



State of Wisconsin

DEPARTMENT OF NATURAL RESOURCES

1325 Tower Avenue
Superior, Wisconsin 54880
715/392-7988

Carroll D. Besadny
Secretary

Dear Brule Steelheader:

Thanks for your excellent cooperation during the 1990 Brule River creel censuses. Your creel information proved to be extremely valuable, and it is helping to insure proper management of the steelhead fishery aimed at improving and sustaining good fishing for the future.

This is the information package we promised you. It was developed to update you on our present knowledge of the Brule River steelhead fishery. The package includes the creel census results, history and the present status of the steelhead, a steelhead life history narrative, and information pertaining to rumors we've heard in past years in the Brule Valley. We hope you find this material informative. A large part of the information comes from our newest fishery management tool--the sea lamprey barrier observation window.

We did not have enough money to print and mail this information to you (budget shortfall) as we had promised. To fulfill this promise, we sought funding from a local sport club--The Lake Superior Steelhead Association. They are solely responsible for paying all production and mailing costs (at great expense) which made this possible. We thank them for this support.

The Steelhead Association has invested money and support toward many steelhead projects in western Lake Superior including helping us install the video monitoring system at the observation window, hatchery support money, and many other excellent projects. They've enclosed a synopsis of their club activities with this mailing.

Thank you for your cooperation and support of the fishery management program on the Brule.

Sincerely,

FISH MANAGEMENT-SUPERIOR

Dennis Pratt - Bill Blust

Dennis Pratt and Bill Blust

*** INFORMATIONAL PRESENTATION ***

Subject: Brule River Steelhead

Date: March 12, 1991

Time: 7:00 PM

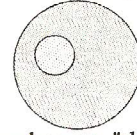
Location: Douglas County Courthouse
1313 Belknap St. Superior, WI
Rooms C & D

We will be presenting this information in detail
Your Questions are Welcome

THE LIFE STORY OF A BRULE RIVER STEELHEAD

The story begins sometime in early to mid-April as the steelhead egg is spawned, fertilized, and deposited in a gravel spawning riffle somewhere on the Brule River. A few hours later the cells within the egg begin to divide and multiply, the same mystery which occurs at this point in the life of all living things.

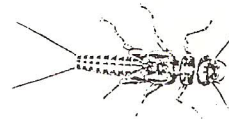
The exact blueprint for the individual steelhead is already set within the developing embryo--a unique mixing of the special traits which allowed its parents to survive to spawn. In each segment of this steelhead's life to follow, nature will select for the fish with the traits necessary for survival and serve "death" to those without them. This process allowed its parents to survive life in the Brule and then in Lake Superior to return to spawn. (This process is described by scientists as "survival of the fittest," it insures continuation of the species.)



Development within the tiny sphere continues for approximately thirty days (hatching time is directly dependent on water temperature) until the tiny steelhead breaks free of its shell. At this point it's called a "sac fry" because of its large cumbersome yolk sac. Development continues while lying on its side in the gravel of the spawning bed obtaining required nourishment from the yolk sac. Somewhere during this early life stage it is thought that the steelhead may memorize the exact location of its spawning bed.



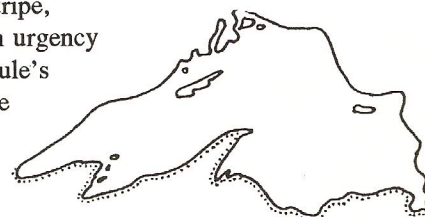
When its yolk sac is almost fully absorbed the fry breaks loose of the gravel and swims up, takes a quick gulp of air at the surface to fill its swim bladder, and then half swims, half drifts laterally to the shallows near the stream bank. The free-swimming fry then gradually drifts downstream along the river bank in search of its next home. It looks for an area out of the main current, possibly a root tangle, a submerged weed bed, or a tag alder branch lying in the water. When the search is complete, the fry begins to feed on extremely small food items that drift by or on small creatures attached to the root tangle. The fry spends most of the next month feeding and growing to fingerling size at this location. By late summer the fingerling's daily food needs become greater than what drifts by its stream bank location. The fingerling steelhead begins to search for more food and in the process wanders into the choppy, shallow riffle area farther out towards the middle of the river. Its confidence builds and it accepts this as its home for the remainder of the summer. This lie provides a constant supply of drifting insects (both aquatic and terrestrial), and by summer's end the fingerling steelhead has grown to 3 1/2 inches.



As winter approaches the water temperature declines to near freezing, and the fingerling's home in the riffle gradually becomes a severe environment. When the water temperature reaches thirty-two degrees, especially on cold, clear nights, ice crystals begin forming on any hard surface on the stream bottom in shallow water. When this occurs, the fingerling moves into the depths of a nearby hole--its winter home. The long wait for spring begins. (Fishery biologists identify January 1 as the birthday of all fish in North America.)

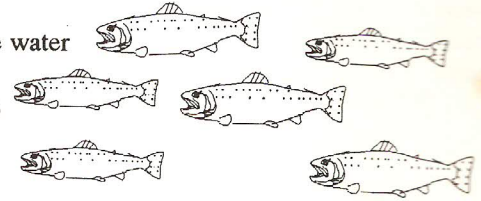
By sometime in March or April the river's annual deicing process passes the juvenile (now considered a yearling) steelhead's winter holding hole. Spring has sprung, and the warmer water temperature quickly melts the remaining ice. The yearling moves back to the riffle to spar for its summer feeding position.

The rest of the yearling's second summer is spent in the riffle taking advantage of the Brule's grocery store of food which constantly changes from one item to the next. By October the yearling has grown to a respectable 6 1/2 inches. The summer's feeding pattern was only interrupted for a very short period of time in July when the river's temperature reached its warmest level (this only occurs in the lower river). The yearling merely reduced its activity to compensate for the heat. Water temperature again descends to thirty-two degrees in November and the yearling once again moves back to its winter holding hole. As spring approaches, the steelhead, now considered a two-year old, begins to feel some mysterious changes inside. With the warmer spring water temperatures, the fish moves from its winter refuge back out to the riffle and develops a huge hunger. It feeds vigorously, growing another 1 1/2 inches by mid-May. A hormonal change inside the two-year old causes it to "smolt" or turn very silver. The pink stripe, so prominent before, disappears, and a nervousness inside shifts to an urgency to move. The smolt's instincts tell it to memorize the odor of the Brule's water and to begin moving downstream. It becomes very hard for the silvery-colored smolt to find a hiding place in the river now with its juvenile camouflage coloring gone. A restlessness sets in until it encounters a small school of other rainbow smolts, and together they instinctively move down the Brule and out into Lake Superior. The school moves across the lake's expanse, close to the surface, in the water layer called the pelagic zone.



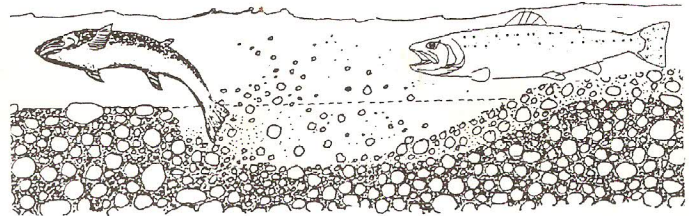
The smolt's silver, iridescent sides and green-colored back provides it with perfect camouflage for this open-lake environment. The school of about ten to fifteen smolts spends the rest of its third summer voraciously feeding on invertebrates and terrestrial insects floating near or on the surface. By the end of summer, the steelhead is 15 1/2 inches long and has roamed over much of the western end of Lake Superior (an area basically encompassed by Isle Royale-Apostle Islands-Duluth).

Growth is very good again during its second summer in the lake. Once surface water temperatures warm, the school's feeding activity swings into full gear, and by mid-September the three-year old has reached 21 1/2 inches. Many more times than the previous summer the steelhead has fed on the schools of two- to three-inch silvery lake herring.



Instinct summons the steelhead to seek out the Brule river in mid-September. Some scientists theorize that celestial navigation allows them to find the south shore where the Brule enters the lake and the memorized scent of the river's water verifies they are near the correct stream. It is now early October and the steelhead has an urge to move up the Brule, but it's chrome color makes it move cautiously, ascending in darkness, or when the water is turbid. Gradually, within a week or so, the lustrous silver color and matching silver veining in the tail darken. The spots that were so prevalent when it was a juvenile begin to reappear as well as the rich pink stripe along its side. This camouflage calms the steelhead as it seeks an over-wintering pool.

The 4,400 eggs which were hardly noticeable last summer are gradually increasing in size creating a plump appearance by winter. The great majority of the nutrition needed for development of the eggs comes not from feeding in the river but from the conversion of the young steelhead's own stored body fat. Even the orange coloration and the calcium needed for egg shell development are robbed from her flesh and scales. The warming waters of spring cause an instinctive urge in the now four-year-old steelhead to move upstream as water temperatures approach forty degrees. The steelhead now searches for her ancestral spawning riffle and by sight and scent may even locate the very spawning run her parents had chosen. At forty-two degrees she begins digging a hole, called a redd, in the gravel with her tail. As she does this the silt and sand originally in the gravel are swept downstream. Focused on the reproductive mode and less on self-protection, spawning is all she considers now. As the female's redd-building process continues, the males jousting events nearby increase in intensity. They constantly spar for positions on either side of her. Once the nest is complete the dominant males nudge her from both sides, and in a quivering motion she releases a few eggs. They are immediately fertilized with a cloud of milt and fall in the downstream portion of the depression. The female covers them with a sweeping tail full of gravel and the process is repeated. The eggs end up in the downstream pile of gravel where the flow of water keeps silt and sand from settling and smothering them. After many spawning repetitions, all the female's eggs are deposited and she moves slowly downstream to the nearest cover to rest. She shows scars as evidence of spawning--a worn chest mark and the bottom of her tail is frayed from digging. Once rested, instinct directs her to down-migrate gradually back to Lake Superior. Downstream movement takes place mainly at night (during the day with dirty water) and is typically slow. She drifts in a tail-first position which allows her to feel her way even in complete darkness. She develops a hunger which increases daily. Upon reaching Lake Superior the four-year old is ready to get back to the routine of feeding and has successfully completed her maiden spawning voyage.



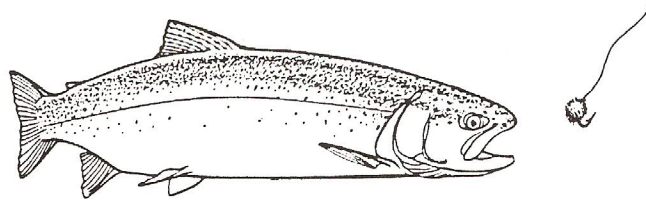
It is now June and she joins up with other steelhead who once again begin roaming as a school and feeding voraciously in the surface waters of western Lake Superior. By the end of the summer she spans 24 1/2 inches in length and weighs approximately 5 pounds.

For the same instinctive reasons she again finds and ascends the Brule on her second spawning voyage. That next spring, at five-years old, she repeats her spawning ritual. Life finally becomes repetitious and a year later, on her third spawning run, she is over 7 pounds and 26 1/2 inches. On her fourth reproductive cycle she returns to the Brule at approximately 8 pounds and 27 inches, and her fifth run at 9 1/2 pounds and 28 1/2 inches. If she survives the rigors of life she will spawn her sixth time at 29 1/2 inches and 10 pounds, and her seventh time at 30 1/2 inches and possibly 11 to 12 pounds!

This is the story of a steelhead that survives nature's obstacles to live a full life span attaining ten years of age. It's a steelhead that spends two summers in the river before smolting and two summers in the lake before returning to spawn. Approximately ninety percent of the Brule population lives in the stream for two summers (the remainder smolt at age I or age III). About one-half of those that smolt at two years of age return to spawn after two summers in Lake Superior as our example had done (of the remainder approximately twenty-five percent return after one year and twenty-five percent return after three years).

Nature plays the major role in mortality from the time it hatches until it returns to spawn (although anglers must take care in releasing all juvenile fish). **Angler harvest becomes the main mortality factor from this point on.** The steelhead could potentially be harvested (killed) during nearly every segment of its life thereafter.

The fall-run steelhead is vulnerable to harvest from the time it congregates near the river mouth and enters the stream until the fishing season closes on November 15. After spending the winter in the river it can again fall prey to the angler before it spawns (the fishing season typically opens before spawning takes place) in the spring. It can also be harvested during the act of spawning, if it spawns downstream of Hwy 2 (as is the case with many steelhead), and on its migration back to Lake Superior. While in Lake Superior it's vulnerable to spring lake trout and salmon anglers. It may be harvested by trollers all summer long during the foraging journey around western Lake Superior. It's important to realize that **the angler (both river and lake) is the Brule River steelhead's chief survival obstacle.**



1990 SPRING AND FALL STEELHEAD CREEL CENSUS - BRULE RIVER

History - Has this been done before?

The 1990 spring and fall steelhead creel censuses were the fifteenth and sixteenth such investigations of the Brule River sport fishery. The earliest census involved a check of the first-ever early trout season on the Brule--the year was 1936. The season that year was opened fifteen days early to allow fishing from May 1 through August 31. A creel census in 1940 recommended the first special fall trout season which was established eight years later in 1948. This experimental thirty-day fall season ran from October 15 through November 15 (the general trout season in 1948 was May 1 through September 7). The third creel survey in 1948 monitored the number of anglers, total hours of fishing, and the average number of hours it took anglers to catch one legal fish during this initial fall season.

Objective - What is the purpose?

The creel survey is a tool used by fish managers to monitor various aspects of a particular fishery and answer some very basic questions. The most important questions answered include *pressure* (how many fishermen and the total number of hours they fished), *catch* (how many fish caught and of those caught how many were killed and how many were released), and *catch rate* (the average amount of time it took to catch one fish).

Method - How is this done?

A simplified explanation follows. The creel clerk records the amount of time cars are observed at parking lots during their daily creel shifts. This time is then expanded to calculate the *pressure* or the total time spent fishing (non-fishing cars are subtracted). The *catch rate* (recorded from angler interviews) is then applied to total hours of fishing giving an estimate of *total catch*. The creel clerk also measures the length of harvested fish and gathers information on voluntarily released fish.

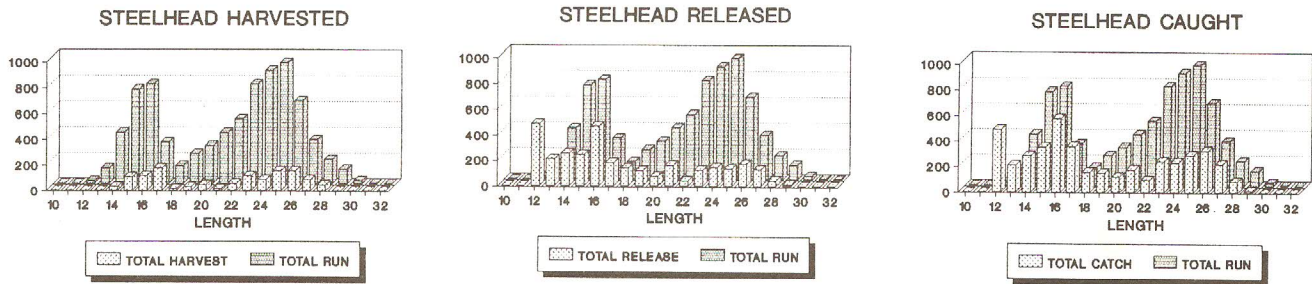
Results - What are the 1990 spring and fall creel census results?

<u>Time Period</u>	<u>Estimated Angler hours</u>	<u>Angler Trips</u>	<u>Steelhead</u>		<u>Total Catch</u>
			<u>Harvest</u>	<u>Release</u>	
March 31 - May 31	36,526	9,646	1,203	3,139	4,342
Sep. 14 - Nov. 15	31,614	8,498	956	1,563	2,519

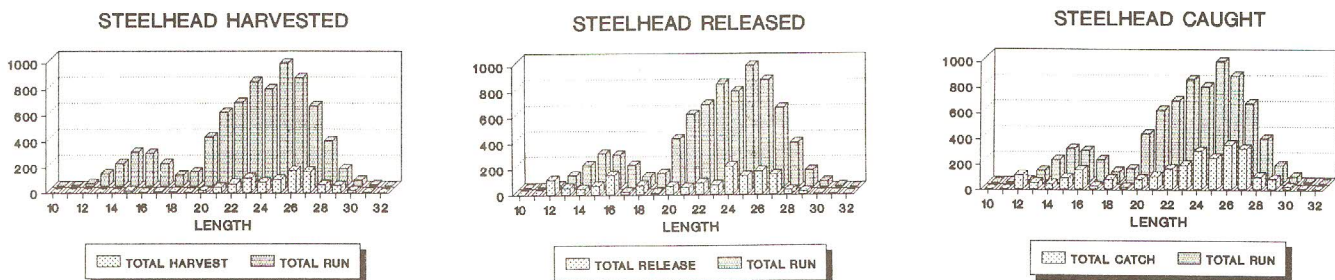
	<u>Spring Harvest</u>	<u>Spring Release</u>	<u>Spring Catch</u>	<u>Spring Barrier</u>	<u>Fall Harvest</u>	<u>Fall Release</u>	<u>Fall Catch</u>	<u>Fall Barrier</u>
Ave. Length of Steelhead (inches)	22.2	18.7	19.7	20.6	24.9	21.3	22.7	22.9

	<u>Spring</u>	<u>Fall</u>
Catch Rate (Hours/Steelhead)	8.4	12.6
Anglers Who Were Successful and Caught a Legal Steelhead	34.6%	25.8%
Anglers Who Caught Steelhead and Released All	53.7%	45.3%

* Comparison of harvested, released, and total catch from the spring 1990 creel with the total run at the fishway observation window for the fall of 1989.



* Comparison of harvested, released, and total catch from the fall 1990 creel with the total run at the fishway observation window during the fall of 1990.



Discussion - What does this mean?

*Steelhead fishing during both the spring and fall seasons in 1990 was exceptional. The steelhead catch rate of 8.4 hours/steelhead in the spring was the best on record, and the fall catch rate of 12.6 hours/steelhead was the second best on record. These catch rates would not have been possible without the practice of **VOLUNTARY RELEASE** by many anglers. Realize that the catch rate was the harvest rate during creels earlier than the 1980's as very few steelhead were released.

<u>Steelhead catch rate for comparable Spring creels (hours/steelhead)</u>	<u>Steelhead catch rate for comparable Fall creels (hours/steelhead)</u>
1990 - 8.40	1973 - 11.4
1979 - 11.5	1990 - 12.6
1973 - 21.1	1949 - 16.5
1984 - 22.9	1954 - 17.3
1949 - 26.3	1978 - 19.9
1986 - 55.8	1948 - 23.6
	1986 - 24.7
	1984 - 26.7

*The average-size steelhead harvested, released, and caught increased from the spring to the fall.

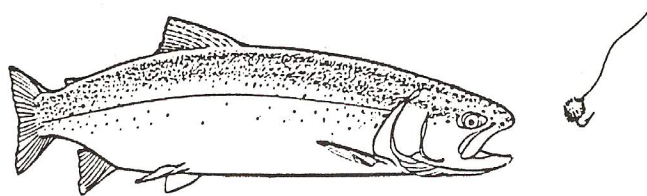
*The increase in the average size of steelhead caught mirrored the increase in the average size of the run observed at the fishway.

*The angler began to harvest a greater portion of steelhead caught that were twenty-five inches and greater.

*Even though jack-size fish (thirteen to eighteen inches) were available in abundance, the great majority were released.

*The **VOLUNTARY RELEASE** rate dropped from 53.7 percent in the spring to 45.3 percent in the fall. This is probably due to the larger average size of the steelhead caught in the fall.

***VOLUNTARY RELEASE** is, without a doubt, improving the Brule steelhead fishery both in the average numbers caught per hour of fishing and numbers of quality size fish available.



HISTORY OF THE BRULE RIVER STEELHEAD FISHERY RESOURCE

What is our present knowledge of the history of the steelhead fishery?

The steelhead (rainbow trout) is a non-native species imported from the Pacific Coast. It was first introduced into the Great Lakes drainage in the late 1800's and first stocked into the Brule in 1892. Approximately two-million steelhead of many sizes and strains have been stocked over the years. Through this stocking a self-reproducing population developed. Basically, the Brule River acts as a "fish hatchery" providing spawning and rearing habitat for the steelhead. Lake Superior provides the forage (food) supply so they can attain trophy size. Annual steelhead spawning runs have occurred for many years. The May 1921 issue of The Wisconsin Conservationist stated, "Local residents reported that the Brule River was full of large rainbows (5 to 20 pounds) which came up the river from Lake Superior in the spring to spawn." Much of the Brule River's historical recognition as a trout stream can be attributed to the migratory steelhead fishery. For many years the Wisconsin angling record for rainbow trout was held by a steelhead caught in the Brule River. A 12 pound, 13 ounce Brule River steelhead caught in 1939 held the state record until 1963. This record was replaced by another Brule River caught steelhead of 13 1/2 pounds, and this record lasted into the mid-1960's.

It can generally be stated that once angling regulations were initiated, the season opener was gradually modified to open earlier in the spring and close later in the fall. This was done to take advantage of the annual steelhead runs in the Brule. The first early season was established in 1936 when the season opened fifteen days earlier (the season was extended to run from May 1 through August 31) and the first experimental fall season began in 1948 (October 15 through November 15). The continual relaxing of the regulations finally led to a year-round season being established on January 1, 1982. Concern about the severe decline of the steelhead fishery began very soon after enactment of this year-round season. Previous to this there were likely years when fishing was good, as well as years when it was poor due to overharvest. However, what used to be a roller coaster ride of steelhead abundance became a severe downward slide during the 1980's. In addition to the year-round season and a daily steelhead bag of five, other things were simultaneously occurring that added to the steelhead decline: the development of a Lake Superior lake trout/salmon fishery (increased steelhead harvested incidentally), improved technology, increased angler knowledge, and the fishery created by the run being stopped below the original lamprey barrier. All together these events gave us the lean steelhead years of the 1980's. The steelhead population was finally depressed severely enough to impact how many steelhead the Brule could produce naturally (too few eggs laid). As near as we can tell the period of 1984 through 1988 represented some of the poorest steelhead fishing within memory. Observations of the steelhead run size passing the newly constructed sea lamprey barrier's observation window verified the anglers concerns. A new set of more restrictive steelhead fishing regulations was enacted at the outset of the 1989 season in an attempt to turn the situation around.

What are the regulations today concerning steelhead and what are they intended to do?

Brule River *Daily steelhead bag - One with a minimum size of 12 inches.

Why? - Reduce adult harvest and eliminate juvenile harvest.

Season - Saturday nearest April 1 through November 15.

Why? - Return to a historical fishing season.

Refuge - Brule River upstream of U.S. Highway 2 and all of its tributaries - season closed from October 1 to the first Saturday in May.

Why? - Intended to protect steelhead while they were spawning at these locations.

Refuge - Skid Mays Ledges - season closed Sept. 1 through May 31.

Why? - Eliminate steelhead harvest at this location.

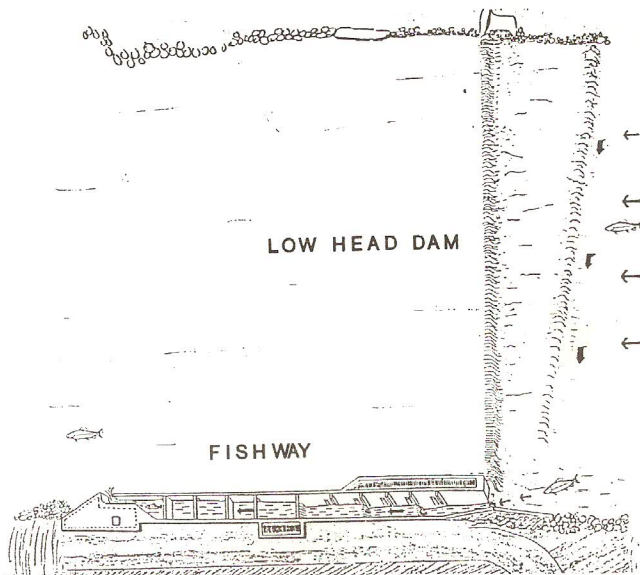
Lake Superior *Daily bag - One with a minimum size of 28 inches.

Why? - Established to essentially eliminate lake harvest with the exception of a trophy.

Season - Year-round.

How does the sea lamprey barrier work and how is it used to monitor the status of the Brule River steelhead?

The sea lamprey barrier/fishway has become an exceptional fisheries management tool. The structure's main purpose is stopping sea lamprey from reaching any of the spawning habitat upstream while still allowing trout and salmon easy passage year round. A simplified explanation of the structure follows. It consists of two main parts: a low head dam extending across most of the stream, and a 150-foot-long fish ladder (fishway) along the east bank (see diagram). The low head dam creates a five-foot waterfall which is impassable by sea lamprey. The fishway is made up of a series of smaller waterfalls with resting pools between them (steps). One of the steps approximately halfway up the fishway consists of an adjustable waterfall (called the lamprey barrier gate). Raising or lowering this gate changes the height of this waterfall. During the sea lamprey spawning run we set the height of this gate just high enough to stop sea lamprey from swimming over it. A fish trap located adjacent to the gate is used to remove lampreys that are captured. Trout and salmon simply swim or occasionally jump over this gate and continue upstream through the other steps in the fishway. Before they reach the river upstream of the structure they must swim by the observation window located at the fishway's narrows. This observation window along with the fishway trap are the two main tools used to monitor the status of the trout runs. Fish passing upstream are monitored by recording them as they pass the window with a time-lapse, video-cassette recording system. This system is operated twenty-four hours a day nearly all year-round (it is shut down for two weeks in June for equipment maintenance). The video monitoring system provides us with the number of fish (count) of each species and at what size (length) pass the window.



Approximately twenty-five percent of the fish are measured on the video monitor from recorded tape. A small sample of fish are captured at the fishway's trap where necessary information is gathered from them (length, sex, scale sample, etc.). The scales provide us with the age of the various sizes of fish passing the window and their life history (i.e., numbers of stream years, lake years, whether they are maiden or repeat spawners, and if they are repeats how many times they've spawned before). For a more detailed explanation of the fishway and sea lamprey refer to the publication, The Brule River Sea Lamprey Barrier's Role in the Sea Lamprey Control Effort available at the barrier or the Superior DNR office.

When do steelhead run the Brule and how many have passed through the fishway?

The spawning migration of steelhead begins in late summer (fall run), is interrupted by winter, and then continues the following spring (spring run). Essentially all steelhead spawn in the spring whether they move into the Brule in the fall or spring. Run information for past years follows.

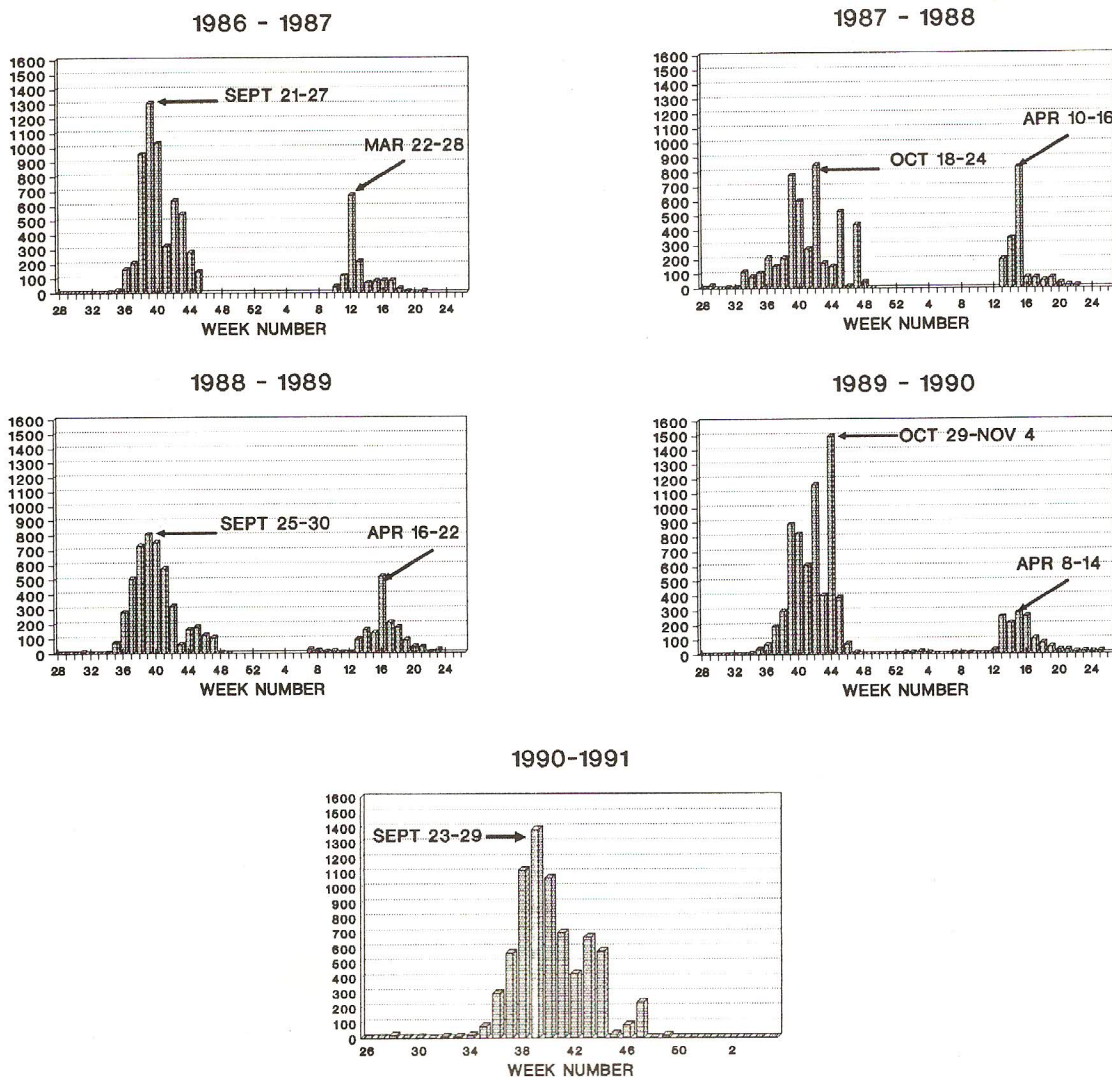
Seasonal Steelhead Passage at Lamprey Barrier Fishway

	<u>1986-87</u>	<u>1987-88</u>	<u>1988-89</u>	<u>1989-90</u>	<u>1990-91</u>
Fall	5717	4776	4714	6459	7302*
Spring	1432	1690	1589	1446	-
Total	7149	6466	6303	7905	-

*Through February 2, 1991.

The numbers of steelhead in the spawning runs are beginning to increase. The steelhead run varied from a low of 6,303 in 1988-89 to a high of 7,905 in 1989-90. It appears that the 1990-91 spawning run will be significantly larger than that of 1989-90 as 7,302 have already ascended. The spring portion is yet to come.

Weekly Steelhead Passage at the Lamprey Barrier Fishway

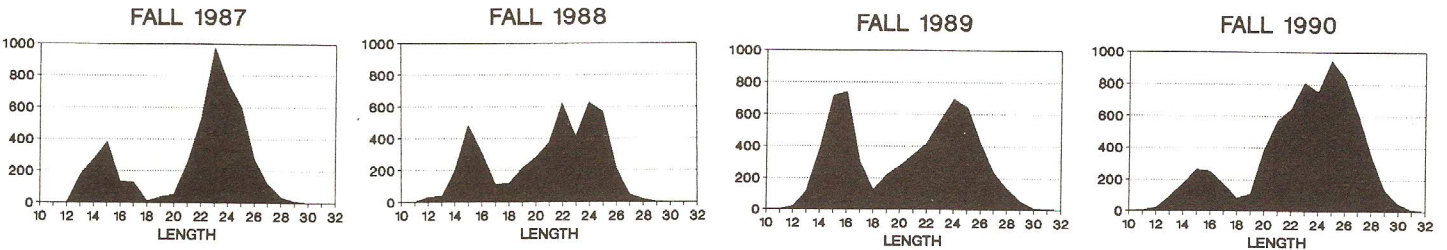


The peak of the fall portion of the run typically occurs during the last week in September or the first week of October.

The spring passage at the fishway begins as soon as the ice jam passes the fishway (triggering steelhead overwintering downstream of the structure to pass), and there is a second peak of silver fish as soon as the Brule is completely open to Lake Superior (the true spring-run fish).

How many of each size have ascended?

As stated earlier, approximately twenty-five percent of the fish are measured on the monitor from recorded videotape. The length frequency graphs that follow show the number of steelhead at each size (fall portion).



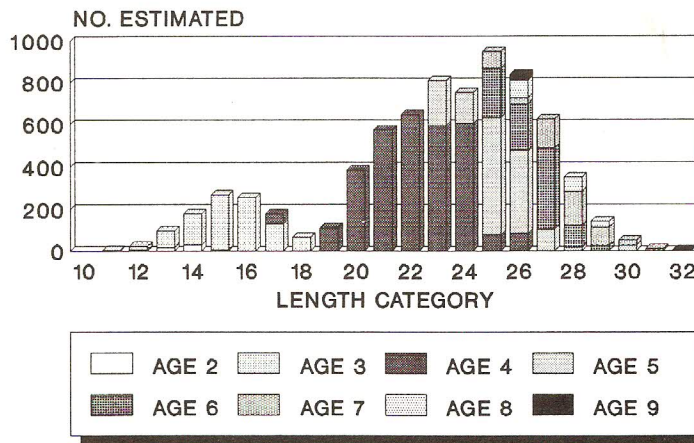
You can easily see that the numbers greater than twenty-four inches have increased dramatically.

How old are they?

The graph at the right shows the ages of steelhead that ascended during the fall of 1990.

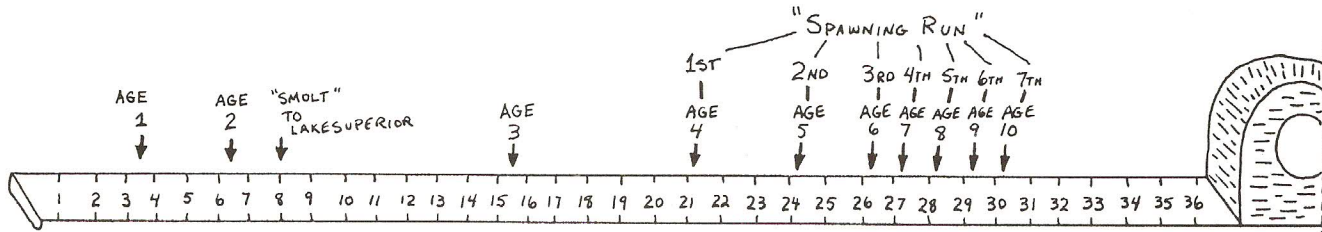
Note: The jack-size fish are mainly three-years old (spawning age) and those greater than twenty-five inches are typically five years and older.

BRULE RIVER STEELHEAD AGE-LENGTH FREQUENCY FALL 1990



How fast do they grow?

The most common life history is the steelhead that spends two summers in the river. It then smolts (turns silver) and down-migrates to Lake Superior. Nearly ninety percent of the Brule River steelhead leave at age II while the remainder leave at age I or III. Generally steelhead then spend two summers in the lake before returning on their initial (maiden) spawning voyage. Approximately fifty percent of those smolting at age II return after two summers in the lake. Steelhead can spawn (repeat) each year for another five or six times. The tape measure below shows a steelhead's potential length at each age.

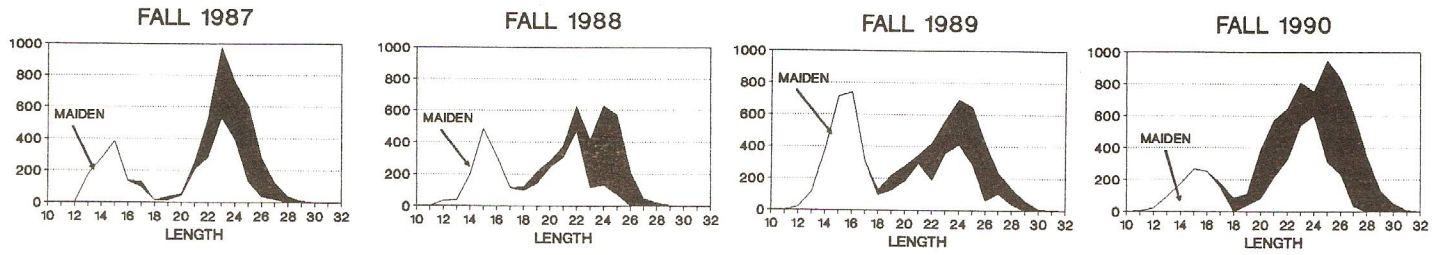


Note: A twenty-six inch steelhead of this life history usually is on its third spawning run. A ten-pound steelhead (one that's twenty-nine inches or greater) routinely had made five previous spawning runs.

The length at age information presented previously represents the average for the past four years. Steelhead have shown improved growth rates over this period. As an example, a maiden spawner (first time) with the life history shown above returned at 20.9 inches in 1987 while a similar fish returning in 1990 was 22.4 inches. Reasons for this improved growth are only speculative at this point.

Have they spawned before?

The scales have revealed the number in each length category that are maidens (first-time spawners) or are repeat spawners. This is shown below with the maiden portion displayed in white and the repeat portion in black:

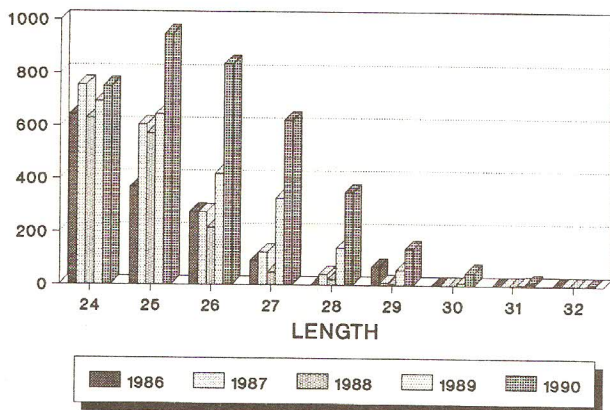


- Note:
- The number of maidens depends almost solely on recruitment, the river's ability to naturally produce steelhead.
 - The size of the left-hand peak shows you the relative year class strength of three-year-old maidens.
 - The repeat portion of the run depends on how many of last year's spawners survived to return again.
 - Steelhead twenty-five inches and larger are typically repeat spawners.
 - In addition to total numbers increasing in the 1990 fall graph, the quality (those twenty-five inches and larger) size fish are increasing in number because there are more surviving to repeat.

What does this mean to the angler?

It means that greater numbers of trophy-size fish are available to be caught. The graph below shows this increase over the past fall seasons. The actual numbers in each inch group are displayed in the table. It becomes very clear that greater numbers of steelhead are surviving to repeat. Note: In the fall of 1990 your chances of catching a twenty-seven inch or larger fish was greater than your chance of catching a twenty-five inch or larger fish in the fall of 1986 through 1988.

QUALITY SIZE STEELHEAD



NUMBER OF QUALITY SIZE STEELHEAD PER YEAR

Equal to or Larger than	1986	1987	1988	1989	1990
24 inches	1447	1805	1490	2296	3708
25 inches	804	1050	862	1604	2956
26 inches	437	446	291	961	2009
27 inches	161	172	75	541	1173
28 inches	69	49	26	213	550
29 inches	0	9	4	72	199
30 inches	0	0	0	13	61
31 inches	0	0	0	4	12
32 inches	0	0	0	0	2

Now to recap what we have learned.

*The steelhead run is improving.

- Total numbers are up.
- Quality is improving (twenty-five inches and larger).
- Survival to repeat spawn is increasing.
- There is recent improvement in growth rates.

*Steelhead fishing is improving.

- Exceptional catch rates--near best on record (as noted in creel report).

Why is the fishery and fishing improving?

The answer is VOLUNTARY RELEASE. Without a doubt we've found that the existing regulations do not protect the fishery from declining. The potential harvest (the number of legal steelhead that could have legally been harvested under existing regulations) is easy to calculate from the creel census data; just multiply the number of angler trips by the percentage of the trips where anglers were successful in catching a legal steelhead. Note that the percentage of successful trips would be lowered if fish caught were harvested - released fish can be caught again.

	Angler <u>Trips</u>	x	Percentage of <u>successful trips</u>	=	Potential <u>steelhead harvest</u>
Spring	9646		34.6%		3338
Fall	8498		25.8%		2192

This means that the legal steelhead catch minus the potential harvest equals the number protected by regulation or percent of catch protected by regulation.

	Legal Steelhead <u>Catch</u>	-	Potential <u>Harvest</u>	=	Number Protected by <u>Regulation</u>	OR	Percent of Catch Protected by <u>Regulation</u>
Spring	4342		3338		1004		23 %
Fall	2519		2192		327		13 %

Note: Percentage of steelhead catch protected by existing regulations declined from spring 1990 to fall 1990.

What will happen if the voluntary release rate declines and the total numbers of anglers fishing increase?

IF:

- The number of steelhead caught increases,
- And the number of trophy-size steelhead increases.

THEN THE REACTION IS:

- Good fishing draws more anglers.
- Larger steelhead become more acceptable for harvest and the voluntary release rate drops (as happened between the spring and fall of 1990).

WHICH RESULTS IN:

- First, the present season's catch rate declines, more fish harvested means fewer available to be caught more than once.
- Second, the quality (number of trophy-size steelhead) of next season's fishing declines as fewer survive to repeat.
- Third, too few spawners (not enough eggs laid) limits juvenile steelhead numbers produced which reduces the maiden portion of future runs.

Our objective in fish management is to maintain good steelhead fishing by maintaining a stable fishery with good numbers and quality. We have seen that the existing regulations cannot insure this. It is your act of releasing steelhead that has resulted in the improvement we see this year.

What regulation is needed to sustain good steelhead fishing on the Brule River?

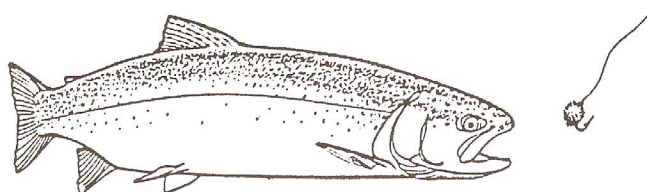
The logical step is to increase the minimum size:

- To allow all steelhead the chance to spawn once before they could be harvested.
- To further protect and maintain the multiple repeat spawning survival rate we now see because of voluntary release.

The existing regulations plus changing the minimum size from the present twelve inches to twenty-six inches will accomplish the objective.

- A minimum size of twenty-six inches would protect 98.3 percent of the maidens and allow them to spawn thus insuring consistent natural reproduction.
- It would protect 62.9 percent of the repeats and maintain a quality fishery in terms of large steelhead.

Those of you who have been voluntarily releasing a large portion of your steelhead catch in response to the steelhead decline of the 1980's are making the difference. The steelhead fishery improvements you've seen of late are a direct result of your collective catch and release steelheading. As you can see, we still have a way to go before we have regulations that protect the fishery, but with your continued support we'll get there!



STEELHEADERS GUIDELINES FOR CONTINUED GOOD FISHING

In order to insure the health and quality of the Brule River steelhead fishery, we must build a respect for the fish, a strong catch and release ethic, and protect and enhance their natural environment.

Fishermen play the largest role in maintaining a quality fishery (fish greater than 26 inches). In order for a steelhead to reach 26 inches it must make it through at least one spawning run. If a fish is harvested on its first spawning run (15-24 inches) it will never reach trophy size. Taking this a little further, a ten-pound fish must make it through five spawning runs, which was a very difficult task with the liberal bag and season restrictions of the past, as well as the anglers historical harvest-oriented fishing ethics. The recent bag and size restrictions enacted in 1989 may have helped in the improvements seen in the 1990 steelhead run, but by far the **fishermen's voluntary catch and release practice** made the biggest impact.

By practicing catch and release fishing you can significantly help restore and maintain a quality fishery, one which all steelheaders can count on for years to come. Here are a few steps to follow.

- * Do not over fight the fish, especially when water temperatures are warm (above 50 degrees) to avoid additional stress.
- * It is best not to use a net and remove the hook while the fish is still in the water.
- * Cut the line from deeply hooked fish.
- * Wet hands before handling and avoid touching the gills.
- * Do not squeeze the fish too tightly.
- * Juvenile fish (4-10 inches) make up future adult runs; therefore, the juvenile you kill by mishandling will never have a chance to return as a trophy. Some suggestions to help decrease juvenile mortality are listed below.
 - Handle carefully as stated above.
 - If you are fishing in an area with high densities of young fish and you feel you are injuring them, move to another spot or change techniques.
 - By using a larger hook, many small fish can be avoided.
 - Artificial lures such as spinners and the use of spawn can cause high mortalities and should be avoided in areas with high numbers of juveniles.

Today's released steelhead

- could become tomorrow's trophy by allowing it to return again at a larger size.
- helps in contributing to the production of young fish needed to sustain future runs.
- may be caught again thus increasing that year's fishing success.

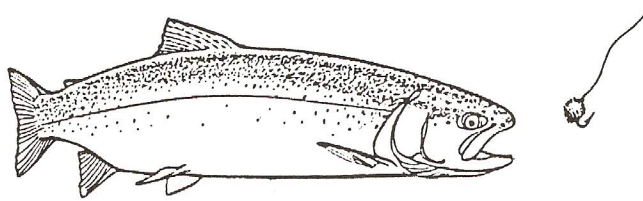
* If you feel you must keep a fish, take a brown trout or a salmon first, or if it has to be a steelhead it is wise to take a large male (greater than 26 inches).

* When you do harvest a steelhead please take special care not to waste it; they are much too valuable.

*** A quote worth thinking about as stated by Rodrick L. Haig Brown:

"The fisherman's enormous advantage in the matter of bag limits is that he can limit his killing without appreciably limiting his sport, and he can also select what he does not kill in a way seldom possible in other sports."

* Don't harvest your limit--limit your season's harvest!



LET'S SET THE RECORD STRAIGHT

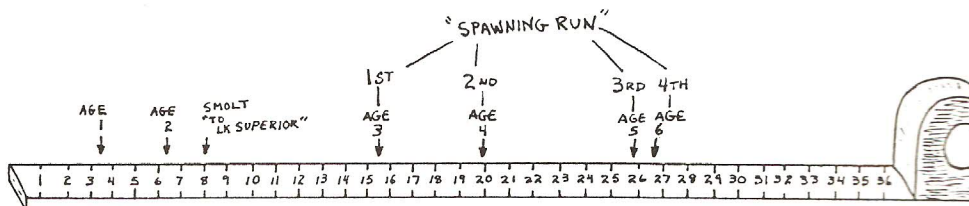
Each year we hear several rumors and bits of misinformation floating around the Brule Valley concerning steelhead. At this time we would like to clear up a few of these.

* **RUMOR:** All jack-size fish (13-18 inches) are males.

FACT: Studies conducted in the past have shown that only 33 percent of all jack-size fish moving up the Brule are actually mature males. The remaining 67 percent is equally divided between immature females and immature males making a false spawning run.

* **RUMOR:** Mature jack males do not grow to large sizes.

FACT: If jacks are not harvested and allowed to make repeated spawning runs they will grow to trophy size (26 inches) in two to three additional years. Their yearly growth potential is shown on the tape measure below:



*** RUMOR: Large fish mysteriously appear occasionally.**

FACT: If nature and more importantly fishermen allow steelhead to survive the rigors involved during the spawning run, the steelhead will return to spawn many times. This year we aged a fish that was returning on its seventh spawning run, as well as many others returning for their fourth and fifth time. This feat was nearly impossible during the high-harvest years.

*** RUMOR: Steelhead will likely die after being released.**

FACT: Studies have shown that fish caught in cold water and not hooked severely will have a high rate of survival (over 90 percent). Tag returns from fish tagged on the Brule have shown several fish were caught more than once during the past fishing season. Two of these fish were actually caught and released twice in the same day.

*** RUMOR: Chinook salmon disrupt steelhead spawning beds.**

FACT: Steelhead spawn in the spring whereas chinook spawn in the fall. The two species do not compete for the same spawning habitat.

*** RUMOR: Coho and Chinook salmon compete with juvenile steelhead.**

FACT: Index sampling conducted on many of the south shore tributaries since the early seventies have shown little or no detrimental effects from coho on steelhead populations. It has been found that coho prefer the slower moving areas of a stream most often occupied by brook trout. It has also been found that during the years when coho production is up, steelhead are also up. Chinook juveniles can be found in the same stream sections as steelhead but because they typically spend only three months in the stream before moving into the lake, it is unlikely much interaction between the two takes place.

*** RUMOR: All steelhead spawn and are produced upstream of U.S. Highway 2.**

FACT: Stream shocking surveys conducted annually on the Brule have shown that the area downstream of highway 2 is extremely important in steelhead production. The area above Highway 2 has been fairly consistent in producing steelhead but it is the lower river which determines a large year class.

*** RUMOR: Steelhead anglers cannot impact the fishery.**

FACT: The steelheader is a very effective angler, especially those of the upper Mid-West (perhaps the best in the country), and can depress future runs. We believe that during the past years when bag limits were extremely liberal, coupled with the year round season, the angler may have caught and removed as much as 60 percent or more of a particular run. It has been documented that 80 percent of a winter steelhead run on a British Columbia stream was removed by the angler. This not only impacts the next year's repeat spawners (large fish in the run), but also natural reproduction by harvesting the fish before it gets the chance to spawn. Even with a bag limit of one, if everyone that caught a steelhead last fall harvested it, 30 percent of the run would be gone. Remember: additional fish mortality will take place on this same run during the upcoming spring. During the 1990 spring creel approximately 42 percent of the total 1989-90 run was caught.

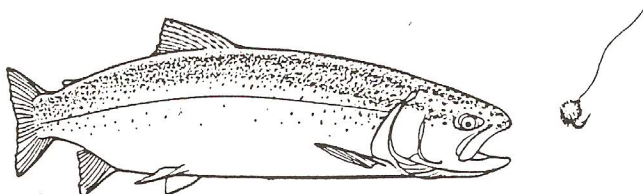
*** RUMOR: The lamprey barrier/fishway stops upstream fish migration and fishing is better below it.**

FACT: Fish run observations at the barrier/fishway have shown that fish movement is dictated by stream conditions. When river conditions are high and dirty, fish have a tendency to move during all times of the day and at increased rates. Whereas during low clear water, fish generally move during low light periods and at reduced rates. When river conditions are low and clear below the barrier, fish move much slower upstream and are vulnerable to the fishermen for a longer period of time. This makes it look like the barrier is stopping fish which is not true. We have also noticed that when a large movement of fish reaches the barrier, they will jump repeatedly at the main barrier face (only during certain water levels). What we believe is happening is that they are searching for a way upstream and move along the wall until they find the entrance of the fishway. Once a run reaches the barrier and begins jumping they are observed going by the window in approximately thirty minutes.

During the past couple of years the Brule River steelheaders have shown they care about the future of steelheading on the Brule. You've supported our fish management programs and have taken it upon yourselves to strive to return to the good fishing once experienced in the late 1970's by becoming release oriented anglers. The number of steelheaders who release their entire catch has risen sharply, and today they represent 50 percent of the people who have wet lines and caught a steelhead on the Brule. The improved fishing we saw this past year was a direct result of this changed attitude.

Although everything may look bright today, we must still realize with the existing regulations a stable steelhead fishery is not guaranteed. The word will spread about the improved fishing resulting in more fishermen and a higher potential harvest. What we have today, which is only a small glimpse of what we can have, may actually decline. We hope the information provided will help you better understand the Brule steelhead, and that it is necessary for us to work together to improve the fishery.

We need you to **continue releasing** a large portion of your seasonal steelhead catch to continue this improvement. Additionally, we would appreciate your continued support for regulations that would protect and guarantee good fishing for years to come.



Written by: Wisconsin Department of Natural Resources - Fisheries Management
Superior, Wisconsin

Funded by: Lake Superior Steelhead Association
Duluth, Minnesota



* **RUMOR: Steelhead spawn in the fall.**

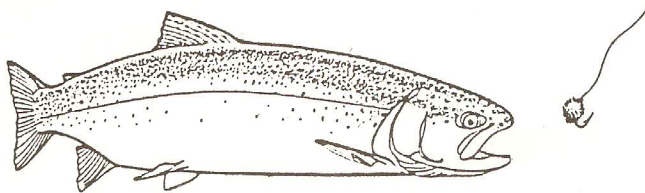
FACT: Years ago fall-spawning steelhead were stocked in the Brule, but there was no documentation of them successfully bringing off a year class, and they likely do not exist today. The fall run does make up the largest portion of the steelhead run (82 percent fall vs. 18 percent spring), but they do not spawn until the following spring.

* **RUMOR: It's wiser to harvest a small steelhead than a large one.**

FACT: We encourage releasing all of your steelhead catch but do realize a selective harvest is biologically acceptable. By selectively harvesting large, older fish over 26 inches (preferably a male), you have insured that all fish have at least spawned once. This insures that enough eggs are laid and that all have been able to pass their genes back into the population.

* **RUMOR: The Brule River Barrier Operator gives out fish run information on a daily basis.**

FACT: Due to the fact that the fish runs are recorded on videotape, it is impossible to keep up reviewing tapes on a daily basis. The barrier operator will answer general questions about fish runs but not daily specifics. Run information is compiled on a weekly basis and is available at the conclusion of each season.



A FEW HELPFUL HINTS FOR THE STEELHEADER

An important step in helping to make steelhead fishing on the Brule enjoyable for you and other anglers is to follow a few ethics:

- * Don't trespass on private property without permission.
- * Don't litter, and pick up what others carelessly leave behind.
- * Know how to identify the trout and salmon species so you can comply with the regulations.
- * Report violations promptly to your local warden or to the D.N.R.'s toll-free poachers hotline 1-800-TIP-WDNR.
- * Don't fish for or disturb fish on the spawning beds.
- * Be considerate towards other fishermen. Never jump ahead of others who have been fishing a run or hole, and ask before you go around them if they are stationary.
- * Camp only in designated campgrounds.
- * Abide by all of the regulations of the Brule River State Forest.