United States Department of the Interior

FISH AND WILDLIFE SERVICE

Suite 322
315 South Allen Street
State College, Pennsylvania 16801

January 19, 1989

Mr. Dean L. Shumway
Division of Project Review (HL-20-RB)
Federal Energy Regulatory Commission
825 N. Capitol Street, N.E. Washington, D. C. 20426

Dear Mr. Shumway:

This responds to your September 8, 1988, request for consultation under the Endangered Species Act (Act) of 1973, as amended, on actions proposed in the Commission's Final Environmental Impact Statement (FEIS) assessing hydropower development in the Upper Ohio River Basin, Ohio, Pennsylvania, and West Virginia (EL 85-19-14). This represents the biological opinion of the U.S. Fish and wildlife Service (Service) in accordance with Section 7 of the Act.

Chronology

September 28, 1987	Service alerts the Federal Energy Regulatory Commission (Commission) of the presence of a listed endangered freshwater mussel, the pink mucket (Lampsilis abrupta) in the upper Ohio River.
June 27, 1988	The Commission releases the Draft Environmental Impact Statement (DEIS) for Hydroelectric Development in the Upper Ohio River Basin, Commission Docket No. EL 85-19-114(ER 88/419).
July 27, 1988	Service comments on the DEIS to the Commission pursuant to the Fish and Wildlife Coordination Act.
August 1, 1988	Intervention filed by the U.S. Department of the Interior (Department) regarding 19 projects proposed for licensing by the Commission in the upper Ohio River Basin.
August 1, 1988	Department comments on DEIS.
August 16, 1988	Letter received from Mr. Charles C. Coutant (Oak Ridge National Laboratory), thanking the Service for providing information on the Ohio River islands and the endangered mussel, L. abrupta.

September 7, 1988	Additional information from the Commission provided to the service regarding the effects of hydroelectric development in the upper Ohio River basin on the pink mucket, L. abrupta.
September 8, 1988	Commission's letter Providing information and partial response to the Department's comments on the DEIS. The Commission states the letter is their request for formal consultation.
October 31, 1988	Letter to Cashell from the Department requesting an extension of time (25 days beyond receipt Of Written notice that the Section 10(j) issue resolution process has been completed under the Federal Power Act to determine whether the Department would make a referral to the Council on Environmental Quality.
November 17, 1988	Meeting between State and federal fish and wildlife agencies and Commission staff to discuss sufficiency of data in the EIS. Agencies provided 60 days to describe information needed to wake recommendations under section 10(j) of the Federal Power Act.
December 13, 1988	Commission letter to the Service referring to the document submitted by the Service at the November 17P 1988, meeting and advises that its September 81 1988, letter initiated consultation.
December 19, 1988	Service review of the additional Information package regarding L. abrupta.
December 21, 1988	Service responds to the Commission stating that a biological opinion will be provided based on existing data.
January 6, 1989	Commission responds to the Service advising that the 45 day period to submit the biological opinion would end on January 21, 1989.

Background

The Commission is presently proposing to license the construction and operation of up to 19 hydropower projects on the Tygart, Allegheny, Monongahela, and Ohio Rivers in Pennsylvania, West Virginia, and Ohio. According to the Commission, the recommended Alternative (Alternative 4) would prevent projects from causing dissolved oxygen (DO) levels that would ham aquatic life by requiring spill flows. However, the Commission has determined that the locks and dams at Willow Island (rivermile 161.7), Belleville (203.9), and Gallipolis (279.2) do not provide significantly more aeration than can be expected from a hydropower project. Therefore, spill flows at these dam will not be required when Do concentrations become low.

The Service alerted the Commission on September 28, 1987, of the discovery Of the endangered pink mucket, L. abrupta, between river miles 292.0 and 292.4 below Gallipolis looks and Dam. L. abrupta is an oxygen sensitive species. Suitable habitat for this endangered species is also found in two reaches below Willow island and Belleville Locks and Dams.

A difference Of opinion exists regarding the validity of Do data used to make predictions about impacts of proposed projects on water quality and additional information was requested by the states of Chic, Pennsylvania, West Virginia', the Environmental Protection Agency and the Service to address impacts.

The projects proposed for licensing could adversely impact fish movement in the river. The sauger, Stizostedion is the only known fish host of and entrainment and turbine-induced mortality could reduce the numbers am movement of sauger and adversely affect the reproductive capability of L. abrupta. Additionally, as many as 29 other mussel species endemic to the Ohio River, seven of which are listed by the State of Ohio as endangered, exist in the Belleville, Racine, and Greenup navigation pools. All of these mussels require a fish host in their reproduction cycles that could be adversely affected by entrainment-induced mortality.

Review of Endangered Species Information

The Service has reviewed the endangered species information contained in the DEIS, dated June 27, 1988, and FEIS, dated September 1988, including the additional information package (Appendix 1). The information concluded that development of hydroelectric projects, as proposed, could have some adverse effect on the pink mucket mussel, Lampsilis abrupta, but that the effect would not be significant. The Service concurs that some adverse effects could result but does not concur with the Commission regarding severity of the impacts. This disagreement is based on our concerns about the validity of the water quality data described in the documents.

The Service concurs that the projects will not affect any other endangered or threatened species and the remainder of this opinion only addresses L. abrupta. The non-affected species include the bald eagle (Haliaeetus leucocephalus) American peregrine falcon (Falco peregrinus anatum), Arctic peregrine falcon (Falco peregrinus tundris), Indiana bat (Myotis sodalis), eastern cougar (Felis concolor cougar), and the flat-spired three-toothed land snail (Triodopsis platysayoides). This precludes the need for further consultation on this project, as required under Section 7 of the Endangered Species Act of 1973, as amended, relative to the non-affected species. If this project is modified or new information becomes available to indicate that these-species may be affected, consultation should be reinitiated.

The additional information also concluded that, while the project may adversely affect a listed species, it would not likely jeopardize the continued existence of that species. This determination is clearly not within the purview of the Commission, but rests with the Service [50 CFR 402.12 and 402.14(h)]. Following the issuance of a biological opinion, the federal agency shall determine whether, and in what manner, to proceed with the action in view of its Section 7 obligations and the Service's biological opinion 150 CFR 402.15(a)].

Pink Mucket Pearly Mussel, Lampsilis abrupta

Distribution

Historical records of L. abrupta indicate it is mostly an Ohio River Basin species, found mainly in the Tennessee, Cumberland, and Ohio River drainages with occasional records from the Mississippi. Lampsilis abrupta originally occurred in 25 river systems but was never collected in large numbers from any one site.

Presently, L. abrupta is known from 16 river system, representing three major geographic locations. The largest populations are found in the Tennessee River (AL, TN and KY), Cumberland River (KY and TN), Osage River (MO),, and the Meramac River (MO). Lampsilis abrupta is presently known from two sites in the area affected by this project; the Muskingum, River below Lock and Dam No. 3, and the Ohio River below Gallipolis Locks and Dam. There is strong evidence that extant populations could occur below both Willow Island and Belleville Locks and Dams on the Ohio River since suitable habitat is found at both locations.

Ecology and Life History

Lampsilis abrupta inhabits medium to large rivers in substrates ranging from silt to boulders. The preferred habitat is a mixture of sand, gravel, and cobble substrates swept by moderate to fast currents in depths up to eight meters. Lampsilis requires well-aerated water having high DO and low carbon dioxide concentrations. Habitat at the occupied Greenbottom site below Gallipolis Locks and Dam is typical for the species. Lampsilis abrupta was found in sand, gravel, cobble# and boulder substrates constantly being swept clean by steady currents in six to eight meter depths.

The life history of L. abrupta although not exactly known, is thought to be similar to other native mussels. males produce sperm which is discharged into the water column and dispersed by currents. Females downstream intake the sperm during feeding and respiration. Fertilization occurs within the posterior section of the outer gills which are modified as brood pouches. Lampsilis abrupta is a long-term breeder, i.e., eggs are fertilized in late summer to early fall and the embryos (glochidium) develop over winter and are discharged into the water column in late spring to early summer. The glochidium then attach (encyst) to the gill filaments or fins of a fish where they develop into a juvenile mussel. The sauger is thought to be the prime host species. It appears that the genus Lamsilis has evolved a mantle flap on the incurrent syphon which resembles a small fish or aquatic invertebrate,complete with eyespot. When extended into the current, this

flap facilitates the movement of glochidia in proximity to the host fish.

Reasons for Decline

Possibly the most important factor contributing to the decline of L. abrupta and freshwater mussels in general in the Ohio River is the alteration and destruction of habitat by impoundments for flood control, navigation,

hydropower, and recreation. Certain mussels are affected by their inability to adapt to habitat component changes, such as reduced flows# altered temperature regimes, and anoxic conditions.

Siltation has also severely affected freshwater mussels. The greatest diversity and bundance of mussels are usually associated with clean-swept sand and gravel substrates. Increased silt transport from surface mining,, coal washing, dredging, farming, logging, and road construction are some of the major sources of sedimentation, Chronic increases in turbidity and suspended sediments decrease the depth and amount of light penetration affects primary productivity# increases water temperature, irritates or causes clogging of gills, and results in a blanket of silt on the substrate. Siltation affects mussels indirectly by affecting the fish host populations, by smothering fish eggs or larvae, reducing food availability or filling interstitial spaces in gravel and rubble substrate, thus eliminating spawning and habitat critical to the survival of young fish. Mussels may be directly affected by siltation through smothering.

Pollution from municipal, agricultural, and industrial waste discharges have decreased or eliminated mussel populations directly and indirectly through elimination of significant species of fish hosts resulting in reproductive failure.

All of the aforementioned impacts, especially those aggravated by river impoundments, have contributed to the decline of mussels preferring unpolluted waters with clean-swept sand, gravel, and cobble substrates. Lampsilis has these habitat requirements.

Project Impacts

Dissolved Oxygen

Freshwater mussel experts agree that most species , including L. abrupta, require well-aerated water, having high DO and low carbon dioxide concentrations flowing over stable substrates of sand, gravel, and cobble. As is of ten the case in a similar group of organisms, different forms have varying habitat requirements to be able to exploit all possible habitats (niches). In the mussel group, this is clearly demonstrated. Thin shelled species# such as the giant floater, Anodonta and the paper floater, Anodonta imgecillis, inhabit silt and organic substrates often low in DO. The ridge mussel, Amblema plicata, has adapted to pool situations and is tolerant to- silty conditions and resulting low DO. However, riffle/run species, such as L. abrupta are intolerant of extended periods of decreased DO levels. Reduced Do levels will also affect the presence of fish (in this case, probably sauger) over the mussel beds altering the reproductive cycle.

The preferred alternative may adversely affect the normal growth and reproduction of riffle/run species of freshwater mussels, including L. abrupta, resulting from decreased Do levels. Fish hosts of these mussel

species, including sauger, my also be adversaely affected by entrainment and turbine-induced mortality.

A factor that has not been thoroughly considered is the obvious improvement in water quality in the Ohio River in the last 20 years. This improvement has resulted in increased reproduction and redistribution Of freshwater mussels and their fish host. The dramatic shift of fish species composition favoring gamefish is well known by resource agencies and anglers. The Service believes that the improved water quality could be adversely affected by the proposed hydropower projects resulting in severe, long-term impacts on water quality and the river's aquatic life, and ultimately preclude the river from reaching its maximum potential as a productive warmwater system.

Biological Opinion

Although L. abrupta was at me time common throughout the Ohio River basin, it is now rare. The newly discovered Greenbottom site is the only place in the Ohio River mainstem, except near its confluence with the Mississippi River, where P. abrupta &A is known to survive. Although still considered rare, abrupt a larger reproducing populations exist in other rivers, such as the Tennessee and Comberland Rivers. Therefore, it is our biological opinion that the act-ion will not likely jeopardize the continued existence of L. . An incidental take statement along with measures which must be taken to minimize the incidental take are specified in Appendix A.

Conservation Recommendations

Conservation measures are discretionary actions that the Commission/development could take to promote the recovery of the species. They are consistent with the scope, magnitude, and duration of the federal action and are not intended to broaden the agency's authority.

The Service recommends the following work to assist in conservation of L. abrupta:

> Conduct additional mussel surveys on the three reaches specified below Willow Island, Belleville, and Gallipolis Locks and Dams to attempt to locate additional L. abrupta populations. Reference the FEIS, Appendix It page 30, Item 5. Adequacy of the Data, (a).

This precludes the need for further act-ion on this project as required under Section 7 of the Endangered Species Act of 1973, as amended. Should this project be modified or new information becomes available, consultation should be reinitiated.

Should any of the "Level of Take" criteria be reached in any of the study sites regarding the actual and potential existence of L. abrupta the Service will determine whether or not additional action is

necessary. Such action may include implementation of additional measures to minimize ham to the species and/or reinitiation of consultation.

Please direct any specific questions regarding this correspondence to endangered species staff specialist, Bill Tolin, in our Elkins Office (304-636-6586).

Sincerely,

Charles J. Kulp
Supervisor

Enclosures

References

Clarke# A. H. 1982. Survey of the Freshwater Mussels of the Tipper Kanawha River (rivermiles 91-95), Fayette County, West Virginia, With Special Reference to Epioblasma torulosa (Rafinesque) and Lampsilis abrupta (Say Lampsilis orb lata, Hildreth), of authors]. Final Report,, U.S. Fish and Wild" e Service, Newton Corner, Massachusetts.

Coon, T.G., J.W. Eckblad, and P.M. Trygstad. 1977. Relative Abundance and Growth of Mussels (Mollusca: Eulamellibranchia) in Pools 8, 9, and 10 of the Mississippi River. Freshwater Biology 7:279-285.

Federal Energy Regulatory Commission. 1988. Final Environmental Impact Statement-. Hydroelectric Development in the Upper Ohio River Basin. FERC Docket No. F.L. 85-19-114. Ohio, Pennsylvania, West Virginia. Office of Hydropower Licensing, Washington, D.C.

Fuller, S.L.H. 1974. clams and mussels (Millusca: Bivalvia). pp. 215-273 in C.W. Fart and S.L.H. Fuller (eds.), Pollution Ecology of Freshwater Invertebrates. Academic Press, New York.

Holland, L. I D. Buff, S. Littlejohn, and R. Joacobson. 1984. Analysis of Exixting Information on Adult Fish Movement Through Dam on the Upper Mississippi River. U.S. Fish and Wildlife Service, National Fishery Research Laboratory, LaCrosse, Wisconsin.

Stansbery, D.H. 1985. The status of Lampsilis aburpta (Say 1831) with Special Attention Given to the Muskingum River Population (Mollusca: Bivalvia: Unionoida). Report for WAPORA, Inc. The Ohio State University Muse= of Zoology, Columbus, Ohio.

Starrett, W.C. 1971. A Survey of the Mussels (Unionacea) of the Illinois River: A Polluted Stream. Illinois Natural History Survey Bulletin.. Vol. 30, Article 5. Urbana, Illinois. 274 pp.

Taylor.. R.W. 1980. A Survey of the freshwater Mussels of the Ohio River from Greenup locks and Dams to Pittsburgh, Pennsylvania. Report for the U.S. Army Corps of Engineers, Huntington District. Marshall University, Huntington, West Virginia.

Taylor, R.W. 1983. A Survey of the Freshwater Mussels of the Kanawha River. Prepared for U.S. Army Corps of Engineers, Huntington District, Huntington, West Virginia.

Tolin, W.A., J. Schmidt, and M. Zeto. 1987. A New Location for the Federally
Listed Endangered Unionid abrupta (Say 1831) (- L. Orbiculata (Hildreth 1828) in the Upper Ohio River Bordering West Virginia. Malacological Data Net 2:18.

U.S. Fish and Wildlife Service. 1985. Recovery Plant Pink Mucket Pearly Mussel - Lampsilis orbiculata. Atlanta, Georgia.

Zeto, M., W. Tolin, J. Schmidt. 1987. The Freshwater Mussels of the Upper Ohio River, Greenup and Belleville Pools? West Virginia. The Nautilus 4:182-185.

Appendix

Incidental Take

This is an incidental take statement for L. abrupta, pursuant to 50 CFR 420.14(g)(7). The additional information package has concluded that the projects, as proposed, may adversely affect L. abrupta. The biological opinion concurs with this finding and concludes no jeopardy of the species. "Take" is defined in the Endangered Species Act, Section 3(19), as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in such conduct". This statement includes the level of take that is anticipated to occur due to the action. The Service will concur with or modify, as necessary, reasonable and prudent measures which pertain to L. abruptaand which have beer FEIS by the Commission (5.4.2. Basin-Wide Recommendations) If the level of incidental take is exceeded, formal consultation under Section 7 of the Act, must be reinitiated.

Level of Take

The level of take will be defined in terms of community structure. it would be impossible to establish a numerical level of incidental take since no population estimates are known within the project areas. The only known occurrence of L. abrupta within the project area is the Greenbottom site below Gallipolis. The is suspected to occur (and riot confirmed) below the, willow Island and Belleville Locks and Dams based on the presence of suitable habitat.

Since L. abrupta represents such a small portion of the mussel community, it would not be practical to only monitor that species. It is reasonable to assume that the status of the entire mussel community reflects the well being of L. abrupta. Therefore, we are proposing that the monitoring studies take place on several known beds or suspected beds.

The following list of criteria were developed by the Rock Island, Illinois, field office of the Service to monitor mussel beds in the Mississippi River to reflect on the status of Lamosilis higginsi. Lampsilis higginsi is closely related to L. abrupta, has essentially the same habitat requirements, and is associated with many of the same species. It is even thought to have the same fish host. Therefore, the level of incidental take is defined as;

1. A continual decline in the density of the five most abundant mussel species after establishing a "before project" baseline. However, baseline sampling should continue every other year until all appropriate power plants are operational and then continue for three more satisfactory sampling periods or six years. This should include adults and juveniles (Juvenile being defined as less than 30 percent of maximum size encountered, measured as total length) other than Amblema p. plicata, which is a pollution-tolerant species.

2. Failure to collect L. abrupta (collection is not expected to add to mortality) from a bed where it is known (if collected during the baseline period). Sampling would still be required even if L. abrupta were not encountered if potential habitat existed;

3. A continual decrease in the live-to-recently dead ratio over the three sampling periods or six years (i.e., more dead than alive). "Recently dead" is defined as those shells exhibiting some shininess of the nacre or dead less than one year;

4. A decline of 25 percent or more in the total number of species encountered per bed;

S. No evidence of recent recruitment of the five dominant species other than A. p. plicata; or

6. A decline in the growth rate of two dominant species other than A. p. plicata.

if any one of these criteria are found at any of the monitored mussel beds an evaluation by the Service would be initiated. If chronic seasonal evidence indicates that changes are due to DO depression affecting mussels and fish host habitat or entrainment of fish hosts affecting movement or mortality, reinitiation of consultation will be required.

Reasonable and Prudent Measures to Minimize Impacts of the Taking

These are measures that have been modified by the Service from their basic form as outlined in Section 5.4.2. Basin-Wide Recommendations, as actions and mitigation to reduce adverse impacts of the projects.

1. Monitoring mussel communities to detect any changes in the various criteria described in the previous section titled "Level of Take". The goal of this task is to establish a baseline and monitor the mussel community over the period of time after ter all power plants are on line. Changes in community structure will be noted and compared to the "Level-of- criteria previously discussed. Should any of the "Take" criteria be met, it will trigger a re-evaluation of project impacts, on L. abrupta, and possible reinitiation of consultation.

Section 5.4.2.5. Recommundations for other Resources, 1. Endangered and Threatened Species, of the FEIS requires developers to develop monitoring plans for the dam tailwaters. The major mussel beds in the Ohio River do not occur in the dam tailwaters. monitoring studies should take place where L. abrupta and some of the state's "angered species occur and may be adversely affected by the proposal. Therefore, monitoring study plans and sites would be selected after consultation with the Service, West Virginia Department of Natural

Resources, and the Ohio Department of Natural Resources, Federal and state collecting permit requirements would also be coordinated.

2. Implement mitigation measures (1) through (8) of those recommended in Section 5.4.2.1. Recommendations for Water Quality, with the following modification:

Mitigation Item No. 1. Spill Flows. Since this essentially eliminates any chance for aeration at Willow Island, Belleville, and Gallipolis Locks and Dams, the Service questions the Commission's opinion that they are not aerators.

An adequate evaluation must be made to determine under what conditions of flow,, temperature, and upstream DO deficit the various projects could operate while maintaining antidegradation objectives. Further, an estimate of the time-frame during which these conditions occur must be determined for each proposed project. To accomplish this purposes more data must be collected to evaluate the.

(1) relationship between upstream DO deficits and downstream DO deficits, under all conditions, including those in which upstream DO concentrations approach or exceed saturation;

(2) relationship between temperature and aeration at each dam;

(3) relationship between flow and aeration at each dam; and,

(4) interactions of the above relationships.

mitigation item No. 2. There appears to be no enforcement capability in this item since Commission order 464 waived 401 Certification for Gallipolis, Belleville, and Willow island Locks and Dams. If this is the case, this mitigation item is meaningless. Non-degradation Standards must be required at these sites.

Mitigation Items Nos. 3-6. Implement.

Mitigation Item No. 7. This mitigation measure was needed during the low flow period in 1988 at Hannibal locks and Dam on the Ohio River but not implemented. It must be resolved as to who, the state or the Corps, is the regulating agency.

mitigation Item No. 6. Implement.

3. Implement mitigation measures (1) through (4) of those recommended in Section 5.4.2.2. Recommendations on Aquatic Ecology and Fisheries.

Mitigation Item No. 2. The incidence of glochidia encystment on fish included in the turbine induced mortality study should be analyzed. This would help answer questions regarding the importance of turbine mortality and fish host movement.