

The Mille Lacs Fish Management Plan:

*Threat to Minnesota's
Premier Walleye Fishery*



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(on behalf of Mille Lacs Lake landowners)

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Background

For decades, Mille Lacs Lake was managed in much the same way as other large Minnesota lakes. The fish population was monitored by test-netting and fishing success with an annual creel survey. Together, these surveys provided the DNR the information it needed to detect changes in fish populations and make appropriate management decisions.

With the advent of treaty management, however, a court-approved allocation system now requires the DNR to assess the walleye population with much more precision. Instead of tracking the “relative” abundance of walleyes through statistics such as number and weight of walleyes per gill net and catch per man-hour of fishing, they are now required to measure the “absolute” abundance by making an annual population estimate. This estimate is then used to establish a “safe harvest level” that will prevent overexploitation of the walleye population.

Once the DNR agreed to a treaty-management system requiring annual population estimates, they were faced with the immense problem of how to make meaningful estimates using the data they had available. So they devised a complex computer model, called the VPA (Virtual Population Analysis) that would generate the number they needed to satisfy their responsibility to the Court.

But even the biologists who devised the VPA have little confidence in its ability to generate an accurate population estimate. The problem is, every piece of information fed into the VPA has a wide margin of error, most of which cannot be accurately measured. So the combined error is unknown, and so is the usefulness of the VPA. The DNR continues to “tune” its model in an attempt to improve its accuracy, but the underlying problem of insufficient or unreliable data cannot be solved anytime soon.

The purpose of this paper is to closely examine the present treaty management system, identify its weaknesses and suggest a common-sense management solution that will not only maintain a healthy walleye population, but also satisfy the Court and protect the interests of sport anglers and Band members.

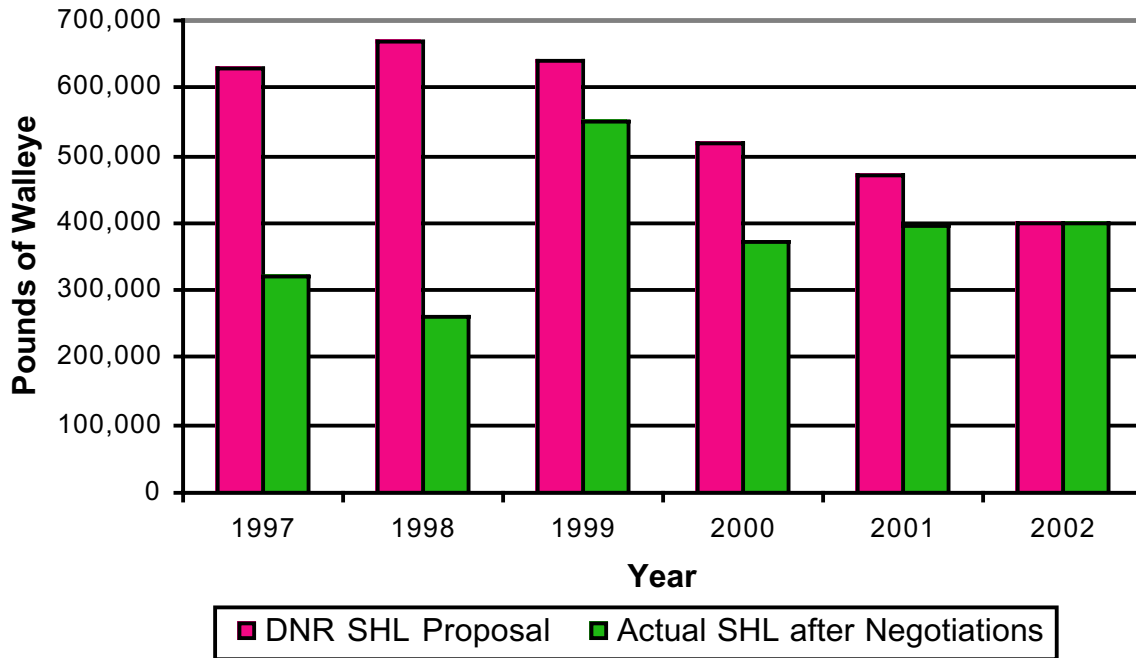
How Treaty Management Works

Once the DNR has completed its annual population estimate, it calculates the safe harvest level (SHL) by multiplying the pounds of catchable walleyes (12 inches or longer) by 24 percent, which is the “exploitation rate” specified in the treaty-management agreement.

But the DNR’s SHL calculation may not be final. In accordance with court-approved “protocol,” DNR biologists debate the numbers with Band biologists at a meeting of the “1837 Treaty Fisheries Technical Committee,” which is held several months before the open-water fishing season. Often, the Bands argue for a SHL considerably lower than the DNR’s proposal, so there must be a compromise. Once there is an agreement on the SHL, the declared Band harvest is then deducted from the SHL to determine the anglers’ quota.

In the early years of treaty management, the DNR made large cuts in the SHL in response to tribal concerns (Figure 1). In 1998, for example, the DNR’s proposed SHL was 670,000 pounds, but the final number after negotiations was only 260,000. Since treaty management began in 1997, the average annual reduction after negotiations has been 172,500 pounds. In response to public criticism for not “standing up for their numbers,” the DNR has taken a firmer stance in recent years so the concessions have not been as great.

Figure 1 - Proposed vs. Actual Safe Harvest Level



However, the DNR's SHL proposals have declined in each of the last five years and are now considerably below the long-term harvest average (Figure 3). With the DNR frequently assuring anglers that the Mille Lacs walleye population remains in good shape, observers are now wondering whether the reductions in SHL proposals are a result of real changes in the walleye population or pressure from the Bands. In 2002, Band biologists did not challenge the DNR's proposed SHL, but the number was only 400,000 pounds, well below the DNR's average SHL proposal of 586,000 pounds in the first five years of treaty management.

Once the SHL is finalized, the DNR uses another model to devise several regulation options that would keep walleye harvest within the quota. Then, the "Mille Lacs Input Group," a panel of citizens with close ties to the lake, meets with the DNR to select the regulation option they like best. Assuming their preference is acceptable to the DNR, that regulation is adopted—at least at the beginning of the season.

But the DNR's model has not proven successful in predicting the coming year's catch. In 2001, for example, DNR biologists proposed five different 4- to 5-inch harvest slots, any of which would have a "less than 10% chance of exceeding the angling quota," which was 290,000 pounds. By the end of May, however, anglers had already caught 174,000 pounds of walleye, and all signs pointed to a harvest that could easily be double the DNR's estimate. The DNR's response was to impose a 16- to 18-inch harvest slot in early June, and the anglers' response was to stay away. Many resorters reported a 50- to 90-percent decline in business after the 2-inch slot was imposed.

Is the Number Valid?

Mille Lacs historian Joe Fellegly describes the DNR's population estimate as, "one of the most important, powerful, controversial, costly and disputed high-impact numbers in the history of applied fisheries science on Minnesota's inland lakes." Fellegly's assessment is based on the fact that "the number" serves as the basis for all regulation decisions. But the validity of the number has been challenged not only by Mille Lacs anglers and business owners, but also by well-respected biologists from inside and outside the DNR.

Dubious Data

One of the biggest concerns is legitimacy of the data used in the models. In some cases, where critical information was missing, the blanks were filled in with what the DNR called "guesstimates." In other cases, the missing data was "simulated," "assumed" or "generated randomly." Sometimes, figures were even imported from studies done on bodies of water in other states. In a candid assessment of VPA results, DNR researcher Paul Radomski noted that the estimates provide guidance in setting the safe harvest level, but cautioned that "different assumptions can produce substantially different results."

Data fed into the population model include gillnetting, creel survey, electrofishing and trawling results. The model also requires accurate aging of walleyes caught by anglers and in sampling gear over a long period of time. Here are some of the specific concerns in data collection and analysis that cast major doubt on the accuracy of the population estimates they generate:

•**Gillnetting.** For more than 25 years, the DNR has sampled walleyes in Mille Lacs using 250-foot "experimental" gill nets, which have five 50-foot sections with different mesh sizes. In most years, 32 sets were made, all within a short distance of shore. The nets have been used to provide managers a measure of *relative* abundance of walleyes and other fish species. In other words, the netting results indicate whether fish populations are increasing or decreasing, but they don't provide an estimate of how many fish are in the population. The original sets may have been adequate for giving managers an idea of population trends, but they were not intended to provide the more accurate information needed to make population estimates.

Nevertheless, that is exactly what the data is being used for—gillnetting results are a major component in the DNR's modeling efforts. But the gillnetting operation has been widely criticized, not only by anglers but also by prominent fisheries scientists. Drs. J.R. Bence and T.J. Quinn, who were hired by the DNR to review their modeling methodology, noted that the gill net sets used in modeling are near shore in shallow water and there are no gill net sets in mid-lake. Consequently, there is no way to know if the data is representative of the entire body of water. Eight deeper sets have been added in recent years, making a total of 40 nets set each fall.

Figure 2 shows the location of the 32 original gill nets and the 8 new ones. Not surprisingly, the new offshore sets have consistently caught more and bigger walleyes than the original near-shore sets—73 percent more by number and 86 percent more by weight. In 2001, for example, the near-shore sets caught an average of 12.88 walleyes while the offshore sets caught 29.71 walleyes. But even though the DNR has this data, it receives practically no "weight" in their models.

In his 2002 report to the Technical Committee, Band consultant R.A. Myers observed that, "In all cases, using this data [the new offshore sets] decreased the estimated fishing mortality and increased the estimates of abundance." DNR biologist, Tom Jones, in his 2002 report to the Technical Committee, concurred with Myers, noting that, "The inconsistency between the

new and original sets may support the concept of a fall migration, and may suggest that the population is higher than appeared based on the original 32 nets.”

Figure 2 —Location of Mille Lacs Gill Net Sets
(1-32=original near-shore sets; 33-40=new offshore sets)



The addition of the 8 new sets clearly provided a more unbiased look at the Mille Lacs walleye population. But as Bence and Quinn point out, “there is a large region of the lake further offshore that is not sampled at all.” In a meeting with the DNR, Bence and Quinn pointed out this shortcoming, but the DNR maintained that the large mid-lake area need not be sampled, because the region is generally “homogeneous and unstructured.” Of course, the mid-lake zone contains most of the famous “mud flats,” which often hold tremendous numbers of walleyes. And surprising numbers of walleyes are also found in the unstructured areas between the flats.

As the gill net map shows, about two-thirds of the lake is not being netted. If it were, it is entirely possible that the mid-lake sets would catch even more walleyes than the new offshore sets. It’s understandable that the DNR wants to preserve their neat data string, but until they distribute their nets to sample the entire lake basin, they will not have a valid population index—or safe harvest level.

The gillnetting results in 2001 show how the near-shore nets, by themselves, can yield biased results. Although the near-shore nets had a lower-than-normal catch, the offshore sets had the highest catch in history. With the unseasonably warm fall, it's possible that the walleyes stayed offshore longer. So what appears to be a population decline could simply be a difference in the seasonal distribution pattern.

Another problem with the gill nets: They do not provide a good sample of large walleyes. Fisheries Director Ron Payer recently acknowledged that the number of big fish presently in the lake can cause inaccuracy in the DNR's population surveys, because "they don't sample as well." For that reason, he conceded that "we might be dealing with an error rate closer to 30 percent than to 10 percent."

•**Trawling.** A trawl is a large windsock-like net that is towed behind a boat. Trawls used by the DNR have small mesh and are intended mainly for sampling small fish like young walleyes and perch as well as other baitfish. Larger fish can easily avoid the trawl by simply swimming out of its way. But trawling results tend to be inconsistent, even for smaller fish, and success is highly dependent on water clarity. The DNR has attempted to factor water clarity into their model, but even then the trawling results are of questionable value. Another concern: Trawling has only been successful on the north end of the lake where the bottom is sandy, so the results may not be representative of the entire lake. According to Bence and Quinn, "It may well be that changes in catchability are so extreme that the trawl time series provides little information regarding abundance."

•**Electrofishing.** Electrofishing is conducted to gather information on the abundance of young-of-the-year (yoy) and 1-year-old walleyes. But electrofishing catch rates depend to a great extent on water temperature, wind direction and wind velocity. The DNR admits that it is unsure if electrofishing is a good predictor of abundance.

•**Creel survey.** While the DNR's creel survey methodology is widely used and accepted, there are many concerns over accuracy of the data. Table 1 shows some of the obvious sources of error in total harvest estimates, practically all of which result in underestimations of the walleye catch. Many of the hooking mortality estimates, for instance, are simply not logical. For the record harvest year of 1992, the hooking loss estimate was much lower than the long-term average. But with many anglers catching easy limits and releasing many more in a day of fishing, the hooking loss should have been much higher than average. Similarly, it's hard to believe that no walleyes over age 5 were released in 1985 and none over 9 in 1993. Another red flag: The DNR did not survey night-fishing before 1998, so they guesstimated night harvest back to 1983.

Each of these sources of error, by itself, may seem trivial. But taken together, they may underestimate total harvest by as much as 20 percent. This is an important consideration in establishing the true historical walleye harvest, a crucial number for making today's management decisions.

Table 1 —Sources of Error in Harvest Estimates

Harvest Components		
Angler Harvest	Hooking Mortality	Band Harvest
Night fishing not surveyed before 1998; used guesstimate.	No hooking mortality rates ever calculated for Mille Lacs; unrealistically low estimates used.	Although there has always been some illegal harvest by Band members, no allowance was made for it in total harvest estimates before 1997, when treaty harvest began.
	Release information relies on angler recollection (number and size of fish).	
	No release estimates were made before 1985 and later pre-treaty release estimates are not believable. For example, the 1985 data shows no releases of walleyes over age 5, and the 1993 data shows none over age 9. And despite the record catch in 1992, the number of releases was more than 50% below average.	
Night catch by ice fishermen has never been surveyed.	No hooking loss estimate ever made for ice fishing despite deep-water swim-bladder problems.	

•**Aging.** Information required in DNR models includes the age of gill net- and angler-caught walleyes, dating back to 1984, as well as the age of walleyes taken by the Bands. Aging walleyes is best done by examining otoliths (small bones in the head). But prior to 1991, the DNR determined age of gill net-caught fish by examining scales and spines, neither of which can be aged with much certainty, especially in older fish. A recent DNR report on Mille Lacs management procedures noted that “errors from reading scales are high (less than 25% accuracy) and biased low past age 5.” Scales and spines are still used for aging angler- and Band-caught fish.

Where aging had not been done, the DNR substituted estimated ages based on length of the fish. But as 1837 Treaty Biologist Rick Bruesewitz pointed out on a recent TV fishing show, “You cannot judge a fish’s age by how long it is.” The futility of this aging method led Bence and Quinn to conclude that the DNR’s estimates of age composition are “biased.”

•**Age Selectivity.** Gill nets and angling methods are age-selective. In other words, the gill net catch and the anglers’ catch do not include numbers of each age class of walleyes in proportion to their numbers in the population. The gill nets used by the DNR do not have a mesh size large enough to get a representative sample of large walleyes. The bigger fish may also be warier of the nets—and anglers’ baits. This means some age classes are not accurately represented in the population estimate. Consultant Myers puts it like this: “Using the data at hand, it is not possible to clearly estimate the absolute abundance [of walleyes] unless strong assumptions are made about the catchability with age of the gill net surveys or the angling.”

The Bence & Quinn Report

In reacting to criticism of its population modeling techniques, the DNR prepared a summary of the review conducted by Bence and Quinn. The summary implied that Bence and Quinn generally approved of their methods. But the original review suggested otherwise, stating bluntly, “We do not particularly like the VPA formulation that was used, or frankly, the VPA approach in general.”

The Bence and Quinn report may have been even more critical had they known that much of the “neat” data they were provided was guesswork. In commenting on the DNR’s set of hooking mortality data dating back to 1985, they said, “To its credit, the Minnesota DNR has conducted hooking mortality studies and calculates total kill by adjusting for hooking mortality.” But the DNR has never conducted hooking-mortality studies on Mille Lacs and did not use the data from hooking mortality studies they conducted elsewhere. Band consultant Myers also recognized the lack of real hooking mortality data, noting that, “This represents the single most important uncertainty in the analysis.”

What Should the Number Be?

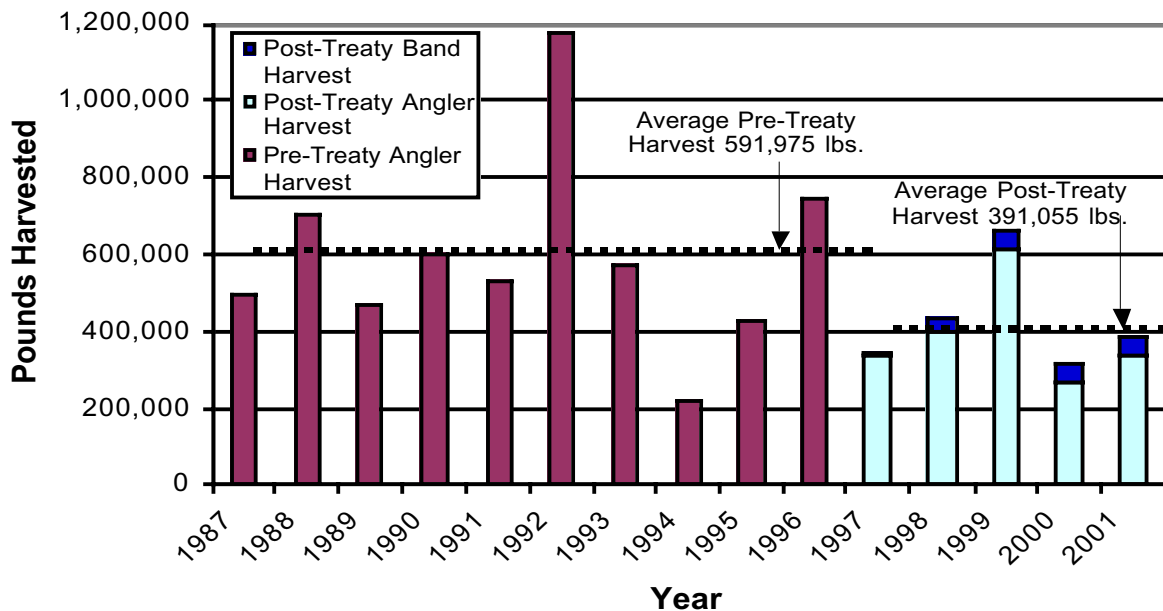
With so much doubt surrounding the computer-generated number, it makes sense to look at a real historic record—what the lake actually produced before treaty management began. The numbers generated from creel and gill net surveys paint a clear picture.

Creel Survey Record

Figure 3 shows that the annual walleye harvest fluctuated from well over 1 million pounds to about 200,000 pounds in the 10-year pre-treaty period from 1987-1996, but averaged 591,975 pounds

Figure 3 - Pre- vs. Post-Treaty Walleye Harvest

(including Post-Treaty Tribal Harvest)



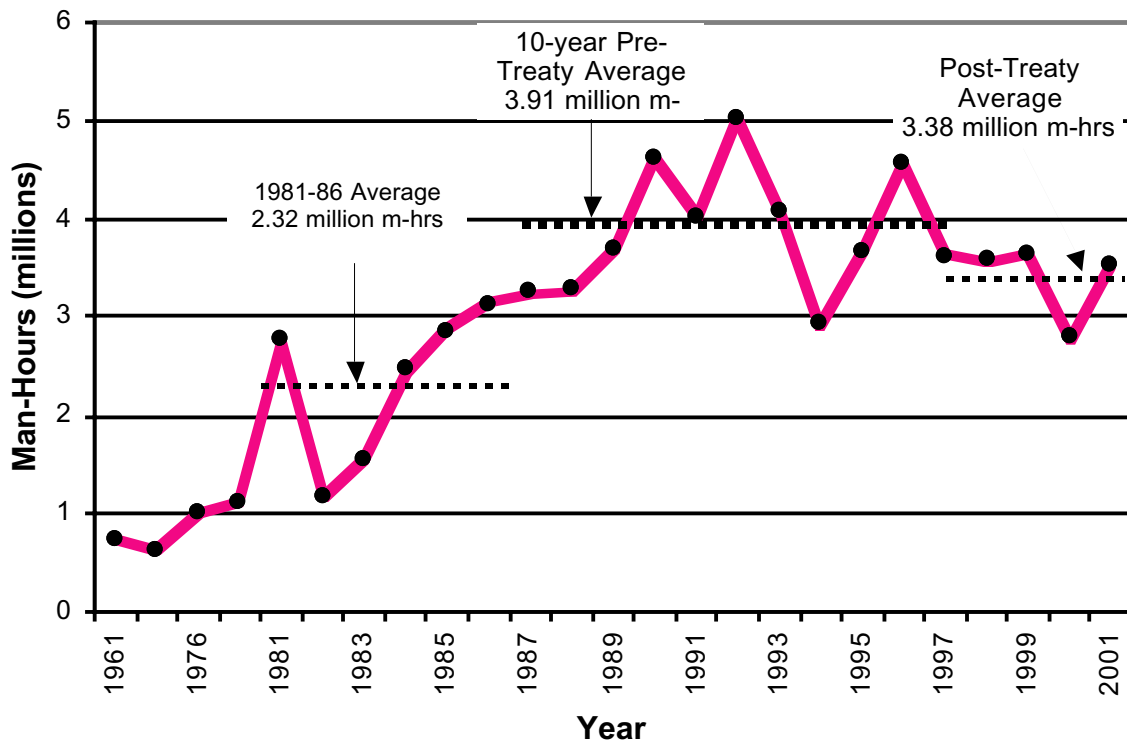
pounds (including hooking loss). This is 200,000 pounds more than the post-treaty average walleye harvest (391,055 pounds) which also includes the Bands' harvest.

The fact that the actual post-treaty harvest is so close to the average post-treaty safe harvest level (395,000 pounds) is indicative of the DNR's efforts to tightly control the harvest to meet treaty goals. But a 34 percent drop in the walleye harvest is not reasonable in light of a relatively stable walleye population.

The pre-treaty average of almost 600,000 pounds was maintained despite a major upturn in fishing pressure beginning in the last half of the 1980s (Figure 4). This is strong evidence that the lake can continue producing at that level in the post-treaty era, particularly with fishing pressure showing a significant decline.

Figure 4 - Pre- vs. Post-Treaty Angling Pressure

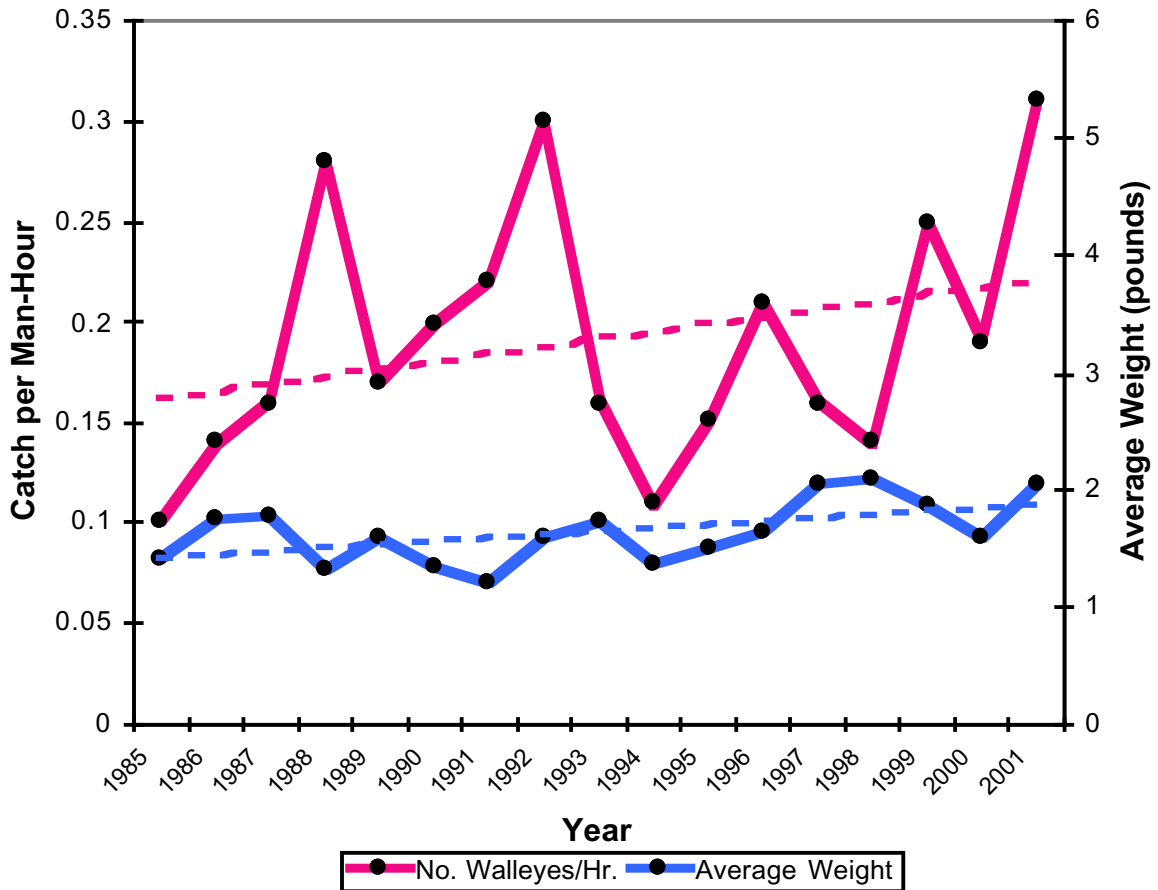
(adjusted for unsurveyed night fishing 1983-1997)



Other creel statistics managers watch closely include the walleye catch rate (number of walleyes caught per man-hour of fishing, including releases) and the average size of walleyes in the catch. These figures can vary dramatically from year to year depending on influences such as weather, food availability and year-class strength, but a multi-year trend of decreasing catch rates or size of fish is usually indicative of a decline in the walleye population.

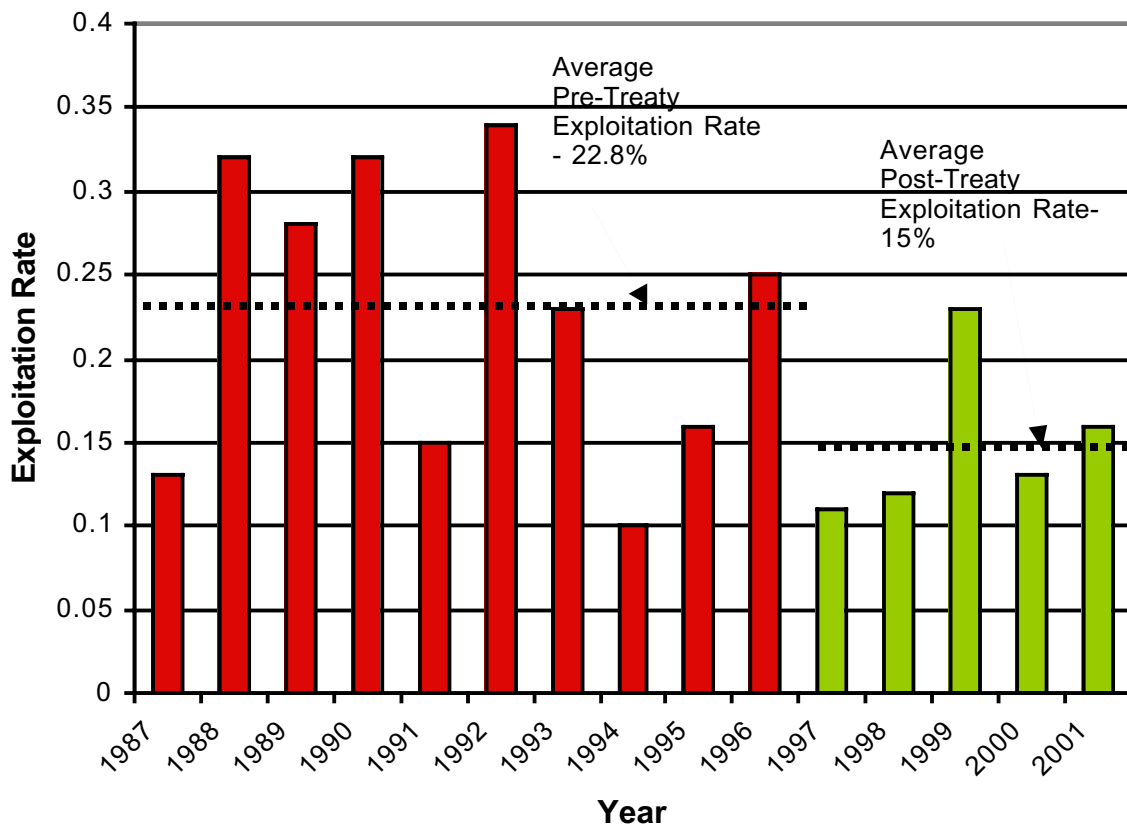
But as Figure 5 shows, there has been no such decline in Mille Lacs. In fact, the dotted trendlines for both catch rate and average size show definite increases. In terms of walleyes kept plus keepable (13-inch+) walleyes released, the 2001 catch rate was the highest on record, including the million-pound-plus harvest year of 1992. And the 2001 walleye average weight of 2.04 pounds was also near a record high.

Figure 5 - Walleye Size and Catch Rate



Changes in the exploitation rate over time provide yet more evidence of the DNR's overly protective regulations. Figure 6, which looks a lot like Figure 3, shows a dramatic decline in the exploitation rate (percentage of the catchable walleyes that are harvested each year, including Band harvest). Although the exploitation rate exceeded 24 percent five times in the 10-year pre-treaty period, it averaged about 23 percent, compared to the post-treaty estimate of only 15 percent. This clearly shows that the lake is not being overharvested and, in fact, is not yielding as many pounds of walleye as it safely could.

Figure 6 - Pre- vs. Post-Treaty Exploitation Rate

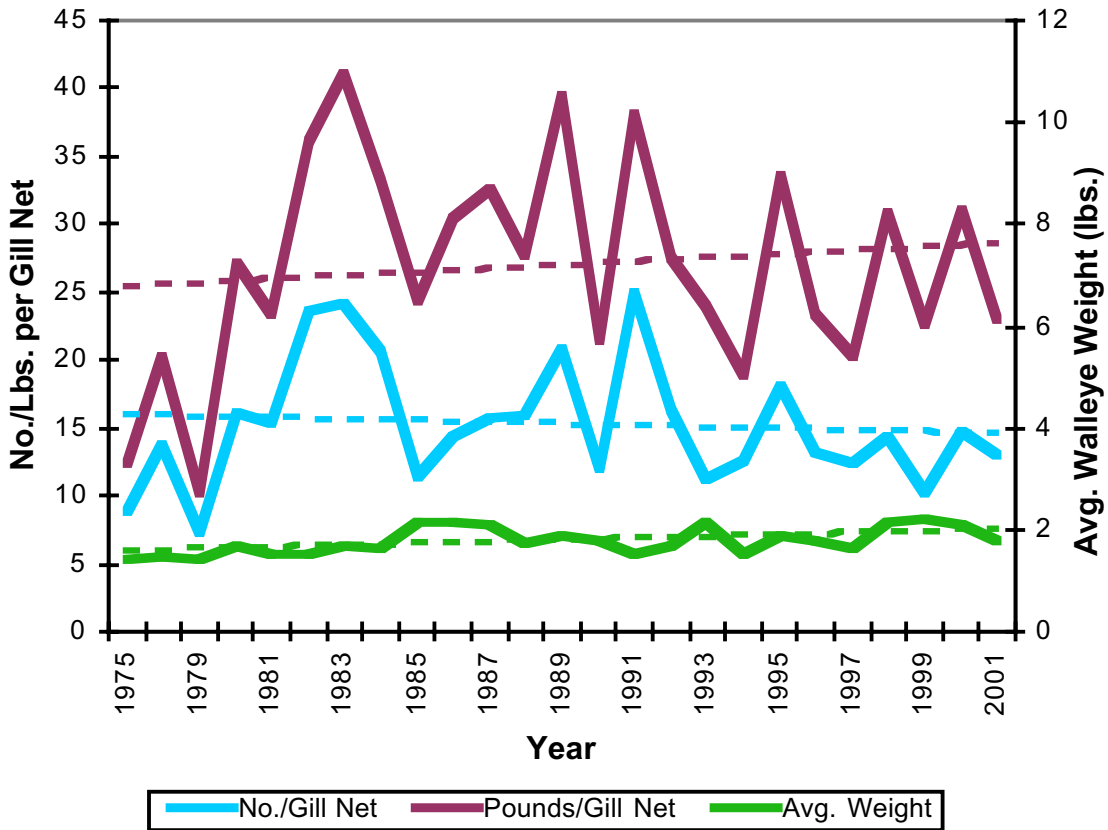


Gill Net Record

Perhaps the most convincing evidence that Mille Lacs can sustain pre-treaty harvest levels is the historic DNR gill net record (Figure 7). The statistics reflect the walleye population trends that have been observed over the last quarter century by biologists and veteran anglers. But despite these ups and downs, the walleye population has remained remarkably stable over the long term. As the dotted trendlines on the graph show, there have been no significant changes in any of the statistics biologists normally monitor. The trendlines show slight increases in pounds of walleye per net and average weight of walleyes in the catch, and a slight decline in number of walleyes per net. But the latter is most likely the result of the recent tight harvest slots (page 15).

Figure 7 - Historic Walleye Gill Net Statistics

(20 nets 1975-82; 32 nets 1983-2001)

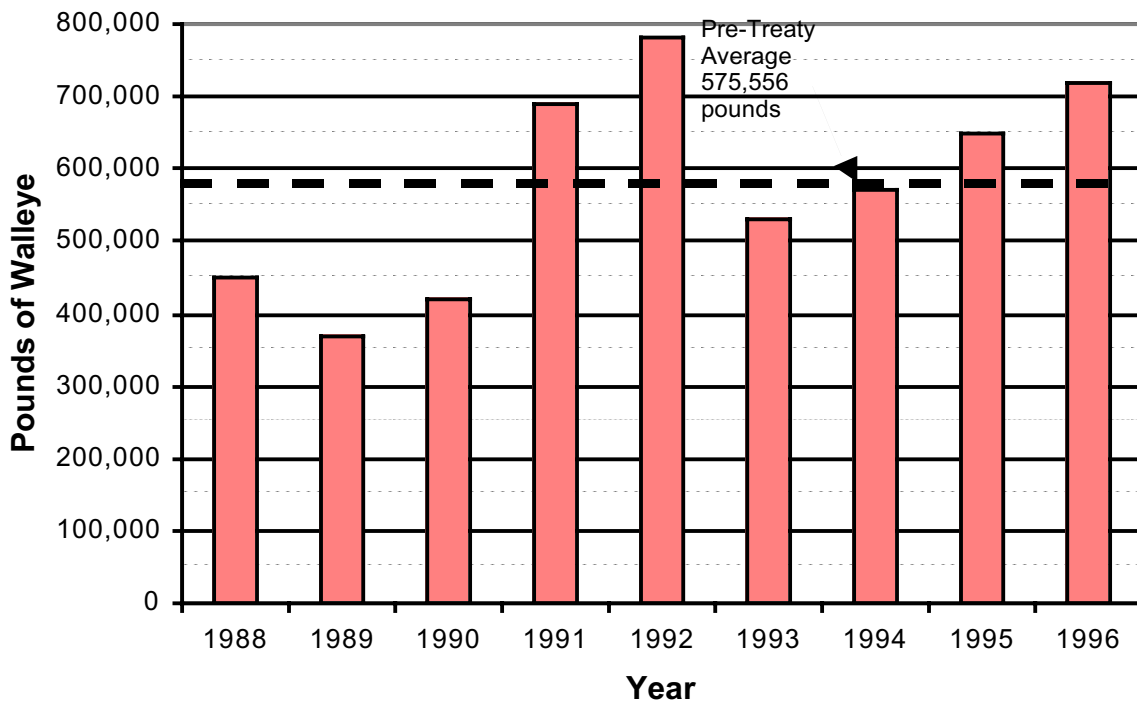


Pre-treaty Safe Harvest Level Calculations

Even though “official” safe harvest levels were not established until treaty management began in 1997, the DNR’s models allow calculation of what the SHL would have been as far back as 1988. Figure 8 shows that the DNR’s pre-treaty SHL estimates averaged 575,556 pounds per year in the 9-year period from 1988-96, 30 percent higher than the 440,000 pounds the DNR now says that Mille Lacs can produce on a sustained basis. Even if the lower post-treaty SHLs (Figure 1) are averaged in, the 15-year SHL average is still 567,333 pounds.

Taking all of this data into consideration, it appears that a reasonable long-term SHL for Mille Lacs Lake is in the 550,000- to 600,000-pound range. In fact, it’s possible that the long-term SHL may be even higher, because regulations like the one-over-20-inch rule imposed in 1985 and the spring night-fishing ban have kept the angling harvest in check. As a result, the upper limit of the lake’s productive capacity has never really been tested.

Figure 8 - Pre-Treaty Safe Harvest Level



What s Wrong with Treaty Management?

Besides keeping the walleye harvest unnecessarily low, the DNR is ignoring the biological consequences of treaty management. Here are the most serious concerns:

Tight Harvest Slots

Slot limits are gaining favor among fisheries managers throughout the country because they make good biological sense. But the slot regulations used in the vast majority of cases are “protected” slots rather than “harvest” slots. Here’s the difference:

Protected Slots. These regulations generally prevent harvest of middle-size fish, but allow harvest of smaller and larger ones. For example, Lac Seul in Ontario has a protected slot of 18 to 21 inches, meaning that anglers can keep all walleyes except for those in that range.

Protected slots have some obvious advantages:

- They “thin out” the abundant smaller fish, increasing their growth rate.
- They protect the middle-size fish, including much of the spawning stock, and ensure a good supply of fish that will grow to larger sizes.
- They allow harvest of some of the big fish that will soon die and might prey on the smaller fish or compete with them for food.

Harvest Slots. Harvest slots are the direct opposite of protected slots. They allow harvest of mid-size fish and protect smaller and larger ones. But they have some serious downsides:

- They may allow small fish to build-up to the point where their growth rate slows.
- They exploit the middle-size fish, including many of the spawners, and make it difficult for anglers to catch “eaters.”
- The build-up of big fish that results is not necessary for good reproduction and may cause a predator-prey imbalance.

As Table 2 shows, a variety of harvest slots were imposed starting in 1999. But even though the Bands did not begin full-scale treaty harvest until 1998, a minimum size limit of 15 inches was added to the one-over-20 rule in 1997, in effect imposing a 15- to 20-inch harvest slot with one fish over 20. Although the specifics have changed from year to year and even within the same season, the regulations are similar in that they have all targeted walleyes in the 14- to 20-inch range with a “one-over” provision. In recent years, however, the one-over length has increased to the point that practically no large fish are being harvested.

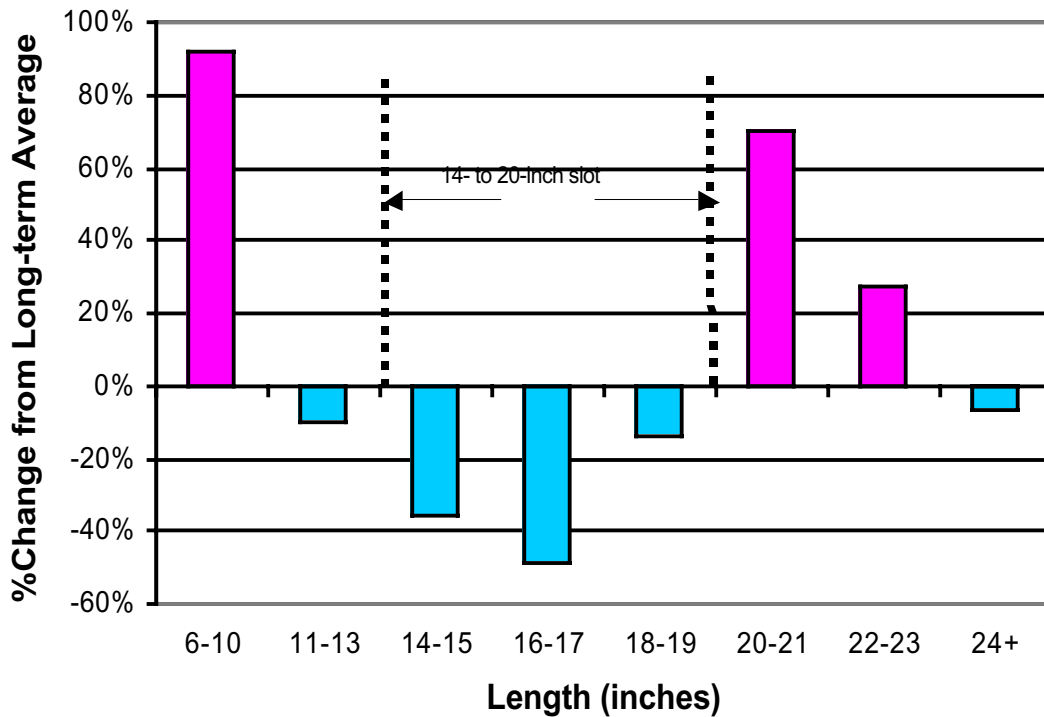
Table 2 —Mille Lacs Length and Bag Limits, 1997-2002

Year	Length Regulation	Bag Limit
1997	15-inch minimum length; one over 20 inches	6
1998	15-inch minimum length; one over 20 inches	6
1999	14- to 20-inch harvest slot; one over 26 inches	6
2000	14- to 18-inch harvest slot; one over 28 inches	6
2001 (thru May 31)	16- to 20-inch harvest slot; one over 28 inches	6
2001 (after May 31)	16- to 18-inch harvest slot; one over 30 inches	6
2002 (winter)	14- to 18-inch harvest slot; one over 28 inches	6
2002 (opener to June 10)	14- to 16-inch harvest slot; one over 28 inches	4
2002 (after June 10)	14- to 17* -inch harvest slot; one over 28 inches	4

*If projections show harvest won t exceed quota; otherwise, 14- to 16-inch slot

The adverse effects of five years of harvest slots on Mille Lacs are evident in the DNR's 2001 gill net survey (Figure 9). Compared to the long-term average, the number of fish in the 14- to 20-inch harvest slot has been greatly reduced while the number of larger and smaller fish has greatly increased. Focusing all the fishing pressure on a two-inch length class, as was done in 2001, accentuates the problem. The 16- to 18-inch slot targeted 16- and 17-

Figure 9 - Size Composition of 2001 Gill Net Catch



nch walleyes, and that size group was down by the greatest amount, about 50 percent. These results are exactly what you would predict from a harvest slot limit.

Compounding the problem caused by tight slots is the fact that tribal gillnetting, because of mesh-size requirements, targets fish of a size similar to that targeted by sport anglers because of the slot limits. The band harvest and the sport harvest consist mainly of 4- to 6-year-old walleyes, most of which are in the 15- to 20-inch length range.

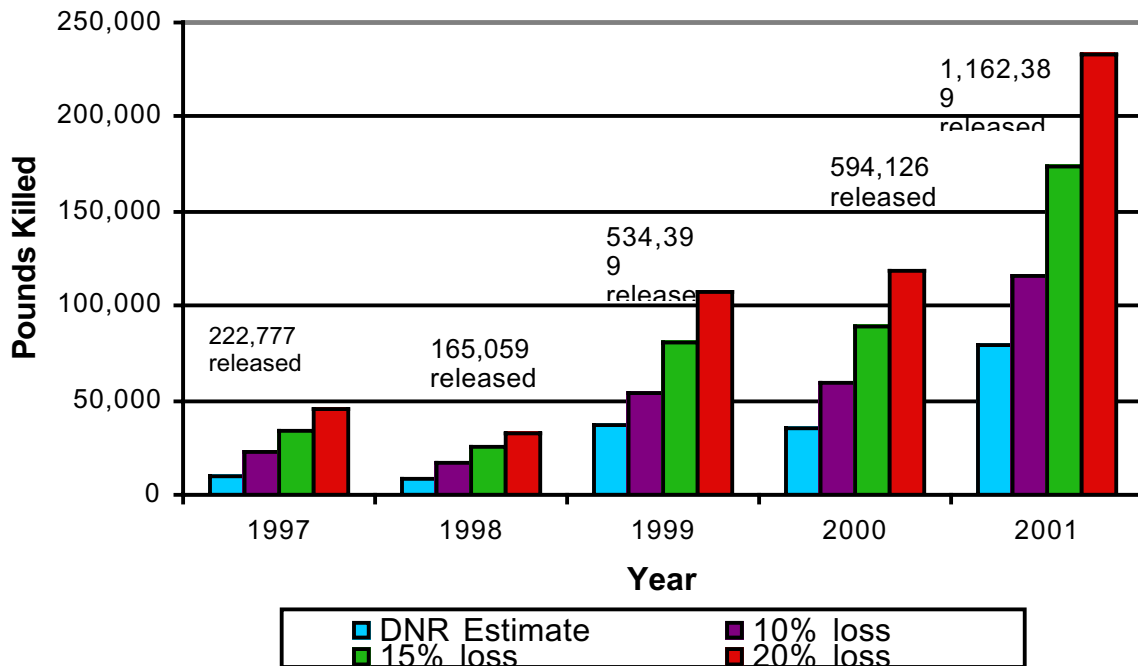
Hooking Loss

The 2-inch slot was imposed in early June of 2001, about the time most walleyes move from the shallows onto deeper mid-lake structure. Fishing was excellent, but with huge numbers of walleyes being released (14 for every one kept), anglers complained of too many dead fish—mostly big ones that had swallowed the hook of a live-bait rig. In an attempt to assess the inevitable hooking loss, the DNR makes an estimate of the number of fish released and then applies a mortality rate estimate to that figure. In the absence of any information from Mille Lacs on hooking loss, they use a 10 percent rate for walleyes under 13 inches and 6 percent for those 13 inches and over. In 2001, that resulted in a hooking loss of 79,143 pounds, almost twice the average annual Band harvest. These fish are counted as part of the angling quota. But many experienced Mille Lacs anglers believe that more than 6 percent of the larger released walleyes die, especially when they're caught on live bait and pulled from deep water

in the heat of summer. Numerous hooking mortality studies confirm that hooking loss is highest under those conditions. In fact, a study of hooking mortality conducted by DNR researchers, including now Fisheries Director Ron Payer, concluded that walleyes caught on leeches in small ponds suffered hooking mortalities ranging from 11 to 23 percent. But the study advised that, “Caution should be used in applying our figures to smaller walleyes or to walleyes caught in water deeper than 5 meters because such fish may be more susceptible to hooking mortality.” On lakes Sharpe and Francis Case in South Dakota, biologists estimate mid-summer hooking loss to be 10 to 20 percent.

Judging from Payer’s study, experience in other states and on-the-water observations, mid-summer hooking mortality on Mille Lacs could easily be double the DNR estimate and may be much higher. Figure 10 shows the post-treaty hooking loss using the DNR’s 6- to 10-percent rate, and what it would be if more realistic rates were applied.

Figure 10 - Post-Treaty Hooking Loss
(at various mortality rates)



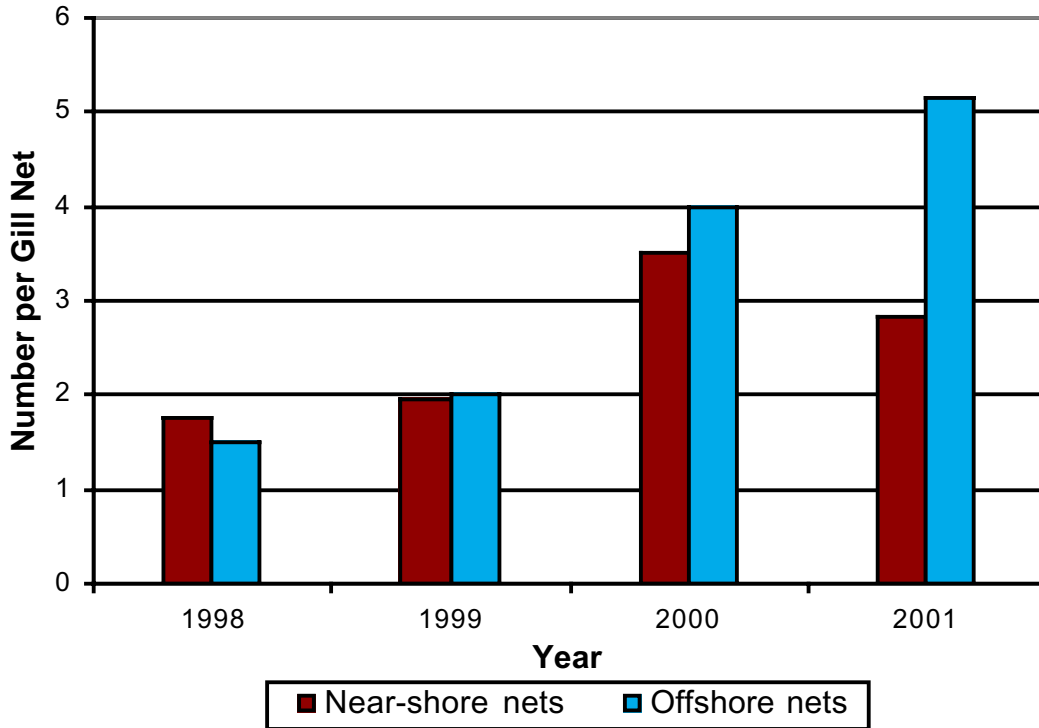
If a 15-percent mortality rate were applied to the 2001 release, for example, the hooking loss would be 174,000 pounds, only slightly below the angling harvest. With that in mind, it’s obvious that some other type of regulation is needed to keep the harvest at an acceptable level and prevent waste of a precious resource. On South Dakota’s lakes Sharpe and Francis Case, the 15-inch minimum size limit is dropped during July and August to “give anglers the opportunity to harvest fish standing a poor chance of surviving if released.”

The likelihood that hooking mortality is considerably higher than DNR estimates makes an important point: Anglers have probably been killing more walleyes than the creel survey shows, yet the population is holding up well. This is yet another indication that the safe harvest level is being set too low. If we can regulate with less hooking loss, the savings could be added to the anglers’ quota.

Are We Setting the Stage for a Crash?

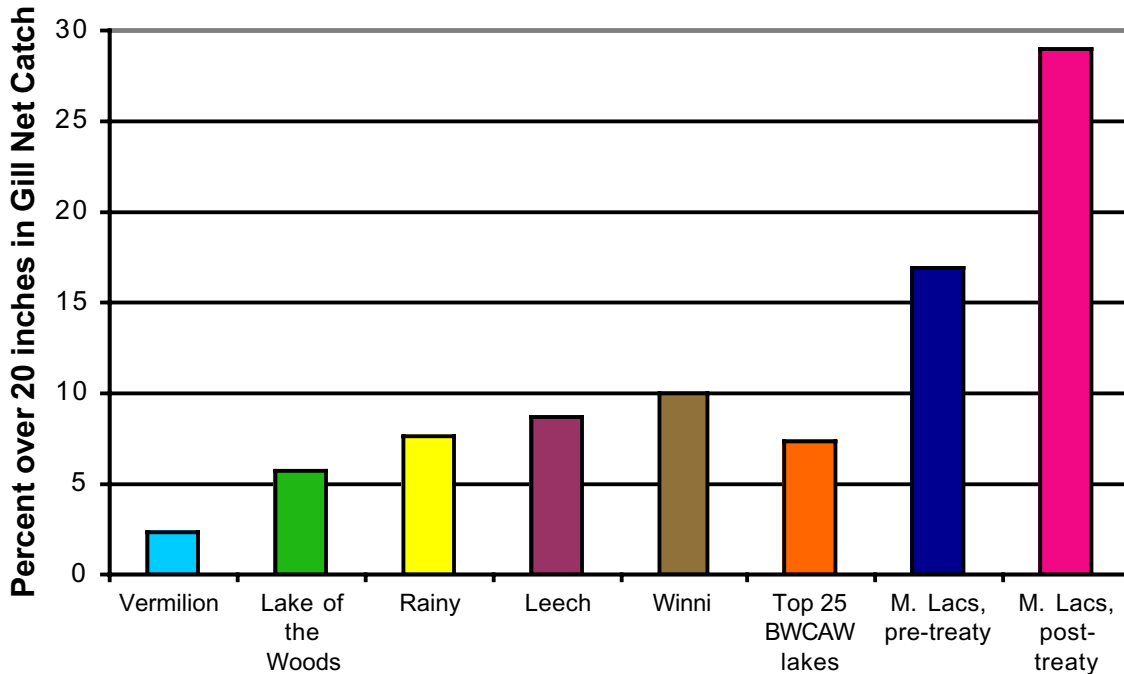
With recent slot limits protecting practically all of the lake's large walleyes, their numbers have increased dramatically since treaty management began. Figure 11 shows the catch of walleyes age 8 and older in all the DNR gill nets (near-shore and offshore).

Figure 11 - Gill Net Catch of Large Walleyes
(8+ years old)



Of even greater importance than the build up in numbers of big walleyes is their increase as a percentage of the total walleye catch in the gill nets. The proportion of 20-inch-plus walleyes has exceeded 30 percent in recent years, an astronomical figure when compared to that in other large walleye lakes. Figure 12 shows that the proportion of large walleyes is much greater in Mille Lacs than in other large Minnesota walleye lakes, and that the proportion has skyrocketed since treaty management began. Of course, the gill net catch underestimates the true percentage of 20-plus inchers in the population, because the nets are not designed to catch large fish. So nobody knows for sure what the real percentage is, but it could easily be in the 40 to 50 percent range.

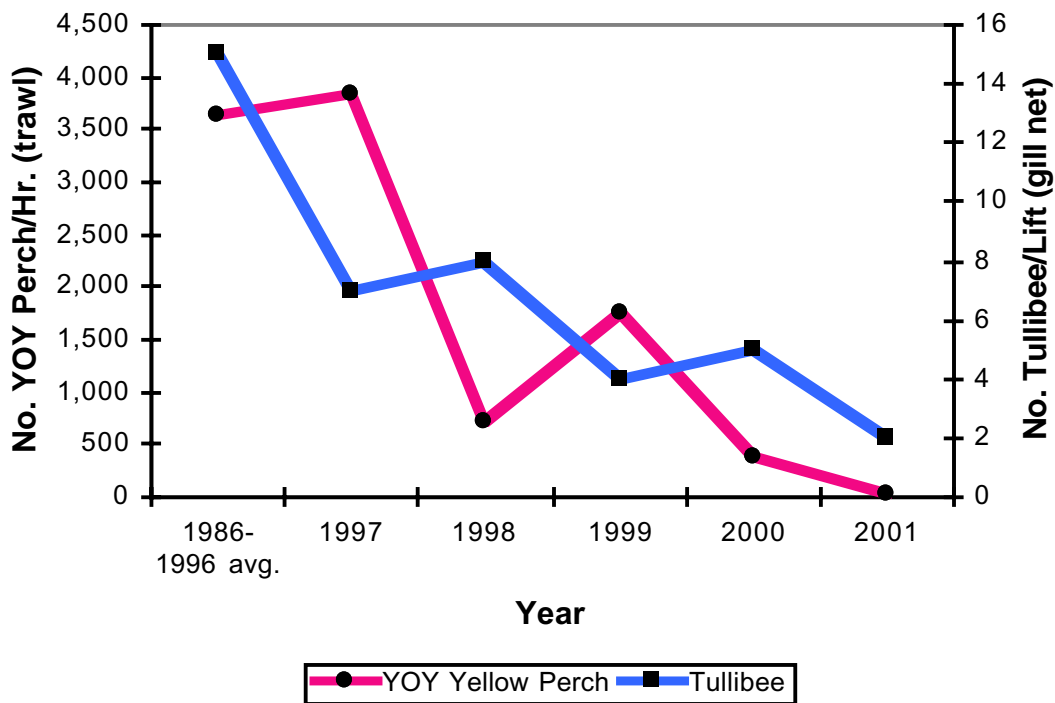
Figure 12 - Proportion of Large Walleyes in Various Minnesota Lakes



In reacting to the big fish build-up, Fisheries Director Payer says that Mille Lacs is “returning to a more natural, unexploited state.” He compares it to lakes in the Boundary Waters that have “a preponderance of large fish.” But statistics from Boundary Waters walleye lakes do not back up Payer’s contention. In the top 25 BWCAW walleye lakes, the average percentage of walleyes over 20 inches in the gill net catch was 7.4 percent.

At first glance, this big-fish buildup may seem like a positive development—anglers are catching more big walleyes than at any time in recent memory, and the big ones are good spawners. But the biological effects of such a high percentage of big walleyes are impossible to predict because a fish population like this would never develop under a normal fisheries-management scenario. Many anglers and some biologists, however, are beginning to wonder if all those big walleyes, along with an abundant crop of large muskies and northern pike, have created what one Mille Lacs resorter recently dubbed, “a giant eating machine.” Figure 13 shows that young-of-the-year yellow perch, the mainstay in the walleyes’ diet, have plunged to historic lows as have tullibee, a favorite of larger walleyes. It’s too early to say for sure that these baitfish declines are a result of the buildup of large walleyes. It could be that the precipitous drop in tullibee numbers is linked to rising lake temperatures. And the plunge in yoy perch may just be part of a natural cycle that will soon turn around. On the other hand, no one is sure the decline is not linked to the big-fish buildup, and there are other warning signs that more problems could lie ahead:

Figure 13 - Change in Baitfish Catch



- Not only is there a scant supply of yoy yellow perch, the 2001 gillnetting found below-average numbers of middle-size perch as well. And even though there were good numbers of larger perch (9 inches or longer), these fish have been scarce during the 2001-2002 ice-fishing season. Could it be that the big walleyes are so desperate for food that they're thinning out the population of adult perch to the point that it's affecting perch spawning success?

- With the plunge in perch and tullibee numbers, walleyes are forced to seek other food sources. But as recent trawl catches show, other common types of small fish are in short supply as well (Table 3). Trout perch, for example, which were once so common on Mille Lacs that they suffered frequent post-spawn die-offs, have virtually disappeared from trawl catches. And other common baitfish, like shiners and log perch, have also shown major declines.

Table 3 —Trawl Catch of Other Small Baitfish

(number caught per hour)

	Pre-Treaty Avg.	1997	1998	1999	2000	2001
Tullibee YOY	14	7	16	8	30	0
Crappie YOY	54	2	3	99	2	0
Sucker YOY	37	0	0	0	0	0
Trout Perch	231	0	0	0	1	0
Log Perch	53	18	0	0	34	3
Minnows	2,112	850	92	221	1,197	238

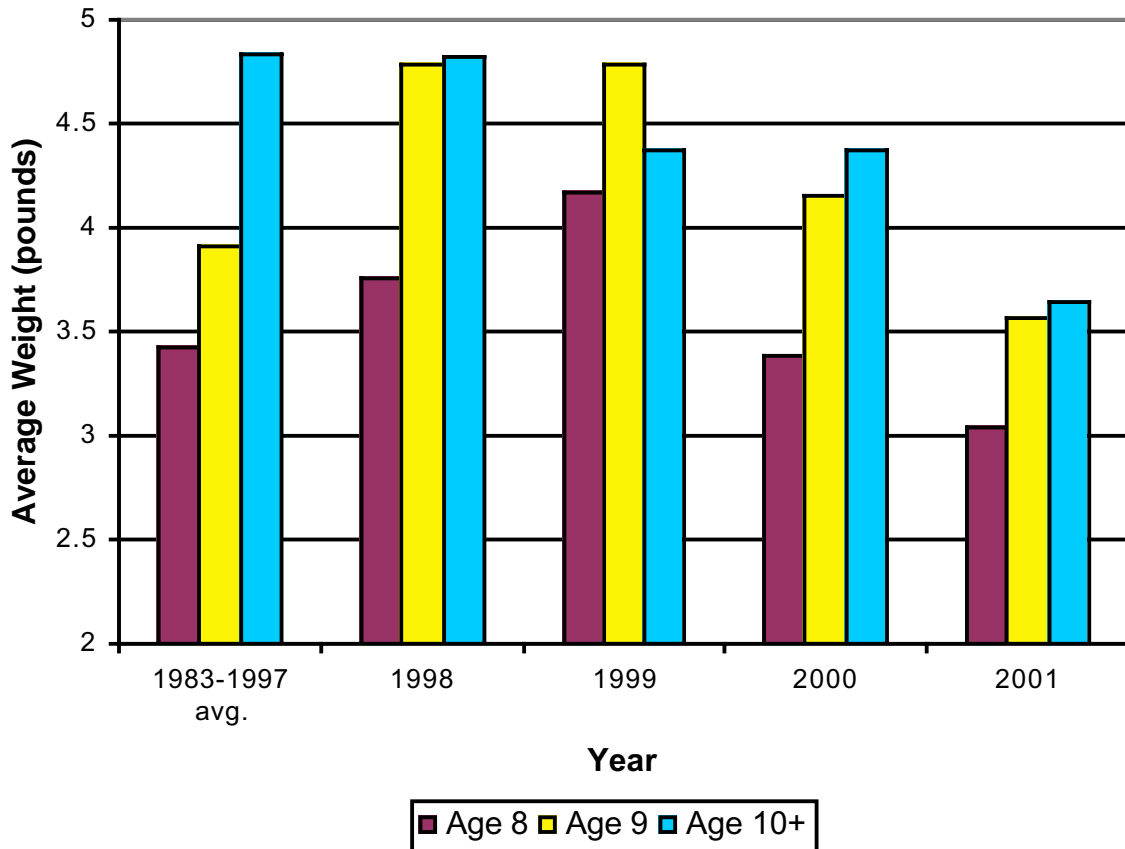
•Biologists and anglers have noted that they’re finding more unusual foods, like crayfish and mayfly wigglers, in walleye stomachs, another confirmation that baitfish are in short supply.

•Gill net catches of burbot (eelpout) have also nose-dived in recent years. The 2001 gill net catch was 88 percent below the historic mean and the 1998-2001 average was 78 percent below the mean. Could it be that, in the absence of perch and tullibees, big walleyes are feeding on small and medium-size burbot? Or maybe the burbot can’t find enough food either. After all, they’re voracious perch eaters too.

•The growth rate and condition (plumpness) of most size classes of walleyes has plummeted in recent years, probably because of declining forage abundance. In his paper, “Evaluation of the Mille Lacs Lake walleye fishery for 2002,” Rick Bruesewitz says, “Overall condition of most sizes of walleye in the 2001 gill net assessment was poor as indicated by their low relative weights [meaning they’re skinny for their length]. Growth was also poor, especially for age 4 to 6 females.” But Bruesewitz’s comments don’t really explain the severity of the problem. The fact is, the condition of all size classes of walleyes, with the exception of 6- to 10-inchers, is the lowest on record. And so is the growth rate of 4- to 6-year-old females.

As Figure 14 shows, there has been a serious decline in the weight of large walleyes at a given age. In 1998 and 1999, for example, 9-year-old walleyes taken in the gill nets averaged 4.78 pounds. But by 2001, the average had dropped to 3.57 pounds, a decrease of 25 percent. Consultant Myers expressed concern over the weight change, referring to it as “a dramatic and unexpected decline.” Myers also noted that, “This decline would result in a decreased quota, even if the numbers [of walleyes in the lake] remained exactly the same.”

Figure 14 - Weight Decline in Large Walleyes



Could all of these developments be happening independently? It’s not out of the question, but it seems highly unlikely. Considering the DNR’s inability to accurately sample large walleyes or, for that matter, any large predator fish, it’s entirely possible that the total weight of predators in the lake is at an all-time high, which would explain the lack of forage. If the forage problem persists, there surely will be problems. The bigger walleyes won’t starve, but if their condition continues to deteriorate, their natural mortality rate will increase as their hardiness and resistance to disease decreases, and their egg production will decline.

Another big concern is the well being of the smaller walleyes, including what appears to be a very strong 2001 year class. These fish have no choice but to feed on yoy perch and other small forage species, all of which are in short supply. And the big walleyes will undoubtedly feed on the small walleyes. Let’s hope for a good perch hatch in 2002.

Not a Unique Problem

The predator-prey ratio can reach an imbalance in any body of water, for a variety of reasons. The problem will usually correct itself within a year or two but, if it doesn't and the health of the fishery is at risk, fisheries managers may take drastic action. Here's how South Dakota managers recently dealt with a severe baitfish decline in Lake Oahe: When the smelt population crashed a few years ago, the growth rate of walleyes slowed considerably and anglers were complaining about skinny fish. In an effort to reduce predation, bring back the baitfish and improve walleye growth, South Dakota raised the walleye limit from 4 a day and 8 in possession in 2000 to 14 a day and 42 in possession in 2001. That resulted in a 185 percent increase in the 2001 walleye harvest which biologists believe has improved the predator-prey balance, at least in some parts of the lake.

But the Minnesota DNR won't consider any regulation that would help relieve the big-fish build-up, because the extra weight may push harvest over the treaty-management quota. Instead, they have recently recommended a continuation of narrow harvest slots that will keep protecting the big walleyes for up to three more years while targeting 14- to 16-inch fish, a size class that is already down 36 percent from the long-term average.

A Common-Sense Approach

Not only has treaty management created the problems now facing Mille Lacs, the problems are self-perpetuating and could become worse. For example, if the number of large predators continues to increase, baitfish levels may plunge even more, resulting in an even-better "bite" that will fill the quota more quickly. Under treaty management, the only way the DNR can stay within the quota is to further tighten the slot, thus aggravating the very problems that need to be solved. Treaty management also discourages anglers from coming to Mille Lacs, creating a serious economic hardship for those whose livelihood depends on the Mille Lacs fishery.

The present treaty management system is a failure because of its reliance on an untested computer model that routinely sets harvest quotas far below historic averages and is unable to make even a "ball-park" estimate of what anglers will catch in the coming year. As Star-Tribune outdoor writer Dennis Anderson put it in a recent column, "DNR is trying to Predict the Unpredictable."

But if the DNR's models are not reliable, what information should they use as a basis for management decisions? And what steps should they take to minimize the previously stated problems? Here are some common-sense proposals:

Back to the Basics

With so much riding on their management decisions, the DNR should not have to rely on unproven computer models but rather should be permitted to use traditional management tools that have worked well in the past. That means assessing fish populations using gill net and creel surveys, just as they do on most other important walleye waters. But the gill net survey should be improved to provide a more dependable index of abundance. And past creel survey records should be updated to reflect all types of angler catch as well as hooking loss. Otherwise, those records do not offer a fair comparison with today's figures, which include those items. In time, the DNR may develop better assessment tools, and they should be incorporated into the management program. But for now, the traditional tools provide the best information.

Better Gill Net Survey. The DNR's best measure of the Mille Lacs walleye population is the long-term gillnetting record. But gillnetting would be an even better assessment tool if the

nets sampled the entire lake basin, including the mud flats. This way, unusual seasonal movement patterns of walleyes would not have as much impact on net catches, and the nets would give managers a more accurate representation of the true size composition of the population. Also, if an additional section of larger mesh were added to the nets, they would provide a better big-fish index. These changes would lead to more realistic quotas.

There is good reason to preserve the long-term data string that the original 32 nets provide. Even if new net sets or mesh sizes are added, the data string can be preserved simply by calculating a separate index for the original net sets and mesh sizes. But as time goes on, the gill net index should gradually be revised to reflect the more accurate information gained from the additional deepwater sets.

Better Creel Survey Record. The DNR creel survey provides information on fishing pressure, fishing success rates and total harvest. When combined with the gillnetting results, the creel statistics give the fisheries manager a strong historical record that can be used for measuring change and making management decisions.

But the DNR's creel survey records have always underestimated the actual walleye catch, and those low estimates are being used as a justification for low post-treaty harvest quotas. For example, the DNR maintains that the long-term (20+ year) average walleye harvest is about 440,000 pounds, so the current safe harvest level of 400,000 is reasonable. But this number is not corrected for the errors in Table 2, and it includes harvest data from the early 1980s that DNR creel reports refer to as "underestimates." In addition, creel counts from the early 80s do not reflect the lake's productive capacity, because fishing pressure was only about half the level of the late 80s and early 90s.

Mille Lacs produced an average of nearly 600,000 pounds of walleye per year for the 10-year pre-treaty period (Figure 3). This number includes conservative estimates for the night fishing catch and hooking loss, neither of which were reflected in the DNR's 440,000-pound average. This suggests that the DNR could safely add 100,000 to 150,000 pounds to its recent safe harvest levels.

The biggest shortcoming of the current creel survey is its failure to accurately measure hooking loss. If the true hooking loss were known, managers might opt for much different types of regulations.

A New Management Plan

The DNR should explain to the court that it erred in agreeing to a management plan that requires them to estimate the number of walleyes in Mille Lacs Lake. Then it should suggest a new plan based on a more traditional approach. Here are the critical components:

- Instead of setting a precise angling quota derived from a fictitious population estimate, recommend an approximate harvest guideline based on historic creel-census numbers (adjusted for all types of angling kill). Taking into account a Band harvest of 100,000 pounds, the guideline should be in the 400,000- to 450,000-pound range.
- Establish a regulation that in most years would keep harvest below the guideline while reducing the focus on a narrow size range, allowing some harvest of 20-inch-plus fish and minimizing hooking mortality. One possible example: A 2- to 3-inch harvest slot until the night opener, then a 3-inch protected slot for the remainder of the season, both with one over 20 or 21 inches. This type of regulation should keep angler harvest around the 400,000-pound mark and spread the catch over a wider size range while helping to thin out the big walleyes. And even though the tight harvest

slot in early season will result in a large number of releases, hooking loss should be minimal because of the cool water temperatures. Later, when the fish go deeper and water temperatures are higher, the 3-inch protected slot will require much less release.

- Set length limits that will help keep the population in balance. If there is a shortage of 16- to 18-inchers, for instance, it makes no biological sense to impose a harvest slot that targets those fish while prohibiting harvest of an over-abundant size class. The input group should have the chance to choose from several DNR proposals, but not to pick a slot that ignores population balance.

- Regulations should stand as long as they make biological sense. But the guideline should not be the sole basis for evaluating regulations. A one-year spike in the catch, for example, is a natural occurrence and should not trigger a regulation change. Even if the catch is slightly above the guideline after three years, a change may not be necessary unless the gill net index shows an obvious downward trend. If the nets show a serious population imbalance, however, length limits should be adjusted accordingly. The main concerns should be the overall health of the walleye population and the predator-prey balance rather than strict adherence to a computer-generated quota.

- If harvest reductions are necessary to preserve the health of the fishery, those cutbacks should be borne by both the State and the Bands. Under the present allocation system, only the State's quota is reduced.

Other Conservation Measures

Because slot limits have become such an important component of the Mille Lacs management plan, the DNR should do everything possible to reduce hooking mortality. Here are some suggestions:

- Avoid tight slots during warmwater periods.** In 2001, for example, the season started with a 16- to 20-inch harvest slot, but the slot was narrowed to 16 to 18 inches in early June, just when the water was starting to warm and most of the fish were moving deeper. With 14 walleyes being released for every one kept, hooking loss skyrocketed and many of the fish that the tight slot was supposed to save were wasted.

- Require barbless hooks.** In an effort to reduce hooking loss, the entire province of Manitoba went "barbless" in 1990. Manitoba Fisheries Program Manager Carl Wall believes barbless hooks will definitely reduce hooking loss, especially in summer. "Barbless hooks are going to help," he said, "there's no doubt. You'll see studies that show they don't, but what the studies don't take into account is the long-term effects of stress. Fish will usually survive a wound, but if you keep them out of the water too long, they won't make it. With barbless hooks, you can get them back in the water much faster." Wall also points out that barbless hooks send a message that gets anglers thinking about conservation.

- Ban "sorting."** Let's say an angler catches several walleyes and holds them in his live well or, worse yet, on a stringer. He continues fishing and, over the next few hours, replaces one or more of those fish with larger ones. Even though that practice is legal under Minnesota law, the released fish may not survive, especially if the water is warm. A ban on sorting would prevent wasting those fish.

- Distribute a catch-and-release guide for anglers.** With slot limits becoming more and more common, the DNR should make every effort to educate anglers on proper procedures for landing, handling and releasing fish. The guides should be available at license providers not only on Mille Lacs, but throughout the entire state.

Summary

Mille Lacs Lake is a world-class walleye “factory” with a walleye population that has proven to be remarkably resilient. Prior to the treaty-management era, the fishery held up well despite increasing fishing pressure, better boats, improved fishing tackle and precision electronics that enable even novice anglers to locate fish and unerringly return to the spot.

Every statistic the DNR normally uses for monitoring a fishery shows that the Mille Lacs walleye population remains strong, and that viewpoint is frequently expressed by DNR officials. When asked for his assessment of the Mille Lacs walleye fishery in an August 2001 Star-Tribune interview, Fisheries Director Payer said, “It’s in very good condition, generally, and the spawning biomass is in very good condition.” DNR researcher Paul Radomski echoed those sentiments in his 2002 Report to the 1837 Treaty Fisheries Technical Committee. “Viewing the complete DNR experimental gill net time series beginning in 1972 suggests that the population appears quite healthy,” he advised.

But in spite of the DNR’s upbeat evaluation, which is based on time-proven assessment methods, the agency has elected to impose deep harvest cuts based on the inaccurate information generated from an untested computer model. The kind of severe restrictions now in effect on Mille Lacs would normally be found only in a fishery that is in serious trouble.

Under the tight constraints of treaty management, the DNR’s main concern is keeping walleye harvest within the quota. But in doing so, it is ignoring the issue of population imbalance, which poses a far more significant threat to the fishery than a quota infraction. If the DNR cannot regain the management flexibility it needs to restore the predator-prey balance, the walleye population may collapse and require years to rebuild.

Unless there is a dramatic increase in fishing pressure or a deterioration of environmental conditions, Mille Lacs Lake should be able to produce walleyes at the pre-treaty level for years to come. Therefore, the DNR should submit a new management plan to the Court that enables them to increase the total walleye harvest to historic levels, which will not only help restore population balance, but also improve the health of the Mille Lacs sportfishing economy.

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