

The Sea Lamprey Invasion and the Decline of Lake Trout In Lake Michigan

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In the definitive history on Great Lakes fisheries, *Fishing the Great Lakes*, Margaret Bogue lists the problems inherent in the fishing industry as it moved into the mid-twentieth century. "Too many people, too many fishermen, too many changes in the marine habitat, too many technical refinements in ways of fishing, not enough public concern, and not enough knowledge about how to protect and conserve the resource spelled decline."¹

Throughout her history, Bogue observes how these factors, particularly over-fishing, caused the downfall of three of the four major species fished on a large commercial scale in Lake Michigan—sturgeon, herring, and whitefish. Lake trout, the fourth of the main commercial species, proved more resilient to over-harvest. Of the four fishes, its populations remained closest to their original size in the Great Lakes. Despite the pressures affecting other species, the lake trout was faring relatively well. Bogue ends her story in 1933, though, before the lake trout's numbers truly started to decline. It would require a strong catalyst to spell the end for Lake Michigan lake trout fishing.

Three years following the conclusion of Bogue's history, an ecological disaster provided such a catalyst—the sea lamprey invasion. The invasion itself originated from indifference by shipping companies and the federal government to the construction of the Welland canal. However, in the coming decades, the effects of this invasion could have been limited if not for government inaction on both the state and federal levels, coupled with over-fishing by Wisconsin fishermen.

This disaster originated with the increasing prevalence of exotic species in Wisconsin state fisheries. Chief among these was the sea lamprey (*Petromyzon marinus*), a parasitic species introduced into Lake Michigan in 1936 which had already made an impact in Lakes Huron and Erie. Bogue notes the importance of this invasion in her history, concluding her text with a dark vision of things that followed, but lacks any in-depth analysis of these events. After 1936, sea lampreys were wiping out thousands of fish per year, yet little preventative action could be taken by the small Wisconsin Conservation Commission. Despite recognition by both commercial and sport fisherman of the devastating impact these parasites were having on the fish stocks, state and federal agencies felt little immediate pressure from either group or the public at large to act. As a result of this indifference from the public, the fishing industry, and the government, virtually no significant action to curb the invasion occurred until the lake trout had already reached its decline.

For tens of thousands of years, the Great Lakes ecosystem had been an isolated freshwater environment. The St. Lawrence River connected Lake Ontario to the Atlantic Ocean, but land

¹ Margaret Bogue. *Fishing the Great Lakes: An Environmental History, 1783-1933*. (Madison, WI: University of Wisconsin Press, 2000), 321.

separated the remaining four lakes completely from the Eastern Seaboard. In Lake Michigan, this isolation allowed for an explosive speciation that made the lake and connected waterways among the most diverse at its longitude in the world. Hundreds of species of salmon, trout, pikes, and other game fish were abundant throughout the Wisconsin region.

Not surprisingly, therefore, the earliest settlers in Wisconsin established dwellings in locations along the shore of Lake Michigan and took advantage of these massive fish stocks. Lake Michigan proved vital in the development of Wisconsin communities, most notably Milwaukee, which, like its southern neighbor, Chicago, used the Lake for transportation as well as food. In the late 19th century, Wisconsin's fisheries thus developed into an important commercial enterprise for the state.

To deal with this expanding industry, fishing regulation expanded on a state and federal level. Unfortunately, problems in this regulation became a recurring theme in the history of Great Lakes fishing. Conflicts over regulation extend as far back as the eighteenth century. Historically, states have been the primary regulators, in accordance with their interpretation with the tenth amendment. For Lake Michigan, this meant that four different state governments established four different sets of regulations. However, because Wisconsin also shares Lake Superior with Canada, both federal and international policy-makers have also come into play. Throughout the history of the Great Lakes, coordination between these different interests was frequently discussed but always pushed aside. Unfortunately, only after lake trout numbers had reached frightening lows did coordination actually occur. The lack of governmental regulation in the preceding decades had a devastating impact on many Wisconsin fish stocks and fisheries.

At the time of the invasion, lake trout was the primary fish stock of both Lakes Michigan and Superior; the sea lamprey, however, would change all of that. By the early 1940s, lake trout catches had fallen to only a small percentage of their previous numbers, from 11 million to less than 200,000 lbs catch per year.² Most fishermen considered the lake trout fishing industry dead only eleven years after the sea lamprey had first found its way into Lake Michigan. In a similar manner, Lake Superior would also experience a decline in the years following its own introduction to the sea lamprey in 1946.³

This rapid proliferation is relatively surprising, particularly considering that sea lampreys are adapted to saltwater environments. They are cartilaginous fishes, classified as cyclostomes, lacking both jaws and parallel appendages, and are among the most primitive vertebrates still in existence. Although primitive in an evolutionary sense, however, they are nonetheless very successful at what they do. They are blood-sucking ectoparasites that also may feast upon the scales and fins of their fish prey.⁴ Once they entered the Great Lakes, they underwent a "veritable population explosion", attributed by scientists to a combination of factors, including "the abundance of suitable host fishes, the relative absence of predators and the existence in the Lakes' watersheds of ideal conditions for successful spawning and for the maintenance of their larval stages."⁵

² Warren Downs. *The Sea Lamprey: Invader of the Great Lakes*, The Great Lakes Alien Series No. 1. (Madison, WI: University of Wisconsin Sea Grant Institute, 1982), 3.

³ Michael J. Hansen. "Lake Trout in the Great Lakes: Basinwide Stock Collapse and Binational Restoration". In *Great Lakes Fisheries Policy and Management: A Binational Perspective*. (East Lansing, MI: Michigan State UP, 1999), 429.

⁴ M.W. Hardisty. *Biology of the Cyclostomes*. (London: Chapman and Hall, 1979), 61.

⁵ Hardisty, p.62.

Of the commercially fished species, lake trout has been the most susceptible to parasitism from the sea lamprey due to their much thinner scales than other salmonid species. One fisherman observed that the lake trout was "easy prey [with] smooth skin. Whitefish was harder to hit [because] they've heavy scales. Herring [are not as susceptible because of the lamprey's] instinct, [lamprey being attracted to] darker [fishes with] more blood."⁶ This greater vulnerability ultimately resulted in the near eradication of the lake trout altogether in the late 1940s. This boded particularly poorly for Wisconsin fishermen whose industry depended so heavily on lake trout stocks. Only later would other species fall victim in large numbers to the sea lamprey.

The initial infiltration of the sea lamprey into the Great Lakes resulted from migration through the Welland Canal. Although the canal was constructed in 1829, it was almost a hundred years later when the sea lamprey finally arrived in Lake Erie (most likely due to renovations of the canal in 1919). In the twenties, the lamprey then passed across Lake Erie, entering into Lake Huron through the St. Clair River bordering western Michigan in 1932. From there it was only a matter of time before it made its way to its final destinations in Lake Michigan and Lake Superior. This migration, therefore, was by no means instantaneous. It occurred over two decades—ample time, aquatic ecologists have argued, for the government to have developed a strategy to deal with these pests.

Despite this extended period, little action was taken by any states bordering the Great Lakes to develop a response to the imminent threat. Although regulations regarding mesh size and total allowable catch had been in place in all four states since the 19th century, there was no immediate effort to strengthen these restrictions. Finally, by the mid-1940s, Michigan began taking steps towards greater regulation of lake trout catches, followed soon after by increased regulation in Wisconsin and Canada.⁷ The question ecologists have asked, though, is why did the interested governments not decide to step in and take any action before this could happen?

As has occurred repeatedly in the history of Wisconsin, commercial greed resulted in an ecological disaster. Just as the lumber industry devastated Northern Wisconsin old-growth forests and agriculture eliminated the southern prairies, so too did the shipping industry and commercial fishing ultimately decimate Wisconsin fisheries. It was the shipping industry that opened the floodgates, but it was over-fishing by commercial fisherman that put the final nail in the coffin of the lake trout. Government officials failed to respond to the imminent threat because there was a commercial interest involved with influence much greater than the state commissions that had been established to protect these resources. In the nineteenth century, the two canals offered a means of transportation to the rapidly expanding Western territories. The growing populations created an increased demand for food that fishing could provide. Fish is a healthy, popular source of food in the Midwest, particularly in Wisconsin. The Friday night fish fry has become a cultural tradition integrated with the religious custom of not eating meat on Fridays that has often utilized Wisconsin fish stocks. An ecologist's cries for conservation fell deaf on the ears of a government concerned primarily with the economy.

Unfortunately, demand for food, including fish, peaked at the same time the sea lamprey invaded. Fishing steadily increased from 1929 through 1946, with no increased regulation from

⁶ Julian Ellefson, Interview, April 5, 1978. *Sea Grant Institute Commercial Fishing Oral History Project, 1978-79*. Wisconsin State Historical Society Archives, University of Wisconsin, Madison, WI.

⁷ Downs, p. 4.

state governments.⁸ This in no small part resulted from the Second World War. One fisherman, Hank Smith, noted that no attempts were made at any governmental level to increase regulation of lake trout fishing while the war was still ongoing. The representative from the Wisconsin Sea Grant Institute delved into this issue:

WSGI: Did [the Director of Conservation] get stricter towards the later years?

Hank: During the war they didn't.

WSGI: They just didn't care at all, I suppose?

Hank: No, they needed the food.⁹

High demand at home and abroad provided a large incentive for over-fishing. Since there was little state coordination, even though Michigan initiated some new restraints on its fishermen, Illinois and Wisconsin fishermen had no increased restrictions on catches in a growingly dangerous climate for the lake trout until after the war. While undoubtedly the sea lamprey was the major culprit in the downfall of the lake trout, wartime over-fishing also hastened this decline.

World War II had another dramatic impact in that an important domestic issue, i.e. fisheries management, was neglected because of the overwhelming pressure put on federal agencies by the war. A quote from a 1946 article in the *New York Times* puts the issue bluntly: "For years, those who depend on fishing for a living have been urging Government action against the lamprey, but until only recently Washington was more concerned about curbing the Japanese and Germans"¹⁰.

During the Depression and the war, the federal government had too much on its plate, and some issues had to be sacrificed. Unfortunately for the lake trout, this meant conservation legislation would have to wait, at the very least, until after the war. Even after the war in Europe had concluded, federal interests abroad had increased to such a degree that it was not until the 1950s that attention returned to domestic issues like conservation.

This indifference on the federal level reflected the attitudes at the time. During the Great Depression, when the sea lamprey was first introduced to three of the Great Lakes, the newly established federal agencies focused on improving quality of life for people, generally without regards for the environment. In fact, it was not until the 1960s and 70s that public interest in ecological preservation became important enough for political consideration. Fish, in that respect, were fortunate; because of their commercial importance, they found a protective voice in the government before other less quantifiably valuable ecological resources.

One important measure of how greatly the issue of the sea lampreys registered on the public radar was its presence in newspapers. In a national paper like *The New York Times*, for instance, the issue received no significant mention in a major article until the late 1940s, despite sea lampreys having had a direct impact on New York State's fishing industry much earlier.¹¹ Since the newspaper is both a source of information for the public and a reflection of the people's interests, clearly the sea lamprey problem was not an issue of great importance to the average American.

⁸ Hansen, p. 427

⁹ Hank Smith, Interview. *Sea Grant Institute Commercial Fishing Oral History Project, 1978-79*. Wisconsin State Historical Society Archives, University of Wisconsin, Madison, WI.

¹⁰ Robert W. Wells. "Fish in Hot Water," *The New York Times*, October 6, 1946, SM17.

¹¹ Proquest Historical Newspapers *The New York Times*, 1920-1960.

Another major issue blocking federal action was a lack of coordination with the states. Blame for lack of federal and state coordination fell on both parties. Without federal leadership, states had little incentive and few resources to devote to the ecological issues afflicting their fish stocks. However, the federal government had little incentive to provide this leadership, as most states wanted federal subsidies without any increased federal involvement in regulation. As a result, little action occurred on either side.

In Wisconsin, there had been several agencies developed to deal with the conservation of state resources. The Wisconsin Conservation Commission within the state's Natural Resource Department was comprised of several different boards controlling different aspects of the state's resources. It was headed by a conservation director who assigned the Commission's resources to its various functions.¹²

Within the Commission, the Wisconsin Fishery Board had the dominant say over the state's water resources. It met three to four times per year, and state game wardens and clerks fell under its direction. The Board was responsible for limitations on fishing licenses, catches, and restrictions on where individuals could fish. The Board also performed surveys of commercial and sport fishing and made recommendations based upon them. The Board consisted of a small group of usually eight or nine individuals, headed by Ernest Swift at the time of the lamprey invasion. Its powers were slightly expanded in a state measure passed in 1946, but it took little direct interest in developing new conservation techniques until the early 1950s, with coordinated research at the University of Michigan in Ann Arbor.¹³

Throughout the minutes of the Fishery Board in the 1940s, although the problem of the sea lampreys was frequently noted, little action was taken. In fact, the Board did not begin a program to address the issue until 1947, when a federal initiative finally allowed for a study of the sea lamprey problem. Dr. Schneberger, a member of the board, described the proposal:

The Fish and Wildlife Service and the Department of the Interior are to work with the conservation departments of the states bordering the Great Lakes in an attempt to eradicate the sea lamprey. The fishery section and the great lakes commercial fishing section will each spend \$1,100 in this study, this sum to be matched by the federal government.¹⁴

This allotment from the federal government originated from a bill signed by President Truman in 1946, allocating \$20,000 to the sea lamprey problem.¹⁵ Sadly, however, by 1947, Lake Michigan lake trout fishing had already declined so as to be virtually non-existent; the new program did not even get a chance to get off the ground.

The board was aware of the lamprey problem as early as its recorded minutes stretch back to 1942, yet this inaction continued for five years. Even after Michigan had initiated its own program, Wisconsin was still in preliminary stages. The Board was well aware of the action being taken in Michigan: "Dr. Schneberger reviewed the various discussions which have been held in St. Paul and Ann Arbor by the Great Lakes Trout Committee. He gave a review of the plan of

¹² Wisconsin Fishery Board Minutes, 1942-1956. Wisconsin State Historical Society Archives, University of Wisconsin, Madison, WI.

¹³ Wisconsin Fishery Board Minutes, 1949-50.

¹⁴ Wisconsin Fishery Board Minutes, September 27, 1946.

¹⁵ Wells.

operations of Wisconsin in the joint study of sea lamprey by the U.S. Fish and Wildlife Service, the lake states and Canada. No action was taken."¹⁶ Considering the invasion into the Great Lakes had begun over a quarter of a century before, and only now were major preliminary studies being conducted, the Board was entering a battle they had practically already lost. Four years after most fishermen had given up on lake trout in Lake Michigan, the Fishery Board came to the same conclusion. "[Board member] Mr. Patterson explained that there was no lake trout industry left in Lake Michigan. Less than 25,000 lake trout were taken commercially in 1950". This was down from over 10 million two decades before. Earlier the board had concluded that the invading lampreys "do not attack large scale fish but only the smaller, finer scale fish". At this later meeting, however, Mr. Patterson noted that it was now apparent that "the lamprey were now attacking whitefish, suckers and lawyers."¹⁷

One of the reasons the Board and many fisherman had ignored the problem was that they felt that the lake trout were doomed. Now, however, as the lamprey moved onto other species, and even though the lake trout was essentially gone, the lamprey were still thriving and eroding stocks of other commercially viable species. In order to have any chance at saving the Wisconsin fishing industry, the Board finally had to take action, although it would be another five years before federal coordination would give the Board any real power.

In Lake Michigan, the program started so late that the situation was already grim. The damage had been done, and the only hope of the state government at this point was to try to prevent any further population jumps by the lamprey. "The lamprey program would continue as in previous years by operating traps at Mishicot, Hibbards Creek and various other points. [Patterson] felt that the program was one of control rather than eradication and that the same amount of funds were available as in the previous years."¹⁸ This painted a bleak picture of the future for the lake trout. The sea lampreys were going to be present regardless, and the government and fishing industry only had the option of trying to salvage rather than truly rebuild the depleted fish stocks, at least for the foreseeable future.

Much of this had to do with limited government resources. Sea lampreys, despite being an imminent problem already observed in the Eastern states and provinces, did not register on the public radar until the late 1930s in the midst of the Great Depression. During the Depression, the state government, like the federal government, had only limited financial resources. The situation did not improve during the Second World War, as every available resource was allocated to the war effort in Europe and Japan. Finally, after the war, when the joint federal-state initiative resulted in \$2,200 allotted to the study of the sea lampreys and their possible destruction, the board could finally address the problem. This money went primarily to research, however, which, while offering future fruitful rewards, did little to help the immediate cause of the lake trout in its decline.¹⁹ The fraction that actually went to control of the sea lampreys was not nearly enough considering the hundreds of lakes, streams, and waterways connected to Lake Michigan affected as the sea lampreys continued to proliferate.

¹⁶ Wisconsin Fishery Board Minutes, December 17, 1946.

¹⁷ Wisconsin Fishery Board Minutes, February 16-17, 1950.

¹⁸ Wisconsin Fishery Board Minutes, February 16-17, 1950.

¹⁹ Wisconsin Fishery Board Minutes, December 17, 1946.

There are several possible treatments that have been used in Wisconsin's history in the elimination of sea lampreys. Chemical treatments, which can target both the larvae, as well as adults, were not suitably developed until 1956 and had any number of further ecological effects on surrounding fauna.²⁰ Up to the 1970s, however, this was the most effective measure. Later, the use of dams to prevent the spawning of the sea lampreys in Lake Michigan tributaries supplemented the chemical treatments and provided less pollution. Unfortunately, these dams also interfere with the spawning habits of numerous other species of fish. Nevertheless, they are the current treatment of choice.²¹

Unfortunately for Patterson, research was only beginning on chemical treatments. The approach taken by Patterson was much simpler, although required much more effort from a man-hours point of view. He sought to capture and eliminate the sea lamprey larvae before they reached development. The life history of sea lampreys is conducive to this approach, as they do not become parasitic until adulthood. Unfortunately, the amount of resources required to take this action in all Wisconsin waterways fell well outside his budget.²²

Patterson therefore had to allocate his resources so as to focus on specific areas. The Wisconsin fishing industry had generally been centralized in a few regions, particularly near Green Bay, by Washington Island in Door County, and in Milwaukee. Generally, therefore, he aimed at the capture of the sea lamprey larvae in Hibbards creek, the Menominee River, and streams tributary to Lake Michigan.²³ From a strategic point of view, these would have the most devastating effect on the populations of the lampreys. By cutting the lampreys off early in their development at their source, the Natural Resources Department employees would at least have a chance at diminishing, or at least limiting, any further sea lamprey population outbursts.

The Fishery Board underestimated the importance that the sea lamprey invasion would have on the fishing industry in its initial years. Additionally, the Board in part represented commercial fisherman, who to a large extent felt that they ought to maximize their catches while the lake trout was still viable, thereby disregarding any chance of protecting the remaining species. These economic pressures, coupled with the inefficient bureaucracy and political indecision of federal agencies, essentially doomed the lake trout. The Fishery Board was perhaps the last chance at preventing the devastating over-fishing that would put the last nail in the coffin, but it was most certainly not up to the task.

The fishermen who failed to support increased limits on lake trout catches and increased preventative measures against the lamprey invasion were the very individuals who would have benefited the most from these efforts. The obvious question, therefore, is why did these fishermen not fully support an effort that would help to ensure the continuation of their profession into future generations? Unfortunately, as so often has occurred in the history of American natural resources, when the government shows little or no conservation leadership, industry does not take initiative either. In this case, it severely injured the industry in the long run, but most fishermen were looking to short term gains.

²⁰ Downs, p.5.

²¹ *Environmental Assessment: Barrier Dam Program for Sea Lamprey Control*. (Ann Arbor, MI: Great Lakes Fishery Commission, 1977), 13.

²² Wisconsin Fishery Board Minutes, February 16-17, 1950.

²³ Wisconsin Fishery Board Minutes, February 24-25, 1949.

There was a general mentality among fishermen that the lake trout were doomed, that the sea lamprey would obliterate them utterly, so the fisherman might as well maximize their catches while they could. Those that were concerned about the fate of the lake trout faced competition from the individuals who cared only about the profit, and since fishermen had only modest incomes, most generally looked out for their own financial welfare than the welfare of the fish.

Since the time when the lake trout fishing industry collapsed in Wisconsin, people have looked for someone to blame for the eradication of this once abundant game fish. Sport fishermen have widely criticized the commercial fishing industry as the source. The commercial fishermen themselves have recounted how it happened, although there is some disagreement about how big an influence fishing may have had in the decline of the lake trout.

Most commercial fishermen were very offended by the accusation that they were fully responsible. Julian Ellefson recounts: "Some people, a lot of the sports fisherman, think commercial fishermen done it all. That's very wrong, and it still holds. They don't want to give the commercial fisherman a break at all, and I think they deserve it. I think the public deserves some of that meat that fish got to eat."²⁴ In effect he argues that by killing some of the fish, fishermen were acting in the public's interest, since much of the fish that would go to waste if not captured. Over-fishing was at least part of the problem facing the lake trout, but, as Ellefson explains, it would be unfair to place all the blame on the fishermen; many of the fish would have died regardless.

Whether or not they share the blame, however, Fishermen were certainly aware of the problem. Ellefson described one time when he witnessed firsthand the destructive power of the lampreys: "[It takes] three hours [for a lamprey] to kill a four pound trout, you know that, because we put a trout in a tank and that's how long it took. I witnessed that down at Nathan's restaurant, so I know that to be a fact. You know, that lamprey hit that trout just like that."²⁵

Hank Smith describes his own encounters with the sea lampreys: "All these dead fish drifted into our nets and we had to lift them up and pick them out and every one was a spawn trout. You could see the spawn in the hole that the lamprey had left. I'll bet you that that year the lamprey killed most of the trout . . . I was out there for a week and never got a trout."²⁶

Herring, as well, were obliterated in part by sea lampreys, as Julian noted. "After '45 that was done. There was not herring fishing after that. . . . About the same time the trout disappeared, the herring disappeared . . . It takes a large lamprey and they could kill a herring in 15 minutes." He earlier had noted, however, "Why [the herring] disappeared I don't know; I don't think the lamprey killed them off. There are things that happen in the lake with nature that no one knows."²⁷ By 1945, although it is not evident why this decline was occurring, fishermen had already recognized the devastation the other commercial species were suffering as well, yet they took no action regarding the sea lamprey for ten more years.

One major point of controversy was whether the lampreys actually chased the trout southwards, or the trout simply were eliminated as the lamprey moved down the lake. While there is some argument as to whether the lake trout actually migrated southward, the fishermen most certainly did. In the southern portions of the lake, fishing increased annually by several percent up

²⁴ Julian Ellefson, Interview.

²⁵ Julian Ellefson, Interview.

²⁶ Hank Smith, Interview.

²⁷ Julian Ellefson, Interview.

to 1946.²⁸ The consequence of this movement was a greater number of fishermen in a more concentrated area. This smaller area held the largest percentage of remaining lake trout, and more fishermen meant over-fishing of these final stocks. This essentially spelled doom for the lake trout.

When trying to understand the causes of the lake trout's decline, the issue of migration is of some importance. Fishermen were moving into more and more concentrated areas in the southern portion of the lake, yet it is not necessarily apparent whether the same can be said of the lake trout. If indeed the trout did migrate, then the fishermen were merely following the populations they had always been fishing. If the trout had not moved, however, then these fishermen were inducing additional strain on the last remnants of the Lake Michigan lake trout populations. Consequently, this has been a source of some contention among fishermen.

Julian Ellefson states, "I don't think the lake trout moved. I think the lamprey moved and killed them as they came, just found them there and killed them as they moved, as the lamprey moved. . . . The lamprey moved, just kept going where the prey was." He observed that the lamprey would "catch the trout so fast that they don't have time to chase them, you know they're so much faster than trout that, like that they got them."²⁹

Another fisherman, Julian's brother George disagreed: "The trout went down that [the Southern] end of the lake. The lamprey eels chased them down there."³⁰ Hank Smith, another fisherman, concurs with George. "The lamprey was chasing the trout around so much that their spawn wouldn't fertilize. God almighty they were getting to be over half marked. At least fifty percent was marked with a piece of lamprey on it."³¹ Other fisherman fell on both sides of the line. Regardless, whether the trout were being chased or they were simply dying in the Northern areas, most trout fisherman either changed catches or moved southward to deal with the diminishing populations.

George Ellefson recalls the end of the trout fishing. "That was the only summer in years that they had any trout in the summer time, but that was the last year. Next year there was nothing. That year was '47 and the next year was '48. Then we quit."³²

Ellefson goes on to assert that the majority of fish killed were the result of sea lampreys, not fisherman. "They said we fished out all the fish, you couldn't fish all the fish out. No way a fisherman could catch all the fish out of the lake, no way at all like that. No way could a commercial fisherman destroy all the trout to that percentage."³³ Despite his obvious bias, Ellefson has a valid argument in this regard. From an ecological standpoint, however, although likely the majority of fish killed after the invasion were the victims of *Petromyzon*, had the fisherman taken any effort to curb this decrease in the lake trout populations, there would have been a much better chance at a quick recovery. Sadly, most fishermen held the bleak approach that Ellefson held--the lake trout was doomed, so why try to limit their catches.

George explains the sorry state that the Lake Michigan fishing industry was in the late 1930s and early 1940s. "It abused the fishing. Some of the fisherman took advantage of it and

²⁸ Hansen, p. 426.

²⁹ Julian Ellefson, Interview.

³⁰ George Ellefson, Interview, *Sea Grant Institute Commercial Fishing Oral History Project, 1978-79*. Wisconsin State Historical Society Archives, University of Wisconsin, Madison, WI.

³¹ George Ellefson, Interview.

³² George Ellefson, Interview.

³³ George Ellefson, Interview

abused it. In the end it wouldn't have made no difference 'cause the lamprey eels took 'em all anyhow. They cleaned the right out."³⁴ Hank Smith emphasizes that there were many responsible fisherman, but also probably some who sought only to maximize their profits. "We worked pretty hard, maybe some certain fishermen were very careless with their spawn and everything, they were that and they could have been jacked up quite a bit. I always tried to do the honest thing."³⁵

Unfortunately, while the Ellefson brothers and Hank Smith state that they almost always attempted to act in the right regarding their fishing techniques, there were others who acted much less responsibly. Bribery of game wardens and illegal catches were frequent occurrences, and often a blind eye was turned to such problems due to the high demand for food created by the war. Several fisherman noted under-the-table payments that they themselves witnessed or heard about second-hand. Julian Ellefson's interviewer at one point notes, "I heard a story that some of the fisherman used to pay off the game warden", an accusation which Julian confirms may have been true in some instances.³⁶

Even before the invasion had occurred, the limited number of capable game wardens was a major problem. Author and naturalist L.H. Kingston of Green Bay Wisconsin was a major contributor to state conservation newsletters, and often wrote letters to the Wisconsin Natural Resources Department regarding the issue of fishing regulation. In a specific letter to the Fishery Board, he criticizes the lack of wardens to look after the state resources. In response to some of these criticisms, in a letter composed in 1935, the current conservation director, H. W. MacKenzie wrote: "We agree with you that the greatest problem the department faces today is the lack of sufficient funds to maintain an adequate enforcement body. The wardens employed in conservation work are all capable and conscientious men, but they cannot humanly patrol all of the territory covered by the violators."³⁷

In response to another suggestion of Kingston, regarding an educational newsletter, MacKenzie also cites lack of resources as a major problem afflicting the state. Unfortunately, the same problems that limited sea lamprey control also affected educational and regulatory initiatives by the state that might aid in the preservation of the remaining fish stocks.

Even the fishermen who obeyed the law still caught as many fish as possible in an economy that placed a high demand for food. During the war, the populations of fish declined rapidly. No doubt this increased demand played some part.

WSGI: You caught a lot of trout, but were you catching less trout than you did after that, say between 1940 and 1946, how did those two periods compare?

Julian: Well, we were catching trout down here after they were done up north, the lampreys hit up there long before they hit us down here and we knew we were going to get it, you know and I know fishermen happen to be down there from up north. . . . I sympathize with them boys, they had no way of making, not a dollar, couldn't even operate, there was nothing to operate for. . . . The lamprey just took them down. It's pitiful.³⁸

³⁴ George Ellefson, Interview.

³⁵ Hank Smith, Interview

³⁶ Julian Ellefson, Interview.

³⁷ Kingston, Lyle. Papers 1935-1956. Wisconsin State Historical Society Archives, University of Wisconsin, Madison, WI.

³⁸ Julian Ellefson, Interview.

A large number of fishermen were put out of business by the invasion, and others switched to other fish. Those that could moved south, which provided temporary respite. "Several fishermen came from up north down this way, but not after that because of conditions here." Only a short time after, though, trout fishing was not a profitable venture for fishermen of any type. Sadly, this final movement of the fisherman would spell bad news for the remaining trout populations. The interviewer observes, "The catch records that the government has for the State of Illinois show that starting about 1940 the catch went way up, a lot more fish were caught just in Illinois than had previously."³⁹

The fact of the matter was that most fishermen were sickened by what was happening to the lake trout. Still, many tried to increase their fish catches by using new techniques. In Milwaukee, in particular, reef fishing became prevalent. Julian Ellefson observes that the most fish he ever caught was in the period just before the period of the invasion, around 1934 to 1936. Once the lamprey started to invade, many fishermen began reef fishing, generally around 1941 until 1944, when they caught nothing. Julian recounts, "I've seen, one day they caught just two trout that day, swimming, just moving, just about gone you know, one had 4 lampreys, the other had three attached to it, going along surfacing the water . . . nothing but dead trout in the nets."⁴⁰

The fishermen realized, therefore, that their livelihood was at stake, yet they applied little if any pressure on the government for increased regulation. At the very time that these fishermen should have cried out for more restrictions, they were going out and catching as many as they possibly could. It is difficult to argue, from a historical standpoint, whether or not the lake trout would have been devastated regardless—that the fishermen merely did what the sea lamprey would have done given more time. However, by quickening the pace by a tremendous extent, these fishermen were in effect signing the death certificate of the lake trout populations before nature had taken course. Also, they cut short the deadline for the scientific community busy developing new chemical techniques for dealing with the lampreys.

Throughout the history of Great Lakes fishing, competition has resulted in lower prices than the environment could stand for long. Lower prices necessitated that fishermen maximize their catch, and most could not jeopardize their families by considering the results such actions would have in the long run. Blame also falls on the middle-men and distributors responsible for bringing the fish to market. Environmental concerns had found no place in the realm of corporate greed. The government, therefore, needed to step in, but resources and public support were lacking.

The states finally decided to take action in the 1940s, led by Michigan but soon followed by Wisconsin and the Canadian province of Ontario. The research performed, especially in Michigan, resulted in the solid conclusion that had already been obvious to most fishermen for up to a decade—the sea lamprey was destroying the fisheries in the Great Lakes, thereby eliminating jobs and an important food source. As a result of these surveys, the United States and Canada formed the Great Lakes Sea Lamprey Committee in 1946, in order to coordinate their efforts on this international problem. The two countries joined forces ten years later to form the Great Lakes Fishery Commission (GLFC) in 1955, almost 20 years after the initial invasion. The agency dealt with numerous problems affecting Great Lakes fisheries, but especially the lamprey problem.

³⁹ Hank Smith, Interview.

⁴⁰ Julian Ellefson, Interview.

Secondary goals included eventually rebuilding the lake trout and restoring the overall Great Lakes ecosystem.⁴¹

In 1950, the University of Michigan in Ann Arbor and the U.S. Fish and Wildlife Service's Hammond Bay Biological began the search for a chemical treatment that would effectively control the lamprey. Finally, after eight years of research on over 6,000 compounds, the Hammond Bay researchers found the solution, 3-trifluoromethyl-4-nitrophenol (TFM), which was poisonous to the lamprey larvae but had little adverse effect on other aquatic life. The earliest treatments were in Lake Superior, where sea lampreys were not as well established as in the other Great Lakes and which housed the last remaining large stocks of lake trout. Some day, scientists hoped, these stocks would be used to replenish the depleted Michigan stocks.⁴²

The effectiveness of these treatments varied from region to region. Some locations required frequent treatment, while others remained free from ammocoetes (lamprey larvae) for generations. This success boded well for the Great Lakes fisheries. By 1962, numbers of sea lampreys caught in Superior had dropped almost 87% from the year before.⁴³ Only a fraction of these were caught the next year, indicating a massive downward shift in lamprey populations. These trends continued in the decades to follow, with lamprey populations remaining at fairly low numbers. Despite these efforts, however, up to one fifth of all lake trout deaths were still thought to be caused by sea lampreys.⁴⁴

Had these efforts been started ten years earlier, perhaps the Great Lakes fisheries would not have been in the dire state they were in by 1955. Unfortunately, lack of coordination between government agencies and the fishing industry ultimately created a much worse problem than what the sea lamprey invasion initially posed. The state's Conservation Commission should have taken action in preparation, but it lacked the resources and ability to confront the problem of its own accord. As in so many instances in the United States history, the public did not care about a problem until it was directly affecting them, and, consequently, the government took no action.

Since the 1960s, numerous advancements have been made in the control of sea lampreys in the Great Lakes. New chemicals were developed to supplement the use of TFM in the treatment of sea lampreys. The use of barrier dams in order to prevent sea lamprey spawning has also risen to prominence under the initiative of the GLFC since the 1970s, and has also proven relatively effective.⁴⁵ Unfortunately, the levels of lake trout remain significantly lower than they were before the invasion occurred.⁴⁶ Serious problems still remain in the control of the sea lampreys. In some regions, populations still remain unaccountably high, despite treatments. Low water levels and salmon spawning can hamper these lamprey treatments. Oftentimes, as well, barrier dams pose a significant problem for other species trying to spawn, such as smelt, rainbow trout, and suckers. Chemical treatments, while perhaps having a minimal effect on other fish, still may threaten some insect species, such as mayflies. Additionally, although the total number of sea lampreys has dropped substantially, their average size has doubled.⁴⁷

⁴¹ Downs, p. 4.

⁴² Hansen, p. 438.

⁴³ Downs, p. 5.

⁴⁴ Downs, p. 6.

⁴⁵ *Environmental Assessment: Barrier Dam Program for Sea Lamprey Control*, p. 17-18.

⁴⁶ Hansen, p. 440.

⁴⁷ Hardisty, p. 62.

Despite these problems, sea lampreys are finally on the decline. Unfortunately, lake trout populations are not substantially increasing simultaneously. The lake trout were once plentiful in the waters of the Great Lakes, but are now present in only small populations, and little action is being done to account for past wrongs. Reduction in sea lamprey populations is an important first step, but the damage done to the Lake Michigan ecosystem is far from undone.

Invasive species are not a thing of the past. Common carp, alewives, sea lampreys, and recently zebra mussels have caused massive ecological disturbances throughout the Great Lakes region, and more species are likely to be introduced soon. Over the past century, these species have swept in and caused irreversible damage; and pollution and over-fishing continue to worsen the problem. As a result, the fate of the Great Lakes appears grim indeed. Unless the public rallies the government to address these issues, the United States may lose one of its most valuable resources. Wisconsin and other Great Lakes States, as well as the United States Federal and Canadian governments, have made great strides in creating uniform regulation throughout the Great Lakes in the GLFC. Without public support, however, any efforts, no matter how coordinated, will likely prove fruitless. If, as occurred with the sea lampreys, people ignore the problems facing the environment, the rest of our aquatic resources will be in the same sinking ship as the lake trout.

Violations of Freedom of the Press in Cuba: 1952-1969

Kelsey Vidaillet

I. Introduction

This study examines the limitations and prohibitions of freedom of the press in Cuba during the administrations of Fulgencio Batista from March 10, 1952-December 31, 1958 and Fidel Castro from January 1, 1959-1969. An in-depth examination of the history of freedom of the press in Cuba under these two regimens is worthy of investigation because these two dictators have been the only two rulers in this neighboring island nation for the last 53 years. More importantly, however, is the fact that an understanding of their relationship with the press is crucial and timely today for many in that country and around the world look forward to the prospects of a free and democratic Cuba in the post-Castro era. While it is difficult to know what the political future of Cuba will be, one thing is certain, change will occur in the near future because in 2006, Fidel Castro will celebrate his 80th birthday.

The research problem that inspired this investigation is that varying degrees of freedom of the press existed throughout Batista's rule and that no freedom of the press was present in Cuba less than a year and a half into Castro's administration. As I wanted to analyze relatively comparable periods of time, particularly the founding years of new regimes, I restricted my research on the current 46 year administration of Fidel Castro to January 1, 1959-1969. This time frame allowed me to address and analyze the years from the beginning of Fulgencio Batista's second administration¹ through the end of Castro's foundation for the press. By 1969, the Cuban press had been heavily consolidated; the only surviving newspapers were those directly controlled by the government and even those were limited to a great extent. As there has not been much previous research done on this comparison, especially not a detailed analysis of Batista, this project will add to the field by combining numerous primary documents with the few secondary sources available. The results of this project will not only be relevant to researchers interested in Cuba, or even Latin America as a whole, but will appeal to those studying journalism, and human rights as well. I anticipate this study's findings will be pertinent to the future administrations of Cuba and I hope they will impact how these governments will approach the press. This investigation will not only provide a historical analysis of how these two dictatorships handled freedom of the press, but it will also illustrate the seemingly impossible co-existence between freedom of the press and dictators. Two overriding research questions have been posed in this project to analyze the topic: First, what strategies were put forth by the two dictatorships of Batista and Castro to create their foundations for restricting freedom of the press? Second, what justifications have been made to explain such strategies?

¹ Fulgencio Batista was democratically elected President of Cuba from 1940 to 1944, eight years prior to his 1952 military coup d'état.