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Montana's Stream-Dwelling Grayling

Worthy of "Extra Special Concern"

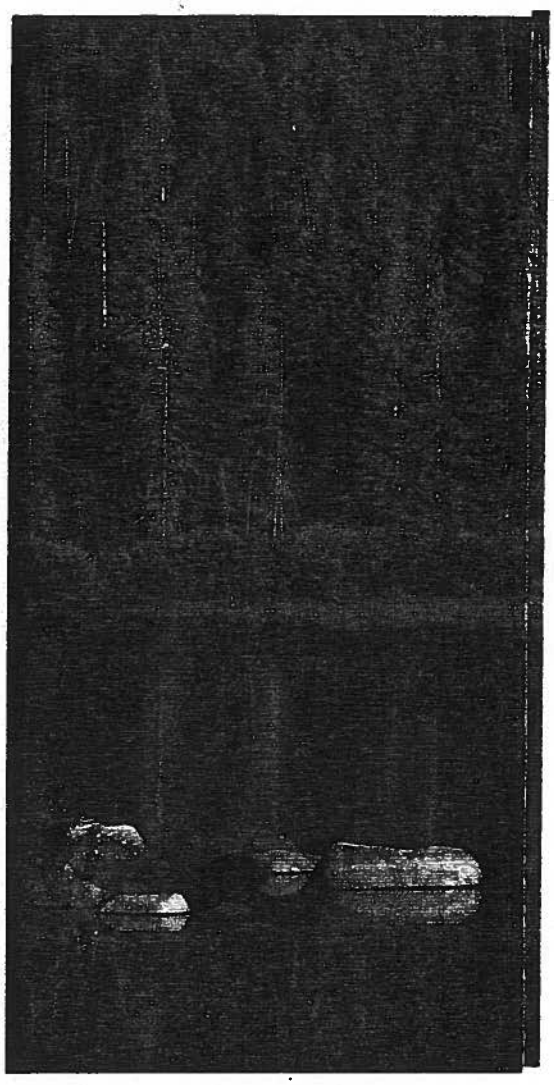
by Norm Peterson

THE EARLIEST description of the Arctic grayling in Montana came from explorers Meriwether Lewis and William Clark in 1805. They caught this "new kind of white and silvery trout" in the Beaverhead River near what is now Clark Canyon Reservoir. Grayling *(Thymallus arcticus)*, are now classified as belonging to the salmon/trout family, Salmonidae. Therefore, Lewis' and Clark's observation was most astute.

Preferred grayling habitat is similar to that preferred by many trout species—clear, cold water (50-60°F) in streams and lakes. The grayling's diet consists primarily of aquatic and terrestrial insects, some algae and occasionally fish. They spawn in spring and females may have more than 12,000 eggs. Unlike trout, however, they build no redds (nests dug out in streambed gravels), but broadcast their eggs. Eggs develop in a relatively short time, 11-22 days. Immediately after hatching, young grayling migrate, the direction depending on the strain or race to which they belong. The oldest grayling studied by biologists was about 10 years old, but few live past 6. A grayling weighing over two pounds or measuring longer than 17 inches is rare. (The state record grayling weighed two pounds, 10 ounces, and measured 18 inches long.) Even though they are often mistaken for mountain whitefish, grayling have a distinguishing characteristic—an extremely large and colorful dorsal (top) fin. The brilliant colors in this fin range from iridescent shades of blue and green to pink. In his 1971 book, "Fishes of Montana," Dr. C.J.D. Brown wrote: "There is no other game fish more unique to Montana. It deserves to be designated as the state fish." But in a 1976 statewide contest, the "black-spotted" cutthroat trout won and was named state fish by the Legislature.

Original worldwide distribution of grayling includes four distinct species—one in Europe, two in Asia and one in North America. The latter historically ranged from Siberia to Alaska through much of Canada and into Michigan and Montana (see map). The Michigan population became extinct in 1936.[1, 2]

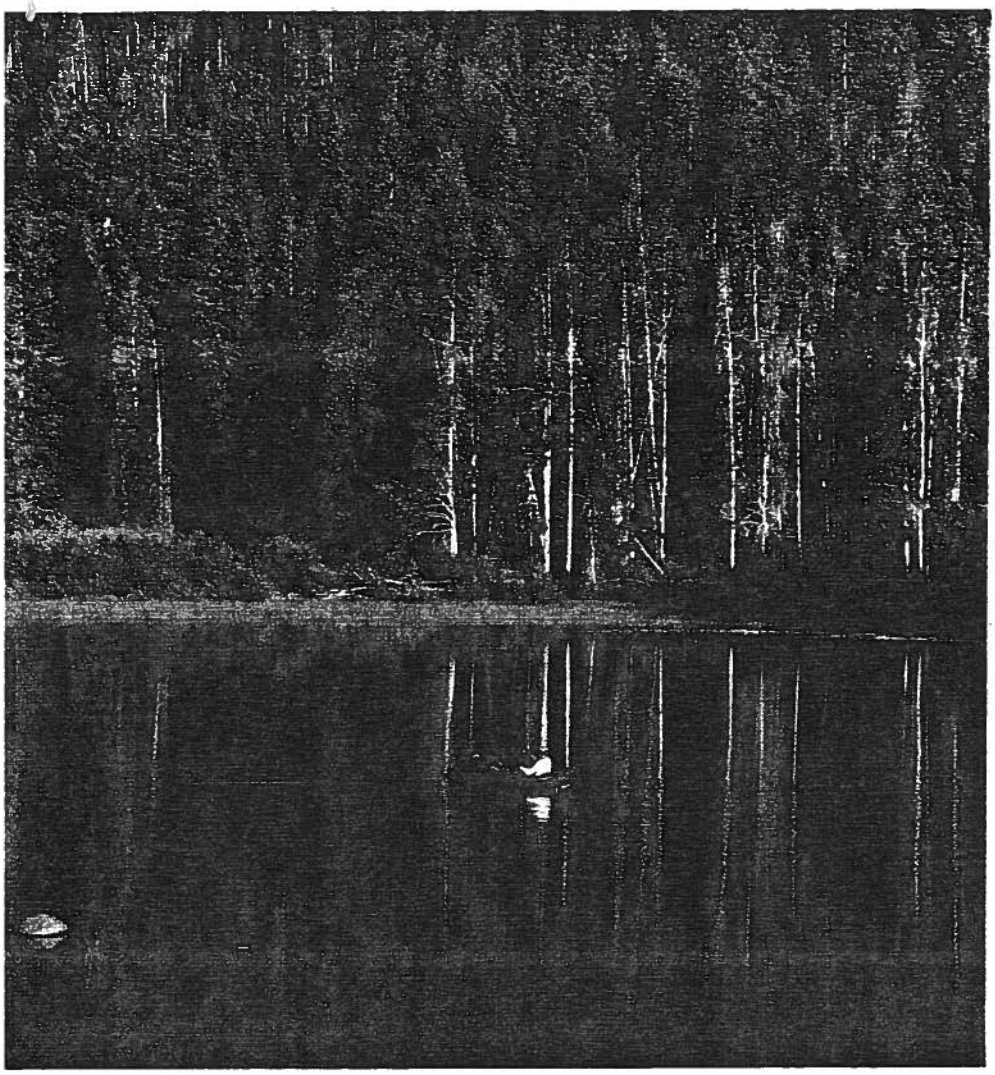
The Montana population originally inhabited the headwaters of the Missouri River above Great Falls. Most were found in the Gallatin, Jefferson, Madison and Smith rivers and their tributaries, as well as in the Sun River. In 1889 (article published in 1891), D.S. Jordan[3] wrote that they were very abundant in the



Madison River below the junction of the Firehole and Gibbon rivers. These original (endemic) populations were reported to dwell almost exclusively in streams, and were only secondarily residents of lakes.[4] These original strains were later used as transplant stock for lakes across Montana.

Much has been written about the Arctic, Michigan and Montana strains being different subspecies or even different species. The following theory is most frequently used to explain the distinctions between the three populations: During the last Wisconsin glaciation (12,000 to 15,000 years ago), which covered large sections of the North American continent, the three populations became geographically isolated and time and habitat differences prompted slight genetic variations.

Grayling distribution in Montana has changed dramatically since man began to record his history, and it is often a map of confusion. Bob



A sparse population of reproducing grayling still remains in beautiful Park Lake (left), near Helena (photo: Mike Logan). The colorful rendition of the grayling is by artist Glenn West.

Cooney, a retired Department of Fish, Wildlife and Parks employee, recalls that his father told stories of abundant grayling in the Missouri River in the area of Canyon Ferry in the late 1870s and 1880s.

In 1971, Dr. R.L. Graham, former leader of the Cooperative Fisheries Unit at Montana State University in Bozeman, reported catching grayling "...as if they had been perch" below Meadow Lake in the Madison River when he "...was a youngster 30 years ago."

Dick Johnson, supervisor for the department's Glasgow region, reported grayling in the Sun River as recently as 1970; Ron Marcoux, the department's fisheries manager for the Bozeman region, reported grayling in 1975 in the South Fork of the Madison. Today, both streams are believed barren of grayling.

An old-timer who delivered mail throughout the Centennial Valley of southwestern Montana reported resident populations "...all through basin streams years ago." A study of the Centennial Valley which I conducted in 1976 (published in 1979)[5] indicated only three valley streams were being used. They were inhabited only during spawning runs from Upper Red Rock Lake where the grayling lived the rest of the year.

In 1962, E. Richard Vincent, a department fisheries biologist in Bozeman, wrote that grayling were present in 21 lakes and 29 streams.[6] In the Sept./Oct. 1971 issue of *Montana Outdoors,* George Holton, assistant administrator of the Fisheries Division, reported that self-sustaining populations were present in 39 lakes and 14 streams in western Montana on both sides of the Continental Divide. In the Jan./Feb. 1980 issue, he wrote that remnant populations were found in 30 streams in the Missouri drainage "...and in perhaps 10 other Montana streams."

A U.S. Fish and Wildlife Service report in 1973 stated 20 lakes and 25 streams in Montana harbor relic and transplanted populations.[7] In 1975, John Varley, a fisheries biologist in Yellowstone National Park, wrote in a personal communication that he estimated that grayling had been reduced to only 4% of their original river range in Montana.

This leads to the question: What is the present status of grayling in streams and lakes in Montana?

What has often been described as the last stronghold for river-dwelling grayling in the lower 48 states—the Big Hole River drainage—may be their *only* stronghold. Even here, their hold is tenuous at best. Only 15 streams, including the upper Big Hole River itself, are known to contain grayling. Of these 15 populations, five are found in streams that run into or out of lakes; these fish may live portions of their lives in the lakes and then migrate to rivers to spawn and remain as residents for a portion of the year.

Seven streams in the Flathead River drainage have grayling; however, biologists believe that grayling migrate to all seven streams from lakes within the drainage. The same can be said for resident grayling in the Madison River above Ennis Lake, the two forks of Hyalite Creek above Hyalite Lake, Broadwater River downstream from Rough Lake and the Belly River below Elizabeth Lake in Glacier National Park.

Therefore, the most recent information indicates that only 10 streams in Montana have viable, self-sustaining grayling populations—and all are Big Hole valley streams. An additional 17 streams are known to have grayling, but they appear to be migrants from upstream lakes.

A unique, self-sustaining grayling population is found in the Sun River slope canal which runs out of Pishkun Reservoir. The reservoir was stocked with grayling years ago. Apparently, some of the reservoir stock migrated downstream and were able to propagate and survive year-round.

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The picture for lake populations appears somewhat brighter: 33 lakes and reservoirs contain grayling. Although most are listed as having sparse populations, a handful are in fact overpopulated.

Before we condemn earlier estimates of streams and lakes in Montana containing grayling, we should realize that the information we had at that time was, at best, "none too good." Recent emphasis by the DFWP on gathering and storing information about grayling and studies such as that conducted during 1979-80 on the Big Hole River drainage by George Liknes, who was doing graduate work at MSU, shed a great deal of light on the situation.[8] On the optimistic side, Liknes believes several small Big Hole River tributaries not part of his study may contain viable grayling populations. Obviously, more study is needed before a complete picture can be presented.

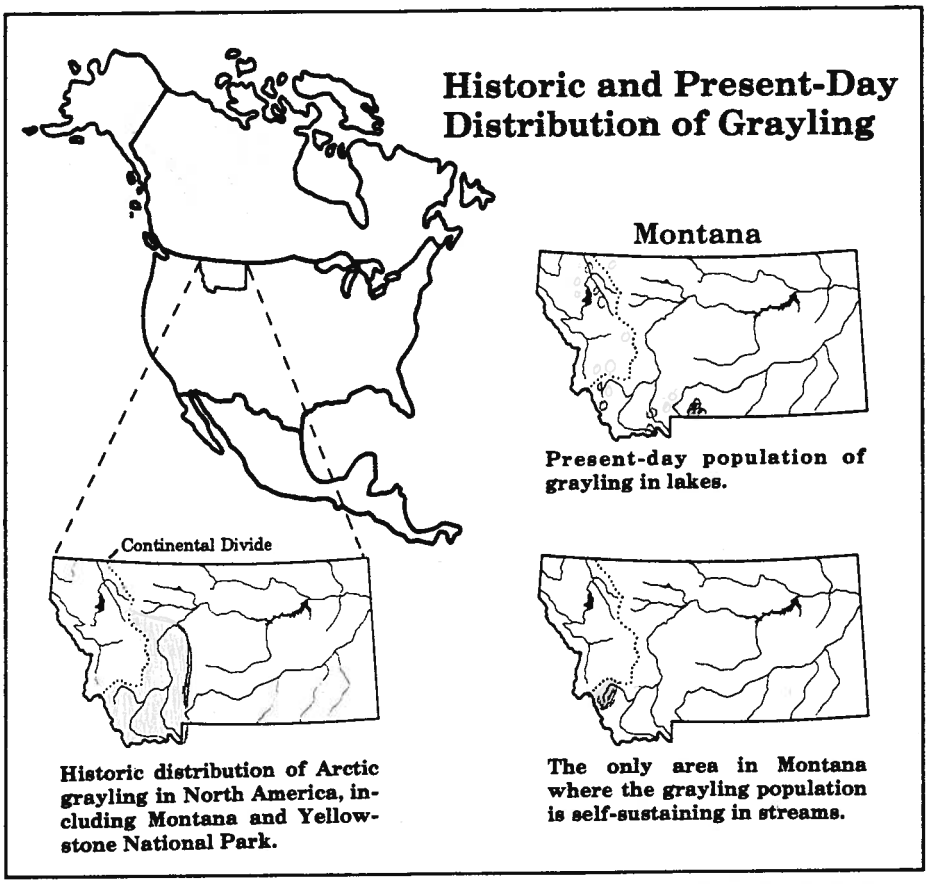
What must the department do to stabilize or increase the number of streams containing self-sustaining grayling populations? I believe—as do other fisheries biologists—that the all-important first step is to assume there is a genetic difference, no matter how small, between the lake-(lacustrine) and stream-(fluvial) dwelling forms.

In 1979, the Endangered Species Committee of the American Fisheries Society designated the Montana stream-dwelling strain as a fish of "special concern," thus assuming a difference does exist. Both Varley (in a personal communication) and Dr. E.R. Vyse, associate professor of genetics at MSU (in a letter to the department), suggest a genetic difference. Dr. Vyse further wrote: "If there are distinct genetically controlled differences between the two forms, it is suggested that the lacustrine form, historically rare in the Montana range of species, is now widespread while the historically common adfluvial form is threatened with extinction."

If we accept this difference between the lake and stream forms, what brought about the rapid decline in the stream population? Vincent, in his 1962 dissertation, wrote: "Grayling have a narrow ecological amplitude that limits their distribution to certain streams or certain sections of streams" and that "there are indications that competition from recent invading fishes and man-caused habitat changes become limiting before water temperatures." He listed four major causes for the decline—(1) climatic, (2) exploitation, (3) introduction of exotic fish and (4) habitat change.[9] Of the four, only climatic changes would occur if man were not present. Vincent summarized by indicating that man and the recent changes he has made in grayling habitat, coupled with the grayling's inability to quickly adapt to these changes, were directly responsible for the decline.

In 1979, J. C. Lynch and Dr. Vyse published a report with information supporting Vincent's 1962 thesis that grayling are not as genetically adaptable as exotic fish (e.g., brook, brown and rainbow trout). They indicated that rainbow are "ecologically plastic, occupying a wide range of habitats" whereas grayling lack extensive genetic variability.[10]

J. D. Dean and J. D. Varley, writing in 1974 about Yellowstone National Park waters, noted: "...among the native species, the Arctic grayling has suffered most from man's activities."[11] The "activities" they were referring to included increased fishing pressure (grayling are easier to catch than most other game fish)



Present-day population of grayling in lakes.

Historic distribution of Arctic grayling in North America, including Montana and Yellowstone National Park.

The only area in Montana where the grayling population is self-sustaining in streams.

Many grayling populations associated with streams merely move into streams for spawning and return to lakes for the remainder of the year (photo: Louis M. Kis).

and competition from exotics such as brook, brown and rainbow. They were obviously not referring to habitat change because their studies have been conducted within the park where habitat change due to man is minimal.

This combination of more fishing pressure coupled with the ease with which grayling can be caught gives a tremendous edge—right at the outset—to the exotics. Add the reduced ability of grayling to adapt and one quickly recognizes that even where habitat changes are minimal, success of a grayling stocking or restocking program would be doubtful—unless competitor exotics were eliminated and grayling harvest were restricted.

A restocking program was attempted in Yellowstone National Park in the 1970s. In a personal letter, Varley wrote that the initial attempt in 1971 at restocking small headwater streams of the Missouri River in the park was unsuccessful. The grayling transplanted in this early attempt were taken from lake populations. They failed to hold stream position and drifted downstream. A second attempt in 1978 proved about as fruitless. However, during the second attempt, grayling were transplanted from stock taken from the upper Big Hole River and two of its tributaries. Thus, it appears that grayling transplanting options are in themselves limited.

The answer to the question about what originally led to the decline of stream-dwelling grayling in Montana lies to a large extent in their lack of genetic adaptability and the rapidly changing environment in which they live. Lake populations, perhaps because of living in an environment less subject to rapid change, have become fairly stable.

As William Shakespeare wrote in "Julius Caesar": "The fault...is not in our stars, but in ourselves...." This seems an apt reason for greatly reduced or extinct stream populations in many Montana streams. And, the scenario for improvement is not optimistic.

If we are to continue to have grayling in our streams, the department's management options must include some, if not all, of the following:

(1) Recognition of a probable genetic difference between lake- and stream-dwelling populations.

(2) Improvement of historic habitat that has been altered by man. This option may be unrealistic in light of existing laws and water uses.

(3) Designation of streams with adequate grayling habitat and already restricted conflicting uses (e.g., wilderness areas or other federal land) as special grayling management areas, thus emphasizing management of stream-dwelling grayling populations.

(4) Transplanting of stream-dwelling stocks to acceptable habitat in isolated streams or portions of streams (e.g., upstream from a nonpassable waterfall in headwater reaches). Competitors must first be eradicated if such a program is to be successful.

(5) Maintenance of restrictive regulations for grayling in streams.

These first five management options relate to more optimum conditions; the next two may be termed the "last chance" scenario and should be used only when all other options have proved ineffective.

(6) Attempting genetic mixing with stocks from Alaska or northern Canada, and possibly introducing a new genetic variability. Of course, this option would alter the original Montana blood line.

(7) As always, the last option is to do nothing—an option that would probably mark the final demise of stream-dwelling grayling in Montana.

Early concern for the potential of this demise was voiced by J. L. Kelly in 1931,[12] Dr. Brown in 1938[13] and P. H. Nelson in 1956.[14] That early concern was met with successful management programs that established self-sustaining populations in many Montana lakes. We need similar programs for grayling in our streams.

James A. Henshall described the Montana grayling as "trim and graceful," Kelly as "the pride of the angling fraternity of the Treasure State," and St. Ambrose, Bishop of Milan, as "the flower of fishes." However described, this most elegant relic of the Ice Age is in a battle for survival in Montana streams—a battle it apparently cannot win without man's help. A first step might be to declare the "true" historical grayling of Montana—the stream-dwelling form—as a fish of "Extra Special Concern."

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