

**AFS Policy Statement #25:  
Hydropower Development  
(Full Statement)**

**Issue Definition**

The decline in North American stream fishes and their habitats is now of major concern. Hundreds of major dams and thousands of smaller projects are presently operating, usually to the detriment of natural stream systems. However, opportunities exist to substantially improve degraded habitats during relicensing procedures. Licenses- for over 200 hydropower projects will expire in the 1990s. Because many of these projects were licensed before environmental impacts were of serious concern, adverse impacts to fisheries resources were not adequately mitigated.

It is the intent of the American Fisheries Society (AFS) to reassess hydropower development and to encourage federal, state, and private agencies to fully determine, mitigate, or avoid losses to our declining stream resources.

**Background Information**

Hydropower development has continued in North America for over 100 years. Originally used to supply mechanical and hydraulic power, the use of water power to produce electricity caused a rapid expansion in hydroelectric development in the last half of the 19th and early 20th centuries. During the first half of the 20th century and particularly during the Great Depression, many large-scale hydroelectric plants were constructed. The most suitable sites were developed or dedicated to other uses by the mid 1900s, and the high cost of developing marginal areas made steam generation plants more economical than hydropower at that time. This trend has begun to change, and escalating costs of fossil fuel and public concerns about the safety of nuclear plants have kindled new interest in developing alternative energy sources, including additional hydropower development.

Although the use of hydropower has provided enormous benefits to civilization, construction and operation of hydroelectric power projects have altered and, in some cases, eliminated natural streams. Despite its portrayal as a "clean" energy source, hydropower development has caused environmental damage. Major river systems in the United States (e.g., the Columbia River on the West Coast, the Connecticut River on the East Coast, and the Colorado River in the Intermountain West) have lost the majority of their free-flowing reaches due to dams and impoundments. Declines of native fish populations, including important sport, commercial, and rare and endangered species, in these rivers range from an almost total loss of stream fauna to declines of 73% or more. Losses of free-flowing rivers are obvious, however, the loss of small streams has been even greater.

Interest in new hydropower development increased in the 1980s, principally because of federal legislation, including the Public Utilities Regulatory Policy Act of 1978, the

Crude Oil Windfall Profits Tax Act of 1980, and the National Energy Security Act of 1980. These acts provide economic, regulatory, and tax incentives to developers. As a result, preliminary permit and license applications and exemptions for nonfederal, "small-scale" projects (i.e., dams with little water storage capacity, using relatively small flows, and producing less than 1 to as much as 30 megawatts power at each project) proliferated.

The small-scale hydropower projects are often of great concern to fisheries managers. Because each project usually stands alone evaluations of cumulative impacts are rarely made. In addition, the effects of one or more of these small projects may be difficult to detect because project proponents seldom prepare adequate baseline and predictive studies. The resultant lack of adequate project-specific and cumulative effects information has resulted in the licensing or exempting of projects from licensing requirements without a full assessment of potential negative impacts and with little or no resolution of fisheries concerns.

Hydropower development almost always converts natural streams to man-dominated environments. Streams are converted to reservoirs, longitudinal migrations and movements of animals are impeded or blocked, and downstream areas impacted. Many of the fisheries impacts of large and smallscale hydropower developments are similar, and many environmental impacts have been identified. These impacts include, but are not limited to:

1. Conversion of rivers and streams to impounded waters with concomitant loss of stream fisheries. Impounded waters are usually managed to completely replace native fauna with a new introduced one,
2. Physical habitat alteration of downstream areas, including changes in water temperature, channel morphology or stream substrates that impact native fishes;
3. Reduction in recruitment of some species due to loss of spawning and rearing habitat caused by upstream flooding, lack of access to spawning areas inadequate fish -passage and others;
4. Stress and direct loss of fish due to project operation; i.e., stranding, nitrogen saturation, and reduced dissolved oxygen levels;
5. Loss of stream productivity due to variable releases, scouring of instream habitats, and altered water temperatures;
6. Replacement of native species by introduced fishes whose life histories are more compatible with altered stream environments.

Conversion of riverine areas to reservoirs has previously been judged beneficial because of the recreational opportunities afforded by fishing for game fish in lacustrine environments. Whereas such reservoir fisheries were once rare and natural streams

abundant, the decline of natural streams has proceeded at an alarming rate. In addition, the long-term maintenance of an acceptable level of reservoir sport fishing has proven to be an expensive venture because of the need for intensive, long-term management practices. These practices include put-and-take stockings, poisoning and restocking, and other management procedures.

## **Policy**

The policy of the American Fisheries Society in regards to hydropower development is to promote the conservation and preservation of remaining freeloading stream habitats in North America and to:

*1. Encourage and support the development of comprehensive fisheries plans and management objectives.*

Many major stream systems have no clear-cut management goals, objectives, or strategies, and for those that do, these often change with political boundaries. Without a management strategy, sustained losses may not be recognized as critical until too late. AFS can aid in the development of better management practices by stressing needs and solutions to some of the more pressing management issues in its publications and meetings.

Fish and wildlife agencies, Indian tribes, and others are encouraged to develop fisheries management plans for river basins and streams. These plans should be filed with regulatory agencies, including the Federal Energy Regulatory Commission (FERC). Recommendations for fish mitigation are more effective when they are made with respect to such plans.

*2. Encourage further development and integration of standardized procedures in hydropower impact assessment.*

Basin-specific fish management goals or comprehensive plans should be used to assess potential or existing impacts of projects. Project *proponents must* provide a complete analysis of these impacts, including assessment of water quality, quantity, and types of fish habitats present. Analytical techniques for hydropower impact assessment must include methods for determining project-specific and cumulative effects. Procedures for risk analysis for project features must be developed and implemented. Long-term monitoring and provisions for project modification must be incorporated into project design.

Standardized procedures must include better field inventory and data analysis and the development and use of improved data management and information systems. These techniques and systems must be institutionally integrated into the decision-making process.

AFS can encourage the development and incorporation of better methods for impact analysis by sponsoring demonstration projects, symposia, and workshops. AFS members should be encouraged to publish more information about the use of standardized procedures.

*3. Support better research to define critical impact thresholds for water quality parameters most commonly affected by hydropower projects.*

Individual and synergistic effects of dissolved solids and gases, changes in water temperatures, and sediment effects require further investigations relative to their effects on fish and fish-food organisms. Since these effects will vary by region and species, broad generalizations may result in the overprotection of some sites and inadequate protection for others. AFS can support water quality research by sponsoring symposia and by emphasizing research needs in its publications.

*4. Support the development of mitigation techniques and technologies intended to reduce or eliminate adverse impacts to fisheries resources from hydropower development.*

AFS should undertake a review of hydropower impacts and sponsor a symposium on state-of-the-art technology. AFS will only support implementation of proven technologies as a part of mitigation, and AFS stresses that monitoring and follow-up studies in demonstration projects are 32 absolute prerequisites for the use of unproven methodologies.

*5. Encourage licensing agencies to establish a fund, either project specific or pooled, that is sufficient to cover removal and restoration costs of nonfederal projects upon license termination.*

Many hydroelectric projects in North America are approaching the end of their project life. A fund is necessary to ensure that money is available to evaluate and implement dam removal or other restoration for projects that do not have capital available to do so. If a pooled fund is established, cost recovery from the project owner should be attempted even if the fund is used.

*6. AFS recommends that agencies consider relicensing under present environmental standards.*

Mitigation for project-related environmental effects for projects that are under consideration for relicensing should not be based on "continuing impacts"; i.e., that the existing project is the baseline environmental condition. We question whether any project has the legal right to remain without total reassessment, because environmental conditions are not static. We urge adequate mitigation for fisheries-related and other environmental damages of older projects that have little or no mitigation features. Relicense is a new commitment of public resources and must be judged in the full light of current environmental statutes.