FISHERY RESOURCES OF THE NATIONAL PARKS

A Portfolio of Policy Statements, Agreements, and Papers Dealing with the Research, Interpretation and Management of Fishery Resources and Recreational Fishing in Areas Administered by the National Park Service.

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Recreational angling for certain species of fishes has become established as a traditional use of a natural resource within areas administered by the National Park Service. In fact, in this respect protection of the fishes stands in a unique position. With the exception of a few other natural features such as pine cones, berries, downed wood, seashells, etc., the park visitor cannot legally carry away any other park features. The taking of natural baits for fishing such as aquatic insects, grasshoppers, wood grubs or angle worms theoretically is prohibited in National Parks.

Early laws relating to Yellowstone National Park provided for fishing for sport. This intent has not been seriously questioned in the creation of subsequent areas.

To provide sport fishing, exotic species have been introduced by transplanting and stocking into waters barren of fish life and in others supporting native fishes. Today relatively few waters exist in National Parks which have escaped this intentional and, all too often, indiscriminate practice. Natural conditions and native fishes have thus been sacrificed in many waters for the recreational benefit of a relatively small minority of park visitors who fish.

Recreational fishing thus has been provided for by law and is now firmly established by tradition. Management activities are being conducted to perpetuate this form of visitor-use.

This is the situation which prevails in National Parks today. The challenges which face the National Park Service concern:

1. The perpetuation of recreational angling for wild, colorful, vigorous trout in a visitor-use activity role which creates minimum interference with wildlife or features of scenic, scientific, or historic significance or with the enjoyment of these features by other park visitors.

2. The protection and perpetuation of the waters and native populations which remain under relatively unmodified conditions.

3. The restoration of at least representative lakes and streams and the associated aquatic life they contained to an original state.

To achieve these objectives, it is necessary for the National Park Service to complete a program which will include:

1. Research on the aquatic environments to determine the original and existing situations with respect to the composition of the fish fauna, the biological and physical conditions and ecological relationships.
An evaluation of angler-use activities in relation to other park-use activities and the protection of park features and their enjoyment by other park visitors.

3. The development and implementation of research, interpretation, and management plans for each park which possess significant aquatic life resources. These plans should be based upon adequate scientific investigations and should provide for:

(1) The perpetuation of unmodified waters and fish populations. (Barren waters which now exist, whether or not fish were ever introduced into them, for example, should be preserved in this fishless condition for the scientific value they incorporate. Deviation from this policy should be permitted only when it is clearly established that the scientific significance to be achieved by the introduction of fishes justifies such action.)

(2) The restoration of native species, natural aquatic conditions, and associated plants and animals in representative waters.

(3) The protection of wild fish populations.

(4) The perpetuation of angling experiences which emphasizes the recreational and aesthetic aspects of the activity rather than catch alone.

(5) The management of present resources through methods such as limited stocking, fishing regulations and law enforcement and through the facts secured from research and scientific investigations. (Primary reliance for fish for the angler will be placed upon the natural reproductive capacities of wild fish populations rather than upon planting of artificially reared fish.)

(6) The creation of greater appreciation and understanding of the aquatic resources through the interpretation of these features to park visitors.

O. L. Wallis
April 1963
POLICIES:

Protection and Management of Wildlife and Fish

Protection and Management of Wildlife and Fish

General

Conserving the wildlife is one of the significant purposes mentioned in the Organic Act of 1916, and plans for protection and management shall leave it and its habitat unimpaired for the enjoyment of future generations. The needs for protection of specific forms of animal life have been among the important reasons for the establishment of a number of parks and monuments. Wildlife in its natural environment is a primary visitor attraction. Associated with management and protection is the pressing responsibility for the perpetuation of endangered and vanishing species. Such forms must be preserved and encouraged for the enjoyment of generations yet to follow.

The animal life in areas administered by the National Park Service is varied in kinds and numbers and the complexity of management mounts as variety and competitions increase. Each species is an integral part of a living community and situations arising from its proper handling are often complicated. See the Organization Volume, Part 5 for certain broad policies established for their protection. More specific policies follow in this chapter.

Policies—Wildlife

Wildlife. The animals indigenous to the parks shall be protected, restored, if practicable, and their welfare in a natural wild state perpetuated. Their management shall consist only of measures conforming with the basic laws and which are essential to the maintenance of populations and their natural environments in a healthy condition.

Hunting. Hunting in areas of the National Park System is incompatible with their preservation in the manner contemplated by the authorizations for their establishment and will not be permitted, except as specifically provided by law.

Wildlife problems, especially those in relation to overpopulation, are to be solved effectively, but use of public hunting as a method of wildlife management aimed at readjusting
animal populations to approximate natural biotic conditions is definitely not to be a solution.

Predatory Animals. No native predator shall be destroyed because of its normal utilization of any other park animal or plant, unless such animal or plant is in immediate danger of extermination, and then only if the predator is not itself a vanishing form. When control is necessary, it shall be accomplished by transplanting, or if necessary, by killing offending individuals and not by campaigns to reduce the general population of a species.

Species predatory upon fish shall be allowed to continue in normal numbers and to share normally in the benefits of fish culture.

Exotics. Nonnative forms shall not be introduced into parks. Any exotic species which has already become established in a park shall be either eliminated or held to a minimum provided complete eradication is not feasible, and the possible invasion of the parks by other exotics shall be anticipated and steps taken to guard against the same.

Native Forms. Every native species in the areas of the National Park System shall be left to carry on its struggle for existence unaided as being to its greatest ultimate good, unless there is real cause to believe that it will perish if unassisted.

Where artificial feeding, control of natural enemies, or other protective measures are necessary to save a native species that is unable to cope with civilization's influences, every effort shall be made to place that species on a self-sustaining basis once more. The artificial aids, which themselves have unfortunate consequences, will then no longer be used.

Reintroduction. Any native species or subspecies which has been exterminated from a park shall be brought back if this can be done, but if a species has become extinct, no related species shall be considered a candidate for reintroduction in its place. If a subspecific variant of a species has become extinct, substitution of a closely related subspecies may be considered.
Adverse Biological Forces. Plants and animals which are inimical to the public health or welfare or which are destructive to historic, archeological or scientific structures, sites, features or records of primary importance shall be subject to neutralization or control.

Hoofed Animals. The numbers of native hoofed animals occupying a deteriorated range shall not be permitted to exceed its reduced carrying capacity and, preferably, shall be kept below the carrying capacity at every step until the range can be brought back to its original productiveness.

Artificial Feeding. No animal shall be encouraged to become dependent wholly or in part upon man for its support.

Captive Animals. Artificiality shall be avoided in the presentation of the animal life of the parks to the public. The preferred presentation shall be through wholly natural situations.

Management. Management measures or other interference with plant and animal relationships should be undertaken after a properly conducted investigation. Approval of programs for the destruction and disposition of wild animals which are damaging the land, or its vegetative cover and of permits to collect rare or endangered species has not been delegated. (See Organization Volume, Part 6, Chapter 2, Order 14, Section 1 (k).)

Endangered and Vanishing Species. The issuance of a scientific collector’s permit must be based upon the abundance of the species in the park which the permit applies. Every request must be considered carefully, and the collection of endangered or vanishing species is restricted or prohibited. Full information on scientific collecting and the appointment of collaborators may be found in the Natural History Section of the Manual, Volume IV, Part 2, and the Organization Volume, Part 6, Chapter 3.

Policies—Fishing

General Statement. Recreational fishing within National Parks and Monuments shall be permitted under management programs directed toward the perpetuation, restoration and protection of
native species and wild populations of fishes and the protection of the natural aquatic environments and the ecological relationships of the associated fauna and flora. This activity shall be directed so as to not decrease the wildlife, scenic, scientific or historic values of the park.

Where Fishing is Excluded. Fishing may be excluded from specific waters when necessary to preserve aquatic or terrestrial species or habitats which are limited in distribution or when such activity materially decreases the enjoyment of the area by the general public.

Native Species. The perpetuation, protection and restoration of native species in safe numbers in waters where they originally were found shall be given primary consideration in any management plan whenever possible.

Native Nonsport Fishes. All species of fishes are fully protected, except those designated for recreational angling.

Native nonsport fishes shall not be reduced or eliminated except as may be unavoidable and incidental to the primary objective of extirpating an exotic unwanted population of fishes.

In any restoration plan, native nonsport fishes should be reintroduced as well as the sport fishes.

Hybrid Trout. Hybrid trout shall not be stocked in waters of National Parks and Monuments.

Stocking. Artificial replenishment or stocking may be employed:

1. To reintroduce native species into waters where they have become eliminated or seriously depleted by natural or man-made causes.

2. To maintain fish populations in selected and approved lakes which are capable of supporting fish life, but which lack sufficient natural spawning facilities to maintain an adequate fish population to meet the need of recreational angling.
Size of Fish to Stock.

1. Fingerling trout may be planted in lakes where competent study had determined a need for supplementary stocking.

2. The stocking of eyed-eggs, fry or fingerlings in streams shall not be practiced except to restore a depleted population of native trout. (Numerous qualified studies on streams of varying sizes throughout the country have demonstrated that where conditions are suitable for trout, natural populations are maintained at maximum carrying capacity by natural reproduction. Planting of eyed-eggs, fry or fingerling trout in streams to supplement this natural reproduction has proven to be of negligible or no benefit.)

3. Stocking of catchable size trout to provide "put and take fishing" is not compatible with the fundamental concept of the National Park Service, therefore, the planting of fish for immediate recovery by the angler shall not be made in waters of national parks and monuments.

4. Adult wild trout may be transplanted to re-establish native species or depleted populations.

Stocking National Parkways. Recreational fishing within National Parkways is permitted under management programs and stocking procedures normally practiced by the State or States in which the Parkways are located. This activity shall be regulated by the National Park Service.

Each Parkway Superintendent shall designate Parkway fishing waters. When the impact of fishing pressure would create damage to Parkway, features and facilities, would produce hazardous traffic congestion or would result in unusual enforcement problems, individual waters may be closed to fishing and to stocking.

Stocking Exotic Species. Exotic species of fishes or other exotic animals, or any exotic species of aquatic plants may not be introduced or stocked in waters of the National Parks and Monuments except:
1. In waters where exotic fishes are established and the restoration of native species is impracticable.

2. Where adequate investigations have demonstrated that additional planting is desirable and necessary to supplement limited or nonexisting natural reproduction.

Management of Exotic Sport Fishes. In waters where exotic sport species of fishes are established, and they are valuable for angling and are ecologically compatible with the existing environment, and their replacement by native species is impracticable, the fishery for the exotic species will be managed in a manner similar to that for native forms.

When replacement of the exotic by the native species is practicable, the latter shall be encouraged to take over its former place.

Removal of Exotic Species—Eradication or Control. Where exotic species have become dominantly established to the detriment of the native species, restoration of the original fish composition may be brought about by the removal of the undesirable exotics. Standard eradication methods; such as, chemical treatment or electric shocking may be employed. Also, these methods may be employed to control exotic species where complete elimination is not feasible.

The need for and techniques to be used for an eradication or control program shall be based upon adequate investigations by aquatic biologists.

Egg Taking. The taking of eggs from fishes for the purpose of artificial propagation within waters in national parks and monuments is rarely justified and should not be permitted until a thorough review has been made.

Protection of Virgin Waters. Lakes and streams which are barren of fish life shall remain in this virgin condition and shall not be stocked.

Artificial Improvement of Lakes and Streams. All forms of artificial improvement of streams or lakes for fishery management purposes which would change the natural habitat and the surrounding landscape are prohibited, except that, when the aquatic
environment has been so altered by man that restoration by natural means is improbable, measures may be taken to return the streams and lakes to a more natural condition.

Management by Regulations. To preserve the populations of native species and yet allow angling, sport fishing shall be controlled by regulations which provide for the conservation of native species of fishes and compatible management of introduced, established species. Limits shall be established so that the total catch will not exceed the natural productive capacity of the waters. Creel limits shall not be considered as "goals".

Fishery Investigations. The conservation and proper management of the fishery resources and angling as a recreational activity is dependent upon a complete knowledge of the status of the fish fauna and the angling pressures being exerted. Adequate and continuing investigations are vital to the successful preservation and management of this resource.

Commercial Fishing. Commercial fishing is generally non-compatible with National Park Service objective and shall be permitted only within national parks and monuments where this activity is specified by law. It will be conducted under restrictions which are designed to conserve and perpetuate the resource.

Publicity. Publicity regarding fishing within the areas of the National Park System shall be directed toward the recreational and esthetic values, and the appreciation of the unspoiled environment as a whole rather than emphasis on the catch. Information regarding angling will be factual and realistic with respect to fishing conditions.

Promotional types of publicity are discouraged but this does not apply to release of information on subjects of conservation of aquatic resources, fish regulations, care of fish by anglers, or the place of angling in the national park experience.

Agreements

Memoranda of Agreement with Fish and Wildlife Service. The need for consultation, and agreement on certain phases of fish
and wildlife investigations and management has been established through Memoranda of Agreement with the Fish and Wildlife Service.

The Secretary of the Interior approved one such agreement on March 5, 1956, that pertained to fish stocking procedure, operation of fish traps and taking of spawn, the assignment of fish from Federal hatcheries, and wildlife research and management procedures.

There is an agreement between the National Park Service, the Fish and Wildlife Service, the Clark County (Nevada) Commissioners, the Nevada Fish and Game Commission, and the Arizona Game and Fish Commission relating to the management of the fishery resources of the Colorado River below Hoover Dam.

An agreement with the Fish and Wildlife Service was made on July 12, 1951, which is a supplement to the agreement of March 5, 1946, pertaining to predator and rodent control work adjacent to areas under the jurisdiction of the National Park Service. Predator and rodent control is to be done after consultation between the two agencies. Specifically, 1080 Stations (sodium fluoracetate) are not to be placed within three miles of the boundary of areas administered by the National Park Service except by joint agreement.

The Secretary of the Interior approved an agreement between the Service and the Fish and Wildlife Service on June 19, 1952, whereby the Fish and Wildlife Service can grow hay in Grand Teton National Park for the purpose of feeding the Jackson Hole elk herd.

The full text of these agreements can be found under Cooperative Agreements, Part 10, of the Organization Volume, Administrative Manual.
The intent of this section of the policies for the protection and management of fishery resources is that publicity relating to angling in areas of the National Park System shall be essentially nonpromotional in nature. It is not the Service's objective to "sell fish" but rather the recreational and aesthetic aspects of angling as it blends into the broad scope of a park visit. This policy does not exclude the release of information relating to the conservation of aquatic life resources, angling regulations, and the role of fishing in the park experience.

A preliminary set of guidelines has been prepared to assist in developing a uniform interpretation and application of the intent and word of this policy in various forms of public contact. For several years they have informally served in the preparation of the free park informational booklets. It is now proposed that they be applied to all other forms of visitor contact through various informational and interpretive media.
Guidelines for the Use of Information on Fishes and Fishing in the Various Areas of Public Contact in Areas of the National Park System:

1. Recreational and aesthetic aspects of the angling experience rather than the catch, alone, shall be emphasized.

2. In areas where angling is a significant recreational activity, a statement regarding it will normally be included under the "What to Do and See" section of the informational booklet.

3. A brief statement on rules and regulations relating to this activity and the license requirements may be included in the "What to Do and See" or the "Regulation" section of the booklet.

4. The National Park Service policy and philosophy about recreational angling and the preservation of native fishes should receive appropriate emphasis.

5. Consideration should be given to the inclusion of catch phrases to emphasize this philosophy: Fish-For-Fun! Keep only the fish you will use in camp! Waste of fish may decrease your future recreational opportunities! Limit your kill not your catch! There's more to fishing than catching fish!

6. A brief discussion of special regulations, such as Fishing-For-Fun or Fly-Fishing-Only, will help to explain the objectives of these programs in the park's pattern of recreational angling and fish conservation.

7. Reference to stocking and hatchery fish should not be incorporated into park informational booklets and should receive a subdued position in press releases and informational and interpretive presentations. Undue emphasis upon this aspect of fishery management frequently tends to attract those solely interested in fishing.

8. An interpretive statement about the fishes and aquatic environments should be considered for inclusion in the "Natural History" section of the informational booklet in parks where the fishes are significant or where fishes can be readily observed by park visitors.

9. In parks where a unique fish is especially significant consideration should be given to illustrating it in the informational booklet.
10. A photograph of angling activity adds interest to an informational booklet but should be used only when the figure of the angler is subordinate to the scenic background. Such a picture may well illustrate the Service's theme of "recreational angling amid highly scenic surroundings in an unspoiled wilderness." An illustration which merely pictures anglers and fishing activity is considered to be of a promotional nature and should be discouraged. (In folders for recreational areas where fishing is considered as a primary use, a picture of anglers and fishing would be considered correct, although a photograph of an angler fishing amid scenic surroundings would be more appropriate.)

11. Catch pictures should not be used. The angler and his catch may make an excellent promotional picture for a sporting goods catalogue or chamber of commerce release but is inappropriate for National Park Service publications and presentations.

C. L. Hallic
Memorandum

To: Washington Office and all Field Offices

From: Assistant Director, Conservation, Interpretation and Use

Subject: Use of chemicals for fish and aquatic vegetation control and restoration operations

Considerable but unintentional damage to aquatic life within Dinosaur National Monument was caused by the chemical fish control operation conducted in the Green River of Wyoming and Utah outside the Monument boundary. Secretary Udall is vitally interested in this situation and in preventing future occurrences of this kind. Recently he has released his personal review of the situation, and has established directives to be observed in the planning and operation of all such projects supervised by this Department. You are instructed to study his review and the accompanying Departmental statement which are enclosed.

The directives referred to above will be further defined. Until more specific instructions are received, detailed plans for fish and aquatic vegetation control projects within waters under the jurisdiction of the National Park Service shall be submitted to the appropriate regional director for comment and for his transmittal to this Office for review and approval prior to their implementation. (This is a temporary limitation on delegated authority.)

These plans shall include a statement of the situation which indicates the need for a fish or aquatic vegetation control or restoration program; a biological and physical survey of the water to indicate the species of native and introduced fishes present, the volume of water and related information; the methods and chemicals recommended for the operation; precautions proposed to confine the effects of the program to the specific waters involved; measures to be taken to reintroduce native nonsport, as well as sport, species of fishes; the long-range stocking and management schedule; and the program for follow-up investigations.
From time to time, fish and aquatic vegetation chemical control operations may be proposed and conducted by other agencies in waters located outside park boundaries or in waters within the boundaries which are not under the Service's jurisdiction. When such proposals and activities may directly and adversely influence park aquatic resources, the superintendent will promptly report this information to his regional director. Upon the completion of an actual control project, a report describing the effects of the chemical treatment program shall be forwarded to the regional director. These reports with related comments and recommended action shall be transmitted to this Office by the regional director.

This memorandum should be retained until appropriate instructions are incorporated in the Fish and Wildlife Management Handbook.

Jackson E. Price
March 25, 1963

REVIEW OF GREEN RIVER FISH ERADICATION PROGRAM

I have received the attached report on the Green River fish eradication program, conducted by the Utah and Wyoming game and fish departments and supervised by the Bureau of Sport Fisheries and Wildlife in September 1962.

The anticipated benefit—a regional trout fishery which will last several years—has been realized, and stocking of trout in the reservoir and tailwaters will begin this spring.

During the treatment operation, toxic materials spread downstream, despite prior plans and chemical detoxification precautions, and a widespread kill of fish and aquatic insects occurred in Dinosaur National Monument.

Because of the disparity between anticipated and actual results of this treatment operation, I have reviewed it with some care.

Fishery management programs will continue to be undertaken in the future in order to enhance the recreational benefits of various water impoundments. In order that future programs may fully benefit from the experience gained at Flaming Gorge, the following directives are set forth for all projects supervised by this Department:

That adequate research be undertaken on the effects of rotenone, potassium permanganate, or other fish controlling agents, under varying environmental conditions, before additional management programs are undertaken, and that when such programs are carried out, research results are applied in a way that is relevant.

Whenever there is question of danger to a unique species, the potential loss to the pool of genes of living material is of such significance that this must be a dominant consideration in evaluating the advisability of the total project.

I am taking measures to assure that future projects are reviewed to assure that experimental work is taken into consideration, and that possible deleterious effects are evaluated by competent and disinterested parties.
As a follow-up of last September's operation on the Green River, I am asking the National Park Service and the Bureau of Sport Fisheries and Wildlife to undertake fish population studies this summer in Dinosaur National Monument to determine the extent of species and population impairment. I am also asking them to plan a longer range research project which will assess the changes on habitat and populations in Dinosaur National Monument brought about by the closing of Flaming Gorge Dam.

These complementary measures will assure a more accurate basis of knowledge for the undertaking of future fishery management projects, and will assure that there is no damage to the environment beyond the intended scope of the operation.
MEASURES TO IMPROVE SPORT FISHING AT FLAMING GORGE UNIT, COLORADO RIVER STORAGE PROJECT, WYOMING AND UTAH

The following statement describes the chemical fish control program carried out on the Green River, September 1962; its effects upon aquatic life in Dinosaur National Monument; and its anticipated benefits to sport fishing on Flaming Gorge Reservoir, Wyoming and Utah.

Measures required to enhance the sport fishing potential of the reservoir to be created by the Flaming Gorge Dam were cooperatively investigated by the Bureau of Sport Fisheries and Wildlife and the Utah and Wyoming Fish and Game Departments over a period of several years. These studies indicated that a trout fishery could be developed in the new lake if populations of non-game fishes could be controlled so as to prevent serious competition with the trout to be introduced. Such competition could prove to be detrimental to the optimum growth and survival of the trout.

Accordingly, it was proposed to treat the waters of the Green River above the dam site with rotenone to kill the non-game fish species. Rotenone kills fish and other aquatic organisms by suffocation, without detriment to bird or mammal life. Fish killed by rotenone can be used safely for food.

Concern was expressed that the operation would threaten the fish and wildlife of Dinosaur National Monument, 45 miles downstream from the dam site. Final plans were approved when it was concluded that the fish control project would not eliminate any fish species, that effects upon the aquatic life of Dinosaur National Monument would be minimal, and that the size of the sport fishery which could be developed economically justified the program.

According to previous investigations, rotenone rapidly weakens through oxidation in flowing waters. To further insure detoxification of the rotenone, arrangements were made to introduce potassium permanganate, an oxidizing agent, into the river before it entered Dinosaur National Monument.

Authorization

The Act of April 11, 1956 (P. L. 458, 84th Congress) authorized the Secretary of the Interior to construct, operate, and maintain the Colorado River Storage Project and participating projects for regulating the flow of the Colorado River, storage of water for consumptive use, reclaiming
arid and semi-arid lands, the generation of hydro-electric power, and other purposes. Section 8 of this Act authorized and directed the Secretary to investigate, plan, construct, operate and maintain facilities to mitigate losses of, and improve conditions for, the propagation of fish and wildlife in connection with the development of the Colorado River Storage Project and participating projects. The Bureau of Sport Fisheries and Wildlife supervises these functions as approved by the Secretary of the Interior, much of which is carried out by the States.

Four major storage units authorized by the Act are now under construction. These are the Navajo Unit on the San Juan River in New Mexico and Colorado; the Glen Canyon Unit on the Colorado River in Arizona and Utah; the Flaming Gorge Unit on the Green River in Wyoming and Utah; and the Curecanti Unit on the Gunnison River in Colorado. A number of participating projects were also authorized and will require water storage developments for irrigation and other uses.

The first detailed planning of Section 8 operations for fish and wildlife began in the early months of 1960. These first plans included rough fish control, not only for the Flaming Gorge Unit, but also for the Navajo Unit. The matter was brought up at a hearing of the Interior Appropriations Subcommittee on May 8, 1961. Chairman Carl Hayden of the Subcommittee inserted in the record a letter to him of May 5, 1961, from Wayne E. Kirch, Colorado River Wildlife Management Committee. This letter transmitted a Resolution urging the appropriation of funds for the Flaming Gorge Fishery Control Program in the 1962 fiscal year. It was noted by Mr. Kirch that this Resolution was unanimously approved and the wish of some 100 delegates to the meeting of the Colorado Wildlife Management Committee, representing the States of Utah, Nevada, Arizona, and California. The Resolution read in part:

"WHEREAS, large numbers of non-game fish inhabit Green River at the Flaming Gorge dam area and after impoundment these non-game fish species would seriously compete with game-fish species and severely hinder the successful introduction in the establishment of the game species and;

"WHEREAS, both the States of Utah and Wyoming feel it necessary to eradicate the non-game fish in Green River and desirable tributaries above the Flaming Gorge dam site to foster proper fishery management of the river segment in question . . . . . . . . . .

"RESOLVED, that the Colorado River Wildlife Management Committee, .urgently request the Appropriations Committee of the Congress to appropriate $173,000 in 1962 fiscal year budget for the Green River fish eradication program."
There followed a cross-examination by the Appropriations Subcommittee on this proposal, which occupies five printed pages of the public record. During it, the Commissioner of Fish and Wildlife and members of the Bureau of Sport Fisheries and Wildlife were interrogated at length on the plans and probable effects of the fish control proposal at Flaming Gorge. Subsequently, the funds for the Flaming Gorge fishery project in the amount of $173,000, as well as those for a similar but smaller project at the Navajo Unit in the amount of $72,000 were included in the Public Works Appropriation Act, signed on September 30, 1961. The Navajo operation was completed in the fall of 1961.

Detailed planning continued in the ensuing 11-month period, during which the project was discussed and reviewed by a large number of interested persons. A summary statement describing the operation was prepared and furnished those who had voiced an objection or sought information. Some 200 of these statements were made available to interested persons in all parts of the Nation, prior to the conduct of the operation.

The American Society of Ichthyologists and Herpetologists, in a resolution passed at their annual meeting March 30-April 3, 1961, voiced opposition to the proposed Flaming Gorge fish control project on the grounds that it would destroy populations of rare native fish species. The project was, in turn, defended by the State fish and game departments of the Colorado River area, and was supported by the Sport Fishing Institute and the Bureau of Sport Fisheries and Wildlife on the grounds that such treatment is an established and demonstrated method of improving sport fishing. The Bureau of Sport Fisheries and Wildlife furnished to all members of the Congressional Delegations from the Colorado States on June 28, 1962, 2½ months before the operation, a progress report in which plans for the control of the fish in the Flaming Gorge area were set forth. Among other things, it pointed out that precautions were being incorporated in the plan to prevent toxic materials being transported into Dinosaur National Monument.

Report of the Operation

The fish control program was conducted by the Wyoming and Utah State Fish and Game Departments in September 1962, with coordination and assistance from the Bureau of Sport Fisheries and Wildlife. A total of 19,000 gallons of 5 percent rotenone solution was introduced into the Green River at various stations beginning at Pinedale, Wyoming, on September 4, and concluding at a site located 7 miles upstream from the Flaming Gorge Dam site on September 7. Approximately 450 miles of the main stream and its tributaries were treated.

To detoxify any residual rotenone, and thus restrict contamination of waters flowing through Dinosaur National Monument, potassium permanganate was released at Browns Park, 29 miles below Flaming
Gorge Dam and 16 miles upstream from Dinosaur National Monument. Potassium permanganate was applied first from this station at 6:10 a.m., September 8, just prior to the arrival of the first water containing measurable traces of rotenone. Release of the detoxifying chemical was discontinued at 5:00 p.m., September 11, when observations of fish held in live boxes and chemical tests indicated that the concentrations of rotenone in the river had been reduced to a level considered safe for the protection of fish and other aquatic life farther downstream. Precautionary measures were taken to protect domestic water supplies in the area treated.

Despite these precautions fish and aquatic insects were killed in Dinosaur National Monument. On September 9, National Park Service personnel reported that fish had been observed in distress in the Green River at Gates of Lodore. Similar observations were made on September 13 at Echo Park and, on September 14, in the Green River at the Split Mountain campground situated near the lower boundary of the Monument. In response, personnel of the Bureau of Sport Fisheries and Wildlife and the State of Utah arrived at the Monument on September 15 to make further observations. Rainbow trout placed in bio-assay jars containing water taken from the Green River at Split Mountain showed no signs of distress. Live fish of several species, apparently unaffected, were observed. The tests indicated that the toxic effects of the rotenone had diminished by this time to below the lethal level. Available information suggests that a mass or "block" of water containing toxic material passed down the river through the Monument. A complete review of this incident is being made to determine when and how this unfortunate and unforseen accident took place.

Follow-up studies to reveal the extent of the damage to the aquatic life of Dinosaur National Monument were conducted later in September and in early October by personnel of the Bureau and from Utah. Although it is evident that the numbers of fishes have been reduced in some locations, all species of fishes previously collected from the Green River, except the humpback chub, were found during these investigations. A decline in numbers of aquatic invertebrates has been reported, also. An over-all report on this project is being prepared.

That any destruction occurred to the aquatic life in Dinosaur National Monument is regrettable. Investigations will be continued to determine the extent of damage to aquatic life, and to what extent it is of a temporary or a permanent nature. Based upon past experience with similar operations, it is expected that aquatic insect life will recover rapidly. The humpback chub occurs elsewhere in the Colorado
River system, and can be reintroduced into the Green River if the modified habitat remains suitable for the species and if it does not return by natural movement.

In the meantime, additional radical ecological changes are taking place in the Green River due to the control of the stream flows, the changes in water temperatures, and the reduction in downstream silt loads as influenced by the regulation of the river at Flaming Gorge Dam. The cumulative effects of these ecological modifications due to impoundment of waters may be expected to influence adversely the habitats and the perpetuation of several native species and cannot be fully predicted at this time.

Anticipated Benefits

The various reservoirs of the Colorado River Storage Project and related developments will have significant impacts on the existing fish and wildlife resources of the Upper Colorado River Basin, and will, at the same time, provide opportunities for the development and management of these resources in the interest of improved fishing and hunting by the public. Measures are being planned and carried out to prevent undue damage to, and improve conditions for, fish and wildlife resources wherever possible as a part of the over-all project development.

The storage reservoirs will be located in particularly scenic areas, and with proper fishery management development they are expected to provide high-quality fishing opportunities for hundreds of thousands of people each year. It has been estimated that they will receive more than two million visitor-days of total recreational use each year. It is expected that one-fifth of this total will involve sport fishing.

With non-game fish populations reduced in the streams above Flaming Gorge Dam, trout stocking operations will be undertaken with expectation that the introduced trout will thrive to develop a sport fishery of major magnitude. On the basis of known experience this fishery can be expected to last from 5 to 10 years. During that period, sport fishing on the reservoir and tailwater is expected to support 120,000 fisherman-days of total recreational use each year. Based upon the 1960 National Survey of Fishing and Hunting, this activity will result in an annual economic benefit of more than $600,000 for the area in the form of expenditures. The recreational benefits to those who fish in these waters will likewise be significant.

February 13, 1963
SOME COOPERATIVE ACTIVITIES OF THE U. S. FISH AND WILDLIFE SERVICE

IN FISHERY RESEARCH AND MANAGEMENT IN NATIONAL PARKS

The U. S. Fish and Wildlife Service, and its predecessor—the Bureau of Fisheries—have conducted cooperative research and management investigations on fishery areas administered by the National Park Service and have provided fish for stocking park waters since the 1880's.

In the past decade, research projects were undertaken in Great Smoky Mountains and Shenandoah National Parks, in Rocky Mountain National Park, and in Yellowstone National Park.

Research on the cutthroat trout and fishing activities of Yellowstone Lake, started in 1945 was continued until 1961 by the U. S. Fish and Wildlife Service when continuing management studies were initiated. A number of reports and publications from this research program have provided the basis for current management activities, and an understanding of the dynamics of the trout populations and the lake environment. Current investigations, using this research as a foundation, provide a continuing indication of the welfare of the trout populations in relation to fishing pressures. These studies consist of age and growth studies, weight and length measurements of trout in the spawning runs and in the catch, and angler catch records. Drs. James Hooffatt, Oliver Cope and Norman Benson headed the research projects.

The project in Great Smoky Mountains, initiated in 1952, was directed toward the determination of the trout populations in the streams of the Park in relation to other fish species and angler-use activities. It resulted in a detailed management plan, the experimentation with various management techniques such as electro-shocking methods for fish sampling and fish control methods, and an annotated checklist of the native and introduced fishes of the Park.

Research on the native brook trout and streams of Shenandoah National Park were conducted between 1952 and 1959. An evaluation of the streams and the development of a management program were among the benefits realized. Dr. Robert E. Haugen and Phillip S. Parker headed the research activities in these two parks.
The history studies of a loca strain of cutthroat trout were conducted in Rocky Mountain National Park in 1958 and 1959 by the U. S. Fish and Wildlife Service. The purpose of this research was to determine the validity of this form and the needs for special management.

Current research is being conducted on the native fishes of the Green River in Dinosaur National Monument and the ecological changes created by the control of waters by Flaming Gorge Dam.

In addition to the research projects undertaken, the U. S. Fish and Wildlife Service through its Bureau of Sport Fisheries and Wildlife has provided the National Park Service with fishery management services. These services have consisted of cooperative lake and stream investigations to assist in the formulation of management plans and trout stocking programs. Such activities have been undertaken in Olympic, Mount Rainier, Crater Lake, Glacier, Rocky Mountain, Mammoth Cave, Lake Superior National Parks, Blue Ridge Parkway and Prince William Forest, and Bandelier National Monument.

Further cooperation of the U. S. Fish and Wildlife Service has been demonstrated in the provision of trout for stocking purposes in many parks including: Olympic, Mount Rainier, Glacier, Yellowstone, Rocky Mountain, Grand Teton, Great Smoky Mountains, and Acadia National Parks, and the Blue Ridge Parkway.

The National Park Service has provided services, facilities, and resources which have been beneficial to the operations and activities of the U. S. Fish and Wildlife Service. Through a cooperative arrangement with the National Park Service, the Bureau of Commercial Fisheries of the U. S. Fish and Wildlife Service, operates a field research station and other facilities associated with research on the rock salmon at Katmai National Monument. As a significant by-product, these research investigations have provided the National Park Service with information which will prove to be useful in the identification and the preservation of the native fish fauna of the Monument.

The National Park Service assists the U. S. Fish and Wildlife Service by granting permission to collect grayling eggs in Yellowstone National Park for use in efforts to establish and perpetuate this unique species in other waters outside the park and for use in attempting to develop hatchery brood stocks of this species. For specialized serological studies on wild rainbow trout, the U. S. Fish and Wildlife Service secured specimens from several waters in Yellowstone National Park in 1962. Trout from park waters were especially significant because they represented completely wild populations free from contamination by hatchery stock.

The Bureau of Commercial Fisheries is conducting life history studies of the pink shrimp and various sport and commercial fishes in the waters of Everglades National Park. In addition, the Bureau of Sport Fisheries and Wildlife
to undertake ecological research on the estuarine environments in the Park. These studies will be useful to the National Park Service, also.

Cooperative relationships between the National Park Service and the U. S. Fish and Wildlife Service are authorized under the "Memorandum of Understanding" approved by Fred A. Seaton, Secretary of the Interior, June 15, 1963. A copy of this memorandum is attached.

O. L. Wallis
Aquatic Research Biologist
MEMORANDUM OF UNDERSTANDING
BETWEEN THE
NATIONAL PARK SERVICE
U.S. FISH AND WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR

WHEREAS the National Park Service is responsible by law to conserve the scenery, the natural and historic objects, and the wildlife within the lands under its jurisdiction, and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations; and

WHEREAS the National Park Service recognizes the need for assistance on technical matters in furtherance of its fish and wildlife responsibilities on lands under its administrative jurisdiction; and

WHEREAS the U.S. Fish and Wildlife Service, as the principal Federal agency dealing specifically with fish and wildlife resources, is qualified to make surveys of these resources on Federal lands and to conduct comprehensive programs of scientific investigation which will provide a sound biological basis for fish and wildlife conservation.

NOW, THEREFORE, it is mutually agreed as follows:

I

The U.S. Fish and Wildlife Service, when requested by the National Park Service, will aid in the conservation and interpretation of biological resources in the National Park System and assist in its natural history research program by providing technical advice and services as stipulated in this agreement. All assistance rendered by the U.S. Fish and Wildlife Service to the National Park Service under this agreement will be carried out with full recognition of and in compliance with basic policies of the National Park Service.

II

1. The U.S. Fish and Wildlife Service, when requested or approved by the National Park Service, will conduct research projects on National Park System lands, keeping within the regulations and policies of the National Park Service. These research projects will be designed to advance technical knowledge on fish and wildlife conservation. The study areas within the National Parks and Monuments may serve as natural "check" areas in relationship to research studies by the U.S. Fish and Wildlife Service outside the National Park System. Advice and information in all cooperative research projects will be freely exchanged.

2. The U.S. Fish and Wildlife Service will endeavor to provide, through necessary investigations, information basic to the
conservation and interpretation of fish and wildlife in the National Parks. Such studies may include but will not necessarily be limited to biological surveys, taxonomy, distribution, population dynamics, life history, ecology, habitat requirements, pesticide-wildlife relations, parasites and disease, and food habits.

III

1. When requested, the U. S. Fish and Wildlife Service will assist the National Park Service by conducting surveys of its marine and fresh-water resources, including the following: the status of fish populations, angler use, feasibility of native fish restorations, reclamation of habitat, needs for stocking, preparation of stocking schedules, securing and distribution of fish, formulation of fishing regulations and providing technical guidance. Equipment and services will be provided as available.

2. The National Park Service will assist in fishery surveys and approved fish restoration projects by providing such manpower, equipment and facilities as may be available for the purpose.

3. The National Park Service will consider requests for the taking of fish and fish eggs for cultural purposes from Park waters when such programs will not jeopardize the welfare of the species in the Park or other Park values.

IV

1. Wildlife management techniques will be developed and recommended when requested and may include animal control and restoration methods when they are required.

2. The National Park Service will assist in the development of approved wildlife management techniques within the Parks and Monuments by providing such manpower, equipment and facilities as may be available for the purpose.

V

Scientific specimens of plants and animals collected by employees of the U. S. Fish and Wildlife Service for taxonomic or other research will be deposited in the study collections of the U. S. Fish and Wildlife Service or other suitable institutions until catalogued as a part of the U. S. National Museum collections. When desired by the National Park Service, duplicate specimens will be provided.
VI

Reports or manuscripts prepared by the U. S. Fish and Wildlife Service which are related to the policy, administration, interpretation, or management of fish and wildlife on areas administered by the National Park Service will be released or published only after mutual agreement in each specific case.

VII

Within the limitations of administrative requirements and the policies applicable to areas administered by the National Park Service, the results of the technical studies made by the U. S. Fish and Wildlife Service will be applied to specific problems by the National Park Service. The U. S. Fish and Wildlife Service will continue to provide technical assistance as may be required in carrying out approved recommendations and programs.

VIII

The extent to which the U. S. Fish and Wildlife Service and the National Park Service will undertake projects falling within the terms of this Memorandum of Understanding will depend upon budgetary considerations and availability of personnel. By mutual agreement, funds may be transferred from one agency to the other for the purpose of implementing this agreement.

IX

The memorandum of agreement between the National Park Service and the U. S. Fish and Wildlife Service, dated March 5, 1946, is superseded by this Memorandum of Understanding.

X

This Memorandum of Understanding shall become effective when approved by the Secretary of the Interior, and shall continue in force and effect until terminated by either agency upon sixty (60) days written notice to the other.

(Sgd.) Conrad L. Wirth
Director, National Park Service

Approved: June 15, 1960

(Sgd.) D. H. Janzen
Acting Commissioner, U. S. Fish and Wildlife Service

(Sgd.) Fred A. Seaton
Secretary of the Interior
Memorandum

To: Washington Office and All Field Offices

From: Assistant Director, Conservation, Interpretation and Use

Subject: Channels of Communication, Bureau of Sport Fisheries and Wildlife and the National Park Service, Matters Relating to Fishery Management Services and Fish Stocking

During a recent meeting of the Regional Supervisors of Fishery Management Services, Bureau of Sport Fisheries and Wildlife, attended by representatives of the National Park Service, the subject of desirable channels of communication on matters relating to fishery management services were discussed. As a result, the Service has adopted the following standard procedures for communication on interagency cooperative fishery programs which you are requested to use:

1. General Procedures:

   a. Washington Office, NPS, will communicate with the Central Office, BSF&W, on matters relating to fishery management services which concern policies and programs of general Servicewide application and will review new projects which require additional budgetary consideration.

   b. A National Park Service Regional Office may communicate with the appropriate Regional Office, BSF&W, regarding the general coordination, planning and implementation of matters relating to fishery management services in areas administered by the National Park Service within a specific Region. Copies of this correspondence should be transmitted to the Washington Office, NPS.

   c. A Park Superintendent may communicate directly with the appropriate Regional Director, BSF&W, on routine matters including projects and services which have been approved. Two copies of such correspondence should be sent to the appropriate Regional Director, NPS.
2. Requests for Initiation of New Services:

a. A Park Superintendent will submit his request for the initiation of fishery management services to his Regional Director in duplicate.

b. The Regional Director, NPS, after evaluating the submission in view of total Regional requirements, may request the services desired by an individual park from the appropriate Regional Director, BSF&W, with copy to Washington Office, NPS.

c. After the Regional Director, BSF&W, has reviewed the request he will inform the Park Superintendent directly if and when the services desired can be undertaken. Two copies of this correspondence should be forwarded to the Regional Director, NPS.

3. Stocking of Fishes:

a. A Park Superintendent will submit his request for hatchery fish, required to fill needs established in an approved stocking program, directly to the appropriate Regional Director, BSF&W, with two copies of correspondence to Regional Director, NPS. (This request should not be submitted directly to the Superintendent of a National Fish Hatchery.)

b. A Park Superintendent may communicate directly with the Hatchery Superintendent on details concerning the delivery of fish for stocking purposes or on similar matters relating to an approved fish distribution program after it has been scheduled by the Bureau's Regional Office.

4. Distribution of Reports:

a. The Bureau has been requested to provide the National Park Service with three copies of reports developed from fishery management services conducted by the Bureau in areas administered by the Service; one copy to be sent directly to the Park Superintendent; a second copy to the appropriate Regional Director, NPS; and the third copy to the Washington Office, NPS.
b. Superintendents of parks in which the Bureau of Sport Fisheries and Wildlife is providing active fishery management services will provide the appropriate Regional Director, BSF&W, with two copies of the Annual Fishery Resources Report.

This memorandum should be brought to the attention of individuals concerned and should be retained until its contents have been incorporated in the Fishery Management Handbook.

[Signature]

Interior - Duplicating Section - Washington, D. C.
Management of Sport Fishing in National Parks

ORVILLE L. WALLIS
National Park Service, U. S. Department of the Interior

ABSTRACT

The National Park Service, entrusted with the perpetuation of natural aquatic conditions in areas it administers, manages recreational fishing so as to create minimum disturbances to these resources. In national parks and monuments angling cannot be managed independently of other park uses and features of significance. The objectives of the conservation of park fishery resources differ in some respects from those which govern programs in waters located outside park areas. The policy and program for the management of sport fishing are outlined.

Fishery resources of the national parks and monuments of the United States are part of the great heritage entrusted to the National Park Service to preserve and perpetuate for present and future generations. Management entails the safeguarding of these resources while providing recreational angling for limited numbers of park visitors who fish.

Recreational angling is a recognized use of these natural resources. This use may appear to be a deviation from the fundamental conservation concept that all forms of wildlife within the national parks and monuments shall receive full protection. In reality, angling is provided for by law in some parks, by rules and regulations in others, and by tradition throughout the Service. Commercial fishing is permitted in a few parks, also.

Birds and mammals of Yellowstone National Park receive full protection by the law of 1894 which specifically prohibits the killing of these animals while providing for the catching of fish by the use of hook and line only. In addition, it directs "... that the Secretary of the Interior ... shall make rules and regulations governing the taking of fish from the streams and lakes in the park." Similar provisions are contained in legislative actions which relate to the establishment of many other national parks. Consequently, fishing is a park-visitor use which dates from the creation of the first national park in 1872.

The law which established the National Park Service in 1916 endowed it with this responsibility: "... to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." The Service has developed a policy and program which provides for recreational fishing consistent with these primary objectives.

In areas such as Lake Mead and Shadow Mountain National Recreation Areas, where recreational activities are administered by the National Park Service, we cooperate with state agencies and the Bureau of Sport Fisheries and Wildlife in the management of the fishery resources. In national parks and monuments the National Park Service assumes the primary responsibility for the management of sport fishing.

A critical evaluation of fishery resources to determine needs for research, investigations, interpretation, and management is now being conducted. The place of recreational angling in the scope of visitor activities also is being reviewed.

The program is directed toward:

1. The determination of original and present aquatic conditions.
2. The perpetuation and restoration of native fishes, natural aquatic conditions, and associated plants and animals.
3. The protection of wild fish populations. (Wild fish are defined as native or exotic fish which have been naturally produced or which have been stocked during previous season's as fingerlings. In contrast, put-and-take fish are recognized as hatchery fish introduced for the purpose of being caught immediately or during the current season.)
4. The provision of an opportunity to fish for wild, colorful, vigorous trout amid surroundings which remain as nearly natural as possible. This activity is to be conducted in a manner that shall create minimum interference with wildlife

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5. The management of present resources through methods such as limited stocking, fishing regulations, and law enforcement and by the use of information secured through investigations and records of angler-use activities. Primary reliance for fish for the angler will be placed upon the natural reproductive capacities of wild fish populations rather than upon planting of artificially reared fish.

6. The creation of greater appreciation of the aquatic resources through the interpretation of these features to the park visitors.

The history of management of fishery resources in many lakes and streams now within national parks is similar to that for other waters throughout the nation. The significance and importance of preserving native fish faunas and original conditions have not always been appreciated in the past.

Exotic fishes have been introduced into waters which were originally barren and into waters containing only indigenous fishes. Such introductions were made by intentional stocking, invasion of exotics from waters outside park boundaries, and unauthorized releases of bait fishes. Although the exotics failed to take hold in some waters, they became established in other locations. As a result of predation by and the competition and hybridization with the introduced forms, the endemic fish faunas have become greatly altered. Initial and subsequent stocking operations have left relatively few waters untouched. Into other park waters, the free movement of native migratory species has been restricted or completely cut off by the construction of dams. Further changes in aquatic environments and alterations in the distribution and composition of fish populations have resulted from the creation of artificial impoundments adjacent to some parks.

Acute and drastic modifications of many original habitats and fish faunas have thus occurred within the parks. Fortunately, some very significant waters and fish faunas still exist under relatively undisturbed conditions. Because relatively few natural unaltered aquatic environments are found throughout the country, the Service recognizes a special opportunity to preserve the natural habitats and native fishes found in park areas.

Fresh-water lakes and streams found in national parks and monuments are classified in two groups. The first group consists of waters which originally contained native fishes. In some the fish populations still exist in a virtually natural state; in others, exotics have been introduced and both the alien and native fishes are present; in still others, the exotics have completely replaced the native fish faunas and exist by natural reproduction.

The second group concerns waters which were originally barren. Some are still without fish life; many are maintained by self-supporting populations of exotic fishes; and others support fish only by periodic stocking.

The eventual objective of the Service is to restore native fishes to their natural waters wherever and whenever feasible. Such a restoration program entails studies of specific waters to evaluate the current fish populations. In most cases, exotic fishes must be eliminated before native forms may be returned. Sport and non-sport fishes will be given equal consideration in any re-establishment plan. Restoration may be achieved by natural or artificial methods.

In Great Smoky Mountains National Park, for example, the introduced rainbow trout (Salmo gairdneri) in Indian Creek were eradicated by chemical treatment and the Appalachian strain of brook trout (Salvelinus fontinalis) restored. A few other waters in the National Park System have also been reclaimed by this method. The future of this procedure shows promise on a selected basis, but wholesale elimination of exotics and restoration of indigenous species probably is not feasible.

Natural rehabilitation of a native population is encouraged. An example of this is taking place in Shenandoah National Park where a series of climatic events reduced the populations of native brook trout. Severe droughts in 1953 and 1954 caused the streams to diminish in size, and the dry seasons were followed by the hurricane torrents which scourcd the stream courses. In order to preserve and restore the remnant native fish populations, the streams were closed to fishing. During this period of closure the surviving brook trout began to replenish the waters. When the streams were reopened, the size limit was set at 9 inches and fishing was allowed only with single-hooked lures. Now the streams abound with wild and brilliantly colored native brook trout. Adjusting...
ments of the size and creel limits in future years will be based on known population characteristics.

It is recognized that reclamation of all streams and lakes is impractical by the use of current techniques. Where restoration is deemed infeasible, therefore, the existing native and introduced fishes are managed as wild populations. Maximum reliance upon natural reproduction is stressed. In lakes and streams which originally were barren and in which natural reproduction is limited or lacking, stocking may be employed to supplement current fish populations. Lakes which are now barren are preserved in this original condition.

Many animals utilize fish in their normal diets. To limit or restrict this natural use of the fishery resources is not undertaken even in the interest of protecting sport fishes unless the fish species are in danger of extinction. Under such a program angling within national parks and monuments cannot be managed independently of other park uses and values. This sport is recognized as an incidental park recreational activity. The primary purpose of a visit to a park is the enjoyment of all natural features for which that individual park was created. Often procedures used to preserve park fisheries are different from methods employed to manage the resources outside park areas. The objectives of each program must be considered before each type of management is understood and appreciated.

Following the national trend, numbers of anglers have increased within the national parks and monuments. Specific natural characteristics of any lake or stream limits the number of fish which can be naturally supported. The catch, therefore, must be regulated within the bounds of this natural productivity. Measures being used to protect wild fishes on specific waters are: lower creel limits, higher size limits, and fishing-for-fun-only and fly-fishing-only regulations. They are providing the desired results.

A creel limit often is interpreted as a goal which an angler must achieve to be considered successful. This objective often results in the taking of excess fish and consequent waste. In keeping with its special objectives, the Service discourages the consideration of creel limits as goals to be achieved and has experimented with low creel limits, the return of unjured fish, and the taking of only enough fish for camp use.

Park officials in Great Smoky Mountains National Park are experimenting with fishing-for-fun-only regulations on four streams as part of a research program conducted in cooperation with the U. S. Fish and Wildlife Service. The angler may fish the year around, catch all the trout he can on single-hooked artificial lures, but he is required to release all fish under 10 inches. He may keep the larger trout as trophy fish. On these waters recreation is the primary objective and the enjoyment of angling comes from the luring of wild trout and not from retaining the catch. Under this system anglers can catch more fish per hour without damage to the basic resources. It is a means of limiting the kill rather than the catch and of coping with high fishing pressure without resorting to measures that would lower the quality of the fishing experience. In other park waters, where the carrying capacity is low, such as the Ohanapecho River in Mount Rainier National Park, angling is restricted to fly-fishing-only. The use of live or natural bait often is prohibited to limit the harvest and to prevent the introduction of non-native animal life.

On Yellowstone Lake in Yellowstone National Park, where the future of the cutthroat trout (Salmo clarki) must be insured, the creel limit is three fish per day. Under such restrictions the population is withstanding the strain of ever-mounting pressure.

Hatchery trout are released into some park waters to supplement natural reproduction and to help sustain angling for wild fish. It is not our policy to provide put-and-take fishing. The stocking of catchable trout for immediate return to the anglers is not compatible with the fundamental objectives of the National Park Service fishery management program. Plantings of this nature tend to attract fishermen who are primarily interested in fishing rather than in the overall enjoyment of basic park features. First priority in stocking programs is given to native fishes. In waters where exotic species have become established and where the restoration of native species is impracticable, these waters are managed by methods comparable with those employed for native species.
Lakes within national parks and monuments are managed according to their specific characteristics. When stocking is needed in trout lakes, fingerlings are planted. Such releases are made according to demonstrated requirements. To prevent indiscriminate planting, definite management programs are established. Where natural reproduction is limited, such evaluations frequently are difficult. In lakes where natural reproduction is absent, the success of previous plantings is used as a guide for future stocking. In Yosemite National Park, for example, there are over 200 high-country lakes which contain trout. They are now managed according to a 10-year plan. Lakes which contain adequate supplies of trout are not restocked. The other lakes are managed on a maintenance basis. Those which receive heavy fishing are stocked annually or biennially, according to their individual requirements.

Back-country lakes receive lighter fishing pressures. Plantings of rainbow trout are made on a rotation system. Under this system the lakes are restocked every 5 to 7 years. This practice provides for maximum growth of planted fish because the factor of competition between age groups is reduced or eliminated. Where several lakes occur in an individual basin, not all are planted in a single season. Good fishing can thereby be had in one or more of these lakes each year. Formerly, when pack stock was used to transport the fish, it was necessary to plant all lakes within a given basin at one time. The cooperation of the California Department of Fish and Game in planting these trout by airplane makes the present program possible. By stocking smaller numbers of trout the individual fish make faster growth. Past overstocking resulted in slower growth and smaller trout—a condition which could not be corrected until the population became drastically reduced. This process usually takes several years. Information on the relative success of each planting is now obtained through follow-up investigations and angler creel census. By having a definite plan for fishery management of the lakes of Yosemite, the National Park Service is perpetuating wild trout fishing. Similar programs are being developed in other national parks.

State fishing licenses are required in a number of parks and all monuments, but they are not necessary in some parks where exclusive jurisdiction is exercised. This requirement generally is governed by the type of legal authority by which a specific area was established.

In the management of its fishery resources the National Park Service enjoys the cooperation of the U.S. Fish and Wildlife Service and state fish and game departments. Although final determinations of stocking requirements are made by the National Park Service, fish planted in park waters are provided by the U.S. Bureau of Sport Fisheries and Wildlife or by the states. The actual planting operations usually are cooperative undertakings. The Service receives assistance and advice in fishery research and management investigations from the Fish and Wildlife Service, state agencies, educational institutions, and private organizations. Cooperative research is welcomed and encouraged in both marine and fresh-water biology. Most parks afford ideal conditions for such study, and we believe the value of these park waters for research will continue to increase.

The interest of the National Park Service in its fishery resources extends beyond the utilization of sport fishes by anglers. The fish fauna is a vital part of the natural history of an individual area, and its proper interpretation to the park visitor is an important function of the Service. Species which are of little interest to the angler may be of greater significance ecologically and biologically than sport fishes. The isolated Cyprinodon fishes of Death Valley National Monument, for example, provide living evidence of past geological happenings. A unique mosquito fish of Big Bend National Park, Texas, is near extinction, and this has caused concern in recent years. A highly specialized chub initially discovered in Grand Canyon National Park may become extinct as water conditions in the Colorado River are modified by the construction of Glen Canyon Dam. The blind fishes of Mammoth Cave National Park, Kentucky, are of special interest to visitors and scientists alike.

Information on the native fish faunas of most parks is meager. Significant studies have been conducted in some of the areas; but, as in other waters throughout the country, additional research is required to complete knowledge necessary for intelligent management.

Sport angling of national significance for wild fishes can be perpetuated and native
fshes and natural aquatic conditions can be preserved in national parks through proper management. Through interpretive programs, appreciation and interest in the aquatic life will extend to all park visitors. The Service is looking forward to developing closer cooperation with the states and other federal agencies to provide a well-balanced recreational, interpretive, and scientific conservation program for the fishery resources.
VISITORS TO NATIONAL PARKS FIND FISHING A POPULAR RECREATIONAL ACTIVITY

The Department of the Interior points out that anglers who "put the accent on the sport and not the catch," will find fishing a popular and exciting recreational activity in 40 units of the National Park System.

These areas—extending from the Virgin Islands National Park to Mount McKinley National Park in Alaska—provide wild, colorful fish ranging from the tarpon to several kinds of trout, including the famous California golden trout, native to Sequoia National Park.

The angler will find the wilderness' settings among the Nation's most scenic and spectacular and as varied as the species of sport fish found in their waters. He can cast a line in the turbulent streams of Yellowstone National Park; the salt water of the Gulf of Mexico, near Fort Jefferson National Monument; the two gigantic lakes contained in Lake Mead National Recreation Area; or in a placid brook along the sprawling Blue Ridge Parkway.

If the angler prefers the remote sections of the larger parks, these regions are readily accessible by thousands of miles of hiking and horseback trails. Concessioners, located within most parks, also are equipped to take the angler to the back-country waters, the Department noted.

The fishing-for-fun philosophy of the National Park Service is encouraged to allow the perpetuation of native fishery resources. Special emphasis also is given to the preservation of high quality fishing for wild trout. In waters where opportunities for natural spawning are either limited or lacking, angling for wild fish is maintained by a stocking program.

Another objective of the National Park Service's forward-looking conservation program is the protection of pure strains of native species against the dangers of
extinction by overfishing and also the introduction of exotic species to national park waters.

Fishing requirements within the national parks are regulated to meet local conditions. Season and catch limits frequently coincide with regulations established by the State in which the unit is located. Fishing licenses are required in most areas. This requirement is governed by the conditions under which the park was established. The Department advises anglers to contact the park superintendent for special regulations.

With the exception of those units located in California, a salt-water license is not required.

Boats are allowed on some roadside park waters. Again, the park superintendent can provide information regarding special regulations which govern boating use within a specific park.

For the angler who plans to include camping in his itinerary, campgrounds are located within most of the parks. These campgrounds generally have well-drained campsites, fireplaces, picnic tables, water, restrooms, and occasionally concession-operated laundry facilities. The angler must provide only his equipment—and his day's catch.

Overnight accommodations and trailer spaces also are located in most of the parks, the Department said.

Conrad L. Wirth, Director of the National Park Service, noted that the Service's management of recreational fishing has been furthered through the close cooperation of the U. S. Bureau of Sport Fisheries and Wildlife, and the various State fish and game departments.

The following is a park-by-park description of fishing opportunities.

ACADIA NATIONAL PARK, MAINE: License required.

Brook trout are found in the streams, and trout, land-locked Atlantic salmon, pickerel, perch, and bass in the various lakes on Mount Desert Island. Shore fishing produces a variety of salt-water species.

Superintendent - Box 338, Bar Harbor, Maine.

BANDELIER NATIONAL MONUMENT, NEW MEXICO: License required.

Wild brook and rainbow trout are plentiful in Frijoles Creek, near the park headquarters. Brown trout are found in remote Capulin Creek.

Superintendent - Santa Fe, New Mexico.
BIG BEND NATIONAL PARK, TEXAS: No license required.

Channel catfish are found in the Rio Grande River, which serves as the international boundary between the United States and Mexico.

Superintendent - Big Bend National Park, Texas.

BLACK CANYON OF THE GUNNISON NATIONAL MONUMENT, COLORADO: License required.

Various species of trout are found in the isolated section of the Gunnison River at the bottom of the Black Canyon.

Superintendent - Box 438, Fruita, Colo.

BLUE RIDGE PARKWAY, VIRGINIA-NORTH CAROLINA: License required.

Placid streams provide fishing for brook, rainbow, and brown trout; some waters are managed as "native trout" streams and reduced limits are enforced. Price and Trout Lakes contain rainbows, while bass and bluegills are found in Cone Lake.

Superintendent - P. O. Box 1710, Roanoke, Va.

CAPE HATTERAS NATIONAL SEASHORE, NORTH CAROLINA: No salt-water license required.

Charter boats, surf, and piers provide access to a variety of salt-water fishes. A few ponds contain bass and bluegills. Inshore marine species include channel bass, mullet, striped bass, bluefish, and spot; deep-sea forms are marlin, sailfish, dolphin, and amberjack.

Superintendent - P. O. Box 457, Manteo, N. C.

CHANNEL ISLANDS NATIONAL MONUMENT, CALIFORNIA: Salt-water license required.

The Pacific waters surrounding the various islands of this magnificent national monument contain sea bass, barracuda, bonito, yellowtail, and other marine species.

Superintendent - P. O. Box 6175, San Diego 6, Calif.

C & O CANAL NATIONAL MONUMENT, MARYLAND: License required.

Bass, sunfish, and a number of other warm-water sport fishes are caught in areas situated along the Canal: Big Pool, near Fort Frederick; Little Pool, at Hancock; and Battie Mixon Pond, near Oldtown.

Superintendent - 479 No. Potomac Street, Hagerstown, Md.

CATOCTIN MOUNTAIN PARK, MARYLAND: License required.

Big Hunting Creek offers trout on a "fly-fishing-only" basis. Wild Brook and brown trout are caught in Little Owens Creek.

Superintendent - Thurmont, Md.
COULEE DAM NATIONAL RECREATION AREA, WASHINGTON: License required.

The kamloop strain of rainbow trout and kokanee salmon are the principal sport fishes found in Roosevelt Lake, which was created by gigantic Grand Coulee Dam.

Superintendent - Box 37, Coulee Dam, Wash.

CRATER LAKE NATIONAL PARK, OREGON: No license required.

Rainbow trout and kokanee, introduced here several years ago, are sufficiently plentiful to provide the angler with an unique fishing experience deep within the rims which surround Crater Lake. The lake is accessible by the one-mile-long Cleetwood Trail. Rainbow and brook trout are found in the small streams.

Superintendent - Box 672, Medford, Oreg.

DESOOTO NATIONAL MEMORIAL, FLORIDA: License required.

Fishermen cast from boats and the shore to catch a variety of salt-water fishes in Tampa Bay.

Superintendent - Box 1377, Bradenton, Fla.

DEVILS POSTPILE NATIONAL MONUMENT, CALIFORNIA: License required.

Rainbow, brook, and brown trout are plentiful in the Middle Fork of the San Joaquin River.

c/o Superintendent - Box 577, Yosemite National Park, Calif.

DINOSAUR NATIONAL MONUMENT, UTAH-COLORADO: License required.

Jones Hole Creek contains rainbow and brook trout, while channel catfish provide a challenge in the Green and Yampa Rivers.

Superintendent - Vernal, Utah.

EVERGLADES NATIONAL PARK, FLORIDA: License required only for fresh water.

Although tarpon, snook, and bonefish are the principal fishes, the spotted sea trout, mangrove snapper, and redfish command the attention of salt-water fishermen in the bays and estuarine waters. Largemouth bass, bluegill, and an assortment of other fresh-water fishes are found in the streams, ponds, and pools.

Superintendent - P. O. Box 279, Homestead, Fla.
FORT PULASKI NATIONAL MONUMENT, GEORGIA: No salt-water license required.

There is fishing from the bridges over the south channel of the Savannah River and in the moat which surrounds the historic fort.

Superintendent - Box 98, Savannah Beach, Ga.

GLACIER BAY NATIONAL MONUMENT, ALASKA: License required.

Here the fishery resources consist of salmon, rainbow, grayling, and Dolly Varden. Anglers are cautioned that Glacier Bay is rather inaccessible and remote at this time.

Superintendent - Box 1781, Juneau, Alaska.

GLACIER NATIONAL PARK, MONTANA: No license required.

Cutthroat, brook, rainbow, and Dolly Varden trout and kokanee salmon are plentiful in the lakes and streams of this scenic park. Grayling are present in a few waters in the Belly River country. Lake St. Mary, Crossley, and Waterton Lakes also afford fishing for lake trout.

Superintendent - West Glacier, Mont.

GRAND CANYON NATIONAL PARK, ARIZONA: License required.

Brown and rainbow trout are found at the bottom of the canyon in Bright Angel Creek, near Phantom Ranch. Channel catfish are taken from the nearby Colorado River. Rainbow swim the Thunder River and Tapeats Creek, both of which are located in remote canyons.

Superintendent - P. O. Box 129, Grand Canyon, Arizona.

GRAND TETON NATIONAL PARK, WYOMING: License required.

Lake trout are taken in greatest numbers in Jackson Lake, located at the base of the picturesque Grand Tetons. Jackson lake, open all year except for a short period during the fall spawning season, affords unusual ice fishing during the winter. A number of other lakes and many streams contain cutthroat, brook, and rainbow trout and whitefish.

Superintendent - P. O. Box 67, Moose, Wyo.

GREAT SMOKY MOUNTAINS NATIONAL PARK, NORTH CAROLINA-TENNESSEE: License required.

Brook and rainbow trout are found in the 600 miles of fishing streams in the park. At lower elevations bass also are taken. Sections of some streams are managed as "Fishing-For-Fun" waters. Here, only artificial flies may be used and all fish, except those measuring more than 16 inches, must be returned to the stream unharmed.

Superintendent - Gatlinburg, Tenn.
ISLE ROYALE NATIONAL PARK, MICHIGAN: No license required.

Northern pike are found in 28 inland lakes and in the waters of Lake Superior surrounding the park. The lake trout is found in both Lake Superior and Siskwit Lake. Other waters contain rainbow and brook trout, perch, walleye, and whitefish.


KATMAI NATIONAL MONUMENT, ALASKA: License required.

Anglers who are seeking rainbow trout, lake trout, Dolly Varden, grayling, whitefish, northern pike, and Pacific salmon can reach this isolated national monument by airplane.

Superintendent - Mt. McKinley National Park, Alaska

LAKE MEAD NATIONAL RECREATION AREA, ARIZONA-NEVADA: License required.

Two huge lakes—Mead and Mohave—created by Hoover and Davis dams provide the main fishing waters of this recreation area. Lake Mead is noted for its largemouth bass and channel catfish. Lake Mohave contains rainbow trout in the upper end and largemouth bass farther down. Sunfish and crappie also are taken in these lakes.

Superintendent - 601 Nevada Highway, Boulder City, Nev.

LASSEN VOLCANIC NATIONAL PARK, CALIFORNIA: License required.

A number of roadside waters and back-country lakes and streams furnish fishing for rainbow, brook, and brown trout.

Superintendent - Mineral, California.

MAMMOTH CAVE NATIONAL PARK, KENTUCKY: No license required.

Sauger, walleye, catfish, and bass are found in the Green and Nolin Rivers and in several small ponds.

Superintendent - Mammoth Cave, Ky.

MOUNT MCKINLEY NATIONAL PARK, ALASKA: No license required.

The magnificent Wonder Lake contains lake trout, while the small ponds and streams provide grayling and Dolly Varden.

Superintendent - McKinley Park, Alaska.
MOUNT RAINIER NATIONAL PARK, WASHINGTON: No license required.

High alpine lakes contain a variety of trout. The streams provide fishing for cutthroat, rainbow, brown, and brook trout.

Superintendent - Longmire, Wash.

OLYMPIC NATIONAL PARK, WASHINGTON: No license required.

Olympic's streams and lakes contain cutthroat, rainbow, and brook trout, Dolly Varden, and Pacific salmon of several species. Larger rivers are noted for steelhead (sea-run rainbow trout) fishing.

Superintendent - 600 E. Park Ave., Port Angeles, Wash.

PLATT NATIONAL PARK, OKLAHOMA: No license required.

The park streams contain largemouth bass, sunfish, crappie, warmouth, and white bass.

Superintendent - Box 379, Sulphur, Okla.

PRINCE WILLIAM FOREST PARK, VIRGINIA: License required.

Three small lakes support bass and bluegill populations.

Superintendent - Triangle, Va.

ROCKY MOUNTAIN NATIONAL PARK, COLORADO: License required.

Cutthroat, rainbow, brown, and brook trout are found in Rocky Mountain's lakes and streams.

Superintendent - Box 1080, Estes Park, Colo.

SEQUOIA-KINGS CANYON NATIONAL PARKS, CALIFORNIA: License required.

The areas many wilderness lakes and streams contain California golden, rainbow, brook, and brown trout. Many of the park waters are very remote and require extensive hike-in and pack-in trips. Sections of two streams are managed as "Fishing-For-Fun" waters and anglers return all fish they catch.

Superintendent - Three Rivers, Calif.

SHADOW MOUNTAIN NATIONAL RECREATION AREA, COLORADO: License required.

Year-round fishing is provided on two man-made waters: Shadow Mountain Lake and Lake Granby. Main fishes are rainbow trout and kokanee. Also present are lake, brown, and cutthroat trout. Ice fishing is offered during the winter.

Superintendent - Box 1080, Estes Park, Colo.
SHENANDOAH NATIONAL PARK, VIRGINIA: License required.

More than 100 miles of streams contain wild and colorful native brook trout. High quality fishing has developed on the Rapidan and Staunton Rivers, both of which have been set aside as "Fishing-For-Fun" waters, requiring anglers to return all fish caught on artificial flies and lures.

Superintendent - Luray, Va.

THEODORE ROOSEVELT NATIONAL MEMORIAL PARK, NORTH DAKOTA: License required.

The Little Missouri River contains sauger, channel catfish, goldeye, and bullheads, which are taken on stretches of the river accessible by road.

Superintendent - Medora, N. Dak.

YELLOWSTONE NATIONAL PARK, WYOMING-IDAHO-MONTANA: No license required.

Yellowstone Lake is well known for its extensive population of native Yellowstone cutthroat trout. Other park streams and lakes contain rainbow, brook, brown, cutthroat, and lake trout. Also found here are grayling and whitefish.

Superintendent - Yellowstone National Park, Wyo.

VIRGIN ISLANDS NATIONAL PARK, VIRGIN ISLANDS: No salt-water license required.

The marine waters surrounding St. John Island, upon which the park is located, contain a variety of salt-water sport fishes, including: tarpon, barracuda, jacks, bonito and bonefish. Fishing includes deep-sea trolling and angling in shallow reef and inshore waters.

Superintendent - Box 1707, Charlotte Amalie, St. Thomas, V. I.

YOSEMITE NATIONAL PARK, CALIFORNIA: License required.

Rainbow, golden, brook, and brown trout are found in the park's more than 200 lakes and 550 miles of streams. Most waters are located off the roadside and require hiking or horseback riding. "Fishing-For-Fun" programs operated on the Dana Fork of the Tuolumne River.

Superintendent - Box 577, Yosemite National Park, Calif.

ZION NATIONAL PARK, UTAH: License required.

A short section of the Virgin River, which flows through Zion Canyon, supports a limited rainbow trout population.

Superintendent - Springdale, Utah.

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Native fish faunas of the national parks provide unique opportunities for research. Outstanding contributions to the knowledge of the systematics, distribution, ecology and zoogeographic relationships of the fishes have been made in several parks. In other park waters, little is known about the composition and identity of the aboriginal fish fauna and the status of current populations. Some of these faunas fortunately remain in a relatively natural state, neither contaminated by non-native forms nor altered by adverse environmental conditions.

The National Park Service recognizes its obligations to perpetuate native fishes, to preserve examples of the endemic fish faunas and, where feasible, to restore native forms which have become extirpated (Wallis, 1958, 1959). Its responsibilities extend beyond protection alone. The average visitor to a park knows little about the fishes and the significance of the aquatic environments. So that an appreciative understanding of the marine and fresh-water life may be fostered, increased emphasis is being directed toward these subjects in the interpretive programs in the parks. The Service encourages research which will aid in fulfilling these fundamental and challenging obligations in the most effective manner possible.

The same early laws which furnished absolute protection for other forms of wildlife made provisions for the taking of fishes for sporting purposes. With this incentive, active programs of fish stocking and transplanting were initiated to expand and improve fishing conditions. Frequently this objective was achieved at the expense of the native fish faunas and natural aquatic conditions (Cahalane, 1947 a, b; Hubbs, 1937, 1940, 1949; Hubbs & Lagler, 1949; Hubbs & Wallis, 1948; King, 1937, 1939, 1940, 1942; Madsen, 1937; Wallis, 1960).

Today, angling is governed by the following general policy as stated in the National Park Service Administrative Manual (N.P.S., 1959):

"Recreational fishing within National Parks and Monuments shall be permitted under management programs directed toward the perpetuation, restoration and protection of native species and wild populations of fishes and the protection of the natural aquatic environments and the ecological relationships of the associated fauna and flora. This activity shall be directed so as the wildlife, scenic, scientific or historic values of the park shall not be decreased."

Fishing is recognized as an incidental visitor-use activity rather than the primary purpose for a visit to a National Park. Natural angling is primarily dependent upon wild populations of fishes rather than upon stock replenished by artificial means.

Attempting to perpetuate native fishes while permitting wild type recreational angling presents a complex task. Only through sufficient research to determine more about the fish faunas can this challenge be met.

The significance and importance of fishes in some parks has been established by ichthyological research. For example:

Intensive studies by Miller (1948) revealed the uniqueness of the Cyprinodonts of Death Valley National Monument. As a direct result of these findings, The Presidential Proclamation of January 17, 1952, set aside the Devil's Hole and its entire population of Cyprinodon diabolus for Federal protection as part of the monument.

An opportunity to protect and preserve certain fish species threatened with extinction in this country came with the establishment of Big Bend National Park. Carl Hubbs (1940) reported on the distinctiveness of the fish fauna of this region. In recent years Clark Hubbs has assisted Park officials in their efforts to perpetuate the mosquitofish, Gambusia gaigei, which is greatly endangered.
Fishes of various lakes and streams of Isle Royale National Park constitute unaltered examples of endemic fish faunas which the National Park Service is perpetuating. Hubbs and Lagler (1949) and Lagler and Goldman (1959) have focused attention upon the important character of these fishes.

General accounts of the native fish faunas in several other parks have been published. Among these are: Yellowstone (Jordan, 1889; Kendall, 1915; Smith & Kendall, 1921; Simon, 1953), Yosemite (Evermann, 1921; Hubbs & Wallis, 1948; Evans, Wallis & Gallison, 1958), Sequoia (Evermann, 1905), Glacier (Hazzard, 1939; Schultz, 1941), Grand Teton (Hagen, 1954), Lassen Volcanic (Potts and Schulz, 1953), Mammoth Cave (Bailey, 1933), Grand Canyon (Miller, 1946), Lake Mead National Recreation Area (Wallis, 1951), and Zion (Woodbury, 1933; Tanner, 1932).

Research on specific ichthyological problems currently is being undertaken in Great Smoky Mountains, Mammoth Cave, Rocky Mountain, Everglades and Virgin Islands National Parks; Katmai National Monument; and Cape Hatteras National Seashore.

In most parks, investigations concerned primarily with the management of sport fishes have been undertaken. Fertile fields for research on taxonomic and distributional studies of the native fish faunas remain virtually unworked. For example, in the following parks, to name a few, surveys of the native fish faunas are lacking or incomplete: Olympic, Mt. McKinley, Mount Rainier, Crater Lake, Lassen Volcanic, Sequoia, Kings Canyon, Zion, Grand Canyon, Everglades, Mammoth Cave, Great Smoky Mountains, Shenandoah, Acadia, and Rocky Mountain National Parks; and Katmai, Glacier Bay, Great Sand Dunes, Bandelier and Dinosaur National Monuments. Surveys in Yellowstone, Glacier and Grand Teton and Yosemite National Parks would reveal changes which have occurred since initial studies were conducted.

More needs to be learned about the life histories, the ecology or the zoogeographic relationships of specific fishes in each park fauna.

Other fields of natural history, such as herpetology, mammalogy and ornithology, afford additional research possibilities.
Qualified scientists with well-defined research objectives are welcomed to conduct investigations within National Parks. The following steps outline the manner for initiating a research project.

1. Submission of Proposal: A plan which briefly outlines the scope and objectives of the investigations, its duration, anticipated collecting requirements, financial support, and institutional sponsorship should be submitted to the Superintendent of the park in which the work is proposed.

2. Review and Approval of Proposal: The Superintendent, usually in consultation with members of his staff and frequently with personnel in the Washington and Regional Offices, reviews the proposal. After this review he has the authority to approve or disapprove any proposal.

3. Issuance of Collecting Permits: When the need to collect scientific specimens in connection with the research project has been demonstrated, the Superintendent may issue a permit. A separate permit must be secured from the Superintendent of each park in which collecting is to be conducted.

Two classes of collecting permits are available.

Class A: Allows for the collecting of insects, spiders, plants, rocks and minerals, for public exhibits and for research by qualified individuals who can establish their connection with public museums or other scientific institutions but who are not Federal employees.

Class B: Provides for the collection of specimens covered in Class A plus other forms of animal life by Federal employees.

4. Collaboratorship Appointments: An individual, otherwise qualified, may receive Federal employment status through an appointment as a Collaborator, WOC, (without compensation) with the National Park Service.
To receive such an appointment, an applicant must fill out two copies of Form 57, Application for Federal Employment; one appointment affidavit, and three copies of a waiver of claims against the Government for compensation. All three copies of the waiver must be signed by two witnesses. The applicant must answer all questions on the appointment affidavit, and have his signature subscribed and sworn to before a Notary Public or other person designated to administer such oaths.

Appointments are limited to the shortest period needed to accomplish the collecting project. This term can be as long as three years with the privilege of having the appointment renewed for an added period if a continuing research program requires it. Appointments for Federal employment for more than six months require a loyalty investigation and fingerprinting.

The Superintendent may make the Collaborator appointment if the work is to be confined to the park he administers. However, if collecting is proposed in two or more parks within one National Park Service Region, the appointment usually is made by the Office of the Regional Director. If two or more areas are located in separate National Park Service Regions, the appointment is made by the Director's Office in Washington.

A Collaborator, WCC, thus has status comparable to that of an employee of the National Park Service. As such he is qualified to receive certain benefits not available to non-employees such as waiver of entrance fees, the use of government housing, vehicles and other facilities and services when available.

5. Financing Research: Currently, the National Park Service has few finances at its disposal to assist in cooperative research projects. However, it is possible for Superintendents to make services and facilities available to qualified investigators. Cooperating Associations in some National Parks occasionally financially support such research and many are in a position to publish popular and semi-scientific findings resulting from the investigations. Such considerations frequently make the National Parks attractive sites for research undertakings.
Most of the cooperative research projects now being undertaken in National Parks are being supported wholly or in part by institutional grants or by funds the institutions have secured from the National Science Foundation or from other sources.

6. Obligations of Researchers: A collecting permit is issued under the following conditions:

   a) The collections shall be used for scientific or educational purposes only, shall be dedicated to public benefit, and shall not be used for commercial profit.

   b) All collecting must be done away from roads, trails, and developed areas, unless such localities are specified in the permit. The collecting shall be conducted in such a manner as not to attract attention or to cause damage to the environment. Because of the scarcity or importance of some specimens, Service officials may designate and limit the kinds, numbers, and sizes of specimens which may be collected, and may make other restrictions necessary to the preservation of the natural features of the area.

   c) The National Park Service reserves the right, in the interest of science, to designate the depository of all specimens removed from a National Park or Monument and to approve or restrict transfers of specimens between depositories. The National Park Service also reserves the right to designate the U. S. National Museum as the depository of any type specimen removed from a National Park or Monument, after the collector has made necessary studies and published the results of his research thereon.

   d) The Superintendent may require the permittee to furnish an inventory and locality description of any or all specimens proposed to be collected before they are removed and, after the collection is assembled, to submit it for examination.

   e) Use or Disposition of Preserved Specimens: The collected specimens shall be deposited in a permanent public museum or in the exhibit, study or type collections of scientific or educational institutions. They must be suitably recorded in a permanent file and must be available to the public.
f) Copies of reports, reprints and other published materials deriving from the research shall be given to the Superintendent for use in the protection, preservation and interpretation of the features studied.

The National Park Service intends to further scientific research of all natural features found within areas which it administers. It desires to cooperate with technical workers to the fullest extent compatible with its charge to preserve the flora and fauna and all geological materials in a natural state insofar as is possible.
Literature Cited


King, Willis. 1940. A discussion of fish stocking policies in national and state parks of the southeastern states. Trans. 5th No. Amer. Wildlife Conf. 140-146.


Scenic beauty found in National Parks is created by a combination of many natural features -- the forests, the eroded canyons or the towering peaks. The attractiveness of these scenes is enhanced by the gurgling, tumbling streams; the clear mountain lakes enclosed in cirques; the crashing of the sea upon a rock-bound coast, or the gentling surf rolling over sandy shores. The grandeur of the Great Smoky Mountains, the Virgin Islands, or Glacier National Park, to name a few, would be lessened if these aquatic features were missing.

These waters are significant also for the biological treasures they possess. The natural aquatic environments and their inhabitants found within National Parks and Monuments, even in the desert of Death Valley National Monument, are among the country's cherished possessions entrusted to the National Park Service to perpetuate for all time and to interpret for the enjoyment and appreciation of park visitors. Certainly National Parks are vast outdoor laboratories for the study of aquatic life under natural conditions.

Isolated and hidden beneath the water's surface film, plant and animal inhabitants of the seas, lakes, ponds, streams, swamps and marshes have been frequently overlooked in an out-of-sight and out-of-mind manner. Their significance has not been fully recognized nor represented in park interpretive programs.

The philosophy has developed that the value of a body of water is best measured by the number of fishes which an angler could catch and that other forms of aquatic life are of consequence primarily as they support sport species. Therefore, often in the past, interpretive attention was directed primarily toward aquatic resources as they related to the angler. Now we recognize that the story can not stop here!

Presented as part of the symposium on Outdoor Laboratories at a joint session of the Annual Meetings of the American Nature Study Society and the National Association of Biology Teachers, New York, New York, December 27, 1960 in connection with 127th Meeting of the American Association for the Advancement of Science.
The National Park Service is taking a fresh look at many things. Among these is the role of the marine and fresh water life in the overall pattern of park interpretation and protection. A program to provide for adequate interpretation of these aquatic features is being developed and encouraged.

In these interpretive endeavors, some very definite principles are being applied.

The significance of aquatic life forms and habitats within a park are initially identified. The broad aspects of the term "aquatic life" is considered to include all plants and animals which are part of an aquatic environment as illustrated at Royal Palm in Everglades.

Their relationship to other park features of geological, historical, archeological, or biological interest are evaluated.

Marine and fresh water life interpretation is then incorporated into an individual park's program in proportion to the significance of these resources and as they relate to the other primary park features.

Wherever possible the aquatic story is molded into the interpretation of other principle park features.

In scenic-scientific parks, where the relationship is frequently more distinct, this integration is easier to achieve than in historical and archeological areas where the association is more remote. In the parks of great biological importance, emphasis is placed upon the ecological relationships of the whole environment rather than upon individual forms. In parks where geology is important, for example, the approach is directed toward telling how geologic processes created the aquatic habitats and influenced the distribution of aquatic life. In historical and archeological parks, attempts are made to illustrate the role which aquatic life forms played in the welfare of the earlier cultures.

The type of park visitation, also determines the treatment the subject can receive. In areas where a visitor's stay is brief, a general approach to a wider scope of natural history is employed; in other parks where a visitor's visit is more prolonged, a more specialized presentation may be enjoyed.

Aquatic interpretation is directed toward creating a fuller understanding and appreciation of the ecology of aquatic life. The observation of aquatic life through self-guiding devices and through participation in conducted trips is encouraged. Local field situations, climatic
considerations, available facilities and visitor-use patterns govern the application and effectiveness of each technique within a park.

A variety of interpretive methods are being utilized to do the job. To develop those most suited to fully utilize unique local conditions requires considerable experimentation. Let's take a look at some techniques which are currently being used.

The beach walk is among the unusual and fascinating interpretive methods employed as part of the regular program along the Atlantic shores of Cape Hatteras, beside the rock-bound coast of Acadia in Maine, next to the tropical blue seas of the Virgin Islands, upon the Pacific Ocean strip of Olympic in Washington, and among the tide pools at Cabrillo National Monument in California. Each walk affords a similar but still a vastly different type of experience. Tidal pools, common to Cabrillo and Acadia, present different ecological associations from those to be discovered along the sandy beaches of Olympic, Cape Hatteras or Virgin Islands.

Such a beach experience frequently starts after a brief "get-acquainted" chat in the shelter of a building or overhanging rock. This is the opportunity for the naturalist to identify and to explain various creatures which may be encountered along the shore. Then after a short walk, the group pauses briefly within sight and sound of the ocean to orient themselves with the expanse of sea and sand before them. As they move out onto the beach or scramble over the rocky pools, the visitors observe the things identified earlier, discover new features and all of the forms of life begin to fall into the pattern of the overall picture. Occasionally, the naturalist may dash out into the water and bring forth various objects of interest which are explained to the group. One can never tell what the sea may cast up upon the shore; therefore, every beach walk is different.

And now a word about the size of beach parties. The experience can be a most rewarding adventure when the number of those participating is small. Everyone is able to participate, to ask questions, to see what has been discovered and to hear what is being discussed. When larger groups show up, the method of presentation must be altered. As it takes more time to "compact" a larger group, fewer stops can be made and each must be longer in duration. With a sizable group, the naturalist loses the opportunity to chat as casually about individual features as are found.

Guided walks are made beside fresh water lakes and streams in several parks including Crater Lake and Rocky Mountain. In Everglades, an
elevated trail, called the Anhinga Trail, has been constructed over Taylor Slough. Naturalists regularly lead visitors over this exciting wildlife trail.

Another type of conducted trip is the guided boat cruise. The main theme of a boat trip may not be aquatic interpretation but aquatic life will be incorporated as it relates to other important park features. On Crater Lake, geology and origin of the lake is the basic story and the interpretation of aquatic life is subordinate to the main topic. Although the mule-drawn barge trip along the C. & O. Canal in National Capital Parks is principally a historic experience, aquatic life is woven in. Naturalist guided boat trips are programmed, also, at Acadia, Glacier, and Lake Mead. The interpreter presents the message either with or without an amplifying system. Boat trips conducted underground on Echo River, deep within Mammoth Cave, are of unique interest.

Some of the trips at Lake Mead, Glacier and Everglades, and upon the Green River at Mammoth Cave are unaccompanied by naturalists. The interpretive messages are presented by the concessioners' boatmen or guides who have been briefed on the correct story by the park naturalists.

In the Everglades another form of boat tour, known as a "boat-a-cade" may be experienced. After a brief orientation talk, the park ranger in the lead boat guides the visitors following in their boats through some of the waterways. After the tour starts he is able to communicate with the participants only at designated stops, and continuous interpretive contact is impossible.

Audubon bird observation boat tours are conducted within Everglades in addition to the other trips.

During the cruise of the Ranger III across Lake Superior, to Isle Royale, passengers learn the aquatic story, through an illustrated program, which is presented in the lounge.

Direct observation of aquatic life is encouraged. An old gun implemen- ment at Cabrillo has been glassed-in to serve as a lookout station from which park visitors assist in counting the gray whales as they migrate southward to their mid-winter breeding grounds. Here the visitors hear the story of this gigantic marine mammal and display panels provide additional interpretive information.

Several lakes, such as Emerald Lake in Lassen Volcanic National Park, and Shadow Lake in Mount Rainier National Park, are closed to angling and are reserved for the observation of trout. Out-of-doors living
fishes are displayed in ponds at Happy Isles Nature Center in Yosemite and in several other parks. Aquariums are occasionally used, such as the small one at Mammoth Cave, in which blind fishes are exhibited. However, their use is restricted to the display of specially unique forms.

The most elaborate indoor living exhibit is located within the Happy Isles Nature Center where the life history of the trout is demonstrated through the use of display troughs containing trout in various stages of development. Panels which form a backdrop combine to make the exhibit very effective.

The Pa-hay-okee or "river of grass" self-guiding nature trail in Everglades presents the aquatic story of the sawgrass and the creatures which dwell here. This elevated trail terminates at an observation platform where visitors look over the "river of grass" and where an exhibit panel explains this unusual habitat.

A cross section diagram of Taylor Slough which will be erected (soon) on the Anhinga Trail and a lift-lid exhibit here illustrate other devices.

Recently established on an experimental basis at Trunk Bay in the Virgin Islands is a most unique self-guiding device -- the world's first underwater self-guiding trail!

A panel on the beach identifies various marine features and invites the experienced swimmer to follow the underwater route. Equipped with a face plate and a snorkel, he then enters the water and views the scenic beauties beneath the sea. Submerged labels painted on glass describe the outstanding attractions along the trail. Eventually, it is hoped that we shall be able to program guided underwater trips at which time necessary safety precautions, such as having a lifeguard in a boat above, and adequate means of underwater communications will be developed. This certainly provides exciting possibilities.

Museum displays play an important part in interpreting marine and freshwater life. These consist of identification and interpretive panels, such as this one at Great Smoky Mountains, or this exhibit at Natchez Trace Parkway. Identification panels are limited in favor of exhibits which also interpret. A diorama of the life in Florida Bay, here still in the studio, add dimension to the scene.

Interest in aquatic life has been kindled in recent years through movies, television programs, featured magazine articles and some excellent books. This is reflected in the multitude of commercial attractions offered the traveler. Although our objectives are more than mere entertainment,
some of these devices offer possibilities which are being reviewed. At Silver Springs, Florida, as elsewhere, glass-bottomed boats afford a look under the sea -- a look which is similar to looking down into a forest from an airplane. At Rainbow Springs, in a different form of boat, the passengers descend into a submerged viewing cabin from which they look out through ports into the aquatic world. At Disneyland, submarines which run along a submerged railway, permits viewers to see beneath the surface. Visitors to the Nature's Fish Bowl at Homassa Springs, Florida, observe fish life from elevated platforms or take a walk under the water in a viewing gallery incorporated into the boardwalk.

The underwater theater built into the side of Weeki Wachee Spring in Florida allows visitors to look into the water from a submerged room.

The possibility of utilizing underwater closed circuit television with stations on the comfort of the land is being investigated.

The main objective in underwater interpretive observation in National Parks is to provide a natural experience by means which will not alter, or damage the marine environments. The construction of some of the devices just shown probably will have to be ruled out because of these considerations. Although some forms of underwater viewing methods are desirable so that more visitors can participate in an underwater experience, they are but a supplement to actually going under and getting wet and observing first hand.

Booklets, self-guiding trail leaflets and other printed materials are being developed to further interpret aquatic life.

Aquatic interpretation is incorporated in scheduled talks in parks where these resources are important. These talks are frequently illustrated by slides and movies.

The discovery that grunion spawn in the sands of Cabrillo National Monument resulted in the establishment of a unique aquatic demonstration in which visitors were encouraged to participate. The naturalist collected some of the sand in which the grunion had spawned and by keeping it moist was able to permit the eggs to survive. While talking about the grunion, he handed out small paper drinking cups. Into each was placed a small quantity of sand and to this fresh sea water was added. Then the participants were instructed to gently agitate the water. After a few moments of such movements, tiny fish appeared suddenly from the apparently barren sand. Such an experience leaves an indelible impression upon the visitor!
To vitalize interpretive presentations, the recent findings of research are incorporated in the programs. The National Park Service encourages cooperative research which will provide just this type of information. Outstanding cooperative aquatic research projects are being conducted in Virgin Islands, Everglades, Yellowstone, Great Smoky Mountains, Olympic and Mammoth Cave National Parks, in Cape Hatteras National Seashore, and in other parks.

Marine and fresh-water interpretation in the National Parks is a challenging venture. It is one which requires an inquisitive spirit, imaginative thinking, creative planning and bold appreciation of new ideas and concepts. The opportunities to create greater understanding, appreciation and enjoyment of the aquatic environments make all of this worthwhile and rewarding.
Former President Herbert Hoover, an ardent fly fisherman, sums up the benefits of fishing in his new book, *Fishing For Fun and to Wash Your Soul*: "Fishing is a chance to wash one's soul with pure air, with the rush of the brook, or the shimmer of the sun on the blue water. It brings meekness and inspiration from the scenery of nature, charity toward tackle makers, patience toward fish, a mockery of profits and ego, a quieting of hate, a rejoicing that you do not have to decide a darned thing until next week."

Furthermore, he adds: "The reason for it all is that fishing is fun . . . nor is it the fish we get that count. We could buy them in the market for mere silver at one percent of the cost. Fishing is much more than fish; it is the vitalizing lure to outdoor life . . . I am for fishing for fun as a contribution to constructive joy because it gives an excuse and an impulse to take to the woods and to the water."

Each of you share this conviction. We are all gathered here at this national convention of Trout, Unlimited to determine ways and means of perpetuating the fun of trout fishing.

Fishing-For-Fun is a concept that there is more to fishing than filling one's creel. It is a philosophy that numerous authors have expressed and that a multitude of anglers have enjoyed for many years. Now this concept is being translated into trout management plans; initially, of course, on an experimental basis.

These plans feature the catch and release of wild trout and regulations which require the use of artificial lures or flies, reduced creel limits or no-kill restrictions, increased size limits, and special seasons. They recognize and enhance the traditional quality of trout angling.

The origin of Fishing-For-Fun is somewhat obscure. Upon a search of the literature on fishing, one finds that writers have long extolled the pleasures of angling amid scenic and placid surroundings and not the thrill of the kill alone.
Ninety years ago, in 1873, W. C. Prime, in his volume, I Go A-Fishing, fostered the concept of catching and releasing of trout and critically condemned the thoughtless ones who find pleasure in killing fish for the mere sake of killing them. He presents one of the first citations in American literature of fishing with a barbless hook to permit the return of trout unharmed.

The obvious value of conserving trout populations by catching and returning of fish has been observed by many anglers who followed. Earnest fly-fishermen have voluntarily followed this practice. Private clubs have required the observance of this procedure on waters they control.

Shortly after the turn of the century, William B. Mershon, the famed Saginaw sportsman, expounded the merits of this practice. At his urging, Michigan Legislature enacted one of the first fly-fishing-only laws in this country to protect the trout on the Au Sable River.

John Alden Knight in his book, The Modern Angler, reports on the requirement which permitted the fly fisherman on the Kennebago River, Maine, to catch as many fish as he could but required that he return all but one trout to the water. He also mentions the formation of the "Fourteen Inch Club," the membership of which consisted of a group of young anglers who vowed to return all trout caught that measured less than 14 inches.

Starting during the early 1940's there has been a trend toward reducing the creel limit as a means of protecting trout populations. Dr. Albert S. Hazzard in 1943 wrote about the necessity of this measure. A couple of years later he wrote that "The only hope for improving trout fishing is by restricting the kill on waters now overfished . . . if the trout fisherman wants such exceptional fishing at a reasonable cost he can have it if he is willing to release most of the trout he catches after he has had the fun of deceiving and landing them."

Pennsylvania Fish Commission adopted the motto, "Kill Less -- Catch More!" in 1949 and later revised it to read "To Catch More, Kill Less." This was one of the educational objectives of the creation of "Fisherman's Paradise."

Dr. R. W. Eschmeyer's thought-provoking article, "Want Less Fishing?" contained facts which are even more vital today than they were when published in Sports Afield in October 1948. He commented that "the catchable portion of the fish population must be shared with hundreds of anglers instead of with just a few. Our portion is becoming so small in some localities that fishing may no longer be attractive to many of the anglers . . . We can try to educate anglers to fish for fun. We no longer need the meat as the pioneers did. Fishing now benefits us mainly in providing relaxation . . . we must learn to fish for fun . . . one way to provide more fishing is to put back the fish we catch."
He predicted that "Folks will be slow to support the suggestion that the fish be returned to the water to provide another thrill later."

In 1952, Dr. Hazzard made the startling suggestion that fishing could be made even better if laws required the return of all fish by making it illegal to have trout in possession at anytime. With the exception of restrictions on the types of lures, additional regulations such as closed seasons, creel limits or size limits would become needless under such a proposition and an angler could fish for wild trout at anytime.

Responding to this suggestion, the National Park Service and the U. S. Fish and Wildlife Service cooperated in the establishment of a pioneer Fishing-For-Fun, no-kill program in Great Smoky Mountains National Park, North Carolina-Tennessee. This seemed to be a logical place for such an experiment as park regulations already required the use of artificial lures and a U. S. Fish and Wildlife Service research team, headed by Dr. Robert E. Lennon, was engaged in studying park waters and trout populations.

At the start, the program was placed on the Bradley Fork in North Carolina and on the West Prong of the Little Pigeon River in Tennessee during the regular season with a requirement that all fish caught should be returned to the stream.

Public acceptance of the new concept was forthcoming to the degree that the program was extended in 1953 with provisions that anglers could fish the year around on these waters and had the option of retaining trout which measured more than 16 inches. In addition, Little River, Tennessee, and Oconaluftee River, North Carolina, were opened on a Fishing-For-Fun basis during the winter and to regular regulations during the normal fishing season.

By 1959, the number of fish caught and released per hour of angling increased to four on the Bradley Fork and three on the West Prong. Pounds of Rainbow Trout in Bradley Fork expanded from 52 pounds per acre in 1954 to 60 pounds in 1959; in the West Prong the increase was from 15 pounds in 1954 to 53 pounds in 1959. Improvement in sporting opportunities was reflected on the West Prong by an increase in the number of trout, measuring 7 inches and longer, from 48 per acre in 1954 to 164 per acre in 1959.

The program is continuing in Great Smoky Mountains National Park although subsequent studies have not been conducted recently to determine the status of the trout populations.

Meanwhile, in Pennsylvania, Dan Reinhold, fishery biologist of the Pennsylvania Fish Commission, had been instrumental in inaugurating a Fishing-For-Fun program on the Left Branch of Young Woman’s Creek
with no-kill, artificial-flies-only, and all-year season regulations in 1958. The project was expanded in 1961 to incorporate the Right Branch and the Renova Club waters. Although the program had favorable angler support and was biologically successful it was terminated without public notice in 1962.

A Fishing-For-Fun program opened on the Rapidan and Staunton Rivers in Virginia in 1961. The stream sections lie within the Ward-Rue Wildlife Management Area and Shenandoah National Park; thus the project is a cooperative effort between the National Park Service and the Virginia Commission of Game and Inland Fisheries.

Anglers are required to use artificial lures only, armed with barbless hooks, and to release all trout caught. Native brook trout and a small number of planted rainbow trout make up the stream populations. The program attracts much angler interest as few waters in this section of the country contain wild trout. The catch per hour on these streams is greater than on nearby streams which are planted with "put-and-take" trout and the angler-use extends throughout the entire season rather than rapidly declining after the opening day's rush.

At Yellowstone Lake, it has been discovered that many anglers discarded fish they catch. To stress the return of trout, a Fishing-For-Fun program was inaugurated in Yellowstone National Park in 1961 on a voluntary basis and more as an educational than as a regulatory activity. Fishermen are encouraged to use barbless hooks and return the fish they catch.

In California, Fishing-For-Fun was established on the Dana Fork of the Tuolumne River in Yosemite National Park as a 3-year experimental project in 1961. Fishermen on this stream are required to fish with flies and to return all trout caught. After two years of operation, it has been demonstrated that the wild stream populations, composed of brown, rainbow, and brook trouts, have increased ten fold.

In Kings Canyon National Park, California, a portion of the South Fork of the Kings River, and a section of the Middle Fork of the Kaweah River, in Sequoia National Park, were set aside as Fishing-For-Fun streams in 1962. Restrictions provide that fishermen use artificial lures only, armed with barbless hooks, and return all fish caught under 1/4 inches. On the Kings River, which is the better trout stream, angler-use and acceptance has proven to be greater than on the Kaweah River.

Additional waters in Katmai National Monument, Alaska, Mount Rainier National Park, Washington, Catoctin Mountain Park, Maryland, Yellowstone National Park, Wyoming, and Blue Ridge Parkway, North Carolina, are managed under fly-fishing-only or artificial-lures-only regulations.
Colorado in 1961 started a program on Parvin Lake and several other waters designated as "Quality Fishing Waters," on which an increased size limit of 14 inches and the use of artificial lures are required. Purpose of this program is to put the emphasis on the recreational qualities of trout fishing.

All trout under 14 inches must be returned in the Fishing-For-Fun program operating in the Kettlefoot, Laurel Fork, Uniconi, and Andrew Johnson Wildlife Management Areas, managed jointly by the U. S. Forest Service and the Tennessee Fish and Game Commission between August 7 and October 6 when artificial lures only may be used.

In Oregon's first test of Fishing-For-Fun, no-kill restrictions, Mud Lake is open to fly fishing only and the use of barbless hooks with the stipulation that all Atlantic Salmon caught must be released.

Pennsylvania placed the "Fisherman's Paradise" Project on a Fishing-For-Fun basis in 1962. The stream is open to fishing the year around to anglers using artificial flies only but the trout must be returned.

By law, the Schoharie Creek in New York was established in 1962 as a Fishing-For-Fun project to "... permit a greater number of sportmen to enjoy the sport of fishing with a minimum of disturbances to the natural production and maintenance of trout populations." Single hooked lures are required but the law did not specify "artificial lures." Fishermen return all trout they catch.

The Amawalk Outlet Fishing-For-Fun project, New York, was created in 1963 with restrictions which provide for no-kill and the use of artificial lures only. The protection of angling for wild trout is the aim of this project.

On the Delaware Wildlife Area in Ohio, three ponds are managed under Fishing-For-Fun regulations which require the use of barbless hooked artificial lures and the return of all fish caught. This program started in 1962 and operates for muskellunge and bass. In a similar program, Virginia has setup Fishing-For-Fun project on two ponds at the Front Royal Fish Hatchery.

Special regulation waters for trout on which the use of artificial flies or lures only are permitted are now found in 25 States. Eighteen States have fly-fishing-only waters; 15 have artificial-lures-only waters and 8 have both types of restricted waters. These States include: Alaska, Arkansas, Arizona, California, Colorado, Connecticut, Maine, Maryland, Michigan, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, Tennessee, Vermont, Virginia, Washington, Wisconsin and Wyoming.
Some of these special restriction programs are primarily directed toward the increase in number of trout available for the creel, the spread of available trout amongst greater numbers of anglers, the decrease of pressure on specific waters; or the protection for populations of wild trout and specific species of fishes.

The Fishing-For-Fun type programs, additionally are conducted for the expressed purpose of experimenting with measures to recognize and to enhance the quality aspects of trout angling without damaging the basic trout populations and with minimum reliance upon the use of hatchery fish.

The catch-and-release concept is now well established amongst salt water fishermen along the east coast. Many tournaments feature the return of fish caught and give extra points for this activity.

There is a growing concern that in efforts to provide trout fishing for the masses, insufficient consideration has been given to perpetuating the traditional quality of trout angling and the protection of populations of wild trout.

Robert G. Martin, Chief of Fisheries in Virginia, has stated that an extension of the Fishing-For-Fun philosophy will fill the bill for anglers who prefer the thrill of fishing for natives at the expense of a full-take-home creel. He cites the Rapidan project as an example of getting more fishing pleasure from restricted trout stocks. He acknowledges that 95 percent of Virginia's trout anglers depend upon "put-and-take" plantings and that 5 percent of the State's trout fishermen really try to ignore hatchery fish.

The objective of the Rapidan Fishing-For-Fun program is expressed differently by Bill Cochran, who writes in Outdoor Life (June 1962) that the purpose is to see that plenty of trout are around to grow up and spawn and give fun to sportsmen who seek recreation and relaxation.

As solutions to the problem of more anglers and less water, the Bureau of Sport Fisheries and Wildlife (in: A Report on Sport Fish Restoration, September 1957) advocated the needs for: 1) Fish For Fun (Fishermen must put more emphasis on the fun of fishing than on filling the creel.); 2) Facts--not Fancy (need for research); and 3) Better Management.

The Outdoor Recreation Resources Review Commission (Report No. 7: Sport Fishing -- Today and Tomorrow, 1962) predicts that: "Fishing-For-Fun may eventually occupy a significant place in providing a special type of recreational fishing on selected waters. Wholesale application of the plan is not advocated by its strongest supporters, and widespread use would likely meet with determined resistance from the fishing public."
In a review I have just completed of Fishing-For-Fun, fly-fishing-only, and similar projects throughout the nation, the following general conclusions become obvious: 1) Anglers generally accept special restrictions when preceded by adequate educational programs and a conditioning period; 2) Special restrictions frequently reduce the angler-use of a water; 3) Trout populations build up under such regulations on many waters but on others such an increase is not noticeable and any benefit is offset by winter mortality; 4) The number of trout caught and the number of sporting opportunities (strikes at lures and misses and fishes hooked but not landed) increase on Fishing-For-Fun waters (many fish are caught more than once); 5) Such programs foster a spirit of conservation and thus have significant educational value; 6) Such waters provide ideal places for the novice fishermen to learn the art of fishing with artificial flies or lures; 7) Fishing-For-Fun programs perpetuate and enhance the recreational qualities of fishing for wild trout; 8) There is a continued need for research on special regulation programs.

Fishing-For-Fun and similar restriction programs create certain problems such as: 1) Adequate posting of waters; 2) Need for increased law enforcement; specialized regulations and the unfamiliarity of anglers with them require additional patrols; 3) Lack of sustained angler interest and use; 4) Pressures to select waters for special programs without adequate examination to determine the suitability of the water and its trout potential (poor selections have proven detrimental to the establishment of additional waters for special regulations); 5) The inability of some inexperienced anglers, even after being "sold" on the concept, to catch trout; 6) Complaints of discrimination (although such programs set aside selected waters for special use in a manner that a portion of city park is devoted to a golf course).

Various methods are recommended for making Fishing-For-Fun, as a philosophy and as an operating program, a powerful force in the challenge obligation of perpetuating the traditionally high standards of trout angling and of preserving wild trout populations.

1) Educate fishermen and the public, and administrators in the concept of Fishing-For-Fun with its catch-and-release philosophy for better sport. A multitude of approaches must be employed such as: a) incorporation of the message in newspaper articles and fishing columns in newspapers and magazines; radio and television programs, sport fishing tackle catalogues, and in talks.

2) Conduct of fly fishing classes to teach art of fishing and conservation, as well.

3) Finance scholarships for promising fishery biologists.

4) Support and work with State Fish and Game Commissioners and their professional staffs in the selection of waters and the operation of special programs.
5) Make use of special waters once established and inform officials in charge of your continued interest and participation.

6) Urge necessary research on special restriction programs.

7) Urge for adequate biological investigations to afford proper stream and lake classification based upon natural conditions and existing wild populations as the basis for individual stream management.

8) Support programs for the control, correction and prevention of pollution, of adverse land management practices; detrimental effects of dams and highway construction; creation of new waters; and acquisition of increased access to suitable fishing waters.

By doing this, members of Trout, Unlimited will accomplish its goal to do everything possible to help conserve, protect and improve trout fishing and to guard the heritage as it has been handed down through generations.

The challenge of Fishing-For-Fun is more than adequately presented in the statement of philosophy of Trout, Unlimited which reads:

"Philosophy of Trout, Unlimited believed that trout fishing isn't just fish for trout.

It's fishing for sport rather than for food where the true enjoyment of the sport lies in the challenge, the lore and the battle of wits, not necessarily the full creel.

It's the feeling of satisfaction that comes from limiting your kill instead of killing your limit.

It's communing with nature where the chief reward is a refreshing body and a contented soul, where a license is a permit to use -- not abuse, to enjoy -- not destroy our trout waters.

It's subscribing to the proposition that what's good for trout is good for trout fishermen and that managing trout for the trout rather than for the trout fishermen is fundamental to the solution of our trout problems.

It's appreciating our trout, respecting fellow anglers and giving serious thought to tomorrow."
APPLICATION OF FISHING-FOR-FUN ANGLING PROGRAMS

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ABSTRACT

Special regulation trout fishing programs are experimentally established on selected waters in 25 States. These projects feature the use of artificial lures or flies only, reduced catch limits, and increased size limits. Some of these programs, frequently called "Fishing-For-Fun," are directed toward the recognition and enhancement of the traditional quality aspects of trout angling. They emphasize the catch and release of wild trout rather than a full creel. Such experiments are being conducted for trout in Pennsylvania, New York, Virginia, North Carolina, Colorado, Oregon, California and Washington, and in six National Parks, and for bass and muskellunge in Ohio and bass in Virginia.

Conclusions are that current Fishing-For-Fun programs: 1) are acceptable to the fishermen if preceded by an adequate educational program; 2) attract less angler-use; 3) can result in buildup in trout populations; 4) result in increased catch per angler effort; and 5) promote the conservation of trout resources.

Introduction.

As interest and participation in sport fishing continue to expand at a rapidly accelerating rate, increasing pressures are being exerted upon trout fishery resources. To perpetuate the traditional quality of trout angling while preserving these resources and meeting constant demands for fishing, without resorting to undue extreme artificialities, is the proposition faced today. It requires the employment of many measures such as: 1) creation of new trout waters; 2) acquisition of more angler access to suitable waters; 3) control and nullification of potential detrimental affects of dams and highway construction; 4) improvement of land management practices; 5) control, correction and prevention of pollution; 6) scientific stocking of high standard hatchery fish to supplement natural supplies; and 7) application and enforcement of special regulations directed toward preserving wild trout angling while providing protection for natural stocks. In this paper, we deal primarily with the last of these measures.

Previously, Wallis and Reinhold (1961) discussed the history of the philosophy and application of catch-and-release angling programs, frequently called "Fishing-For-Fun," and reviewed the status of special restrictions for trout angling. The present material is a further discussion of the "catch more by killing less" concept and an analysis and review of current special trout regulations.

Special Restriction on Trout Fishing.

Convincing evidence has shown that "warm water species" with high reproductive capabilities generally require less restrictive regulations. Longer seasons and larger catch limits frequently improve the fishing for these species on individual waters.
Such liberalization of restrictions could prove to be biologically detrimental and depleting to heavily-fished populations of wild trout. On trout populations maintained entirely or nearly so by use of hatchery fish, the economic ability of the agency responsible for the stocking, rather than biological considerations, governs the extent to which less stringent restrictions can be tolerated.

Creel limits, size limits, fishing seasons, and methods of capture are restrictions which have been enforced since the initial establishment of trout regulations.

**Creel Limits.**

Creel limits for trout have been drastically curtailed in recent years. A general daily creel limit which exceeds 10 trout is allowed in only 8 States which are Massachusetts (streams), New Mexico, Vermont, Washington, Wisconsin and Wyoming with 12 trout and Alaska and Idaho with 15 trout. The lowest general limit is found in Delaware where 4 trout may be taken. Seventeen States have a 6 trout limit; 3 have a 7 trout limit; 5 have an 8 trout limit; and 13 States permit a creel of 10 trout.

**Size Limits.**

The almost universally adopted standard minimum size limit was previously 6 inches. Later, it was discovered that this requirement frequently was an ineffective measure to protect the trout potential because the most efficient spawners on certain waters measured more than 6 inches.

Cooper (1949, unpublished Doctoral dissertation, Univ. Mich.) in his investigations in Michigan showed that a larger size limit was necessary to provide adequate protection for potential spawners as the lower limit was allowing fish to be taken before they had spawned. The survival of sublegal trout after release was then questioned. A controversy arose which centered around the question of the comparative mortality of trout released after being hooked by flies or by worms. Extensive studies by Shetter and Allison (1954; Hazzard, 1955) revealed conclusively that trout taken and released on worms suffered an average mortality exceeding 33 percent while flies were fatal to less than 5 percent of the trout released.
Subsequent investigations by Shetter and Allison (1958) have shown that the mortality of trout taken and released by the use of artificial lures is as low as for fly-hooked trout. It was concluded that a minimum legal size limit unless accompanied by restrictions on bait resulted in the loss of many of the sublegal trout returned.

At least 28 trout States have now abandoned the minimum legal limit except on waters managed under special regulations. (Five have 6-inch limit; four have 7-inch limit; and one has a 9-inch limit.)

Seasons.

The trend has been to lengthen trout seasons to the extent of permitting all-year trout fishing in certain waters and special season extensions for fly fishing only on other waters.

Methods of Captures.

Fly fishing has long been considered the sporting method to catch trout. Many waters, both public and private, in this country and in Europe have been restricted to the use of flies only. As early as 1907, Michigan Legislature passed a pioneer fly-fishing-only law to protect the trout populations on the Au Sable River.

In 1949, Michigan established a series of experimental trout waters for the purpose of testing the effectiveness of special trout regulations such as smaller creel limits, larger minimum size limits, and fly-fishing-only restrictions as measures to expand trout populations and increase the numbers of trout available for the creel. (Cooper, et al, 1959, 1960, 1961, 1962; Shetter, et al, 1954, 1962.) The Michigan investigators have concluded that on specific waters such as Hunt and Pigeon Creeks the combination of special regulations has not increased the numbers of creeled trout but that in other waters such as the main branch of the Au Sable River an improvement in the stream trout populations and in the trout catch was evident.

Studies by Burdick and Brynildson (1960) on the Peshtigo River in Wisconsin further showed that fly-fishing-only restrictions established in 1955 did not improve the trout fishery although the investigators conclude that the regulations might prove effective on other waters.
Lennon and Parker (1960) in the studies in Great Smoky Mountains National Park, and Lennon in Shenandoah National Park, have shown that fly-fishing-only regulations combined with a larger size limit and smaller creel limits have served to build up the stream populations without supplementary stocking in Shenandoah and with a minimum of planting in Great Smoky Mountains waters.

These representative experimental studies clearly demonstrate that special regulations can not be universally applied to all waters with the same results and that ideally, each stream should be regulated and managed according to its distinctive biological capabilities and fishing pressures.

Specific waters in 25 States are restricted to the use of artificial flies or lures only; 18 have fly-fishing-only waters; 15 have artificial-lure-only waters; and 8 have both types of restricted waters. The 25 States are: Alaska, Arkansas, Arizona, California, Colorado, Connecticut, Maine, Maryland, Michigan, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, Tennessee, Vermont, Virginia, Washington, Wisconsin and Wyoming.

Fishing-For-Fun programs with no-kill restrictions operate in California, New York, Ohio, Oregon, Pennsylvania and Virginia. Fishing-For-Fun projects with trophy-size limits prevail in California, North Carolina and Tennessee.

A State-by-State review of special regulations is attached and Fishing-For-Fun programs in National Parks and in various States are discussed on pages 9-22.

Special trout regulation programs in several States are directed essentially toward increasing the numbers of trout available for the fishermen to catch and retain, to spread the available numbers of trout amongst greater numbers of anglers, to decrease pressures on specific waters and to provide an added degree of protection for populations of wild fish, especially those where attempts are being made to preserve or to reestablish native species or to establish newly-introduced forms.

Other special regulation programs are being conducted for the expressed purpose of experimenting with measures to recognize and to enhance the quality aspects of trout angling without damaging the
basic trout stocks and with minimum reliance upon the use of hatchery fish. These programs are called "Fishing-For-Fun," "Quality Fishing," "Recreational Fishing," "Special Restriction Programs," and "Catch-and-Release Angling." They feature the use of artificial lures or flies only, the return of all fish caught (or the retention of larger "trophy-sized" trout) or smaller creel limits, increased length limits and special seasons.

Catch-and-Release Concept.

Four score and ten years ago, Prime (1873) advocated the catching and releasing of trout rather than killing all one could and subsequently throwing them away.


Eschmeyer (1948) observed that one way to provide more fishing is to put back the fish we catch -- to fish for fun but not for food. He warned that "fishing just for fun will not be popular for sometime." Later he stated (1954) that emphasis must be placed on the enjoyment of fish and not on "meat."

The Bureau of Sport Fisheries and Wildlife (Anon., 1957) in its report on sport fish restoration lists: fish for fun, facts-not fancy (need for scientific research), and better management, as solutions to problems created by more anglers and less water. It states: "Fishermen must put more emphasis on the fun of fishing than on filling the creel."

Hazzard (1943, 1945a, 1945b, 1963) has repeatedly contended that anglers must learn to be content to kill fewer trout. In an article in Sports Afield in 1952, he further predicted that a trout angler's
sport could be improved if laws prohibited him from having trout in possession at any time. He mentioned that under such a proposal, restrictions such as creel-limits, size limits and seasons could be abolished. The fisherman would fish for the fun of fishing and return all the trout to the stream.

Anglers were required to return all trout caught on artificial lures on the initial Fishing-For-Fun program, as proposed by Hazzard, established on portions of two streams in Great Smoky Mountains National Park in 1954. The program was expanded in 1958. A similar program was placed in operation on Young Woman's Creek in Pennsylvania in 1958. Additional experimental Fishing-For-Fun projects with various modifications are now operating in Yellowstone, Yosemite, Sequoia, Kings Canyon, and Shenandoah National Parks; in Colorado (as "Quality Fishing"); on the Schoharie and Amawalk Rivers of New York; on "warm-water" ponds of Delaware; on streams in Wildlife Management Areas of Tennessee; and Mud Lake in Oregon. (These projects are subsequently discussed in greater detail.)

The catching and releasing of trout is legal in most States. Regulations on the special trout lake in Two Rivers State Recreation Area in Nebraska provides that "each fish caught shall be counted, no fish shall be returned." In North Dakota, the law provides that: "After a fish has been caught, it shall be illegal to return it to the water except for pike less than 18 inches in length which must be returned to the water." The New Jersey laws permit no more than six trout to be killed but trout in excess of this number may be caught provided they are immediately returned to the water unharmed.

The practice of catch-and-release of marine fishes is well established along the Atlantic Coast. (See pages 23-25.)

"Fishing-For-Fun may eventually occupy a significant place in providing a special type of recreational fishing on selected waters," is the prediction contained in the Outdoor Recreation Resources Review Commission's report on fishing (ORRRC, 1962).

Elkins and Sharp (1962) mention that Fishing-For-Fun idea is another approach to expanding recreational fishing on national wildlife refuges.
Correspondence indicates that several additional States and several other National Parks are giving consideration to the establishment of special regulation programs including Fishing-For-Fun projects.

Conclusions on Fishing-For-Fun Programs.

Fishing-For-Fun projects, still in the experimental stage, have demonstrated: 1) that the fishermen will accept such types of special restriction programs when preceded by an adequate educational program; 2) that angler-use is less than on normal regulation waters; 3) that trout populations can be built up under such regulations; 4) that the number of sporting opportunities (strikes at lure and misses and fishes hooked but not landed) and the numbers of fishes actually caught are greater than in waters with regular creel limits; 5) that such waters provide ideal places for the novice fishermen to learn the art of fishing with artificial flies or lures; and 6) that such programs foster a spirit of conservation of trout resources.
National Park Service Fishing-For-Fun Experiments.

The policy of the National Park Service provides that recreational angling in National Parks shall be provided under as natural conditions as possible and with a minimum degree of artificiality associated with this activity. Primary reliance for the support of fishing is placed upon natural wild trout populations, preferably native species, wherever possible. Restricted stocking is undertaken to supplement populations when conditions for natural reproduction are limited or lacking. (Wallis, 1960.)

The philosophy of Fishing-For-Fun which places emphasis upon the quality of the fishing experience and the preservation of wild trout populations rather than upon a full creel coincides with this policy. In many parks, the Service has pioneered in special angling regulations aimed at this goal.

Experimental Fishing-For-Fun trout angling projects which feature no-kill or reduced creel limits, increased size limits, and use of artificial lures or flies only have been established on selected waters in six National Parks. In addition, fly-fishing-only or artificial-lures-only programs operate on other waters in several parks. These projects are briefly discussed.

Great Smoky Mountains National Park. When Dr. Albert S. Hazzard made the Fishing-For-Fun proposal that trout fishing could be improved by the return of all trout caught in Sports Afield in 1952, it appeared logical to experiment with this concept in Great Smoky Mountains National Park. A fishery research team of the U. S. Fish and Wildlife Service, headed by Dr. Robert E. Lennon, was actively engaged in research on Park waters. The use of artificial lures only with reduced limits had been required on these waters for a number of years, thus the transition to a no-kill restriction could be expected to be less abrupt.

Originally the Fishing-For-Fun program with the requirement that all fish caught must be returned to the water was established in 1954 on the Bradley Fork in North Carolina and the West Prong Little Pigeon River in Tennessee to determine the effects of no-kill angling on trout populations and to gauge public acceptance of this concept.
In 1958, the program was modified to open these two streams to all-year-round fishing and to provide for Fishing-For-Fun on Little River and Oconaluftee River during the off-season, September through May. The fishermen were permitted to retain "trophy" size trout measuring more than 16 inches. By 1959, the number of fish caught and released for each hour of angling expanded to four on the Bradley Fork and three on the West Prong. Pounds of rainbow trout in Bradley Fork increased from 52 pounds per acre in 1954 to 60 pounds in 1959 and in the West Prong this increase was from 15 pounds in 1954 to 53 pounds in 1959. An improvement in sporting opportunity was reflected on the West Prong by the increase in number of trout measuring 7 inches and longer from 48 per acre in 1954 to 164 per acre in 1959.

The success of this program has received nationwide recognition and has served to stimulate additional experiments in Fishing-For-Fun management. (Thompson, 1959; Forbes, 1958; Titus, 1959; Grahame, 1959; Gould, 1960, Reinhold, 1958; Titus, 1960; Wallis, 1960, 1961a, 1961b; Cochran, 1960; Lennon and Parker, 1960; Anon., 1960a, 1961a, 1961b; Riethmiller, 1961; Corder, 1961; Stupka, 1962.)

Although the Fishing-For-Fun program has continued on these waters, no subsequent follow-up investigations have been made since the termination of the research project to determine the status of the trout populations in relation to fishing pressures. Park officials are of the opinion, based upon visual observation, that fishing pressures have declined on the Fishing-For-Fun waters despite the fact that an angler can continue to catch and release more trout in them than he can in waters managed under regular regulations.

More than 600 miles of trout streams are managed on artificial-lure-only regulations with a 5 trout creel limit.

Sequoia and Kings Canyon National Parks. In 1962, two stream sections in Sequoia and Kings Canyon National Parks were placed on a Fishing-For-Fun basis with restrictions which require the use of artificial lures only, barbless single hooks, and the release of all trout measuring less than 16 inches.

In Kings Canyon, the 2-mile section of the South Fork of the Kings River extends between Roads' End and the confluence with Bubbs Creek. It is a large river flowing over very gentle gradient with a well-proportioned number of pools and riffles and contains natural populations of rainbow and brown trout which have not been supplemented with hatchery stock for many years.
The second section is a 2-mile stretch along the Middle Fork of the Kaweah River from Hospital Rock to Morro Rock, located in Sequoia National Park. It maintains a steeper gradient and has poorer conditions for natural reproduction. In recent years, it has been stocked with larger-sized trout.

Public acceptance of the catch-and-release program has varied in proportion to the character of the stream. On the South Fork, the better of the two streams, the special restrictions are readily accepted. Catch success and fish size have been higher and consequently the anglers' satisfaction greater.

The catch-and-release program with its accompanying cession of stocking and establishment of no-kill and artificial-lure-only regulations on the Middle Fork has met with less enthusiasm. Park Biologist Richard Riegelhuth has determined that special regulation waters require adequate signing, expanded public information programs and increased number of patrols.

Shenandoah National Park. The Fishing-For-Fun philosophy for recreational angling applies to the 46 small trout streams of Shenandoah National Park with a total length of 108.5 miles. The climatic conditions in the Blue Ridge limit the biological capabilities of the waters to support large populations of trout. The importance of these scenic streams and their wild trout populations will continue to increase in significance. They are located within 100 miles of the Washington Metropolitan Area and the trail system makes them accessible and attractive to fishermen and the watersheds have shown remarkable recovery since placed under Park protection. Lennon (1961) investigations were made on Park waters and trout populations.

A series of seasons of drought, followed by scouring hurricane-created downpours, left the wild populations of native brook trout severely depleted prior to 1954. Park waters were closed in 1954 and 1955 to allow for natural comeback without the stocking of hatchery fish. The streams were reopened on an artificial-lure-only basis with a size limit of 9 inches and a creel limit of 8 trout. The 9-inch limit, a compromise between a no-kill fishing-for-fun program and a renewal of the 7-inch limit, was initiated to protect the spawning potential during the recovery years and to encourage the sporting aspect of trout fishing (Lennon, 1961). In 1963, the creel limit was reduced to 5 fish and the size decreased to 8 inches because of a buildup of trout in some of the streams.
It was recognized that the higher size restriction would cut down on the yield of trout to the creel. Such yield is and must continue to be considered of secondary importance in Shenandoah National Park where the primary Service objective is the recreation of fishing for wild, colorful native brook trout amid scenic and undisturbed surroundings. Few eastern waters offer this combination of quality recreational experience.

Even under more liberal regulations, streams of the Blue Ridge are utilized extensively by the average angler only during the early spring. Then the pressure slacks off and only the relatively few avid trout fishermen frequent the mountain streams. This group of fishermen has expressed preference for fewer 9-to-14-inch wild trout in the creel to larger limits of 7-inch trout, and generally have approved of the quality of fishing which is being preserved.

Two streams, the Rapidan and the Staunton Rivers are managed as no-kill Fishing-For-Fun waters as discussed elsewhere.

Yellowstone National Park. The program started in 1961 in Yellowstone National Park encourages anglers to voluntarily fish for fun and to return the trout they catch. It is directed toward fishermen using Yellowstone Lake where it has been discovered that vast numbers of fish are discarded in the trash cans at the end of the fishing expedition, although the catch limit is established at three fish on the Lake and five fish elsewhere in the Park. The success and aptness of such a voluntary program as an immediate means of protecting a valuable resource is under study. Preliminary studies have shown that mortality of fish returned in this program has been low.

Only artificial flies, with a single hook, may be used as lures in the Firehold River, Madison River, Squaw Lake, and Gibbon River, from mouth of the stream to crest of Gibbon Falls.

Yosemite National Park. A 3-year experimental Fishing-For-Fun program was initiated in 1961 on a 3-mile stretch of the Dana Fork of the Tuolumne River in Yosemite National Park. The objective was to test the no-catch regulations as a means of improving opportunities to fish for wild trout without resorting to measures which would lower the quality of the fishing experience. (Corder, 1961.)
The experimental water is a heavily used, readily accessible stretch which parallels the Tioga Road. It contains naturally propagated populations of brown, brook and rainbow trout. Prior to 1961, the numbers and size of trout had declined because of excessive use. Samples taken after 2 years of Fishing-For-Fun operations indicate that the trout are 10 times as plentiful and significantly larger in the restricted portions of the stream than in unrestricted waters above and below the test stretch. This experiment has revealed several problems of administering such a program. Even with advance news releases and talks before interested groups and with the section adequately signed, the Fishing-For-Fun concept is so new that public understanding and appreciation of the objectives are slow in developing. Signs along the highway created public interest to the extent that many Park visitors stopped at the Tioga Pass Entrance Station to inquire more about Fishing-For-Fun. This disrupted the normal movement of Park visitors through this entrance point.

The second problem concerns the inability of the average fishermen to catch wild trout on fly. People who are wholly in accord with the principles of catching and releasing trout are quickly disappointed when they fail to catch fish as quickly as they had anticipated. Park Biologist Delmer M. Armstrong comments that fishing for fun can be expected to serve only a small segment of the angling public but should be continued as a means of promoting the type of angling most compatible with National Park Service objectives.

Additional signs have been erected and an information sheet developed to answer inquiries. The Fishing-For-Fun program has met with public acceptance. No complaints were received regarding its philosophy. The number of signs necessary to delineate the project area brought forth a single complaint about this intrusion upon the scenic landscape.

Consideration is being given to expanding the program slightly on an experimental basis on other waters in the Park including a portion of the Merced River in the lower end of Yosemite Valley. This stretch would be open to year-round angling under artificial-lures-only restrictions and anglers would be required to return all the fish they catch.
Special Regulations in Other Parks. Waters in Katmai National Monument, Alaska, are restricted to the use of artificial lures or flies only. The Ohanapecosh River and tributaries of Mount Rainier National Park, Washington, are open for fly fishing only.

In Catoctin Mountain Park, Maryland, a unit of the National Park Service, fly fishing only is permitted on Big Hunting Creek under a cooperative program with the State of Maryland. Trout populations are maintained by periodic stocking of adult trout.

In a joint program with the State of Tennessee, artificial flies or lures only are allowed for fishing on Boone Fork below Price Lake, Basin Creek and tributaries, and on Price Lake in the Blue Ridge National Parkway. These waters are classed as "Native Trout Waters" and are managed under restrictions which provide for a reduced catch limit of 5 trout measuring not more than 9 inches.
State Fishing-For-Fun Programs for Trout.

Catch-and-release type Fishing-For-Fun programs have been established on an experimental basis in several States. Descriptions of these projects for trout in Virginia, Pennsylvania, New York, Oregon, Tennessee, and Colorado are presented below. Similar programs which foster the recreational qualities of trout fishing are discussed in the statement, "State-by-State Review of Fishing-For-Fun Type Angling Programs."

Virginia.

Rapidan Fishing-For-Fun Project. Now in its third year, a Fishing-For-Fun program operates on the Rapidan and Staunton Rivers as a cooperative effort between the Virginia Commission of Game and Inland Fisheries and the National Park Service. The Fishing-For-Fun sections of these streams which total 7 miles are populated with native brook and stocked rainbow trout. The project has secured public acceptance and participation has increased.

On opening day in 1961 the program did not attract as many anglers as nearby streams planted for put-and-take but the fishermen caught 3.7 trout per trip on the Rapidan River as compared with a creeled take of 1.5 and 1.2 trout on heavily stocked nearby Garth and Moormans Rivers. Fishing use on the Fishing-For-Fun streams has held up throughout the season into October whereas the pressures rapidly diminish on the put-and-take waters. The trips in 1962 increased by 35 percent over those recorded in 1961. The total number of trout caught was 61 percent larger. Trout caught and released per trip increased from 3.9 in 1961 to 4.4 in 1962. Both years it took approximately 67 minutes to catch each trout.

Anglers from 31 counties and cities and the District of Columbia, Maryland, New Jersey and Pennsylvania have fished on the project waters. Nonresidents accounted for 9 percent of the total trips. Forty-eight percent of the anglers came from the suburban Washington area, approximately 100 miles distant. Only 7 percent were from Madison County where the project is located.

A total of 319 adult rainbow trout were planted in 1961 and 300 in 1962. The 1961 plant experienced fine over-winter survival. In 1962, 1,356 rainbow trout were caught; several rainbow trout
obviously were caught more than once. Wild trout made up 56 percent of the total catch. Incomplete tabulations for 1963 reveal that nearly twice as many wild brook trout have been caught as taken in 1962. Although the rainbow trout apparently suffered severe winter mortality, there is evidence of natural reproduction of this species.

**Pennsylvania.**

**Fisherman's Paradise Project.** Since April 14, 1962, a Fishing-For-Fun program has operated at Fisherman's Paradise, Spring Creek Project, near Bellefonte. On this stretch of the river which measures less than a mile, fly fishing only is permitted all year. An angler must return trout caught to the stream. (Hazzard, 1962; Trembley, 1963.)

This project formerly was managed with restrictions which required fly fishing with barbless hooks, limit of one trout per day and a limited number of trips per season. Scores of anglers vied for freshly planted "trophy" sized trout.

Under Fishing-For-Fun restrictions, use of the water has declined drastically with 100 individuals using the stretch on opening day in 1962 as compared with the 1,404 fishermen present on opening day in 1961. The water was visited by anglers from 10 of the 67 counties of Pennsylvania although fishermen from the three adjacent counties accounted for the greatest number of participants. Other fishermen came from 17 States and one from England.

To supplement trout in the stream and to compensate for movement from the project area, approximately 1,100 adult trout were stocked in 1962. Between April 14 and December 31, 1962, 7,697 trout were caught and released. It took 1.87 hours on the average to catch a trout.

To canvass the acceptance of the program, anglers were requested to record their comments. Seventy-seven percent of those commenting indicated definite approval of the Fishing-For-Fun program over the former "Paradise" project operation. Forty-four reports requested that this type of program be expanded to other streams in the State. During the initial year of operation, Fishing-For-Fun at Fisherman's Paradise attracted over 14,662 anglers on less than a mile of stream. Although winter use was not heavy, fly fishermen did try and succeed at luring trout during the cold and snowy months.
Young Woman's Creek Project. Fishing-For-Fun programs apparently operating with success and public acceptance on the Left and Right Branches of Young Woman's Creek, a distance of 8 miles, and cooperatively on the private ponds of the Renovo Country Club were abruptly halted in 1962 without public explanation. Started in 1958, as the second major Fishing-For-Fun project, the program on the Left Branch of Young Woman's Creek received considerable favorable national recognition. (Miller, 1958; Forbes, 1958; Titus, 1959; Grahame, 1959; Reinhold, 1959, 1960; Lucas, 1960; Vaughn, 1960; and Grove, 1961.)

New York.

Fishing-For-Fun projects with no-kill restrictions operate on a 1.44 mile section of the Schoharie Creek, town of Lexington, Green County, and on a 2.8 mile stretch of the Amawalk Outlet between Amawalk Reservoir and Muscott Reservoir.

Schoharie Creek Project. By law, the Schoharie Creek Fishing-For-Fun project was established in 1961 on the stream section starting 600 feet downstream from the bridge at Mosquito Point and extending downstream for 1.44 miles. In words of the law it was created to:

"... permit a greater number of sportsmen to enjoy the sport of fishing with a minimum of disturbances to the natural production and maintenance of trout populations and in order that the Department may obtain factual information concerning the survival and growth of trout under natural conditions until September 30, 1965."

The law further provided that fish may be taken only by angling with not more than one lure having not more than one single hook point and that trout taken from these waters shall not be reduced to the permanent possession of the taker and shall be immediately returned to the water without unnecessary injury.

Anglers who use the stream are enthusiastic about the project but the concept has not been as widely accepted as had been anticipated. There is evidence that populations of trout cannot be maintained by natural reproduction and that other species are present in this section.
The law which provides for use of a single one-hooked lure does not specify the use of artificial lures, a requirement considered desirable for a successful catch-and-release program for trout. As an initial test of the Fishing-For-Fun concept, it appears that this section of the Schoharie Creek was an unfortunate selection.

**Amawalk Outlet Project.** The lower portion of the Amawalk Outlet, a stretch of 1.9 miles, appears to be more suited to the application of special regulations such as a no-kill limit and use of artificial lures only. The presence of natural reproduction of brown trout was discovered in samples secured by electrofishing in 1961 by biologists with the New York Department of Conservation.

Waters released from the bottom of the reservoir, a unit in the water supply system of the city of New York, insure a cool and fertile flow of unpolluted waters, averaging 20 to 30 feet in width in the tree-shaded course of the river.

Subsequent shocking samples in May and August, 1962, supported the earlier discovery of the presence of wild brown trout. The August tests indicated the presence of 3,500 browns, less than 6 inches, and 1,200 trout measuring more than 6 inches and up to 14 inches in the stream after 4 months of intensive fishing. Scale readings of 65 fish in October revealed that: 39 young-of-the-year trout measured 3.7 to 5.6 inches (average 4.8 inches); 21 one-year trout were 6.5-9.7 inches (8.5 inches); 4 two-year trout were 10.2-11.2 inches (10.9) and a single three-year fish was 15.9 inches. These studies disclosed that the trout made excellent growth but that heavy fishing pressures apparently cropped off the majority of fish as soon as they reached desirable size.

The discovery of a wild population of brown trout on a popular stream located within 40 miles of New York City indicated the need for protection by either the establishment of a no-kill, artificial-lure-only regulation or by a reduced catch limit, and a high size limit, combined with use of artificial lures only. The County Federation of Sportsmen's Clubs recommended the initiation of a no-kill, artificial-lure-only project for a period of 3 years subject to annual review by the Department and the sportsmen.
The program, started on April 1, 1963, has been well accepted. Although the numbers of fishermen are fewer than had been expected, many anglers make return visits. The majority of fishermen using the stream appreciate this type of fishing and the project's goal is to convert more to this way of thinking. (Einar Chrysti*, Conservation Biologist, personal communication, July 3, 1963.)

In April, 1963, it took an angler 4 hours to catch a trout; 2 hours in May and 45 minutes in June. Studies made by the Westchester Conservation Council reveal that in 1962 a fisherman using regular methods caught one trout for every 18 hours of effort. Previous pressures were so great that few wild trout were available for anglers. (Kehm, 1963.)

Oregon.

Fishing-For-Fun program was initiated for Atlantic Salmon on Mud Lake in 1962. Fly fishing only with barbless hooks is allowed and all fish caught are released. Angler-use has increased in 1963 but during the first year there was a noticeable decline in numbers of fishermen using the water.

Tennessee.

All trout under 14 inches must be returned in the Fishing-For-Fun program operating in the Kettlefoot, Laurel Fork, Uniconi and Andrew Johnson Wildlife Management Areas from August 7 through October 6. Artificial lures only are permitted.

Colorado.

Under the term "Quality Fishing," Parvin and Butts Lakes, Bull Creek Reservoirs Nos. 1 and 2, and sections of East River, Poudre, and South Platte Rivers are managed as Fishing-For-Fun waters with the return of all trout measuring less than 12 inches and with restrictions which require the use of artificial lures only.
State Fishing-For-Fun Projects for Warm-Water Species.

Currently less restrictive measures generally govern fishing for "warm-water" species. The greater reproductive potential of these fishes makes it feasible to take increased numbers from many waters without seriously affecting the basic stock.

Ohio and Virginia are experimenting with Fishing-For-Fun restrictions which require the return of all fish caught on selected waters to determine public acceptance and the relative value of such special measures.

Ohio.

The experimental Fishing-For-Fun project, established in 1962, operates for largemouth bass and muskellunge on three 1-acre lakes on the Delaware Wildlife Area. (Riethmiller, 1961, 1962.)

Fishing activities are governed by restrictions which require the angler to: obtain a free special permit (on which questions are answered and returned), to use only artificial lures equipped with not more than one treble barbless hook or three single barbless hooks, and to return all fish caught.

One pond was planted with 12 muskellunge measuring 28 to 38 inches in 1962 and 6 additional fish were stocked in 1963 to supplement the 6 which carried over. Bass pond #14 received 51 (12-21 inch) bass in 1962 and 50 (13-17 inch) bass in 1963. The other, #16b, was planted with 89 (7 inch) bass in 1962 and 33 (13-17 inch) fish in 1963.

It required 13 hours to catch a trophy-sized muskellunge in 1962 and 19 hours in 1963. Sporting opportunities (number of times fish were hooked and lost plus the number of strikes) were tabulated. They amounted to one for every 2.5 hours of fishing in 1962 and one per 3.3 hours in 1963. Eight percent of the muskellunge anglers were successful in 1962 and 9 percent in 1963.

Thirty-three percent of the anglers were successful in landing a large bass every 2 hours in bass pond #14 in 1962. In addition, five sporting opportunities were experienced during this 2-hour period. Catch success increased to 61 percent in the first 1.5 months of fishing in 1963 when it took 54 minutes to catch each bass.
A bass was caught every 43 minutes on bass pond #16b in 1962. The catch success was 40 percent and sporting opportunities amounted to five per hour. Although the catch success increased to 54 percent in the first month of the 1963 season, it took over twice as long to catch a single fish and sporting opportunities were experienced one-half as frequently.

During 1962, each bass was caught and released on the average of 1.5 times and each muskellunge was taken 1.8 times. Mortality amounted to one muskellunge for every 22 catch and releases and one bass for every 43 releases.

Participation in the project has not been as large as anticipated in spite of much initial interest and considerable publicity. Those who have fished for fun have been enthusiastic supporters of the program and have made many return trips.

Thirty-two percent of the fishermen came from the local area; 56 percent from Columbus; and 12 percent from other localities.

Riethmiller (1962) concludes that fish can be caught with artificial lures and released with low mortality while providing additional recreational fishing; that a small but enthusiastic group of Ohio's fishing public have expressed interest in Fishing-For-Fun angling; and that adequate protective measures are required to reduce the poaching problem.

Eventually, it is anticipated that the program will be expanded to larger lakes. The following elements are considered desirable in the establishment of such a Fishing-For-Fun lake: area of 50 to 100 acres; located within 30 miles of a large city; a newly-created lake (so that local anglers' fishing habits will not require changing); and regulations which provide for keeping trophy-sized fish by setting higher length limits.

**Virginia.**

At the Front Royal fish hatchery, Virginia is making a series of tests to determine the value of angling regulations on 28 ponds open for public fishing. Two of these ponds are designated as Fish-For-Fun waters in a program which started in 1961 to experiment with the combination of artificial-lure-only and no-kill restrictions. One pond contains a smallmouth bass - longear sunfish combinations and in the other are largemouth bass and bluegill. By the end of 1961, each bass had been caught 1.7 times during the season and each sunfish was taken 0.7 times. Mortality rate of 3 deaths per 100 fish caught and handled by fishermen was experienced.
The concept of catch-and-release was well accepted. Ten percent of the anglers to the hatchery ponds during the close of the 1961 season used the Fish-For-Fun ponds in preference to the ponds operated under conventional regulations.

**Vermont and New Hampshire.**

Fly-fishing-only regulations with a 10-inch size limit and a creel of three fish is permitted from June 1 to 20 on the Connecticut River between Vermont and New Hampshire. During the remaining portion of the season, fishing is restricted to use of artificial lures with a creel limit of 10 fish.

**Maine.**

In Androscoggin County, Maine, bass may be taken by use of artificial lures only between June 1 and 20.
Catch-and-Release of Marine Fishes.

Marine sports fishermen have released tarpon, marlin, sailfish and several other species for years. Since the previous report (Wallis and Reinhold, 1961), the practice of catch-and-release of marine fishes has continued to expand.

The majority of past tournaments has emphasized prizes for the largest and the most fish killed and racked up on the dock. Currently, many major tournaments are stressing the sporting qualities of fishing and conservation of marine fishes instead of prizes.

In the 1962-63 Metropolitan Miami Fishing Tournament, Florida, 93 percent of the fish entries covered fishes which had been released. Awards are given for the release of all 33 species eligible for contest entry. An angler won the All Release Trophy in 1963 for returning over 1,600 snook, redfish, tarpon, trout and ladyfish. Releases have increased fivefold since 1957.

The Sailfish Tournament, sponsored by the Stuart Sailfish Club, Florida, is almost completely a release affair.

Designed for fishermen who fish for fun, the Everglades Tarpon and Snook Tournament gives primary recognition to release of fishes and conservation. No prizes are given but plaques and citations are presented for release of tarpon and snook. In the recent tournament, an angler won a release citation for returning 62 snook.

Guide captains who promote and report the release of game fishes receive special recognition. Top guides are now classed by the number of releases and not the number of dead fish he brings to dock.

In 4 days of the 1963 Fourth Annual International Blue Marlin Tournament sponsored by the Hatteras Marlin Club, North Carolina, 41 marlin of the 56 caught were tagged and released.

Reports from Cape Hatteras National Seashore, North Carolina, reveal that one marlin was released by deep sea anglers for every four fish brought to boat from Oregon Inlet and Hatteras charter boats in 1963.

During the 3-day Derby of the Ocean City Light Tackle Club, Maryland, for 1963, 36 anglers in 12 boats caught and released 65 white marlin. One angler released six in one day.
The release of 69 of the 76 sailfish caught highlighted the 1962 Silver Sailfish Derby, West Palm Beach, Florida. The C. F. Johnson Trophy was won by an angler for taking and returning 12 sailfish in the 3-day tournament.

With special release citations, fishermen are encouraged to release white marlin and tarpon in the Virginia Salt Water Tournament which affords an angler no inducement to bring in a boatload of fish.

On the west coast, the Newport Spin Club, California, holds an annual derby for the express purpose of promoting the idea of Fishing-For-Fun. Points are given for yellowtail, tuna, albacore, bonito and other species which are caught and returned. In the Third Annual Conservation Derby of 1962, 39 ocean anglers, representing 19 spin fishing clubs in Southern California, caught and released 656 fish.

Many marine sportsmen tag the catch before they release it. Attempts are thus being made for sports fishermen to assist biologists in securing details about the growth, movements and other facts about the little-known life history of marine fishes. Additional points are given in some contests for each fish which is tagged before it is released.

Woods Hole Oceanographic Institution, Massachusetts, conducts an international tagging program. It provides anglers with a kit containing tags, record forms, and a bright red yachting flag to fly when a big fish has been tagged.

In his "Up the Stream" column in the Washington Post (July 28, 1963), Kennedy Ludham sums up the catch and release of marine fishes as follows:

"Once, a sportsman who wanted to release his catch alive to be caught again another day was in danger of getting tossed overboard by his guide. The professional guide's reputation depended upon how many fish were dumped on the dock.

"Through intensive conservation education aimed at both sportsmen and guides, the old idea that a catch must be exhibited to be proved has fallen into disrepute. Now the boat that brings back more than a reasonable number of fish is subject to criticism and ridicule."
"Unfortunately . . . too many bottom-fishing boats are bringing hundreds of non game varieties which instead of being utilized, are tossed into the neighborhood ashcan.

"The outlook is bright, however, with game species. More and more resorts featuring offshore fishing for big game species are emphasizing that the release of fish not wanted for mounting is a status symbol. In some cases, released fish count higher in tournament scores than fish brought to dockside."
STATE-BY-STATE REVIEW OF FISHING-FOR-FUN TYPE ANGLING PROGRAMS

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Special fishing regulation programs have been established in many States to emphasize the recreational qualities of the sport of angling rather than to solely enhance the fisherman's take-home catch. They are designated by various names such as: Fishing-For-Fun; Fish-For-Fun; Quality Fishing; Recreational Fishing; Special Regulation Waters; and Fly-Fishing-Only Waters.

In addition, some special regulations have been enacted to serve special purposes such as: the protection of native species; the perpetuation of wild trout populations; the reduction of excessive fishing pressures; and the spread of available fish amongst the increased numbers of fishermen.

This summary is compiled from State fish and game laws, personal communications with various State officials, reports and published references.* Sincere thanks are extended to those who assisted in this review.

Alaska: Sport fishing in the waters of Katmai National Monument is governed by regulations which require the use of artificial lures only. Fly fishing only with not more than two single hook flies is permitted in the posted section of Brooks River. On the remaining section of the river, from the mouth to a point approximately 880 feet upstream, plugs, spoons, and spinners with not more than one single hook and not more than one attraction blade may be used. In other streams of the Monument the lure may consist of not more than two single hook flies or not more than one plug, spoon or spinner to which may be attached not more than one single hook. In the lakes, each artificial lure must consist of not more than two flies or not more than one lug, spoon, or spinner to which may be attached not more than one treble hook.

*References cited are included in the List of References Relating to Fishing-For-Fun, September 1963.
Arkansas: Artificial baits only are permitted for the taking of trout on White River and Norfolk River below Bull Shoals and Norfolk Dams to Lock No. 1 between November 1 and March 1.

Arizona: Currently, Frye Mesa Reservoir is open to fishing with artificial lures or flies only. Fly fishing only is permitted on Canyon Creek, from origin to crossing of Indian Reservation boundary. Both programs are well accepted by the public. Little Colorado River was dropped as an artificial-lure-only water because of insufficient interest, although no adverse factors were encountered. It is anticipated that in 1964, the entire Oak Creek will be placed on artificial-lure-only regulations to attempt to cut down on excessive fishing pressure and to channelize "meat" fishermen to areas where they can be more economically satisfied. Artificial-lure-only program has worked effectively on small Frye Mesa Reservoir in controlling excessive angling pressure.

California: Fly-fishing-only streams of California include: 1) the following tributaries of Gualala River: Rockpile Creek, Buckeye Creek, Wheatfield Fork and South Fork above Valley Crossing; 2) Pleasant Valley Creek, Alpine County; 3) North Fork Tule River and all its forks and tributaries above confluence with Pine Creek, Tulare County; 4) Patah Creek from Solano Diversion Dam to Monticello Dam with 3 trout creel limit and a 10-inch size limit (except during general trout season in adjacent areas); and 5) Kings River, from Garnet Dike Campground upstream to mouth of Rough Creek, Fresno County, with three trout limit. Approximately 36 miles of streams are regulated as fly-fishing-only waters.

Crowley Lake has a special fly-fishing-only season; September 15 to October 31, from the shore at north landing westerly along shore to mouth of Convict Creek. Flies must have barbless hooks. The reduced creel limit is 5 fish and the minimum size limit is 12 inches.

Hunter Lake, Calaveras County, and McGowan Lake, Tehama County, are restricted to use of artificial lures only.

Several waters have reduced creel limits, from 2 to 5 fish on trout and salmon; others have open season limited to selected days of the week.

In addition, the National Park Service manages selected waters in Yosemite, Sequoia and Kings Canyon National Parks on a Fishing-For-Fun basis which requires the use of artificial lures only and the return of fish under 16 inches or the return of all fish on Dana Fork, Tuolumne in Yosemite. (Corder, 1961.)
The Fly Fishermen for Conservation group is again proposing to the California Fish and Game Commission that a winter Fishing-For-Fun season be placed on a 6-mile section of the Kings River below Pine Flat Dam, east of Fresno. Fly fishing only, barbless hooks and no-keep restrictions are recommended. This organization believes that more and more low-limit-high-release fishing is going to become necessary and that now is the time to pioneer with these restrictions and to educate fishermen that it is not necessary to kill fish in order to enjoy fishing.

Colorado: Under a 3-year-old program started in 1961 to develop "quality fishing" waters, 12 lakes and stream sections are managed under special regulations. Four of these are fly-fishing-only waters. (Tanner, 1961; Seaman, 1961; Williams, 1961; Eason, 1962; Peterson, 1963.)

Two "quality" or Fishing-For-Fun plans are in operation. One requires use of flies and lures only with a minimum size limit; the second provides for use of flies only with no size limit. The former is favored as it is less discriminatory and does more to enhance quality fishing according to State officials.

Of the total of 10,000 miles of trout streams, 7,100 are considered good or adequate. The 50 miles of streams under special regulations represents one-half of one percent of the 7,100 miles. Special regulations apply on 5 out of 2,400 trout lakes and reservoirs. The total of 185 acres on these waters represents less than one-half of one percent of the total acreage of 89,800.

In the following table facts about the quality fishing waters in Colorado are summarized:
The program on Parvin Lake met with marked success Eason (1962) determined. In 1960, 6,000 angler trips netted 7,000 trout for a catch-per-man-hour average of 0.28. Under the "quality" fishing program in 1961, 6,000 trips resulted in a total catch of 18,000 trout and a success rate of 0.97 fish-per-man-hour. Only 547 of the fish measured over 14 inches; this meant that 11,000 more trout were caught but the number returned amounted to 17,500.

Eighty-nine percent of the anglers enthusiastically endorsed the program and requested the expansion of the program to other waters although only 53 percent of these fishermen had caught a trout which measured over 14 inches.

One angler put it: "I would rather catch three or four 12- and 13-inch fish and put them back alive than catch twenty 6-inch fish to keep!"

<table>
<thead>
<tr>
<th>Waters</th>
<th>Area or Length</th>
<th>Type of Regulation*</th>
<th>Size Limit - 12 inch</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>ALO</td>
<td>FFO</td>
</tr>
<tr>
<td>Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parvin</td>
<td>65 acres</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Butts</td>
<td>30 &quot;</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Bull Creek</td>
<td>60 &quot;</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Res. #1&amp;2</td>
<td>30 &quot;</td>
<td>X</td>
<td>-- no size limit --</td>
</tr>
<tr>
<td>Woods</td>
<td>185 acres</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stream Sections</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>East River</td>
<td>5 miles</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Poudre</td>
<td>4 &quot;</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>South Platte</td>
<td>3 &quot;</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Roaring Fork</td>
<td>7 &quot;</td>
<td>X</td>
<td>-- no size limit --</td>
</tr>
<tr>
<td>Rio Grande</td>
<td>10 &quot;</td>
<td>X</td>
<td>&quot;</td>
</tr>
<tr>
<td>Lake Fork-Gunnison</td>
<td>1 &quot;</td>
<td>X</td>
<td>&quot;</td>
</tr>
<tr>
<td>Henson Creek</td>
<td>20 &quot;</td>
<td>X</td>
<td>&quot;</td>
</tr>
<tr>
<td></td>
<td>50 miles</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*ALO - artificial-lure-only; FFO - Fly-fishing-only.
Angler acceptance was achieved because it provided an ideal place to teach women and children the art of fly fishing as more fish could be caught and the emphasis was placed upon the sport when the undersized fish had to be returned. Furthermore the water was never crowded with fishermen and the litter problem was considerably reduced.

It is not anticipated that any new waters will be placed under "quality" fishing restrictions until a more complete evaluation of current programs has been completed.

Connecticut: Sections of 5 streams and 5 small ponds are managed on fly-fishing-only regulations. Numbers of such waters are sufficiently small so that it is reported that opposition is not overly vociferous. No additional waters are expected to be included under special restrictions at this time. Latimer Brook is managed on an artificial-lure-only basis with a 10-inch length limit on trout for the purpose of protecting sea-run brown trout until they reach smolt size and migrate to Long Island Sound.

Georgia: Previously several streams were managed under artificial-lure-only and fly-fishing-only restrictions but these special programs reportedly were discontinued because they were so broadly violated and because they failed to maintain public interest and acceptance.

Maine: More than 147 lakes and sections of 19 rivers and streams are open for fly fishing only. Of the 18,000 miles of streams in the State, 150 miles are managed under fly-fishing-only restrictions. The programs on smaller lakes involve mostly the taking of brook trout.

Fly-fishing-only waters have resulted from legislative action rather than being a prescribed program of the Department of Inland Fisheries and Game. They have developed over a period of many years in answer to groups striving to reduce numbers of fishermen in certain waters. The agency believes that a reduction of total catch where desirable can be achieved as effectively through lower creel limits.

 Portions of Kennebago, Rangeley and Big Magalloway Rivers, Cupsuptic and Aziscoos Lakes and Upper Dam Pool are open to fly-fishing-only restrictions during September with a one-fish limit. On several other rivers and bays, namely, Penobscot, Narraguagus, Pleasant, Machias, Dennys River, and Sheepscot, fishing for Atlantic Salmon is limited to flies only and the creel limit is reduced to two fish. Many waters are managed with a reduced limit of five trout.
Although the fly-fishing-only programs are directed toward trout and salmon, black bass on some waters may be taken only by casting, spinning and fly fishing with artificial lures possessing a single-pointed hook and a creel limit of three fish, between June 1 and 20.

Maryland: A 3.5 miles section of Big Hunting Creek in Catoctin Mountain Park (a unit of the National Park Service) and Cunningham Falls State Park, and 1.5 miles of Savage River are operated as fly-fishing-only waters. Primary reliance is placed upon stocked trout rather than upon naturally reproduced fish and the regular State limit of 10 trout prevails. Although there is wide interest in the development of additional Fishing-For-Fun waters, no changes in current program are anticipated.

On a recent questionnaire, 79 percent of the fishermen indicated satisfaction with current stocking program and 73 percent revealed that they would fish on Fishing-For-Fun streams.

Massachusetts: Anglers are permitted to retain a reduced creel limit of two trout per day in the lakes and ponds (except reclaimed ponds) during a special season which extends from the last Sunday in October to February 23.

Michigan: For experimental purposes, Michigan manages 55.5 miles of stream sections on an artificial-fly-fishing-only basis. The reduced creel limit is 5 trout on each except for one on which 10 trout may be retained. The length limit is 9 inches on three sections, 10 inches on four, and 7 inches on the last.

The program was started on the North Branch of the Au Sable in 1949 to evaluate the effectiveness of a combination of regulations, flies only and higher length limits of 9 or 10 inches and a lower creel limit of 5 fish (Cooper, et al, 1959, 1960, 1961, 1962; Shetter, 1954, 1961, 1962).
Currently the experimental stream sections include the following:

<table>
<thead>
<tr>
<th>Name of River/Location</th>
<th>Length</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Branch Au Sable River</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Dam 2 and Otsego-Crawford County line</td>
<td>4.2 miles</td>
<td>9-inch limit</td>
</tr>
<tr>
<td>Eaman's Landing to mouth</td>
<td>14.9 &quot; 9- &quot; &quot;</td>
<td></td>
</tr>
<tr>
<td>South Branch Au Sable River</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deer Heart Valley Road to mouth and junction with main stream</td>
<td>16.1 &quot; 10- &quot; &quot;</td>
<td></td>
</tr>
<tr>
<td>Au Sable River, Main</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burton’s Landing to Wakeley Bridge</td>
<td>8.7 &quot; 10- &quot; &quot;</td>
<td></td>
</tr>
<tr>
<td>Boardman River, from Forks Forest Campground to Scheck’s Bridge</td>
<td>3.9 &quot; 10- &quot; &quot;</td>
<td></td>
</tr>
<tr>
<td>East Branch of Au Gres River and downstream to Meadow Road Bridge</td>
<td>0.7 &quot; 7- &quot; &quot;</td>
<td></td>
</tr>
<tr>
<td>Little South Branch of the Pere Marquette River - Carlson Bridge to Lake Newaygo County line</td>
<td>4.7 &quot; 10- &quot; &quot;</td>
<td></td>
</tr>
<tr>
<td>Pigeon River, Sections C and D</td>
<td>2.3 &quot; 9- &quot; &quot;</td>
<td></td>
</tr>
</tbody>
</table>

(Creel limit: 5 fish except on East Branch where limit is 10 fish.)

Twelve Special Trout Fishing Ponds planted with legal-size trout are managed for public fishing as state-operated catch-out ponds. The total acreage amounts to 75 acres. Artificial-fly-fishing-only regulations on these waters combine with a two trout limit of fish measuring not less than 7 inches. (On Manistee Pond the limit is five fish.)

It is anticipated that the total mileage of fly-fishing-only streams may be reduced in 1964. (Hazzard, 1947; Hazzard and Fukano, 1948; Westerman, 1949; Christensen, 1953; Cooper, 1954.)
Montana: Officials have expressed interest in special regulations and are watching developments in other States. Other than on a very limited basis, however, it is believed that such programs would be premature as fishing pressures are relatively light.

Consideration is being given to the recommendation of Fishing-For-Fun or other special regulation as management for endemic cutthroat trout populations in one or two small streams in north-central Montana where fishing pressures are increasing to the extent that the native strains of wild cutthroat species are becoming threatened. Such programs would be designed to confine the catch to the productive ability of the wild populations. There is a recognition of the increasing need for managing wild populations rather than leaning too heavily upon hatchery fish.

New Hampshire: Although there are currently no Fishing-For-Fun waters in New Hampshire, it is anticipated that such an experimental project of this nature may be established next year on one of the easily accessible rivers.

During the regular angling season, 30 lakes and ponds and portions of 8 streams are restricted to fly-fishing-only. New Hampshire has 194 lakes and ponds managed for brook, brown or rainbow trout with a total of 20,337 acres and 632 trout streams with combined length of 4,040 miles. Waters designed for fly-fishing-only amount to: 15.5 percent of the stocked ponds by number or only 3.1 percent of the total trout lake acreage; and 1.8 percent of the trout streams or 2.1 percent by stream area. Coos County contains half of the fly-fishing-only ponds.

Ponds reclaimed for trout and all other State waters, unless closed to fishing or covered by specific regulations, are open to fly-fishing-only from the day after Labor Day through October 15. This provision is designed to utilize fish when they are more receptive to a fly as the waters become cooler in the fall.

Other restrictive measures include a reduced limit of two fish on lake trout and salmon. The golden trout may be taken by fly-fishing-only methods from the day after Labor Day to September 30; the limit is two fish measuring more than 12 inches.

On interstate waters, artificial lures only are required for bass fishing, June 1-20, with a length limit of 10 inches and a creel limit of 3 fish.
New Jersey: Six sections of streams are designated as fly-fishing-only waters. They are: Big Flat Brook, from the concrete bridge on Route 206, downstream to end of Roy Tract, approximately 4 miles; Big Flat Brook, Blewett Tract marked by signs; South Branch of the Raritan River, section known as "Ken Lockwood Gorge," 2.5 miles; Musconetcong River, at bridge at Schooley's Mountain Road to entrance of river into Cook Chemical Works Pond opposite Cedar Castle, approximately 1 mile; Paulinskill River, dam at Paulinskill Lake downstream to marker sign, 1 mile; Paulinskill River, portion known as "Emmons property," Fredon-Stillwater Road to marker, 1.25 miles.

Currently no stretches of streams are managed as no-kill Fishing-For-Fun waters although the establishment of such programs are contemplated for the coming year.

On the fly-fishing-only waters, spinning reels or any type of angling whereby the fly is cast directly from the reel is expressly prohibited. No more than six trout may be killed but trout in excess of this number may be caught provided they are immediately returned to the water unharmed. Fly-fishing-only regulations currently are being evaluated in terms of angler utilization, angler success and total harvest in a study scheduled to be completed in 1964.

Fly-fishing-only programs have been created in response to interest expressed by fishermen. On some, apparently it has worked out quite well although it is believed that this may be due to the natural capabilities of the water rather than as a result of the special regulations.

New Mexico: Artificial lures only may be used for fishing in San Gregorio Lake; in Gilita Creek, from junction with Willow Creek downstream to its junction with Snow Creek; and in South and Middle Forks of Big Canyon Creek.

New York: A 1.44 mile section of the Schoharie Creek in the town of Lexington was designated as Fishing-For-Fun water by the Legislative Act of January 3, 1961, signed by Governor Nelson Rockefeller. The project initiated in 1962 is authorized to operate on an experimental basis until September 30, 1965. Anglers fishing this stretch are permitted to use not more than one lure having not more than one single hook point, but are required to return all fish taken to the stream. Any type of lure, natural and artificial, may be used because the law did not specify differently.
A second Fishing-For-Fun water was designated on the 2.8 portion of the Amawalk Outlet from the dam to Muscoot Reservoir, on April 1, 1963. It was created by a Departmental Order authorized by legislation providing for fishing regulation by agreement with New York City on waters owned or controlled by that municipality. Regulations require that artificial lures only may be used and that no trout may be retained. The project is established as a 3-year experimental program subject to review each season. This fishery consists primarily of self-maintaining populations of wild brown trout which exhibit excellent growth. (Kehm, 1963.)

A reduced daily limit of three trout prevails on Protection Pond, Erie County; Ashokan Reservoir, Ulster County; lakes in Putnam and Westchester Counties; and on Seneca, Canandaigua, Keuka Lakes. On the last three lakes, the minimum size limit is 15 inches.

A reduced limit of five trout, half the State general limit, regulates fishing on: the Beaverkill, from mouth to confluence with Willowemoc Creek; Willowemoc Creek, upstream to Livingston Manor; the Battenkill River; Wiscoy and East Koy Creeks in Allegany County; part of the Delaware River and its West Branch forming the boundary with Pennsylvania (where the length limit is 10 inches); and on several waters in Central and Western Counties (between April 1 and May 15).

North Carolina: Officials in North Carolina have long recognized that some waters should be regulated for the use of anglers who do not want to catch hatchery trout. Some streams have been designated as "artificial-lures-only" waters for over 20 years.

In 1960, a program of classifying specific waters as "Native Trout Waters" was initiated. In them, catchable size trout are not planted and angling is restricted either to the use of single-hooked artificial lures only or to fly fishing only and the reduced catch limited to five trout measuring more than 9 inches per day. Initially the public acceptance and participation on these waters was less than had been expected. However, during the second and succeeding years, these programs have gained in public favor and use. The fly-fishing-only section of the Nantahala River is reported to be the most popular and heavily-used portion of the river since these restrictions went into effect.

Currently, five streams and one lake are classed as "Native Trout Waters." Four streams, Boone Fork below Price Lake; Basin Creek and tributaries; Lost Cove Creek; and Lower South Mills River, are restricted to fly fishing only. Artificial lures only may be used on Price Lake and Steels Creek. Combined length of the native trout streams is 46 miles.
In addition, portions of Wilson, North Harper, Rock, and Middle Creeks and the Middle Prong of the West Fork Pigeon River, with a total mileage of 18 miles, are regulated to artificial lures only. Fly fishing only is permitted on 3 miles of the Nantahala River. Regular State creel limits and size limits prevail on these waters.

The special restriction waters are managed in cooperation with the National Park Service and the U. S. Forest Service. Price Lake and Boone Fork below Price Lake and Basin Creek and tributaries are located within the Blue Ridge National Parkway. The other waters are found in sections of Forest Service lands defined as Wildlife Management Areas. In the Wildlife Management Areas an angler is required to secure a daily permit and to check in and out of the area. In this way, the use of the streams may be determined. (Davis, 1963.)

Additionally, two streams in Great Smoky Mountains National Park are managed by the National Park Service on a Fishing-For-Fun basis which requires the return of all trout except those measuring over 16 inches. Artificial lures only and a reduced limit of five fish restrictions prevail on other Park streams. (Thompson, 1959; Forbes, 1958; Titus, 1959; Grahame, 1959; Gould, 1960; Reinhold, 1958; Titus, 1960; Wallis, 1960, 1961a, 1961b; Cochran, 1960; Lennon and Parker, 1960; Anon., 1960a, 1961a, 1961b; Riethmiller, 1961; Corder, 1961.)

North Dakota: Artificial lures only may be used on Spring Lake, Williams Creek, Raleigh Reservoir, Bowbells Coal Mine, Parshall Coal Mine, McVille Dam and Dickinson Dike. On the last four, the reduced creel limit is three fish per day. Salmon eggs are considered as artificial lures.

Ohio: An experimental Fishing-For-Fun project for largemouth bass and muskellunge was initiated on three 1-acre ponds on the Delaware Wildlife Area on April 19, 1962. Regulations required anglers to fish with artificial lures only armed with not more than one trebel barbless hook or three single barbless hooks and to return all fish caught. This program continued in 1963. (Riethmiller, 1961, 1962.)

Oregon: Atlantic Salmon in Mud Lake became subjected to Fishing-For-Fun regulations in 1962 in Oregon's first test of no-kill restrictions. Between May 25 and October 6, all Atlantic Salmon hooked must be carefully removed from the hook and returned to the water unharmed. Fly fishing only with barbless hook is permitted on this lake. When the limit changed from one fish per day to no fish a decline in numbers of fishermen was noted, but more anglers participated in 1963.
Fly fishing only is permitted on Fay Lake; Gold Lake; Metolius River from Lake Creek down to Bridge 99 on River Loop Road; Sparks Lake and its tributaries; and North Fork of the Umpqua River and tributaries (exclusive of lakes) from presently established deadline near mouth of Rock Creek upstream to a point 50 yards below Soda Springs Power Plant. The fly-fishing-only regulation on the North Fork is designed to protect spring chinook which seldom take a fly. Under previous regulations, lure fishermen continued to catch and release the fish with considerable damage to gravid females. In 1963, the North Umpqua experienced one of the largest runs of spring chinook since counting started in 1946. Fly-fishing-only regulations are credited with this event.

Except on North Fork of Umpqua River and tributaries, it is unlawful to use fixed spool or spinning reels and/or monofilament lines except for fly line backing in those waters restricted to fly fishing only.

It is expected that additional special fly-fishing regulations with reduced bag will be established.

Pennsylvania: A Fishing-For-Fun program requiring the return of all trout to the stream has operated on Spring Creek at Fisherman's Paradise since April 14, 1962. Artificial flies only are permitted for fishing which is open on an all-year basis. (Hazzard, 1962; Trembley, 1963.)

Fly-fishing-only regulations apply to 28 stretches of trout streams in Pennsylvania. They provide that artificial flies or streamers only may be used with conventional fly fishing tackle and that the daily creel limit will consist of six trout measuring more than 9 inches. Mileage of these streams totals 85 miles of the 4,500 miles of stocked streams in Pennsylvania.

Fishing-For-Fun programs apparently operating with success and public acceptance on the Left and Right Branches of Young Woman's Creek, for a distance of 8 miles, and cooperatively on the private ponds of the Renovo Country Club, were abruptly halted in 1962 without public explanation. The initial program on Left Branch of Young Woman's Creek was started in 1958 and received much national recognition. (Miller, 1958; Forbes, 1958; Titus, 1959; Grahame, 1959; Reinhold, 1959, 1960; Lucas, 1960; Vaughn, 1960; Grove, 1961.)

Rhode Island: Deep Pond, Mowry Meadows Pond, and Upper Rochambeau Pond are reserved for fly fishing only.

Tennessee: Artificial lures only are permitted in the Kettlefoot, Laurel Fork, Uniconi and Andrew Johnson Wildlife Management Areas, from August 7 through October 6, and all trout under 14 inches must be returned to the water.
Fishing is permitted on Wednesdays, Saturdays, and Sundays and national legal holidays only during the regular and the special seasons.

Fishing at any time is limited to artificial lures only on Higgins Creek and Laurel Fork Creek and its tributaries upstream from the Dennis Cove Recreation Area. Legal size of trout which may be kept on the Laurel Fork is 9 inches for rainbow and brown trout and 7 inches for brook trout.

On the North River and its tributaries, comprising a total of about 20 miles in the Tellico Wildlife Management Area, artificial lures only may be used during the season from April 11 to November 10. These waters are open for fishing on Thursdays, Fridays, Saturdays, Sundays, and national holidays.

All streams of the Ocoll Area are open from April 20 through July 23 on Saturdays, Sundays and national legal holidays. Artificial lures only may be used between June 22 and July 28.

Artificial-lures-only programs are fairly well accepted by the public, "particularly by those who claim to be fly fishing purists." Unfortunately, it is believed that the special regulations favor the poacher type of fishermen. Providing certain sections of streams for specialized fishing is favored within reasonable bounds.

Two streams on the Tennessee side of Great Smoky Mountains National Park are managed by the National Park Service as Fishing-For-Fun waters requiring the return of all trout measuring less than 16 inches. Other Park streams are open to artificial lures only with a creel limit of five fish. (Thompson, 1959; Forbes, 1958; Titus, 1959; Grahame, 1959; Gould, 1960; Reinhold, 1958; Titus, 1960; Wallis, 1960, 1961a, 1961b; Cochran, 1960; Lennon and Parker, 1960; Anon., 1960a, 1961a, 1961b; Riethmiller, 1961; Corder, 1961; Stupka, 1962.)

Vermont: The reduced creel limit for rainbow trout on 14 waters is 2 fish per day measuring more than 10 inches as compared with a general catch limit of 12 trout over 6 inches on other waters in the State.

Fly-fishing-only regulations are enforced on the Connecticut River from the day after Labor Day to October 31 inclusive, except in that portion of the river north of the southern boundary of the town of Dalton in New Hampshire and a point opposite such boundary in town of Concord. Flies may be cast or trolled.
Fishing for bass on the Connecticut River between June 1 and 30 is restricted to the use of **artificial lures only** and the daily limit is 3 fish over 9 inches in length.

**Virginia:** 1963 is the third year of management of the Rapidan and Staunton River on a Fishing-For-Fun basis for trout with regulations which require the use of artificial lures only with a single barbless hook and the return of all trout. This program is administered in cooperation with the National Park Service. (Shoman, 1961; Sheridan, 1961; Birchfield, 1961; Wallis, 1961a; 1961b; Anon., 1961a, 1961b, 1961c; Corder, 1961; Sheldon, 1961; Riethmiller, 1961; Cochran, 1962; Martin, 1962; Sheridan and Gillam, 1962; Martin, 1963; Sheridan, 1963.)

Similar restrictions apply to Fish-For-Fun ponds for largemouth bass and smallmouth bass at the Front Royal Hatchery. Each bass was caught 1.6 times. Catch was 1.2 fish per hour. The hatchery had 28 ponds open to fishing in 1961, of which 2 were designed as Fish-For-Fun. Ten percent of anglers during the end of 1961 fished in the Fish-For-Fun waters.

Consideration is being given to establishing an additional Fishing-For-Fun program on 3-miles of the Little Tumbling Creek on the Clinch Mountain Wildlife Management Area in southwest Virginia. (Peery, 1963.)

**Washington:** Ten lakes and portions of three rivers are designated as fly-fishing-only waters. These are: Bayley, Bonney, Ebey, Hannan, Fish, Long, Cady, Aeneas, Moccasin and Brown's Lakes; and North Fork, Stillaguamish River (except during winter season); Icicle River from Trout Creek to Black Pine Creek; and Inlet Stream of Brown's Lake. The catch limit on Bayley Lake is two fish per day.

Five additional lakes: Blythe, Chukar, Scaup, Blue, and Dry Falls Lakes, are "restricted fishing waters." The creel on them is limited to 3 fish over 12 inches in length. It is unlawful to release fish measuring more than 12 inches. Fishing is reserved for artificial lures only consisting of no more than two flies or one flasher, spoon or artificial lure. (The lure must have no more than two single hooks but double or treble or any multiple hooks are permitted.) On the portion of the Spokane River from 7-Mile Bridge to Monroe Street Bridge, the catch is limited to 2 fish over 12 inches.
Wisconsin: Fly-fishing-only regulations combined with a creel of 5 trout measuring over 12 inches per day restrictions prevail on a 5.5 mile stretch of the Peshtigo River, from Johnson Falls downstream to foot of Springs Rapids and on a 5 mile section of the Wolf River lying in Langlade County. (Burdick and Brynildson, 1960; Moore, 1962.)

The Conservation Commission authorized the program on the 5.5 mile stretch of the Peshtigo River in 1955. Sportsmen and conservationists expressed desire for a fly-fishing-only program with higher size limit and reduced bag limit on the assumption that undersized trout caught and released experienced less mortality than fish caught on worms and that in Wisconsin the rainbow and brown trout normally do not spawn until they are larger than the 6-inch limit.

Although legal-sized trout were present, the river received additional stockings of 12-inch brown and rainbow trout to increase spawning populations and 20,000 fingerling of the same species. No stocking since 1957. Burdick and Brynildson (1960) concluded that the special restrictions after 4 years of trial failed to maintain good trout fishing and was not sufficiently rewarding to the fishermen.

A total of 8,076 fishermen contacted had fished 25,559 hours and caught only one 12-inch trout for every 13 hours of effort. It took 122 hours to catch one legal-sized wild trout. Only one out of seven anglers was successful in catching a legal-sized trout. Few wild trout were present in the stream and few reached the creel.

Fishermen in general favored the program although a few bait fishermen who had fished in this area earlier expressed disapproval. Fly fishermen in particular expressed desire to have additional trout waters set aside for fly fishing only. Some concluded that restrictive regulations should not be imposed until adequate biological evidence shows that the fishery will benefit. Most of the anglers came from within a 50-mile radius.
Special angling regulations govern the operation of programs such as Fishing-For-Fun type activities which feature emphasis upon the recreational qualities of sport fishing. Among these special regulations are those which provide for decreased creel limits (or no-kill restrictions); increased size limit; and use of artificial lures or fly only. The following citations relate to these programs and regulations to the catch-and-release of sport fishes:


Gould, John D. 1960. Fishing-For-Fun, something new under the fishing sun will have legislative attention this year. The New York Conservationist, 14: 4(Feb.-Mar.), 21.


Peery, Charles H. 1963. We are in business on Clinch Mountain. Virginia Wildlife, 24: 6(June), 10-11.


Reinhold, Dan. 1959. Fish for fun, Pennsylvania's experiment on Left Branch Young Woman's Creek is beginning to provide some answers. Penn. Angler, 28: 9(Sep.), 8-12.


Introduction.

Angling is a traditional national pastime. Fishes upon which this recreational activity depends constitute a highly prized natural asset, a resource too valuable to be wasted. The Fishing-For-Fun concept is encouraging greater numbers of anglers to enjoy the sport by releasing many fish they catch. Without diminishing the basic resource, such programs expand recreational opportunities.

A trout is too highly prized to be caught only once (Miller, 1958). By the time a hatchery trout reaches an angler's creel, frequently, its worth exceeds that of a golf ball which a golfer uses over and over (Grove, 1961). Additional recreational enjoyment can be realized by catching and recatching an individual fish more than once!

A basic difference exists between the fisherman and the hunter. In angling, the question of killing is nearly always optional, Knight (1939) observed.

He remarked that "... a fish hooked with a fly and played to the net is usually not materially hurt and may be returned again to the water slightly weary but otherwise as good as ever to be caught again next year ... the idea of not killing many fish causes an angler to become intent on a fish not on a number of fish!"

Based upon paper presented at the 91st Annual Meeting of the American Fisheries Society, Memphis, Tenn., September 14, 1961.
As a matter of personal pride and satisfaction, many individual fly fishermen turn back the majority of trout they catch. This has been a common practice among a selected few for decades. Official recognition of the catch-and-release philosophy is reflected in current fresh-water programs established in several states. In these programs that encourage the "kill-less-but-catch-more" concept, regulations restrict methods for taking trout and reduce the numbers of fish which may be retained.

The catch-and-release of marine game fishes, likewise, has found wide acceptance. Prized marine species such as sailfish, tarpon and bonefish received initial attention in catch-and-release programs in salt water. The idea has expanded in recent years to include other important fishes. These programs are managed on a voluntary basis rather than upon stated laws. Favorable public sentiment and special recognition in tournaments and the feeling of sportsmanship are the incentives which support these salt water programs.

Development of Fishing-For-Fun Concept.

Back in 1906, William B. Mershon, the famed Saginaw sportsman, noted that in a single day he and a companion caught and returned 400 trout on the North Branch of the Au Sable River (Petersen, 1956). At his urging, in 1907, the Michigan Legislature passed a fly-fishing-only bill for the protection of the trout populations of the Au Sable River and for the perpetuation of the sport of angling. This was an experiment unique in this country over 50 years ago! (Petersen, 1956; Cooper, 1951; Titus, 1960.)

Beck (1938) advocated lower daily creel limits and the use of artificial flies as measures to reduce the kill of trout. His admiration was expressed not for the man with the overloaded creel but for the angler who released all the fish beyond his reasonable requirements.

Hazzard (1943) determined in 1943 that the trend in all progressive trout states was directed toward lower kill limits. This movement, he reported, placed emphasis upon the recreational importance of trout rather than upon the value of meat.
Two years later, Hazzard (1945b) wrote: "The only hope for improving trout fishing is by restricting the kill on waters which are now overfished . . . if the trout fisherman wants such exceptional fishing at reasonable cost he can have it if he is willing to release most of the trout he catches after he has had the fun of deceiving and landing them." The kill must be limited to the capacity of the waters to produce satisfactory fishing (Hazzard, 1945a; Trueblood, 1951).

Within a short time, Michigan established a number of sections of streams upon which angling was restricted to flies and where the catch limits were low. On these waters, an angler was permitted to catch all the trout he wanted but he was allowed to kill only a few.

The Fishing-For-Fun concept continued to develop. In 1949 the Pennsylvania Fish Commission adopted the motto, "Kill Less-Catch More!" It was reworded in 1952 to read "To Catch More, Kill Less!" In its revised form, it is still in use.

Hazzard proposed in 1952 that angling on the more heavily fished waters can be improved by making it illegal to have trout in possession at any time. This proposition sparked the initiation of a no-kill Fishing-For-Fun program in Great Smoky Mountains National Park, Tennessee-North Carolina, in 1954.

Various types of programs have developed under the Fishing-For-Fun or catch-more, kill-less concept. Under a no-kill Fishing-For-Fun plan, all fish caught are released by regulation or voluntary action. Under special regulation Fishing-For-Fun plans, smaller creel limits, larger minimum length limits, fly-fishing-only, and artificial-lures-only rules prevail. The encouragement of angling for recreation within the carrying capacities of the waters and the return of all or a portion of an angler's catch are features these plans share in common. Reduced emphasis is placed upon the kill.

A variety of names have been applied to these programs. Included among these are the following: Fishing-For-Fun, Fish-For-Fun, the Hazzard Plan, fly-fishing-only, quality fishing, catch-and-release, put 'em back alive, no-kill-trophy-fishing and special regulation programs.
Application of the Fishing-For-Fun concept has been directed in fresh-waters primarily toward trout and salmon (Grahame, 1959; Fox, 1961). Warm water species such as pickerel, pike and largemouth bass receive consideration in situations where the potential of the existing fish populations to withstand heavy fishing pressures is limited.

As a practical management measure, the wholesale application of Fishing-For-Fun to all species of fishes and to all waters is not advocated. In waters which contain crowded populations of sport species, for example, the application of this principle could prove to be detrimental. On selected waters, this plan can enhance recreational opportunities to fish for wild trout without depleting the basic resource.

The matter of questions which arise from the establishment of Fishing-For-Fun programs is discussed in Appendix A; some guidelines for the conduct of such programs are outlined in Appendix B.

Some programs for Fishing-For-Fun rely upon wild populations of trout which have resulted from natural reproduction or have been created by the stocking of hatchery trout fingerlings. Other programs depend upon the stocking of larger sized fish.

Programs Operate in 17 States.

Fresh waters in 17 states and several Canadian providences are managed under special Fishing-For-Fun type regulations. These rules prescribe that trout or salmon may be taken only with artificial flies or lures, provide for reduced daily kill limits, or allow only the larger fish to be retained. Some require the use of barbless hooks.

These states include: Alaska, Colorado, Maine, Maryland, Michigan, New Hampshire, New Jersey, New York, North Carolina, Oregon, Pennsylvania, Rhode Island, Tennessee, Vermont, Virginia, Washington, and Wisconsin. (A state-by-state review is included as Appendix C.)
No-Kill Fishing-For-Fun Plans. Fishing-For-Fun plans which require the return of all trout have been established on specific streams in Pennsylvania, New York and Virginia.

On the Left Branch of Young Woman's Creek in Pennsylvania the Fishing-For-Fun program has operated since 1958. It requires the use of flies only and the return of all trout. (Miller, 1958; Forbes, 1958; Titus, 1959; Grahame, 1959; Reinhold, 1959, 1960; Lucas, 1960; Vaughn, 1960; Grove, 1961).

The National Park Service and Virginia in 1961 initiated a cooperative Fishing-For-Fun on the Rapidan and Staunton Rivers. Regulations on these waters provide for the use of artificial lures only and the return of all trout. (Shomon, 1961; Sheridan, 1961; Birchfield, 1961; Anon., 1961a, 1961b, 1961c; Mallis, 1961a, 1961b).

Legislative action in 1961 designated a 1.44 mile section of the famed Schoharie Creek in the Town of Lexington in New York as a Fishing-For-Fun water. Anglers will be limited to the use of one lure and will be required to return all fish caught in the streams during the period of the experiment which extends from 1962 to September 3, 1965.

Special Regulation Fishing-For-Fun Plans. Fishing-For-Fun plans which operate under special regulations that permit low catch limits or longer minimum length limits have been established in Colorado, Michigan, Pennsylvania and Washington. A pioneer application of special regulations on specific waters was made in Pennsylvania in 1934 with the establishment of the Springs Creek Project, now known as "Fishermen's Paradise" (French, 1939). Originally this project was planned as a demonstration of stream improvement. It evolved into a program which allowed the angler to use flies and barbless hooks, and permitted him to catch 10 fish in any one day but provided that he could keep no more than two fish. The trout, stocked in large numbers, were fed in the stream. The intent was to provide fishermen with a spot to improve their skill.

A limit of one fish per day now prevails at "Fishermen's Paradise." The stream continues to receive heavy plantings of larger sized hatchery trout. Now the project affords highly competitive fishing. Anglers vie to see how large a fish each can land under extremely artificial conditions. As such the current program has deviated from its original objective.
From this germ of an idea, Michigan began a program of special regulation trout ponds in 1943. On these waters the daily creel limit was established at two fish per day and the minimum size of fish which could be kept was eight inches. This program still continues in an expanded form. Many anglers fish in these ponds solely for recreation and return all of the trout they catch except for an exceptionally fine specimen (Hazzard, 1947; Hazzard and Fukano, 1948; Westerman, 1949; Cooper, 1954).

Colorado opened Parvin and Butte Lakes in 1960 to "quality fishing" under regulations which require the use of artificial lures or flies and the return of all fish under 14 inches (Tanner, 1961; Seaman, 1961; Williams, 1961).

Six lakes in Washington, set aside for experimental purposes in 1961, are managed as restricted fishing lakes. On these waters, the daily catch limit is three fish. The anglers release trout under 12 inches but must keep fish which measure over 12 inches. The purposes of the Colorado and Washington programs are to improve the quality of angling and to provide for a sustained fishery for larger sized trout.

National Park Service Activities.

The National Park Service policy places primary reliance for recreational fresh-water angling upon the wild populations of fishes. Where conditions of natural reproduction are insufficient to provide suitable recreational enjoyment, supplementary hatchery trout may be planted to supplement wild stocks (Wallis, 1960).

The development and operation of programs which implement this policy are encouraged. Reduction of creel limits, and the increase in length limits and the establishment of fly-fishing-only and Fishing-For-Fun programs are measures currently employed in some National Parks. They are aimed at achieving this objective and at perpetuating recreational angling, a traditional and significant use of a natural resource within areas administered by the National Park Service. Angling for wild and colorful trout amid some of the Nation's cherished scenic wilderness landscapes is thus developed.
Great Smoky Mountains National Park. Regulations permit the use of artificial lures or flies only in Great Smoky Mountains National Park, Tennessee-North Carolina and in Shenandoah National Park, Virginia. Fly-fishing-only regulations restrictions prevail on selected waters in Yellowstone, Mount Rainier, and Acadia National Parks, Blue Ridge Parkway and Katmai National Monument.

A Fishing-For-Fun program, initiated in Great Smoky Mountains National Park in 1954, under a cooperative research project conducted by the U. S. Fish and Wildlife Service, has been the subject of considerable nationwide recognition (Thompson, 1955; Forbes, 1958; Titus, 1959; Grahame, 1959; Coulb, 1960; Reinhold, 1959; Davis, 1960; Titus, 1960; Wallis, 1960, 1961a, 1961b; Cochran, 1960; Lennon and Parker, 1960; Anon. 1960a, 1961a, 1961b). It pioneered in this field of management of recreational fishing.

Fishermen were allowed to fish on two streams with artificial lures and to catch all the trout their skill and experience would permit but the plan called for the return of all fish caught. These waters were the West Prong of the Little Pigeon River, Tennessee, and the Bradley Fork, North Carolina.

The plan, a pioneer in the field of recreational fishing, was formulated upon Hazzard's premise (Lennon and Parker, 1960) that sport fishing for wild trout can be preserved, improved in quality and made available to increasing numbers of anglers by prohibiting the kill of trout.

After the program had met with success and public acceptance, far-sighted park officials extended and modified the plan in 1958. The two Fishing-For-Fun streams were opened on an all-year-around basis and it became legal to retain trout measuring over 16 inches. Sections of two additional streams, Little River in Tennessee and Oconalufee River, North Carolina, were placed on a modified Fishing-For-Fun plan. During the winter season, September 1 to May 15, the two were managed under the Fishing-For-Fun rules and with general park regulations during the regular fishing season.
Between 1954 and 1960, Lennon and Parker (1960) determined that under the Fishing-For-Fun plan the angler's individual catch per unit of effort and the quality of fish improved, public approval was achieved, and the wild trout populations increased. The average number of trout caught and released totaled more than six fish per hour, which greatly exceeded the catch experienced on streams where trout could be kept.

**Yellowstone National Park.** On Yellowstone Lake, the catch of the famous native cutthroat trout has expanded with the increasing numbers of fishermen. The total annual catch currently approaches the maximum number of trout the populations can safely provide in a single year without damaging the basic stocks. More than 7,500 trout was discarded in trash cans at the Fishing Bridge Campground during July 1959, although an angler's catch is limited to three fish per day.

Faced with this dramatic situation, park officials initiated a program of voluntary Fishing-For-Fun in 1960 to encourage park anglers to fish for sport and to release all fish not intended for camp use (Anon., 1960b, 1961b, 1961c; Clark, 1961; Wallis, 1961a, 1961b). As the plan finished its second year, public acceptance has been achieved, although final evaluation of this application of Fishing-For-Fun on a voluntary basis has not been completed.

**Shenandoah National Park.** The Rapidan and Staunton Rivers in Shenandoah National Park were placed on a Fishing-For-Fun plan with artificial-flies-only and no-kill restrictions early in 1961 (Shomon, 1961; Sheridan, 1961; Birchfield, 1961; Wallis, 1961a, 1961b; Anon. 1961a, 1961b, 1961c). The program has received general public endorsement. It is anticipated that other park streams may be included under a similar program in the future.

**Yosemite National Park.** In Yosemite National Park, California, a three-mile, roadside stretch of the Dana Fork of the Tuolumne River was opened to Fishing-For-Fun in 1961 with artificial-flies-only and no-kill rules. This experimental program is scheduled to run for three years.
Consideration is being directed to proposals to establish Fishing-For-Fun plans on selected waters in Rocky Mountain National Park, Colorado; Olympic National Park, Washington; Lassen Volcanic National Park, California; and other parks.

Private Fishing-For-Fun.

The Fishing-For-Fun concept is not restricted exclusively to public waters. In Pennsylvania, anglers pay only for the fish they catch and retain at privately operated fee-fishing pond establishments which number more than 200. Many of these waters are stocked with warm water fishes but others are planted with trout.

Five trout pond establishments contain waters which operate on a Fishing-For-Fun basis and on which the return of the catch is fostered. Anglers pay solely for the opportunity to fish but are required to use artificial flies. Rules on some ponds permit the retention of trout but an additional fee is charged for each trout killed (Grahame, 1959). Fishing-For-Fun for trout on a commercial basis has proven to be an acceptable and economically successful operation.

Many private fishing clubs operate, as they have for years, upon the Fishing-For-Fun concept with no-kill rules and other highly restrictive limits. Seven private clubs that own or lease waters in three eastern states and operate expressly for fishing completed questionnaires mailed to them. Each report that catch-and-release is encouraged. Five have specific rules requiring the use of artificial flies or lures exclusively and reduced bag limits. Two clubs maintain no-kill regulations on principle warm water sport species. On private waters, in general, restrictive sport fishing pre-dates the adoption by state agencies of such measures for public waters. A number of clubs have possessed fly-fishing-only rules since the start of the century.
Catch-and-Release of Marine Fishes.

Program for the release of marine sport fishes have operated for many years along the Atlantic seaboard. Tons of fishes, discarded to waste on the docks, directed thoughtful and imaginative marine fishermen to initiate catch-and-release programs for the purpose of encouraging the conservation of recreationally important fishes by reducing the kill.

The formation of the Stuart Sailfish Club, Stuart, Florida, in 1941 fostered the release of all sailfish not intended for mounting. Annually, the club presents special pins to anglers in recognition for the number of fishes released, as well as, buttons and pins for sailfish retained. The pins awarded each year for the release of fish outnumber those presented for fishes kept by a ratio of 10 to 1.

Nearly all of the sailfish taken in Stuart's Annual Light Tackle Sailfish Tournament are released. During the past five years, an average of 100 sailfish have been released during each contest while only a few are retained.

The philosophy has developed in the Stuart area that it is a greater honor to catch and release a sailfish than it is to keep one. Without a definite campaign, the concept of catch-and-release has spread to other species of marine fishes.

To launch a campaign for the conservation of the sailfish was the objective of the formation of the Sailfish Conservation Club of Palm Beaches, Florida, in 1949, in cooperation with the West Palm Beach Fishing Club. Since the project was initiated, certificates of sportsmanship and memento trophies have been awarded to over 6,000 anglers who have released more than 12,000 sailfish off the Palm Beaches.

The tagging of sailfish before they are released started in January 1960, under a program conducted in cooperation with Woods Hole Oceanographic Institute. Since the project was initiated, 800 sailfish have been caught, tagged, and released.

To be currently eligible for the memento trophy, the angler must see his fish tagged before it is freed. Four tournament points are given in the annual Silver Sailfish Derby for the release of sailfish and for each fish tagged, an additional point is awarded.
The application of the catch-and-release philosophy is now firmly established and widely accepted in the Palm Beaches area. Currently, over 80 per cent of the sailfish caught off these ports are released alive. Of the fish entered in recent derbies, between 85 and 89 per cent were freed.

A program initiated in 1954, for the release of sailfish, bonefish, and tarpon in the Metropolitan Miami Fishing Tournament has expanded to incorporate the return of 33 additional species. In the 26th Annual Tournament, December 18, 1960 to April 6, 1961, sportsmanship awards, in the form of colored plaques, were presented to 765 anglers for the catching and freeing of sport fishes.

Public approval of the idea has progressively expanded. The release of fishes in the last four tournaments has increased 10 per cent each season. In the 1960-61 tournament, 40 per cent (24,000) of the total of 60,000 fishes caught and entered in the contest were freed alive. The winner of the trophy presented for the adult fisherman who caught and released the largest number of eligible fishes turned in a score of 714 fishes released. In the junior class, the top youthful angler released 797 fishes.

Fishermen who release the largest numbers of sailfish, tarpon, and bonefish receive awards and each angler who frees five or more sailfish wins a special plaque.

In the International Tarpon Tournament at Punta Gorda, Florida, awards are given for release of tarpon and other species. The tournament functions with an aggregate scoring system which provides bonus points for release of tarpon and allows penalty points for the entry of undersized tarpon.

Since 1955, nearly 1,000 white marlins have been tagged and released at Ocean City, Maryland.

The release of tarpon has long been fostered along the West Coast of Florida in the Boca Grande area. A single scale, frequently, is removed before the tarpon is freed, as the sole evidence of the successful catch and release. Randall and Moffett (1958) reports that some fishing lodges, clubs, and restaurants, where tarpon fishermen congregate, have their walls covered with tarpon scales, duly marked as to place, date, size, and name of the angler.
In the St. Petersburg area, steady strides are being made in the adoption of the catch-and-release philosophy for tarpon. In the most recent Jaycee Tarpon Roundup, the release of tarpon reached an all-time high of 55 per cent. Sailfish anglers in this vicinity are starting to recognize the importance of freeing the fishes not intended for mounting.

Conclusions.

Each season, thousands of sport fishes are caught, killed, and discarded. This fantastic destruction of a highly prized but limited natural resource can be reduced by the active development of catch-and-release programs. The recreational significance of angling is enhanced and a greater spirit of conservation is engendered by programs which recognize that the killing and displaying of large numbers of fish is not the mark of angling success.

Literature Cited


Gould, John D. 1960. Fishing-For-Fun, something new under the fishing sun will have legislative attention this year. The New York Conservationist, 14: 4(Feb.-Mar.), 21.


Reinhold, Dan. 1959. Fish for fun, Pennsylvania's experiment on Left Branch Young Woman's Creek is beginning to provide some answers. Penn. Angler, 28: 9(Sept.), 6-12.


APPENDIX A.

Questions Regarding Fishing-For-Fun.

The question of the mortality of fish released after being hooked, played, and released is raised in connection with catch-and-release programs. Research in Michigan (Shetter and Allison, 1954; Leonard, 1954; Seaman, 1961) and elsewhere has demonstrated that less than 6 per cent of trout taken on single hook lures or flies die after being freed. By contrast, the mortality of trout freed after being caught with baited hooks amounts to 20 to 58 per cent.

Fishes are able to withstand considerable handling without detrimental effects. This is demonstrated by the large numbers of fishes which survive after being tagged or after being handled during spawning operations.

Waters managed under special regulations are open equally to all anglers who utilize the prescribed tackle and methods. Consequently, special regulations are not considered to be discriminatory but are established for the perpetuation of fishing opportunities for the benefit of all fishermen and not for select groups. Per cent of waters under such management is small; it amounts, for example, to: 55 miles out of 16,000 in Michigan, 79 miles out of 4,700 in Pennsylvania, 52 miles out of 70,000 in Oregon (Titus, 1960), and 1.44 miles out of 7171 miles of stocked waters in New York.

Lennon and Parker (1960) conclude that illegal fishing was no greater on Fishing-For-Fun streams in Great Smoky Mountains National Park than on other waters; in fact, they believed that it was less. Additional patrol work may be necessary to adequately protect the law-abiding angler on such waters but public reaction unfavorable to fishermen who break the regulations tends to discourage the dishonest person.

Overpopulations of fishes should not be expected on Fishing-For-Fun waters which have been carefully selected after adequate preliminary investigations which determined the existing populations and the productivity. Fishes should be expected to increase in numbers and in individual size under such restrictive measures; this is normally one of the objectives of such regulations.
In both marine and fresh-waters, sport fishes have been recaptured shortly after having been hooked and released. In a section of the Rapidan River which did not previously have rainbow trout, 300 were planted. The end of the season an incomplete tally revealed that over 549 rainbow trout had been taken from this section (Anon. 1961). Some of the trout, obviously, were caught more than once. Such evidence discredits the belief that fishes caught once become so hook-shy that they become unavailable for future catching.

APPENDIX B.

Guidelines for Establishment of Fishing-For-Fun Programs.

Successful development and establishment of fresh-water Fishing-For-Fun programs on a voluntary or regulated basis depends upon the following stages of development:

1. **Selection of the waters.** Lennon and Parker (1960) recommend that freshwaters considered for Fishing-For-Fun programs should receive adequate biological surveys to determine their potentialities; should be attractive and accessible to the public; and, whenever possible, should have good spawning and survival of wild fish. In addition, the need and the demand for an increase in recreational opportunities in a particular area and the possibility of continued administration of a Fishing-For-Fun program once initiated should be considered. Waters subject to general regulations should be located in the vicinity adjacent to Fishing-For-Fun waters.

2. **Selling the plan.** Support of the angling public and administrative officials is vital to the establishment of a successful program. Frequently, a long term campaign of public relations and education may be required before the actual establishment of a Fishing-For-Fun plan. Such a campaign may involve the presentation of talks before official and public groups, the issuance of press releases and feature stories, and personal contact. Influential sportsmen, sold on the concept, assist in winning the confidence and support of others.
In states and in national parks where the establishment and conduct of Fishing-For-Fun plans and special regulations have been successful, pre-planned campaigns of education preceded the initiation of new restrictions. As the educational program is a continuing one, additional information, released during the conduct of the program, keep the public's interest alive and avoid detrimental misunderstandings.

3. Formulation of regulations. Special rules and regulations to avoid confusion should be carefully and clearly written; should receive adequate distribution through all available media; and should be posted beside waters to which they apply.

4. Progress of the Program. Periodic surveys of fish populations and water conditions and of angler-use should be undertaken to determine the effectiveness of the special regulations and to indicate possible modifications which may be required.

APPENDIX C.

State-by-State Review of Special Regulations:

Alaska: State regulations now provide for sport fishing by artificial lures only, with not more than 2 barbless single hook flies or not more than one plug, spoon, or spinner to which not more than one barbless hook may be attached in Katmai National Park. In Brooks River, lures are restricted to not more than 2 barbless single hook flies, excepted in the posted area which extends 880 feet up stream from the mouth. In this area, plugs, spoons, and spinners with not more than one barbless single hook and not more than one attractor blade may be used.

Colorado: With the start of the 1961 season, Parvin Lake and Butts Lake were managed on the modified Fishing-For-Fun basis for the purposes of improving the size of the trout caught. Only artificial flies or lures are required and all fish under 14 inches must be returned. Fly-fishing-only regulations are established on Woods Lake and portions of Roaring and Rio Grande Rivers. Programs have met with public acceptance to the extent that consideration is being given to expanding the concept to other selected waters.
Maine: A number of ponds and several streams are open to fly-fishing-only.

Maryland: Fly-fishing-only has been established on Big Hunting Creek since about 1925. In addition, fly-fishing-only is required on Cherry Creek and Jones Falls, where the daily creel limit is 5 trout per day.

Michigan: Fly-fishing-only restrictions exist on portions of the North Branch, South Branch, and the main Au Sable River; Boardman River, Pigeon River, and Little South Branch of the Pere Marquette River. Length limits vary from 9 to 10 inches on individual streams and the catch is limited to 5 trout. In southern Michigan, a number of special trout fishing ponds are managed on fly-fishing-only rules which limit the daily catch to 2 trout which measure over 7 inches.

New Hampshire: All waters, including the reclaimed trout ponds, are open to trout fishing with artificial flies only from the day after Labor Day to October 31. The use of artificial flies is required on some ponds during the general season.

New Jersey: Six trout may be killed on several waters regulated to fly-fishing-only. Experimental Fishing-For-Fun programs for trout on a few selected waters and for smallmouth bass on a recently reclaimed lake are under consideration.

New York: A one-mile section of the Willowemac Creek is designated as a Public Fly Fishing Area, on which fishing is restricted to use of artificial flies. A 1.44 mile stretch of the Schoharie Creek, the famous fly fishing stream in the Town of Lexington was designated as a Fishing-For-Fun water by the Legislative Act of January 3, 1961, signed by Governor Nelson Rockefeller. On the Schoharie, anglers will be limited to one lure having not more than one single hook point and a hook gap not greater than one-half inch and all trout caught must be returned. The experimental program on this stream will be placed in operation in 1962 and will run until September 30, 1965.

North Carolina: On 93 miles of streams, the use of artificial lures is required. Other general regulations include a no-length limit and 10 trout creel limit. Fly-fishing-only rules apply to 38 miles of trout waters; of these, 35 miles have been designed as Native Trout Streams in which trout of legal size will not be stocked and on which the minimum length limit is 9 inches and the creel limit is 5 fish per day.
Public acceptance and high participation has been experienced on these waters. The artificial-lure-only designations have existed on some waters for over 20 years. The fly-fishing-only section of the Nantahala River is the most heavily used section of the river since this regulation became effective. Fly-fishing-only regulations have been established on these streams in response to requests from anglers who are more interested in catching wild trout than hatchery fish.

**Oregon**: Portions of the Deschutes River and tributaries, Metolius River, Umpqua River, North Fork, and Mud Lake are open under fly-fishing-only restrictions.

**Pennsylvania**: Activities of a Fishing-For-Fun nature in Pennsylvania are discussed in main body of paper.

**Rhode Island**: During a special trout season, December 1 to February 20, anglers are allowed to take or possess two trout per day.

**Tennessee**: Portions of Laurel Fork Creek and North River and its tributaries are open to artificial-lures-only rules.

**Vermont**: All waters are open exclusively for fly casting or trolling during September. Forest Lake and Lake Mitchell are open to fly-fishing-only between May 1 and September 30 and May 1 and October 1, respectively. Along the Connecticut River, an angler may use only flies from the day after Labor Day to October 31 and may retain only two salmon that measure over 12 inches. Black bass may be taken only on artificial flies between June 1 and June 30.

**Virginia**: Fishing-For-Fun plan for trout operates on the Rapidan and the Staunton Rivers and for bass and bluegills on two experimental public fishing ponds at the Front Royal Hatchery (Anon., 1961d). Anglers are required to use only artificial lures and barbless hooks and return all fish caught.

The hatchery experiment is part of a 3 year program to determine if a size limit is needed on largemouth bass in bass-bluegill ponds and to observe if excessive mortality occurs from catching and releasing of undersized bass. Eight ponds are open to conventional fishing. On four, the minimum size limit is 14 inches and on the others no size limit occurs. One of the Fishing-For-Fun ponds is stocked with largemouth bass and bluegills and the other with smallmouth bass and rebreast sunfish.
Washington: To provide a sustained fishery for larger fish, six lakes have been set aside for experimental management as restricted fishing lakes. Blyth, Chukar, Scaup, and Howard Lakes are open April 23 to July 15 and Blue and Dry Fall Lakes are open September 1 to November 30. The daily catch limit is 3 fish. All fish under 12 inches must be released but trout which measure more than 12 inches must be kept. Fly-fishing-only rules exist on Icicle River from Trout Creek to Black Pine Creek, and on Fish, Long, Bonney, Ebey, Bayley, Cady, Aeneas, and Brown's Lakes and on the North Fork of the Stillaguamish River.

Wisconsin: Portions of Peshtigo and Wolfe Rivers are open to fly-fishing-only with a catch limit of 5 fish and the requirement that all under 12 inches must be released.

Other States: Georgia previously managed a few streams with fly-fishing-only or artificial-lures-only regulations with a limited catch of 8 fish per person. This program was discontinued in 1961 because it was believed that too many fishermen violated the rules. Although initial interest was high, permanent public acceptance was not maintained. In Connecticut considerable interest in Fishing-For-Fun has developed although programs have not been installed. The establishment of Fishing-For-Fun programs is under consideration in other states.