PMC-EF2a
(2.04.02)

# U.S. DEPARTMENT OF ENERGY
## EERE PROJECT MANAGEMENT CENTER
## NEPA DETERMINATION

**RECIPIENT:** Electric Power Research Institute (EPRI) **STATE:** CA

**PROJECT TITLE :** Assessment of the Environmental Effects of Hydrokinetic Turbines on Fish:

| Funding Opportunity Announcement Number | Procurement Instrument Number | NEPA Control Number | CID Number |
|---|---|---|---|
| DE-FOA-0000069 | EE0002659 | GFO-10-195 | GO0 |

**Based on my review of the information concerning the proposed action, as NEPA Compliance Officer (authorized under DOE Order 451.1A), I have made the following determination:**

**CX, EA, EIS APPENDIX AND NUMBER:**
Description:

**B3.3** Field and laboratory research, inventory, and information collection activities that are directly related to the conservation of fish or wildlife resources and that involve only negligible habitat destruction or population reduction

Rational for determination:

Electric Power Research Institute (EPRI) is proposing to use DOE and cost-share funding to conduct research activities to determine injury and survival rates for fish passing through hydrokinetic turbines. Research would be accomplished by:

(1) Conducting a review of existing information on injury mechanisms associated with fish passage through conventional hydro turbines and determine its relevance and applicability to fish passage through hydrokinetic turbines;

(2) Developing theoretical models for the probability of blade strike and mortality for various hydrokinetic turbine designs; and

(3) Conducting flume studies with at least three turbine designs and several species and size classes of fish to estimate injury and survival rates and describe fish behavior in the vicinity of operating turbines.

Specific tasks outlined for this project include:

*Task 1: Literature Review to Determine Applicability of Existing Data to Hydrokinetic Turbines (A9)
*Task 2: Estimation of Strike Probability and Survival Using Existing Information (A9)
*Task 3: Laboratory Flume Evaluation of Fish Survival and Behavior – Turbine Types I and II (B3.3)
*Task 4: Laboratory Flume Evaluation of Fish Survival and Behavior – Turbine Type III (B3.3)
Task 5: Project Management and Reporting (A9)

Tasks 1 and 2 involve paper studies and modeling activities only. Task 3 involves laboratory testing and studies.

Task 3 and 4 studies would be conducted with three different hydrokinetic turbine designs and several fish species/sizes to estimate turbine passage survival and injury rates and to determine behavior of fish as they approach and encounter operating turbines. The three hydrokinetic turbines that would be evaluated are: (1) Gorlov, (2) axial propeller, and (3) ducted. Types 1 and 2 would be evaluated at the Alden Research Laboratory and type 3 at the USGS CAFRL (Conte Anadromous Fish Research Laboratory). The turbines selected for testing are being considered for installation at sites throughout the U.S.

Tasks 3 and 4 studies would also involve biological testing of fish. This testing would occur at two separate facilities: Alden Research Labs and the Department of Interior USGS CAFRL. It is necessary to conduct testing at separate facilities due to the unique accommodations available at each of the facilities. Each facility has provided detailed

information regarding guidelines for fish care and use in research.

Alden Research Labs:
Standard Operating Procedures: Guidelines for Fish Care & Use in Research
Division of Fisheries & Wildlife Class 3 Aquaculture permits for 2009/2010

Fish acquired for testing by Alden are received from commercial aquaculture facilities which hatch, rear and ship these organisms to Alden. The suppliers used are dependent on the species required for testing and to the extent possible local suppliers are used to minimize transport time and stress associated with shipment.

All fish would be held prior to testing and during 96-hr post test observation periods in a re-circulating fish holding system located in a building adjacent to the test flume. The holding facility has seven 420-gallon circular tanks (5 ft in diameter, 3 ft deep) and eighteen 235-gallon circular tanks (4 ft in diameter, 2.5 ft deep). This system was initially designed for the biological evaluation of the Alden/Concepts NREC turbine, during which over 40,000 fish were tested, and has since undergone significant upgrades to improve water quality, minimize maintenance requirements, and allow long term holding of test fish.

Alden's Standard Operating procedures for activities under this award include:

*Alden's fisheries program manager is responsible for renewal and/or obtaining all required Fish Importation, Class 3 Aquaculture, Wastewater Hauler and any additional permits required for the facility and the species under study.
* It is the responsibility of the Project Manager to develop a study design which uses the appropriate species or closely related surrogates and limits unnecessary replications to obtaining the most information possible from the fewest number of organisms.
* The fisheries program manager must be familiar with the species to be studied in order to provide environmental conditions essential for the well-being of the research organisms.
* Alden staff is ultimately responsible for minimizing fish stress and injury throughout the holding and handling process. Staff should understanding that inducing stress can evoke physiological and behavioral changes which would result in data that is not representative of "normal" biological function.
* Staff is responsible for understanding and maintaining Alden's ethical standards mandating a respect for all life forms and processes.

Department of Interior, USGS CAFRL facilities:

U.S. Geological Survey, Leetown Science Center: Operating Policies of the Institutional Animal Care and Use Committee

CARFL is a 40,000 sq - ft Federally Funded Research and Development Center (FFRDC) established by the U.S. Geological Survey - Biological Resources Division, Department of the Interior to study the physiology, behavior, and ecology of anadromous fishes and to design and test experimental fish passages and hydraulic structures.

For this project fish would be collected locally (i.e., within the Connecticut River watershed and as near as possible to CAFRC) under the auspices of state-issued scientific collection permits and importation permits to Massachusetts when needed. Per DOE investigation, no federally listed threatened or endangered species are found in the area of collection; therefore Section 7 consultation with the US Fish and Wildlife Service under the Endangered Species Act is not required.

CAFRC would also use domestic fish; in this case they would be acquired from state and federal hatcheries. Fish that are collected from within the Connecticut River watershed are typically tested within 48 hours of capture and then released at the point of capture. Fish come from outside of the watershed are euthanized and disposed of in accordance with CAFRC protocol.

Flume testing conducted at CAFRL would investigate mechanical injury, avoidance behaviors, and migratory delay for fish passing a hydrokinetic turbine in a large-scale semi-controlled laboratory setting. Tests would be conducted in a large flume designed to test devices like hydrokinetic turbines and fish ladders.

Flume trials would consist of releasing 20-50 fish. Fish would be individually tagged with radio tags and held overnight before testing. At the beginning of each trial, flow conditions would first be established according to the testing schedule, and then the fish would be released into a staging area from which they can volitionally enter the test flume from either a point upstream or downstream of the turbine. Juvenile Atlantic salmon and adult American shad would be used to test the effects on the type 3 turbine on migrating fish.

Alden Research Laboratories and the USGS CAFRL have established permits in place for collection and testing of fish species. CAFRL facilities comply with the Animal Welfare Act (AWA) regulations contained in 9 CFR Part 2, Subpart 2C, Section 2.37 that require each Federal research facility that uses animals to establish an Institutional Animal Care

and Use Committee (IACUC).

Activities under this project comprise of field and laboratory research, inventory, and information collection activities that are directly related to the conservation of fish or wildlife resources and that involve only negligible habitat destruction or population reduction; therefore a CX B3.3 applies.

**NEPA PROVISION**

DOE has made a conditional NEPA determination for this award, and funding for certain tasks under this award is contingent upon the final NEPA determination.

Insert the following language in the award:

You are restricted from taking any action using federal funds, which would have an adverse affect on the environment or limit the choice of reasonable alternatives prior to DOE/NNSA providing either a NEPA clearance or a final NEPA decision regarding the project.

Prohibited actions include:
Testing activities on Massachusetts State threatened and endangered species.

This restriction does not preclude you from:

If you move forward with activities that are not authorized for federal funding by the DOE Contracting Officer in advance of the final NEPA decision, you are doing so at risk of not receiving federal funding and such costs may not be recognized as allowable cost share.

Note to Specialist :

None Given.

**SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.**

NEPA Compliance Officer Signature: _____ Date: 6/2/10
NEPA Compliance Officer

**FIELD OFFICE MANAGER DETERMINATION**

☐ Field Office Manager review required

**NCO REQUESTS THE FIELD OFFICE MANAGER REVIEW FOR THE FOLLOWING REASON:**

☐ Proposed action fits within a categorical exclusion but involves a high profile or controversial issue that warrants Field Office Manager's attention.
☐ Proposed action falls within an EA or EIS category and therefore requires Field Office Manager's review and determination.

**BASED ON MY REVIEW I CONCUR WITH THE DETERMINATION OF THE NCO :**

Field Office Manager's Signature: _____ Date: _____
Field Office Manager