving, or enhancing recreational opportunities at the Project and in their vicinities, and for the purpose of ensuring the safety of the public in its use of Project lands and waters. In addition, recreation is a recognized Project purpose at FERC-licensed projects under section 10(a) of the FPA.

7.4.6 Methodology

To determine the amount of recreation use at the Project, the Licensees propose to conduct a recreation use study in combination with a user contact survey.

Task 1: Study Preparation

The Licensees have developed a user contact survey that will be administered to Project recreation site users and visitors. Prior to commencement of field work in Task 2, the Licensees will develop a schedule for user counts and user contact surveys. All sampling days will be randomly selected and survey routes will be completed on a rotating basis and at different times of day to account for time-of-day use patterns. The Licensees will review readily available municipal, county, state, federal and NGO recreation plans for information regarding recreation use within the Project boundary and immediate vicinity. The Licensees will consult with municipal and county recreation departments and recreation/open space committees in those towns and counties where the Project is located. A draft user contact survey is included with this study plan (Figure 7.9-1).

Task 2: Field Work

The recreation use study will occur from mid-April through mid-October 2015 to capture recreational use occurring while the various Project facilities are open to the public. It will be conducted using a combination of calibration counts, spot counts, user surveys, and registration/attendance records.

Calibration counts will be conducted at each formal Project recreation facility that does not track users or require users to register to enter/use the site/facility, and will be documented on a data collection form. These counts will last for at least two hours per site on each calibration day and will be conducted on four (4) days per month which will include two (2) randomly selected weekdays and two (2) randomly selected weekend days. If a month contains a three-day holiday weekend, one (1) day per holiday weekend will be included in addition to the standard calibration days. A stratified random sampling methodology will be used to vary the days, time of day and start locations for the survey route.

The spot counts will be conducted on four (4) days per month which will include two (2) randomly selected weekday and two (2) randomly selected weekend day. If a month contains a three-day holiday weekend, one (1) day per holiday weekend will be included in addition to the

standard calibration days at formal Project recreation areas that do not track users or require users to register to enter/use the site/facility. This information will be documented on a data collection form. The spot counts represent short-term counts (approximately 5 minutes per site) and will record the number of vehicles parked at a site/facility and the number of users observed. Some of the Project facilities are managed by other entities and require users to register and/or pay a fee for entry and use of the site. The Licensees will obtain registration information from the managing entities for these sites to determine the amount and types of use occurring. This information will be statistically analyzed to develop the recreational user figures for the Project. Final recreation use for the formal recreation facilities within the Project will be summarized by season and activity type for each site.

The user contact survey (Figure 7.9-1) will be administered to users during the calibration count days to gain user opinions with regard to the existing Project recreation facilities and opportunities. The survey will record the number of people in a party, their primary reason (recreational activity) for visiting the Project, their perception of level of use, and their opinions with regard to the amount and types of recreation opportunities offered within the Project boundary.

Task 3: Data Entry and Statistical Analysis

Information collected during Task 2 will be entered into spreadsheets for statistical analysis. Information such as the number of recreation days spent at the Projects' recreation sites, average number of persons per party, and the percent of the facilities' capacity that is currently being utilized will be determined. The Licensees will project changes to Project recreation use over the term of a new FERC license by applying an accepted model such as the "U.S. Outdoor Recreation Participation Projections to 2060" (2012, J.M. Bowker, Ashley Askew) to the use estimate derived from this task.

Task 4: Report Writing

The information that is gathered during this effort will be used to complete the recreation portion of the license application, as well as a Recreation Management Plan. The report for this study

will include a facility inventory, the location of facilities in relation to the Project boundary, including facilities/amenities that may straddle the Project boundary; the types and number of amenities provided at each facility; the condition of the facility/amenities; entities responsible for the operation and maintenance of the facilities; fees, if any, associated with the facilities; hours/seasons of operation; photographs, use figures for each recreation site, overall recreational use figures, projected use figures, and a compilation of responses to the user contact survey.

7.4.7 Consistency with Generally Accepted Scientific Practice

The Licensees propose to use commonly accepted strategies to determine existing Project recreational use, user perceptions, and future recreation needs and demands. User counts, including on-site observations and facility attendance records, user contact surveys, statistical data analysis and published recreation trends will provide the basis to address these issues.

7.4.8 Deliverables and Schedule

Field data collection for this study will take place in April 2015 through October 2015. Statistical analysis of the data will occur in 2015.

Study reporting will be conducted in accordance with the Licensees' Process Plan and Schedule (18 CFR § 5.6(d)(1)), as provided in the PAD, and the FERC's SD1.

7.4.9 Cost and Level of Effort

Licensees believes that the proposed level of effort is sufficient to obtain current information on recreational usage and demand within the Project area, and from which to project future use and demands. The estimated cost for the recreation inventory and user contact survey outlined in this plan is approximately $70,000 to $85,000.

7.4.10 References

Code of Federal Regulations, 18 CFR § 4.51(f)(5)

Consumers Electric Company and DTE Electric Company, Pre-Application Document for the Ludington Pumped Storage Hydroelectric Project (FERC No. 2680), January 2014

Federal Energy Regulatory Commission, Licensed Hydropower Development Recreation Report (Form 80), Ludington Pumped Storage, 2009

Federal Energy Regulatory Commission, Study Requests and Comments on Preliminary Study Plan, 2014

U.S. Outdoor Recreation Participation Projections to 2060, J.M. Bowker, Ashley Askew, 2012

Figure 7.9-1
Recreation User Perception Survey
Ludington Pumped Storage Project

Interviewer: _____ Date/Time: _____ Rec Site: _____

Weather: _____ Air Temp: _____ Declined Survey: _____

Good Afternoon. My name is _____ and I am conducting a recreation user survey of visitors to the Ludington Pumped Storage Project area for Consumers Electric and DTE Electric. We are surveying users for their views on the public recreation sites and facilities associated with the Project. Your responses will provide CE and DTEE with user perceptions with Project facilities. Responses from this survey will remain anonymous. Would you mind answering a few questions?

1. Have you participated in this survey effort before?

   Yes_____ Thank you for your time. We are only interviewing each person once with this survey.
   No_____ Continue with Survey

2. How many in your group, including yourself? _____

3. Have you ever visited the Ludington Pumped Storage Project area before? Yes__ No__

4. What is your Zip Code? _____ or Country of Residency?_____

5. What is your primary reason for this visit today?

   Biking □ Birding □ Camping □ Disc Golf □ Dog Walking □

   Driving for Pleasure □ Educational Programs □ Fishing from Boat □

   Fishing from Shore/Pier □ Flying RC Aircraft □ Hiking □ Hunting □

   Nature Observation □ Orienteering □ Other:_____ Photography □

   Picnicking □ RC Aircraft □ Running □ Sightseeing □ Skiing □

   Snowshoeing □ Walking □

6. During your visit today what is your perception of the amount of use occurring at this site?

1	2	3	4	5
Not Crowded		Somewhat Crowded		Extremely Crowded

7. Please rate the following amenities at this location.

	Excellent		Fair		Poor
Facility Condition	1	2	3	4	5
Variety of Amenities	1	2	3	4	5
Parking	1	2	3	4	5
Accessibility	1	2	3	4	5
Overall Quality	1	2	3	4	5

Please explain any poor ratings.

_____

_____

8. What, if anything, enhanced your recreation experience today? _____

9. What, if anything, detracted from your recreation experience today? _____

10. Does this recreation facility serve your interests? Yes____ No_____

    If not why?_____

    _____

    _____

11. Do you have any additional comments regarding recreation opportunities associated with the Ludington Pumped Storage Project? _____

    _____

    _____

Thank you for your time and input.

7.5 Cultural Resources

7.5.1 Archaeological Resources Survey

7.5.1.1 Goals and Objectives

The Licensees propose to conduct a Phase 1 background research and field survey for the Project. The goal of this work is to assist FERC in meeting its compliance requirements under Section 106 of the National Historic Preservation Act (NHPA) (1966), as amended, by determining whether historic properties (archaeological sites that are eligible for or listed in the National Register of Historic Places [NRHP]) are present within the Project's Area of Potential Effect (APE). The Licensees propose to consult with the Michigan State Historic Preservation Office (SHPO), federally recognized Indian tribes who have an active interest in the Project and other interested parties in advance of the survey to define and map the APE, determine appropriate areas to be surveyed, and determine appropriate survey methods. The steps in accomplishing this goal include: 1) identification of known cultural resources listed in, or eligible for listing in, the NRHP as historic properties, 2) review of information relating to the extent of prior disturbance with the boundaries of the Project; 3) consultation with the Michigan SHPO and interested tribes; 4) review of archaeological and other related data that are pertinent to the formulation of a sensitivity model for determining whether historic properties may be located in the Project APE, and 5) offering a field strategy for archaeological field survey to determine whether such properties are present in the Project's APE.

If any cultural resources are discovered during the survey, the NRHP eligibility of those resources will be determined in consultation with the Michigan SHPO. (If necessary, additional Phase II archaeological evaluations may be conducted to allow a definitive determination of eligibility.) The survey information will be used to develop a Historic Properties Management Plan (HPMP), which will be filed with the Preliminary Licensing Proposal after consultation with the Michigan SHPO. The HPMP will address the elements outlined in the FERC's letter dated May 16, 2014.

7.5.1.2 Known Resource Management Goals

Section 106 of the National Historic Preservation Act (1966) requires that federal agencies, licensees, and those receiving federal assistance take into account the effects of proposed undertakings on any resource that is listed on or is eligible for the NRHP. If NRHP-eligible properties are present in the APE, consultation on ways to avoid, minimize, or mitigate adverse project effects must take place. One possible strategy for addressing adverse effects to such properties involves preparing a Programmatic Agreement (PA) and drafting a HPMP that identifies how adverse project effects on NRHP listed or eligible properties will be addressed. As the lead agency, FERC is responsible for fulfilling the requirements of Section 106 in its decision to issue a new license to the Project.

As stipulated by the regulations that implement Section 106 (36 CFR Part 800), the Michigan SHPO represents the interests of the State of Michigan and its citizens, and advises and assists FERC in determining the significance of cultural resources within the APE. The Michigan SHPO administers cultural resource management reviews under the National Historic Preservation Act (Section 106), which involves providing technical guidance and professional advice on the potential effect of licensed projects, such as the Ludington Project, on the state's historic, architectural, and archaeological resources. Section 106 and its implementing regulations also define a special role for federally-recognized Indian tribes in consultation regarding any properties of religious or cultural significance that might be affected by a licensed project or other undertaking.

7.5.1.3 Background and Existing Information

Preliminary background research was completed on the Project as part of the preparation of the PAD, which was submitted to FERC in January 2014.

7.5.1.4 Project Nexus

The proposed investigations will provide information on archaeological sites located within the Project's APE that are potentially eligible for listing to the NRHP and will define any potential adverse effects to historic properties that would be created by the continued operation of the Project. Once the potential adverse effects are determined, the information that is developed

during the course of the survey will be used as the basis for preparing a HPMP. Guiding the Licensees' actions relating to Section 106 during the term of the new license, the HPMP will discuss how to avoid potential adverse effects or how they will be mitigated. The final HPMP will be filed with the license application.

7.5.1.5 Methodology

The scope of work that will be required to complete a cultural resources survey and evaluation of this Project for Precontact and Historic period archaeological resources for this Project will be identified through consultation with the Michigan SHPO, federally recognized Indian tribes who have an active interest in the Project and other interested parties. All methods used to conduct either additional survey for archaeological sites or for the NRHP-eligibility evaluation of sites will conform to the Michigan SHPO guidelines (the Michigan SHPO website http://www.michigan.gov/mshda/0,4641,7-141-54320---,00.html).

7.5.1.6 Consistency with Generally Accepted Scientific Practice

All of the field investigation methods used will follow all applicable Federal and Michigan guidelines, including those contained in the Michigan Historic Preservation's website (see the Michigan SHPO website referred to above). In particular, the Michigan SHPO-approved level II Pre-contact period and Historic period archaeologists will be employed to undertake field and site evaluations.

7.5.1.7 Deliverables and Schedule

The schedule for the Phase I field survey effort as described in the above methods will occur in the summer or fall of 2015. A draft report will be prepared for review and comment by the Michigan SHPO, currently scheduled for the fall of 2015. Follow-up Phase II studies to identify whether any of the archaeological sites discovered during Phase I survey are eligible for listing to the NRHP (if needed) are currently scheduled for spring of 2016. A Phase II report will be provided to the Michigan SHPO for review and comment, and a final report provided to FERC and the Michigan SHPO. A draft HPMP will be provided to the Michigan SHPO, Indian tribes involved in the cultural resources survey and other interested parties involved in the survey for review and consultation. When consultation is completed, the HPMP will be completed and

provided to these same individuals for final written concurrence, then filed with FERC along with filing the Preliminary Licensing Proposal.

7.5.1.8 Cost and Level of Effort

The cost for completion of archaeological investigation of this Project will be estimated once the Michigan SHPO has offered its guidance on the APE and a scope of work, and anticipates the cost to be between $70,000 and $100,000.

7.5.1.9 References

None.

7.5.2 Historic Structures Survey

7.5.2.1 General Description of Proposed Study

The purpose of any historic structures investigations required as part of the license renewal is to identify historic resources within the Project APE that are listed in or are eligible for listing in the NRHP and to assess possible effects from Project operations on those resources. This will be accomplished through consultation with the Michigan SHPO and other interested stakeholders and preservation groups; site file and background research; and field studies.

The area of investigation will include the APE as defined after consultation with the Michigan SHPO. According to FERC, the Project APE includes "the lands enclosed by the Project's boundary and lands or properties outside of the Project's boundary where Project construction and operation or Project-related recreational development or other enhancements may cause changes in the character or use of historic properties, if any historic properties exist." The Licensees will consult with the Michigan SHPO for concurrence with this definition of the APE for historic architectural resources.

The survey information will be used to develop a HPMP, which will be filed with the Preliminary Licensing Proposal after consultation with the Michigan SHPO and other interested parties. The HPMP will address the elements outlined in FERC's letter dated May 16, 2014.

7.5.2.2 Goals and Objectives

The goal of the study is to assist FERC in meeting its compliance requirements under Section 106 of the National Historic Preservation Act of 1966, as amended (Section 106) by determining if licensing of the Project will have an adverse effect on historic properties. The objective of the study is to identify cultural resources listed in or eligible for listing in the NRHP. If it is confirmed that historic properties are present, the Licensees will identify and assess any potential adverse effects to historic properties from the continuing operation and maintenance of the Project.

7.5.2.3 Known Resource Management Goals of Agencies with Jurisdiction Over Resource

Section 106 requires that federal agencies, Licensees, and those receiving federal assistance take into account the effects of proposed undertakings on any resource that is listed in or is eligible for the NRHP. As the lead agency, FERC is responsible for fulfilling the requirements of Section 106 in its decision to issue a new license to the Project.

As stipulated by the regulations that implement Section 106 (36 CFR 800), the Michigan SHPO represents the interests of the State and its citizens, and advises and assists FERC in determining the significance of historic resources within the APE. The Licensees propose consulting with the Michigan SHPO in the establishment of the APE, development of the survey methodology, identification of NRHP-listed and -eligible historic resources (and the applicable NRHP Criteria), assessment of effects (if any) to the NRHP-listed and -eligible resources, and development of a Programmatic Agreement (PA) and HPMP, if needed.

Addressing any possible adverse effects to such properties (now or in the future) involves preparing a PA and drafting an HPMP that identifies how adverse Project effects on NRHP listed or eligible properties will be addressed.

7.5.2.4 Background and Existing Information and Need for Additional Information

Above-ground resources within the Project boundaries consist of the powerhouse, office building, storage/maintenance building and a building associated with the Mason County Park (constructed as part of the Park and recently upgraded by Mason County). The Ludington Pumped Storage Project was constructed between 1969 and 1973, and while properties less than 50 years old are not typically considered eligible for the NRHP, they can be eligible under Criterion Consideration G, which recognizes more recent resources that are considered exceptionally important examples of engineering or architecture.

The Ludington Project is unique in that it is Michigan's only pumped storage hydroelectric facility. At the time it was constructed, the Project had the largest generating capacity in the world for pumped storage facilities, and it remains the third largest pumped storage facility in the

world and the second largest in the United States. As part of the 2011 "Application for Non-Capacity Amendment of License," the Licensees conducted an NRHP-eligibility study for the Ludington Pumped Storage Project prior to initiating consultation with the Michigan SHPO. This assessment found that the Project "meets several of the eligibility criteria for NRHP listing."

In a February 2012 letter reviewing the effects of the proposed undertaking, the Michigan SHPO stated "it is the opinion of the State Historic Preservation Officer (SHPO) that the effects of the proposed undertaking do not meet the criteria of adverse effect [36 CFR g 800.5(a)(1)], therefore, the Project will have no adverse effect on the Ludington Pumped Storage Hydroelectric Plant, *which appears to meet the criteria for listing in the National Register of Historic Places*." The Licensees will seek a formal determination of NRHP eligibility for the Project from the Michigan SHPO and will further consult with the Michigan SHPO to determine whether any additional investigations are needed to define under which Criteria the facility is NRHP-eligible.

7.5.2.5 Project Nexus

If, following consultation with the Michigan SHPO, it is determined that the NRHP-eligibility of historic structures within the APE still needs to be addressed as part of the Section 106 review process, an historic structures survey may be conducted. The survey will identify historic resources within the Project's APE listed or determined eligible for listing in the NRHP and provide assessments of existing and potential Project-related effects to historic resources.

Following fieldwork and the preparation of a final report with survey findings, the Michigan SHPO will make any NRHP eligibility determinations and/or clarifications for resources within the Project APE and will also assess any potential effects from continued Project operations on historic resources.

Information developed during the course of the historic structures survey will be used as the basis for preparing an HPMP. Guiding the Licensees' actions relating to Section 106 during the term of the new license, the HPMP will discuss how to avoid potential adverse effects and/or how they will be mitigated. The final HPMP will be filed with the license application.

7.5.2.6 Methodology

In advance of completing work under this study, the Licensees will consult with the Michigan SHPO to develop the APE for the Project. The Licensees will seek a formal determination of NRHP eligibility for the Project from the Michigan SHPO and will determine whether any additional investigations or surveys are needed to define under which Criteria the facility is NRHP-eligible. Any proposed historic structures survey will conform to the professional standards and guidelines established by the Michigan SHPO. The Licensees will employ a professionally qualified architectural historian who meets the *Secretary of the Interior's Standards* (36 CFR Part 61) to conduct the architectural studies.

Following consultation with the Michigan SHPO, the Licensees' consultant will complete background research, including a brief review of Project correspondence, including previous determinations of NRHP-eligibility, and a review of previous surveys in the area.

A field survey will include an examination of the previously identified above-ground resources within the Project APE. Information about the current appearance, including the setting, physical condition, and character-defining architectural features of the resources will be recorded. High-resolution digital photographs will be taken of each resource. Additional photography will include general context views that show the resources in relation to one another and their surroundings.

Upon completion of the field investigations, the Licensees will prepare a final report that will contain a narrative description of the resources identified during the survey, including information about the general setting and current physical condition. The narrative will provide a statement of integrity that addresses changes that have occurred over time.

Recommendations will include a narrative statement of significance that will define the applicable National Register criteria, criteria considerations (if any apply), areas of significance, and periods of significance. The narrative will include a summary statement of significance that will establish the level(s), period(s), and areas of significance. Other components of the report will consist of a bibliography of sources consulted and graphical information, including a map of

the Project. The map will be prepared in ArcGIS format and will include the scale, north arrow, and legend.

7.5.2.7 Consistency with Generally Accepted Scientific Practice

All of the field investigation methods used will follow all applicable Federal and Michigan guidelines, including those contained in the Michigan Historic Preservation's website (the Michigan SHPO website referred to above). In particular, the Michigan SHPO-approved level II Precontact period and Historic period archaeologists will be employed to undertake field and site evaluations.

7.5.2.8 Deliverables and Schedule

Following consultation in early 2015, background research would be completed in spring 2015, followed by a field survey also in spring 2015. A draft report summarizing the findings would be completed and available for the Michigan SHPO review and comment in the summer 2015, with a final report to be completed by fall 2015.

7.5.2.9 Cost and Level of Effort

The estimated costs for consultation with the Michigan SHPO, and any required field survey are approximately $10,000 to $12,000. The Licensees believe that the proposed level of effort is adequate to obtain and update the information on historic resources within the Project's APE.

7.5.2.10 References

None.