# The Impact of the Removal of the Edwards Dam on the Kennebec River

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# TABLE OF CONTENTS

PAGE NUMBER

## The Impact of the Removal of the Edwards Dam

In a modern world of growth and industrialization, society still must remain focused on the environment and the changes that we are constantly making. Through our modernization we have caused unwanted waste, pollution, and negative change to our surrounding environment. One thing, in particular, that society has taken for granted is clean water and the many benefits we gain from this precious resource.

Before Europeans arrived on the continent of North America, much had remained the same for millions of years. Change was slow and occurred naturally. Over time species could adapt to the new conditions they were challenged with because the changes occurred so slowly. Once industrialization began major changes were being made in society. However, the effect of industrialization on the environment caused many environmental stresses. Nature had to struggle to keep up with the rapid changes.

Humans settled along rivers, lakes, and oceans using their natural resources to their advantage. Never once did someone stop to consider if they were taking too much or if their "endless" supplies would ever run out. Humans were quite content taking what they needed from nature. The fish and wildlife that used the river seemed to be a continuous resource. Humans never questioned their effect on nature, until we started seeing great changes in the fish and wildlife populations.

The construction of the Edwards Dam on the Kennebec River, in Augusta Maine, had a large negative effect on the ecosystem. With factories and mills on the river, humans used water for manufacturing processes, which created a devastating amount of pollution that was discharged directly into the river. The construction of the dam changed

the river's natural structure and prevented the fish from reaching their ideal, natural spawning grounds.

We still have much to learn about how dams affect the fish and wildlife environment in United States and in other countries around the world. However, one common position today is that if dam removal is cost effective, then every effort should be made to carry out the procedure. The removal of any dam has many positive and negative changes that can be argued. The removal of the Edwards Dam in Kennebec, Maine is a source of discussion for these changes and can be outlined in great detail.

**History of Dam Removal**

The Kennebec River drains approximately one fifth of Maine's water shed, about 5,493 miles from Augusta north (*figures 1-4*). The Kennebec originates as an outlet of Moosehead Lake and flows 165 miles southward to the Atlantic Ocean (USDI 1996, 5). This river system provides the major freshwater supply to Merrymeeting Bay, the largest tidal system north of Chesapeake Bay on the east coast of the United States (FERC 1994, 1).

The oldest proof of humans using the river for its fish resources can be seen in archaeological sites. Native Americans in 1100 BC to 1500 AD fished for striped bass (*Morone saxatilis) (table 1)* and sturgeon (*Acipenser)* as evidenced by the presence of fish remains in these sites. For every Atlantic salmon (*Salmo salar*) bone found there were ten from a sturgeon. In 1975, James Sullivan, the author of *History of the District of Maine* wrote,

> "The Kenebek affords great quantities of lumber, and is inhabited by several species of valuable fish, in the season suited to their kinds. Salmon and Sturgeon

> are taken in great abundance there, and shad and alewives relive the wants of the necessitous part of the inhabitants" (USDI 1996, 6).

Before the dam was constructed wildlife thrived. The citizens in Maine however, feared the decimation of fish and wildlife from the dam's construction years before the dam was built. Although most of the citizens opposed the dam's removal there was nothing they could have done to stop the construction because the decision was made by state officials.

The Edward's Dam was constructed in 1837 below the head of the tide in Augusta, Maine by the Kennebec River Dam Company and originally called the Augusta Dam. Edwards Dam's plans also called for a boat lock and fish ladder. During the first year the operator changed their names to Kennebec Locks and Canal Company.

Only after a year when the dam was first built, the fish ladder was washed away in the spring flood of 1838. The dam's owners refused to rebuild the ladder and there would be no fish passage again until 1999, when the dam was permanently removed. From this point on the industrial use of the dam continued to grow. The dam now powered seven saw mills, a grist mill, and a machine shop.

The Edwards dam continued to have its problems and was breached four times until in 1870 it was rebuilt to its final design that would remain the same until it was removed in 1999. With this new design, the ownership changed to the Edwards Manufacturing Company. The new owners expanded the dam's use by employing over 700 textile workers. The new textile mill on the west shore was powered by the waters flow from the dam. By 1903, eight water wheels were in operation from the dam's mechanical power (Squires 1985, 1-14).

In 1913 the first electrical generators were installed, and the dam was to be used for power generation until 1999. The dam's use remained steady until 1973 when Miller

industries bought the dam and was responsible for the employment of 800 area jobs (*figure 5*). Tragedy struck two years after their purchase and 150 feet of the dam was washed out in the winter flood of 1974. At that point in time biologists and the community did not want the dam rebuilt, but their cries could not stop the reconstruction. Just after the company was recovering from the loss of the dam in 1974, the textile mills production slowly came to a stop in the early 1980's (http://amrivers.org/tableofcontents/kennebectimeline.htm 4/8/2003).

From the mid-eighties to present there was an upward trend toward environmental friendliness by the Maine government and the community. The first movement toward any restoration was for alewife *(Alosa pseudoharengus),* a small baitfish in the herring family. Almost a year after that act, the Kennebec Hydro Developers Group, which consisted of seven dam owners upstream from the Kennebec, committed themselves to the restoration of alewife, American shad (*Alosa sapidissima*) and Atlantic salmon populations. The Edwards Manufacturing Company refused to participate, but made an attempt one year later by installing an unsuccessful fish pump.

In 1989 the Kennebec Coalition was formed by American Rivers, the Atlantic Salmon Federation, the Natural Resources Council of Maine, and Trout Unlimited to push for removal of the dam. This group of conservation minded people knew that removing the Edwards dam was in the best interest for nature and for the economic growth of communities along the Kennebec River. During this same year the textile mills were closed because of fire damage, but the hydro electric generation equipment was rebuilt (USDI 1996, 2).

In the early 1990's some significant changes began to occur and the idea of the removal of the dam was becoming a reality. In 1991 the Edwards Company applied for a new license to increase their generating capacity to 11.5 megawatts for the next 50 years. This project would require an average workforce of 35 workers and during peak times, 80 workers per day. The monthly payroll would fluctuate between $35,000 and $352,000.

The city of Augusta also expected to see revenue from dam operation. In 1994 the city received $189,000 in property taxes and other fees from the Edwards facility (FERC 1997, 4-189). On December 31, 1998, when the license terminated the city was expecting to receive additional sums based on the gross revenues of the project, but they soon had to face the reality that the dam was going to be removed.

Groups active in pushing for the Edwards dam removal turned to Governor McKernan to gain legislative support from the City of Augusta. Once the City of Augusta was convinced that removing the Edwards was dam would benefit them, they pushed for part ownership of the dam and settled a contract that would give them 3% of gross revenue. In 1993 when the Edwards Company tried to renew their 50 year license, the Federal Energy Restoration Commission (FERC) opposed the new contract. Instead the FERC issued a new policy giving themselves the right to have authority to deny any application for re-licensing and the ability to make the decision if a dam should be removed or not. Before doing so every alternative had to be considered based on cost effectiveness and economic and environmental benefits.

One alternative that was considered other than removing the dam was to continue the current restoration program that relied mainly on trucking fish from below the dam to the waters north of this location. The program also used fish hatchery assistance and

attempted to carry on with this program until new licensing was obtained. Officials quickly realized however, that the upstream fish trucking alone could not completely restore the Kennebec River. With the dam removed the fish could reproduce naturally and eventually sustain themselves. A free flowing river could just not be compared to limited attempts of restoring the fish population like upstream trucking and fish ladders.

The FERC's final decision was to re-license the dam to the Kennebec Company with expectations of a $9 million fish passage system. The proposed fish lift was a single mechanical fish lift that included a collection facility at tailrace level with two entrances. The fish were attracted by attraction water introduction, and the lift also included a V-trap with separation gate, and a crowding device to force fish into a water-filled hopper (USDI 1996, 2). The passage was designed to accommodate the annual run of 40,000 American shad, 82,000 alewives and 250 Atlantic salmon. The fish lift would operate from May through November. Down stream passage would also be provided by the fish lift at optimal times fish would be migrating down river. The dam was the potential solution to aid anadromous species of fish to upstream passage. Anadromous fish migrate from the sea to reproduce in fresh water and include Atlantic salmon, striped bass, Atlantic sturgeon (*Acipenser oxyrhynchus*), and alewife.

The lift had its problems though, and it had a limited amount of use. The shortnose sturgeon among other fish would not benefit at all from the lift, because they spawn in early spring when waters are near 40 degrees Fahrenheit. Since the flow at this time is usually 20,000cfs the fish ladder would not be able to operate, given the hydraulic capacity being 3,300cfs. Shortly after this decision however, the FERC follows the Final

Environmental Impact Statements suggestions towards dam removal and orders dam removal at the owner's expense (FERCEA 1994, 2-5).

On May 26, 1998 a final settlement was agreed upon in which the State of Maine received the dam as a gift from the Edwards Manufacturing Company on January 1, 1999. The State also obtained funding for the dam removal from Bath Iron Works and upriver KHDG dam owners. On February 25, 1999, all hydro generating equipment was sold at public auction giving more funds for the removal (http://maineenvironment.org/Edwards_Dam/histroy.htm 4/8/2003).

**The Dam Removal Process**

The removal process began during the summer of 1999 and ended in the fall of that year. The removal process was designed by Woodard & Curran Engineering Science Operations and E-PRO Engineering & Environmental Consulting, two engineering firms that provided plans and environmental permit applications from the US Army Corps of Engineers, the Maine Department of Environmental Protection, and the City of Augusta (WCEPRO 1998, Cover Page).

The construction to remove the dam began in June of 1999; a temporary gravel cofferdam was constructed upstream from the dam on the west portion of the river. The cofferdam allowed for the dewatering of the area it contained and the dry Edwards Dam could be safely removed by construction works and their equipment.

On July 1, 1999 the removal of the west side of the dam was finished and a ceremony was held for the breach of the dam. Over 1,000 people attended the ceremony along with Governor of Maine Angus King and Secretary Bruce Babbitt. After a number

of speeches, backhoes began scooping away the cofferdam. After twenty four hours, the river came to a stable height.

Another cofferdam was soon constructed that covered a 200 foot span, on the east end of the dam. The same process of removal occurred again and this cofferdam was breached on August 12, 1999. Eventually the river dropped an additional five feet to its original height before the Edwards Dam was in place (*figure 6*).

A third and final cofferdam was constructed again from the west end, and allowed construction equipment to remove the middle portion of the dam. The debris from the dam was used to fill the power canal on the west bank of the river along with other locations to restore the site. The final cost of dam removal was $7.3 million.

During the removal period, construction and other related activities did cause some inconvenience. There was unwanted noise, dust, exhaust emissions, and some unwanted traffic in the popular travel routes. The construction also provided some positive short term benefits like employment opportunities for construction workers. These workers spent money on eating and drinking establishments, gasoline stations, and housing. This was also a short-term economic benefit from their spending (http://www.americanrivers.org/templates/temdetail.asp?ACTCONURL=/tableofcontents/ 4/8/2003).

**Edwards Dam Present**

From the fall of 1999 the Edwards Dam site and the seventeen miles of upstream river instantly were restored to original flows. Water levels dropped and stabilized within days and the lake-like impoundment transformed into a free flowing river with riffles,

runs, and deep pools. Historical spawning habitat was restored for all anadromous fish and the fish have already begun to use the restored river to their advantage. The river restoration is not done yet though, as fish populations will take decades to rebound back. There is a new interest in the river and the changes that have taken place. Many people find an attraction to the restored river and are making the effort to see it for themselves.

**Results of Dam Removal/Economic Aspects**

The people of Augusta have seen a significant effect on business, industry, and development since the dam has been removed. The removal of the dam itself has paved the way for other dams to be removed, with much of the groundwork already being accomplished such as environmental impact analysis and the construction process. Many speculations now can be answered and dams considered for removal can be analyzed with realistic results. There have been many positive changes from the dam's removal in recreation and business.

Swimming opportunities have been created because of the more accessible shoreline on the Kennebec River. Many of the areas exposed by the removal of the dam are sandy shorelines, creating beaches for those interested in swimming. There has been eight miles of exposed shoreline on each side of the river and all are optimal for swimming. At the Sidney boat launch there is public access to a 2,000 foot long by 100 foot wide shoreline that can be used for swimming and sun bathing (FERC 1997, 4-175). In the fishing industry a study in 1991 predicted a $48 million boost to the local economy once the dam was removed. Each year the projected income has increased and fishing shops along the river have seen an increase in business. "Business is just really starting

to come around," says the one of the attendants from Fly Fishing Only, a fly fishing store in Fairfield, ME (Fly Fishing Only Interview 2003). Since the removal of the dam there has been an increased interest in the river. Anglers can fish for Atlantic salmon, striped bass, brown trout and other game fish (The Kennebec Coalition 1999, 4).

Guides and Outfitters for fishing, kayaking, whitewater rafting, and other outdoors sports have seen an increase in business because of the more favorable water levels and increased fish habitat. Boaters and anglers have returned to the area in large numbers. Guide services and local business are seeing an increase in the people who return to the river each year because of improved and increased diversity of angling and other recreational experiences. River banks are now green with native grass despite the initial fear of muddy banks exposed by low water level.

The removal of the Edwards has replaced the sixteen mile flat-water impoundment with an exciting stretch of Scenic River that can be enjoyed by all. The upper Kennebec River is now dominated by commercial rafting. This sport was beginning to become popular just before the dam was removed. The long free flowing river has opened up many new rapids that offer exciting opportunities for the rafters. The intentions of the people who advocated the dam removal were to provide a wide diversity of white water trips down river, provide an increase of white water in the river for existing and future users, and to maximize competition among outfitters. In addition business has become more stable and it is provided by knowledgeable and well qualified outfitters (NRPDMSPO, 138-139) (The Kennebec Coalition 1999, 3-4).

The opportunities for wading anglers have seen a substantial increased because of lower overall water levels. Prime fish habitat is now easily accessible to all that seek it.

The main areas for wading are located just below the five significant rapids and into the large pools below them. Atlantic salmon, striped bass, trout, and smallmouth bass (*Micropterus dolomieu*) are now easily accessible to the wading angler. Much of the land along the river is privately owned but if permission were obtained from a land owner, 5 miles of river would be open to optimal wading conditions (FERC 1997, 4-167).

The fishing industry especially is seeing increasingly positive changes in business and the quality of fishing. Most of the clients that utilize the guide services are out-of-state fisherman. While the high profile fishing spots are becoming very crowded, the new Kennebec has room for many with quality fishing through out the river. The seventeen mile stretch of renewed river from Waterville to Augusta offers everything an angler needs. With the dam removed there is more current and optimum conditions for game and baitfish. The shallow, fast runs serve as ideal spawning areas for Atlantic salmon, trout and alewives. This in turn will lead to more fish in the future and even more fishable water throughout the river (The Kennebec Coalition 1999, 1-4).

Individuals that have been fishing the river for years have found the dam's removal a positive change. Theses anglers have worked for and are willing to keep working for improvements to the river. They are willing to give their time and spend money to support the local fishery. Anglers that have never fished the Kennebec are now giving it a chance and want to discover this new fishery for themselves. "And a free flowing river is much more valuable. You don't think so, go up to Caratunk, God that place has gone from ghost town to boom town, almost overnight," says one of the Fly Fishing Only fishing guides (Fly Fishing Only interview 2003). They will add to business with their trips and will spend money on local shops and guide services. Finally the

anglers that will never use the Kennebec appreciate the improvement of a fishery. Before construction of the Edwards dam, the Kennebec River had a strong Atlantic salmon run. With removal of the dam fisherman and non-fisherman feel a satisfaction that the right thing has been done to improve the Atlantic salmon stock (DAREMDZ, 3).

The archaeological and historical resources are another important factor that was considered with the dam removal. In 1880, in Popham, a small Indian campground was unveiled. Since then over 500 sites have been discovered and all are eligible for listing in the National Register of Historic Places. The Indians and Colonists traveled along rivers including the Kennebec and many of their artifacts are now waiting to be discovered with the removal of the dam. There 60 archaeological sites that currently exist from Augusta to Waterville. With 98% of the prehistoric sites in Maine being near water ways the opportunities are many (NRPDMSPO, 142-143).

During the dam removal process hundreds of logs were salvaged from the dam and surrounding areas. The logs have been used for furniture, musical instruments, and other wooden products (http://pbs.org/wgbh/buildingbig/wonder/structure/edwards.html 4/8/2003).

Because of water drawn down caused by removing the Edwards dam, much of the land that was once submerged underwater has been uncovered. The Capital Riverfront Improvement District was formed by legislation, to "Protect the scenic character of the Kennebec River corridor while providing continued public access and an opportunity for community and economic development" (http://www.maineenvironment.org/Edwards_Dam/AnniversaryFacts.htm). Property can

be sold with confidence in that the land will be preserved the way it presently remains and the aesthetics will always have a certain standard.

With the removal of the dam there was a drop in overall water level which eliminated some of the navigable surface area for motor boats. This area ranges from less than 10% at high water level in the spring. During the lower waters of summer the area lost drops to 24%. Motor boat access is now more limited than before the dam was in place, but there is still four two-mile stretches of river that can be enjoyed. During the lower water depths of June through October the river is accessible to canoes, kayaks, and rafts in all but the four slower sections. In the Sydney area, a 4.25 mile ten foot deep stretch is still available down stream from the Sydney boat launch. There are plenty of motor boating areas in the Kennebec but intentions with removal of the dam were to restore the river. There are plenty other motor boating destinations in the ponds and lakes surrounding the Kennebec (FERC 1997, 4-169,170).

The City of Augusta has continued to develop the area around the former site of the Edwards dam for public uses. Where the Edwards mill site once stood now exist a grass park to be enjoyed by the residents of Augusta, along with the vast amount of people that visit the Kennebec River and fuel the industries that rely on the river. The Kennebec communities continue to plan new river celebrations and renew the old ones.

**Results of Dam Removal/Environmental**

The removal of the dam has opened up over seventeen miles of historic upstream spawning habitat for anadromous fish. (CKC, 7) All fish would now be free to move upstream and downstream as they please and the spawning habitat has increased. The

newly formed deep pools could be potential over wintering grounds for striped bass and sturgeon.

Alewives have returned upstream to Waterville and Winslow, which are located eighteen miles above the Edwards Dam site. State biologists have estimated the population at almost two million and increasing. Striped bass and American shad have returned to the upper stretches benefiting their future as a species and the sport fishing has become more diverse. Atlantic salmon and sturgeon, which cannot be targeted by anglers because of fishing regulations also have returned to the upper section. (http://www.state.me.us/ifw/fishing/2003openwaterlaws.htm#GENERAL%20LAW accessed 11/03).

The Atlantic salmon is a prized species among commercial and recreational anglers. It takes juvenile salmon one to three years to reach the length of five to seven inches at which point they undergo a migration from the freshwater river to the ocean. It takes an additional one to three years of life in the ocean to reach sexual maturity and to ultimately return to freshwater to reproduce. Adult salmon enter their spawning rivers from spring through fall, and spawn in late October through November. Ideal spawning habitat for Atlantic salmon is gravel in the size range of 0.5 to four inches in diameter. Areas with shallow riffles interspersed with deep runs offer ideal conditions for spawning. Adult salmon also need resting areas comprised of pools that provide temporary rest of their up stream travel.

Historically, the Atlantic salmon ranged as far north as the west branch of the Kennebec River which is 144 miles from the ocean. Helen Coburn, author of Skowhegan on the Kennebec writes, "River salmon were so plentiful in our early period that

everyone was tired of fish diet" (USDI 1996, 7). In the early 18th century fisherman estimated 68,000 salmon alone from Augusta down stream. By 1850 however, fisherman reported that catching four Atlantic salmon in a year was a good season (USDI 1996, 11). This was proven by incidental catches by commercial fisherman. The salmon also have endured severe pollution in the 1960's which resulted in extensive fish kills. Since the removal of the dam, Atlantic salmon have migrated nineteen miles above the old dam site to Ticonic Falls in Waterville. The Atlantic salmon are using the new waters to their advantage, but it is too soon to see changes in the population resulting from this migration. A free flowing river, time, and less commercial netting pressure will bring back the species. Through the past 140 years the salmon have shown their determination as a species to endure the changes to the river, and they will continue to do this with the dam removed. The removal of the dam is a positive change and to their advantage (NRPDMSPO, 71-74).

In 2000, Paul Christman of the Maine Atlantic Salmon Commission, documented findings on Atlantic salmon spawning at several locations eighteen miles above the Edwards Dam site. He estimated that less than one third of the Atlantic salmon spawning habitat was surveyed for redds in the fall of 2000 (Watts, 4). This leaves two thirds of habitat left, and it is likely that there are spawning salmon in all of these locations. Also taking into account human restraints such as limited time and resources there could be many more redds yet to be discovered. Currently, the run in the Kennebec is under 200 fish a year. With the dam being removed, recreational fishing is expected to increase ten fold. We can expect to see a salmon fishery in the Kennebec River by the year 2020 (DAREMDZ, A25).

The Atlantic salmon will see a net benefit from dam removal. With the water levels lower there will be more upstream pools in which the salmon prefer to rest. The water above the dam opens up new habitat and provides aquatic insects and more baitfish as food. The water temperatures in the summer still could reach dangerous levels for the salmon parr, but they are well adjusted to water changes and would seek cooler pools or highly oxygenated runs. These deep pools would also provide for a wintering ground for the juvenile fish. Most important though, is safe up and downstream fish passage. A fish ladder would promote more fish passage fatalities and turbines would also have killed more fish than desired.

The results of the attempts to restore Atlantic salmon can be compared to the restoration in the Penobscot River that has been going on for 25 years. From 1987-1991 the Atlantic salmon run has averaged 2,700 fish, and there were approximately 2,400 salmon anglers present on the river through out the year. In 1994 it was projected that salmon anglers brought in $1.65 million to travel and fishing industries in the Penobscot area. In the future we can expect to see even greater revenue than this from the Atlantic salmon run in the Kennebec (FERC 1997, 4-171).

The most abundant baitfish currently in the river is the alewife. Alewife range from Newfoundland to North Carolina and land locked species can be found in all the Great Lakes and some lakes in central New York. In 1723, a French priest wrote, "At a particular season of the year, they [the Indians] repair to a river not far distant, where during one month the fish ascend in such numbers that a person could fill 50,000 barrels in a day, if he could endure the labor." He continued to state how they were so abundant that their backs were forced out of the water because of overcrowding. (USDI 1996, 6)

The alewife has come to be one of the most valuable commercially sold anadromous fish (Squires 1988, 13). The majority of the fish sold are used as lobster bait but the potential uses are many. With recent studies showing that the Kennebec has the potential of a 30-50 million pound harvest, it is in every ones best interest for a complete restoration, and with the removal of the dam the fish will be able to be restored even sooner.

The alewife population is expected to come back to what it was in 1837, before the dam was constructed. The Kennebec is the only river in Maine with prime habitat for the alewife. From Merrymeeting Bay to Augusta, the twenty miles of freshwater provides the alewife with ideal spawning conditions. The spring alewife run in the Kennebec River is expected to reach 6 million in the future, becoming by far, the largest in the state. Although it is hard to determine, current populations studies have shown that alewife are the most abundant of the three alosids (shad, alewife, and blueback herring (*Alosa aestivalis*)) in the Kennebec. The results of the Edwards dam removal are expected to be seen soon as the alewives that were conceived upstream of Augusta are almost at maturity. It takes these fish four to five years to reach maturity, and the returning adult populations make their return back to spawn in early May through June. The fish affected by the dam's removal still have not reached maturity, so the results are not yet seen (NRPDMSPO, 62-64).

The American shad is the largest member of the herring family averaging from about two to five pounds and growing up to eleven pounds. The American shad ranges from Newfoundland to St. Johns River in Florida. The fish spends most of its adult life in the sea and returns when sexual mature which occurs from about two to five years of age.

The runs that are typical to the Kennebec are all four to five year old fish, so an increase in the population is yet to be seen, especially since the low population was low at the time of dam removal.

The shad population had completely collapsed from pollution and the existence of the dam. Enormous runs were documented in the early 1800s, with 6,400 shad being taken by 4 men in one day (USDI 1996, 8). In 1880, 108,000 shad were documented from the Merrymeeting Bay area, and by 1919 the shad population had completely collapsed from pollution and the dam being in place. There currently exists a very limited population with 30-50 fish being taken annually (NRPDMSPO, 64-67).

The Atlantic Sturgeon and shortnose sturgeon (*Acipenseridae*) are one of the most primitive of species in the Kennebec River system. The fish originated over 300 million years ago and have gone through very little change in the last 40 million years. These fish are covered in bony armor and have a tooth less rubbery mouth. Both of these species are anadromous fish and can be found in brackish water through out most of their life cycle. The Atlantic sturgeon ranges from Labrador to the northern coast of South America, while the shortnose sturgeon ranges from the St. Johns River in New Brunswick to the St. Johns River in Florida.

Atlantic sturgeon enter the Kennebec in early summer when the water temperatures reach 55-70$^{o}$ Fahrenheit. They feed on mollusks, polychaeta worms, gastropods, shrimps, amphipods, isopods, and small fishes. The Atlantic sturgeon has been found to reach the age of 60 years and the oldest in the Kennebec was 40 years of age. These fish have been known to reach fourteen feet in length and to weigh over 811 pounds. Spawning adults have been found in the Kennebec from mid July through early

August. These fish spawn in areas of small rubble, gravel, or hard bottom in running water pools below waterfalls. Historically, Atlantic sturgeon did spawn between Augusta and Waterville, an area now available to them after removal of the Edwards dam. Samuel Penhallow wrote in 1726, "In the Kennebeck River the sturgeon fishery was also begun and carried on with so great success that many thousands of kegs were made in a season" (USDI 1996, 9). By the year 1880 however, there was only 12 resident fishermen that pursued sturgeon, and their catch was down to 6 tons, with previously being 160 tons (USDI 1996, 13). Since the dam was constructed in the 1800s the commercial catch declined by 50%, and currently the populations are almost nonexistent.

The shortnose sturgeon differs from the Atlantic in that the mouths are different and they also lead different life cycles. The shortnose sturgeon spawns at cooler water temperatures, and appears earlier in the season. These fish will appear in late April to early May. These fish spawn in a substrate of gravel, rubble, and large boulders near deep turbulent areas. The adult fish are confined to the river systems and move throughout the season between feeding, spawning, and wintering areas (NRO 1996, 3-10). With the dam being removed the species habitat would increase by 91% and the fish population by 11.1% (NRPDMSPO, 96).

Rainbow Smelt (*Osmerus mordax*) spend most of their lives in the marine environment and spawn in river systems like the Kennebec. Of all the anadromous species they have been the least affected by the dam because much of their spawning habitat is located below the dam. They mainly feed on planktonic and benthic crustaceans, but also feed on euphasid shrimp, caprellids, polychaeta, insects, fish remains, and plant debris. When the ice begins to melt in spring they head to spawning

grounds. They reach sexual maturity at the age of two to three years old. The smelt spawn in waters ranging from swift water to dead pools and with bottoms ranging from silt to gravel to rock ledge. Smelt run into trouble with a six to eight inch or greater drop in water column and find it impassable or fatal. Much of their spawning habitat is blocked because of manmade structures. The estimated population of smelt before the Edward's dam was removed was six to 90 million (FERC 1997, 3-104).

The striped bass is another species that is present in the Kennebec throughout the year. The fish can be identified by the longitudinal black stripes that go from head to tail on the sides of the fish. Striped bass have been known to spawn from temperatures from 50-75 degrees F, with optimum temperatures being 65 degrees. The spawning areas range from the head-of-tide in Chesapeake Bay to small tidal systems in the Roanoke River in North Carolina. The Kennebec also has its own native breeding population of striped bass (FERC 1997, 4-172). Spawning occurs in slow to moderate currents and in the mid channel of the river.

In the 1830s, these fish were so abundant that over 1,000 pounds of fish could be taken on a single tide (USDI 1996, 9). Throughout the early 1900s this fish became of high demand but were very plentiful. Over harvesting began to occur and its population continued on a downward trend. These fish will not use fishways and the dams eliminated much of their spawning grounds. They suffered greatly and are just beginning to show their comeback. It is estimated that the removal of the dam will increase the population by 28,000 to 85,000 fish. With the removal of the dam the fishing revenue for striped bass fishing could end up reaching $4.6 million (NRPDMSPO, 98).

Brown trout *(Salmo trutta)* are currently the most prominent sport fish in the river. Brown trout will benefit greatly form the dam removal. Ideal habitat for adult brown trout is water flowing at 4,500cfs and this has increased from 184 to 201 acres. The dam has also opened up opportunity for a sea run brown population. Brown trout will see an increased abundance of small bait fish such as juvenile alewife and shad along with aquatic insects also. The spawning habitat would be slightly increased too. Removal of the dam is expected to bring in $559,790 annually (FERC 1997, 4-173).

Smallmouth bass are the most abundant of all species that existed in the Edwards impoundment. Ideal habitat has declined for the smallmouth bass 275 acres to 28 acres with a restored flow of 4,500cfs. The fish will suffer from the loss of depth through out much of the river. Most smallmouths now can be found from just upstream of Sevenmile Stream to the Augusta-Sidney town line. Smallmouth bass have suffered because of predation by the striped bass along with optimum habitat being decreased. With intentions of the dam benefiting anadromous species it was planned that there would be less smallmouth with the dam removed, but there are many alternative lakes and ponds near the Kennebec River that these fish can be pursued (FERC 1997, 4-175).

**Disapproval from the Augusta Fisherman**

Although the removal of the Edwards Dam is of best interest for the success of the Kennebec River some have been against the removal of the dam and have a supporting argument. Many fishermen in the Augusta area complain that the fishing is greatly reduced from the period when the dam was in place. With the dam blocking all fish from upstream passage the fish congregated below the dam in vast numbers. During

the spring herring runs, the striped bass fishing was fantastic with non stop action. With the dam being removed the striped bass along with all other fish make their way quickly upstream. All the good fishing now is found seventeen miles upriver at the next major obstruction.

The smallmouth bass fishing also has suffered from the removal of the dam. The majority of the smallmouth bass habitat was lost with the removal of the dam. When the dam existed an angler could see quality fishing through out the day. Anglers recall that it was common to catch 30-60 smallmouth bass a day without moving from your spot. Now an angler has to fish hard and cover miles of river to catch just a half dozen fish (Lars Hawk Interview).

Not only is there a decrease in smallmouth according to some of the Augusta anglers, but there has been an overall decrease of all fish due to predation of the striped bass. Lars Hawk, an active fishing and politics describes the situation:

> "Every year you've got the stripers, and when they come in, you'll see them down there and they will boil the fish up, and along that freaking river for three, five, six hundred yards across and back until every one of those fish have been eaten. And that includes perch, the white perch, smallmouth, any largemouth, or any other trout that has snuck out from the brook. It's vicious."

In many fishermen's minds the removal of the dam is a shock to the fish that have adjusted to the dam being there. Another concern is that the stripers will also target the trout upstream, which have given the Kennebec its world class reputation for trout fishing.

Other issues continue to be ignored and these fishermen want answers. When the dam was up, the head of the tide was considered to be at the high tension wires which are approximately a couple hundred yards above the dam. The head of the tide is important to

anglers because in Maine it dictates if you need a freshwater license or not. If the water is tidal you do not need a license, and the head of the tide is the border for this. The Augusta angler's argument is that since the dam has been removed the seventeen mile stretch of river is tidal now. The state has done nothing to address this and they still continue to pay for a freshwater license to fish this tidal zone.

The Augusta anglers and friends feel that they haven't been treated fairly during the removal and are upset with the state of Maine and some of the organizations. This group of dedicated and conservation minded anglers feel that more consideration should have been taken when the decision was made to remove the dam. They also feel that the Maine government has misled and lied to them. A meeting was promised to the public in aid to the removal decision making process. This meeting never happened and many feel that they never had a say in the debate on if the dam should be removed. Many of the anglers were left frustrated as high ranking politicians got to speak their voice, but had never even cast a line into the Kennebec River. These anglers wanted to know how someone who did not know much about fish and their habitat get to make such crucial decisions on the dam's removal.

Lars Hawk, also claimed to have found a binder that one of the Maine officials had left behind at the dam's removal. This was all the proof he needed to know for a fact that all the figures and numbers of projected fish populations were lies. Lars and many of his friends were appalled with this information and quickly spread the information to fellow anglers. In the long run the Augusta anglers knew there was nothing they could do and had to deal with the reality that the dam was to be removed. Some of the fishermen

remain dedicated to the river and others have moved to find new bodies of water to fish because of this (Lars Hawk Interview).

### Water Quality

Water quality has significantly improved since the removal of the Edwards dam. More diverse upland riparian habitat and a net increase of wetlands have been accomplished by dam removal. The river has returned to its natural flow, and the amount of white water rapids has increased. White water rapids are ideal for small craft boating, and also provide highly oxygenated water to fish. Swimming areas have been improved by increasing shoreline areas with access to the river. Long-term erosion of known archeological sites that were once subject to impoundment fluctuations has been reduced and can now be researched in stable conditions. Additional shore land, especially on the west bank where the river channel is shallow has also been revealed with the removal of the Edwards dam. The more natural water levels have revealed rapids, such as Six-Mile Falls, and many small islands have also reappeared.

The dam discharges made an unstable water temperature in between releases, and with the dam being removed water temperatures are now stable. Each time a water discharge was made, a sudden temperature changed occurred, especially during the height of summer. The shallow waters below the dam warmed rapidly and waters behind the dam were cooler due to their greater depth. The sudden changes in temperature stressed fish and were detrimental to aquatic insects. The changes in water level from the dam discharges also had a negative effect on fish habits and aquatic life. Fish had to deal

with varying feeding schedules, while aquatic insects were faced with cold temperatures delaying their hatching times.

Water quality has improved dramatically since 1978 when most of the discharges were starting to be treated. The Kennebec watershed has been raised to class AA, A and B from prior levels of class B (FERC 1997, 4-18). The quality of the aquatic habitat will only continue to improve since the removal of the dam. The only parts of the river that are below standards are a few tributaries which have health advisories due to dioxin contamination. The polluted sections are a 56 mile segment of the Kennebec River from Skowhegan to Merrymeeting bay and also the lower Kennebec River below Waterville to Augusta which has low dissolved oxygen problems and bacteria problems. With the dam being removed these conditions should improve. Sampling has shown that cadmium and arsenic are confined above the dam, and dam has prevented the contaminants from moving downstream. Removal of the dam would not re-suspend these particles.

Much of the pollution can be traced to farms, forestry, and urban development. The pollutants from these activities are the source of the eutrophication problem and low dissolved oxygen problems. With the additional problems of sewer overflows, the bacteria contamination problem is further increased. The dioxin pollution can be traced to the tanning and textiles industries. The removal of the dam has had little impact in these conditions, and the solution to this problem would be improved waste management to river discharges. (NRPDMSPO, 29)

In 1990, legislation considered improving water quality with the removal of the Edwards Dam. The DEP prepared a report and studies found that there would be a significant increase in dissolved oxygen and an increase in abundant and diverse aquatic

community (NRPDMSPO, 54). Water levels have been reduced up to eighteen feet in areas near the Edwards Dam. Some industrial debris has been revealed from this (FERC 1997, 4-138). There has been a significant increase of land on the west bank of the river where the waters were relatively shallow to begin with. There has been a slight short term erosion problem along the 28 miles of riverbank affected by the dam removal but have quickly stabilized.

Another intention of the removal of the dam was to establish a more uniform flow that is possible without the power generation. Since the dam has been removed the flows are more stable and predictable. The Kennebec River is subject to major and frequent flooding through its nature. The most recent flood of April 1987 caused over $22 million worth of damages. Following this flood, the Army Corps of Engineers conducted a study of the prevention alternatives was conducted. Two flood control reservoirs were found to be impractical because of design and cost procedures. All of the communities except for two on the Kennebec River participate in the National Flood Insurance Program (NFIP). The program covers all events that could happen on a flood plain for a 100 year flood. The Federal Emergency Management Agency (FEMA) also has invested tens of thousands in detailed flood insurance to identify the 100 year flood boundaries. The precautions and managements of a 100 year flood have been identified to minimize damages. With or without the dam being in place these problems still must be faced (NRPDMSPO, 52-53).

When the dam was in place, the stretch of river from Vassalboro-Sidney was a slow moving section. With the dam being removed this section is a free flowing stretch of sixteen miles. This section now is comprised of more than a half dozen rapids and is ideal

for the average canoeist. The shallowness of this stretch limits is to small crafts like kayaks, canoes and rafts keeping the larger boats from being able to use the river. This would result in a more peaceful and scenic river (FERC 1997, 3-42-50).

The Augusta stretch has steep banks and undeveloped shore lines. With the lower level this has become an ideal scenic area like the upper stretches. In Augusta, Hallowell and Gardiner there are municipal boat landings. In Augusta there is a park that is part of the open space system in the city (NRPDMSPO, 137).

**Wildlife**

The surrounding areas along the Kennebec from Waterville to Augusta are comprised of ten cover types. They include hardwood forests; mixed forest shrub land, disturbed areas, agricultural lands, and open land are common to fairly common. Softwood forest, bottomland forest, plantation forest, shrub swamp, and shallow marsh are less common and are somewhat limited. Common canopy species are red oak, green ash, white birch, aspen, red maple, white pine, eastern hemlock, spruce, and balsam fir. Less common species include silver maple, sugar maple, yellow birch, American beech, hophornbeam, black cherry, willow and American elm. There are more than 100 varieties of herbaceous species and shrubs (FERC 1997, 3-125). None of the locations of these plants and trees are considered critical and they have seen no change since dam removal.

Thirty miles of the Edwards high quality shore line are considered as wildlife resource areas. Through out this area 196 avifauna, 33 herpetofauna, and 50 mammal species were identified. The large riparian habitat is home for white-tailed deer, otter, raccoon, and other species. The woody vegetation provides perches for kingfisher,

flycatchers, osprey, and bald eagles. All species have benefited from dam removal with an increasing abundance of fish and insect life (FERC 1997, 3-125).

Change in water levels has exposed additional land that used to be inaccessible by land owners. There has been an increase of usable land and property values have increased. In certain situations however property taxes have also increased (FERC 1997, 4-192).

With the abundance of baitfish and aquatic life bald eagles, ospreys, great blue herons, kingfishers, and cormorants (*figures 7 & 8*) can be seen using the river. (Townsend, 1) Other less known species such as Alewife floaters, which are a kind of freshwater muscle are benefiting from the upstream passage of alewives. The alewife floaters make their way upstream through the fish's gills and were limited to below the Edwards Dam (http://amrivers.org/tableofcontents/damremovalbenefits.htm).

**The Future of the Kennebec River**

The original intentions of the Edwards Dam removal was for fish restoration and the attempts will continue to be carried on until fish populations are back to what they once were. Although it is too soon to see a major change in fish populations, the numbers of returning fish are already increasing. In the upcoming decades biologists will be able to obtain an accurate count on returning fish to see if the removal of the Edwards was worthwhile. In the mean time, Maine biologists continue to monitor the Kennebec River for positive and negative changes from the dam removal.

There are many future plans for the river that will continue to improve the populations of alewives and American shad. Alewives and American shad will continue

to be "trapped and trucked" until established goals have been reached. American shad larvae produced at shad hatcheries will also be trucked to favorable habitat and then released. Young of the year American shad and alewives will be samples and documented for future references. The downstream passage of American shad and alewives will continue to be studied more extensively. The total fish assemblage from Augusta to Waterville will continue to be studied at select locations. Also a temporary fish weir is to be installed on Sevenmile Brook (MDMRSED, 86-89).

The Atlantic salmon restoration program will continue to be administered. Habitat surveys on tributaries and geographic information system coverage will be performed. The current populations will also continue to be assessed in the Kennebec River and tributaries. Temperature profiles will also be obtained on select Kennebec River tributaries during the summer months to gain a better understanding of thermal regimes that would be critical for salmon restoration. Streamside incubators will be tested in the Sandy River to study growth and survival of juvenile salmon and to establish cost effectiveness on using stream side incubators. Annual reports, recommendations, development, updating, and implementation of a long-range restoration management plan will continue to be implemented (MDMRSED, 91-92).

The removal of the Edwards Dam is an important aspect in the restoration of past fish populations. With an organized and applied fish management plan, the fish populations will be restored to the best they can be in the current status of the Kennebec River. Most importantly though is that society and man have identified the important of our natural resources and the importance of preserving them for the future.

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Table 1

| Fish of the Kennebec River | |
|---|---|
| **Scientific Name** | **Common Name** |
| *Alosa sapidissima* | American shad |
| *Salmo salar* | Atlantic salmon |
| *Micropterus salmoides* | Smallmouth bass |
| *Osmerus mordax* | Rainbow smelt |
| *Alosa aestivalis* | Blueback herring |
| *Salmo trutta* | Brown trout |
| *Morone saxatilis* | Striper bass |
| *Acipense oxyrhynchus* | Atlantic sturgeon |
| *Alose pseudoharengus* | Alewife |
| *Acipenser brevirostrum* | Shortnose sturgeon |

(Squires 1988, Table 4)

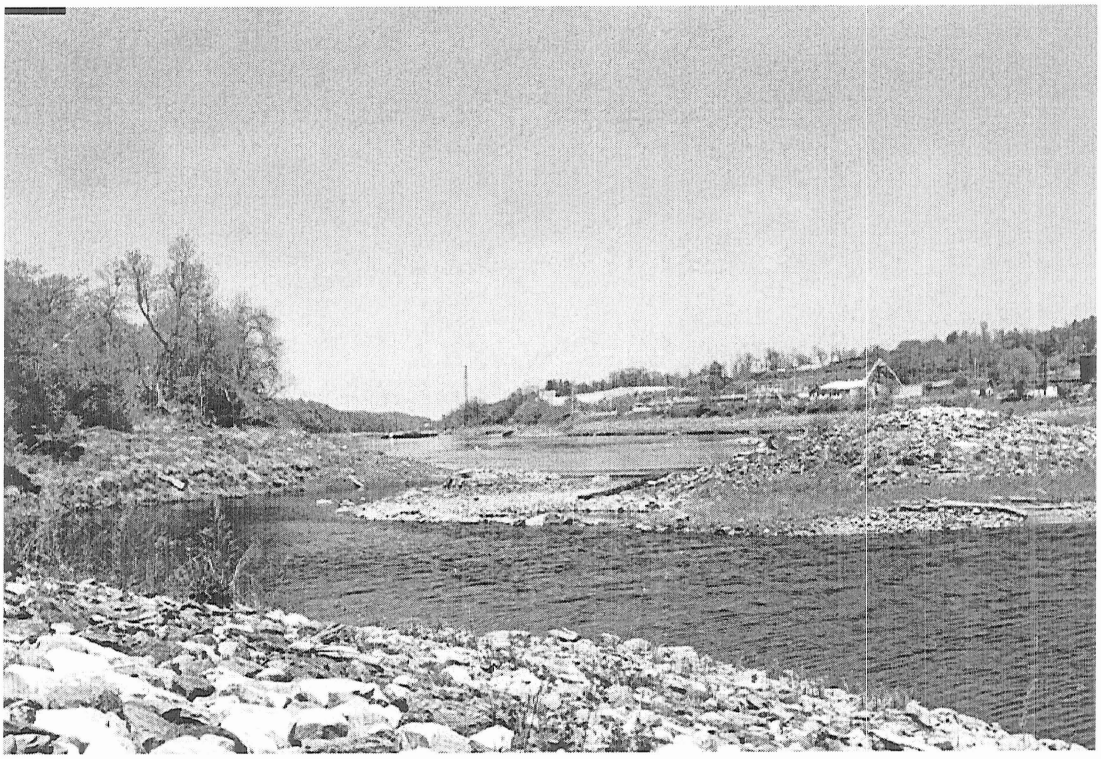


**Figure 1: Looking Upstream Where the Edwards Dam Once Stood**

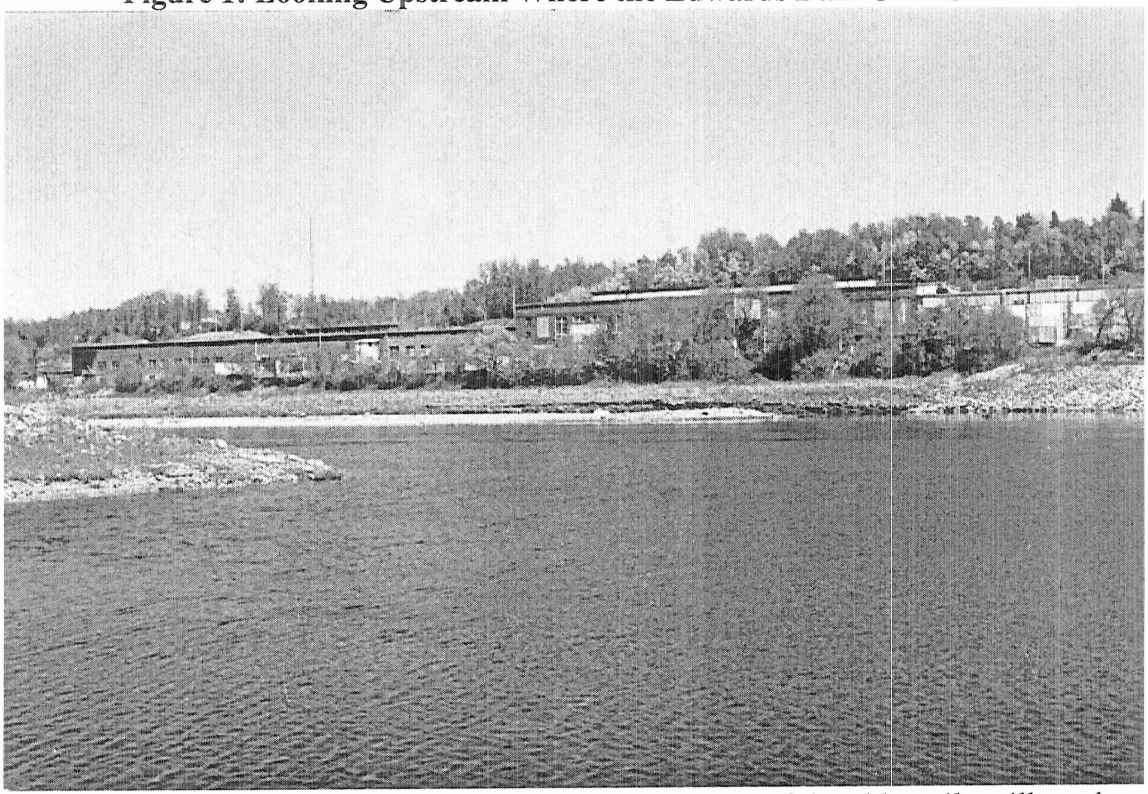


**Figure 2: Another Upstream View.** In the distance some of the old textile mill can be seen, that are used for other business today.

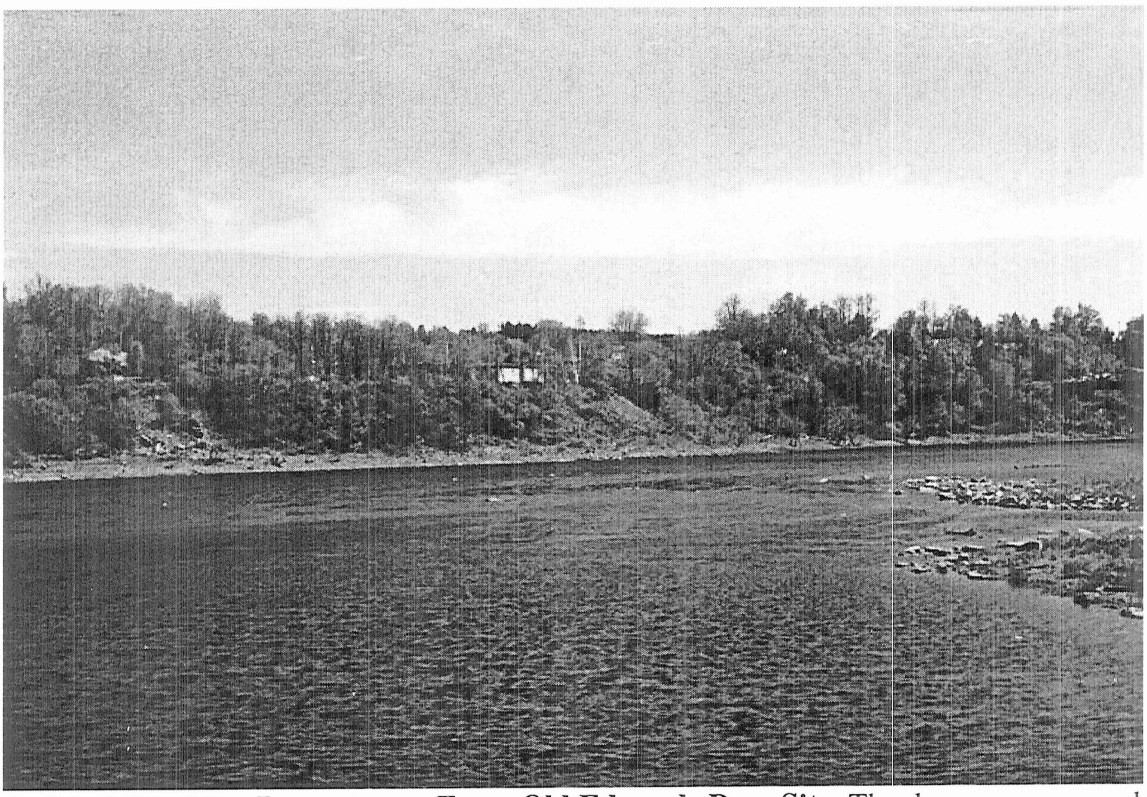


**Figure 3: Looking Downstream From Old Edwards Dam Site.** The dam once spanned all the way across the river. Down stream in the next mile lies the city of Augusta.

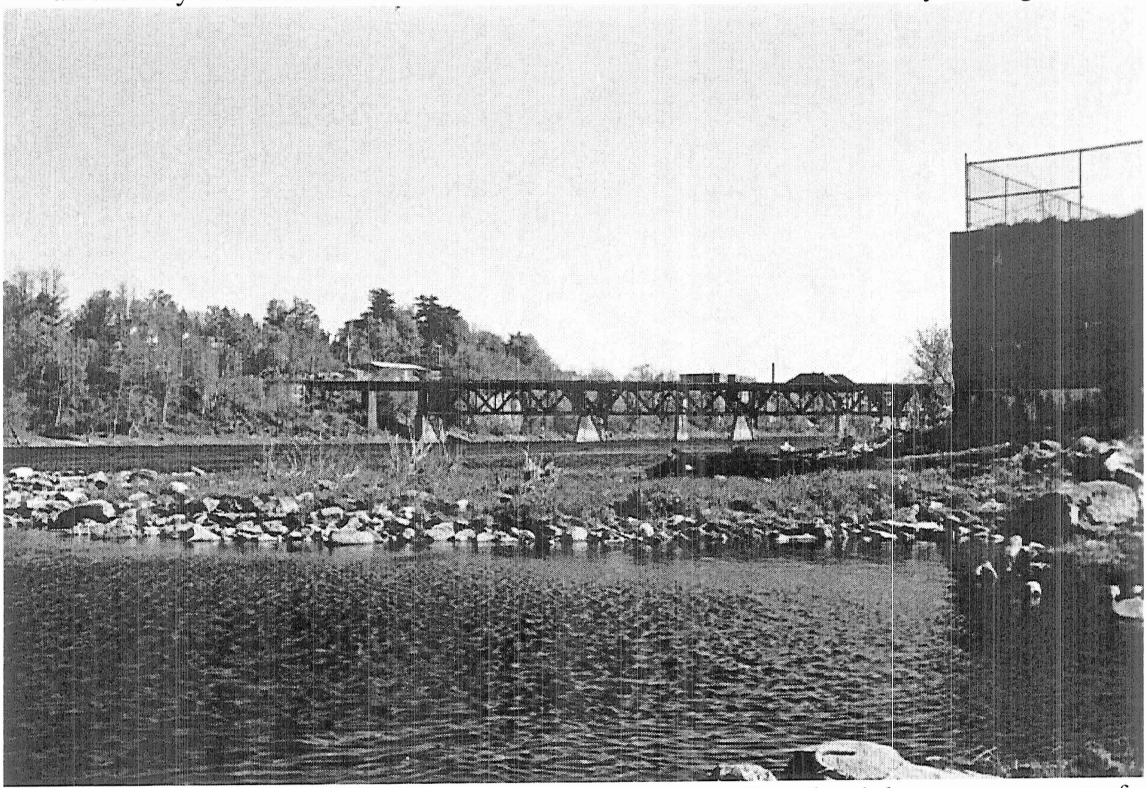


**Figure 4: Another Downstream View.** The concrete wall to the right was once part of the dam. The bridge connects the city of Augusta.

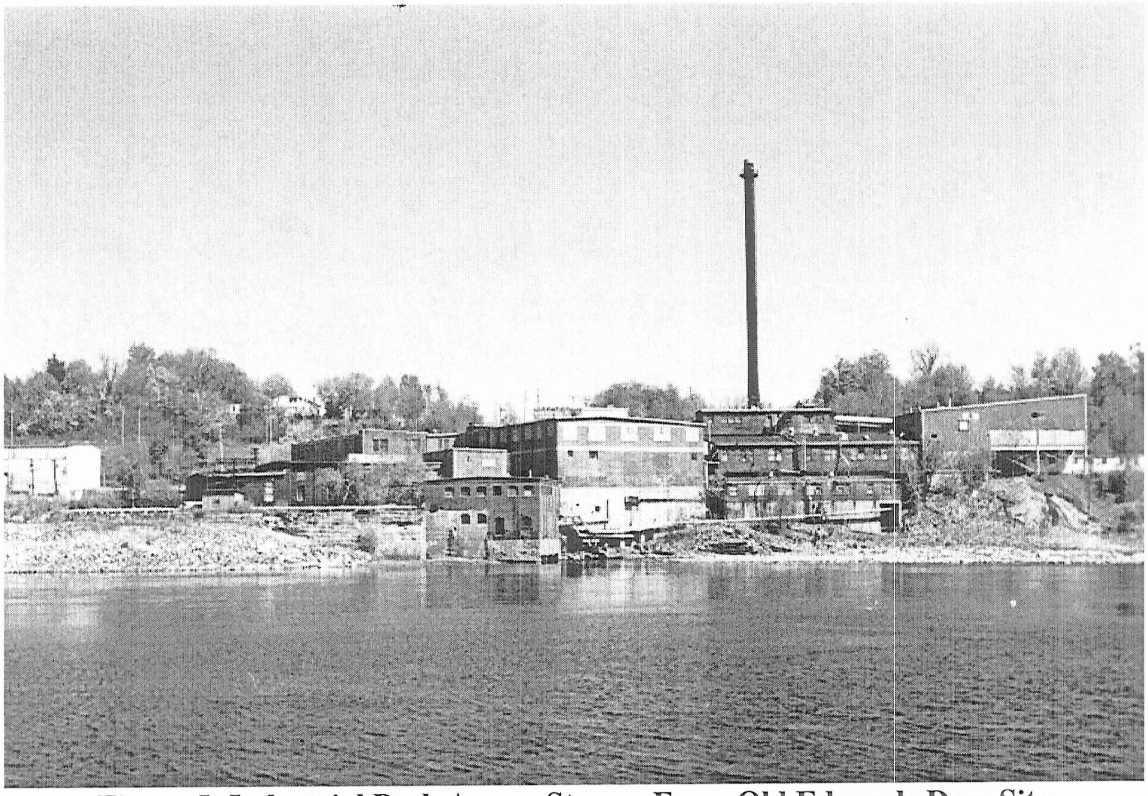


**Figure 5: Industrial Park Across Stream From Old Edwards Dam Site**

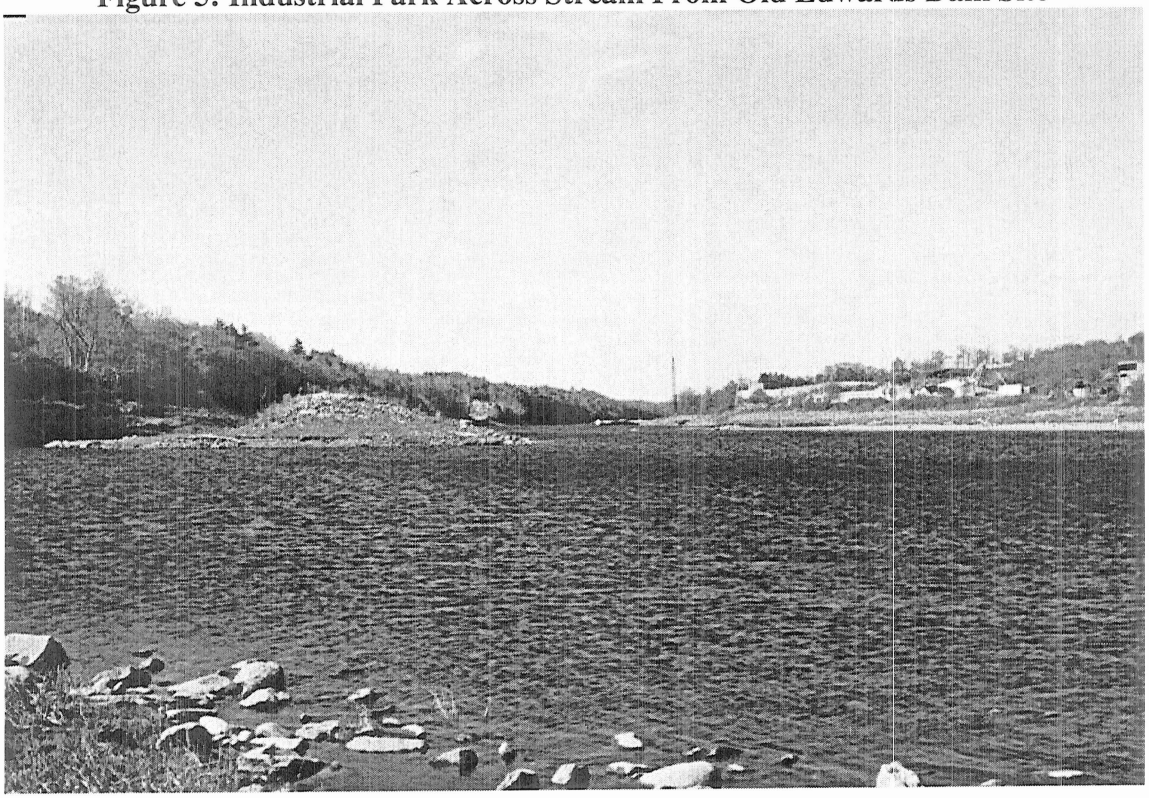
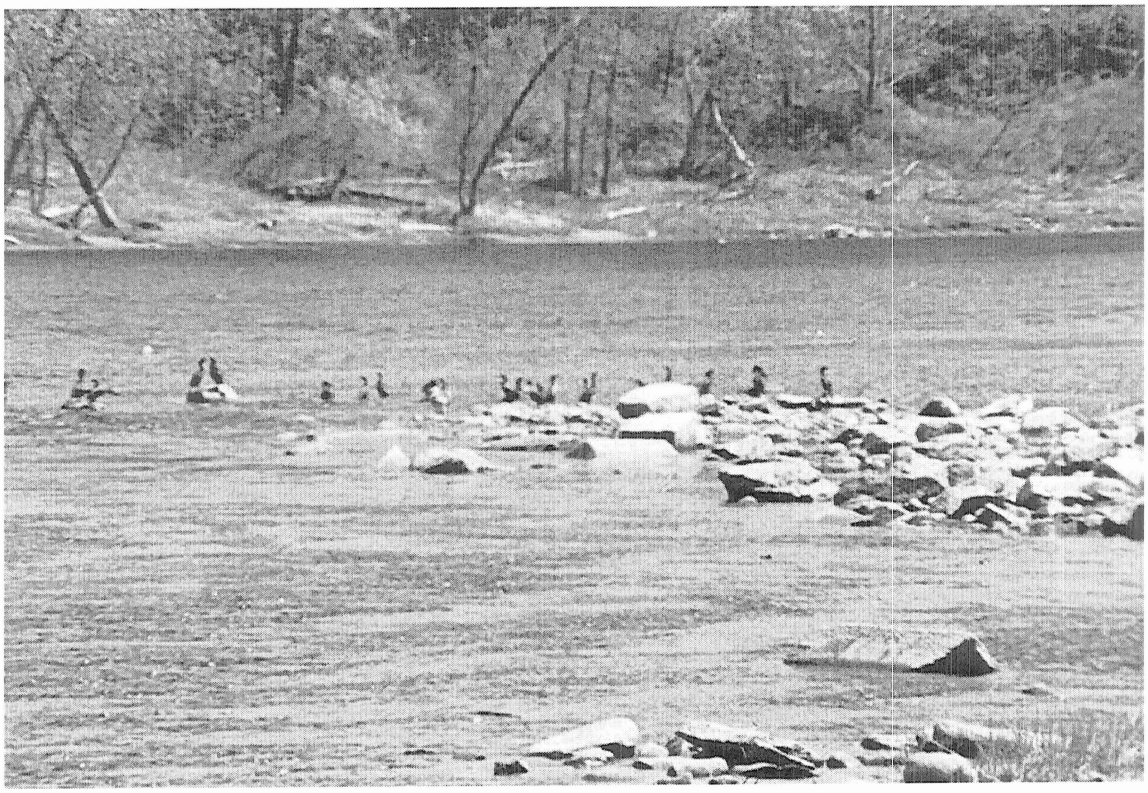
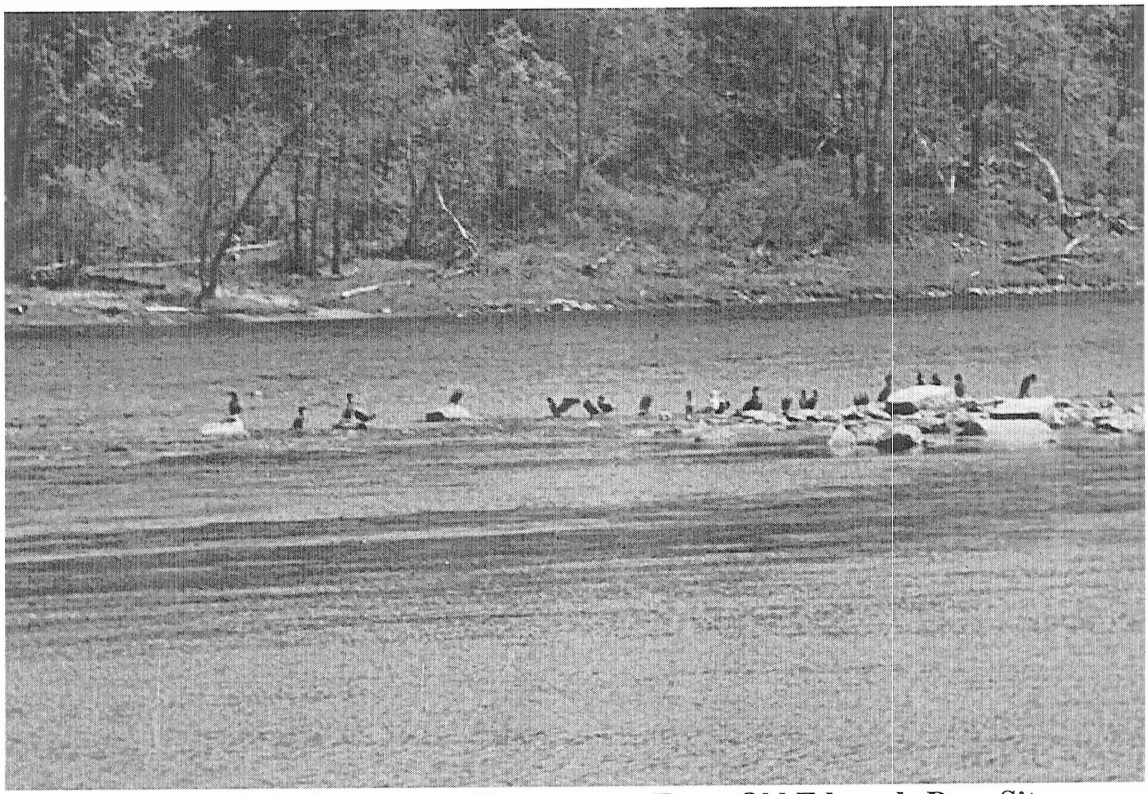


Figure 6: An Upstream View of the Old Edwards Dam Site





Figures 7 & 8: Cormorants Downstream From Old Edwards Dam Site

**Personal Communication**

Interview with Lars Hawk
Date: May 2003
Location: Kennebec River where Edwards Dam once stood
Used with permission.

Lars: They were supposed to dredge out but the reason why they put this dam here 165 or some odd years ago and change was that there was that natural slit bed under it which made a good footing. I don't know… we really got screwed on this deal. There was supposed to be a meeting at the state house and that never materialized, and it's pretty much King and the boys in the back room and they just went ahead and crushed it. The company that did the dig got $7.5 million and they got another $7.1 million in a kick back that was hushed for some project down river and we come to find out about that they had come to fill in some wetlands that was to become some part of a condo. So that was their chip on the other end. Ever since then the fishing sucked, the alewives ands everything go straight up now. We ain't seen a salmon here in five years. I might have seen two smalls ones but, I didn't actually catch them to check them so they might have been browns. That was the other funny one. I can't remember her name. She used the excuse and boy did they really ream it to the public. She said this dam has to go because the salmon have been banging their heads on it for you know so many years, but that was the running joke because there are no salmon. Five six years ago some did come up into Bourne/Pawn brook. I'm believing that was the last of the batch. And kids were down there and the locals were down there and they were just netting them right up.
But it's sad and depending what you're fishing for, you know it was nothing to catch 30-60 smallmouth a day without moving from your spot. Or the same with the striped bass

and now the other thing I found pretty funny, now I'm no purist or anything in any which way. A lot of the trout guys we're pissed off that the alewives, the lampreys, the stripers, and the sturgeon got up river because the mawled up all the rainbows that were natural up there.

Paul: So you have natural rainbows?

Lars: We used to, up Taconic falls in the upper Kennebec. And the ones that weren't purists that wanted the stripers were all for it but now in the last few years the trout are all just thinning out and they're pissed off and they can't figure it out. And they're pissed off and I get the greatest kick out of that.

Paul: So the dam really wasn't that good of a thing for the fisherman?

Lars: They were better of leaving the dam

Paul: Yea?

Lars: Well for us fisherman down here it was. Above it you could get a lot of good trout and you could get landlocks if you were just willing to go along the railroads above the dam. You could get past, but you just had to be willing to get in there. Since it's gone the 2nd year the fishing really sucked and you could walk three miles from here to Hallowell at low tide and you're luck if you got 4 or 5 smallmouth bass.

Paul: Now where did all of them go? Way up?

Lars: Well they can only go to Waterville. But once the runs came through it was like party time. The turbines that were here would make mince meat out of the alewives trying to through and that's what most of the fish fed on. Since its been three, four years it is starting to come around. The lower river is starting to come back to normal but there is not as many smallmouths. If you're lucky and you're fishing down where the yellow

stairs are over there you might be able to get a trout early on the spring out of Bourne brook. And that's because there's a fish hatchery way upstream and the let stockers go. Mostly browns and brookies.

Paul: So it's not even worth fishing here now then?

Lars: Well right now sucks, but when the stripers start coming that jetty over there will be standing room only. Get a spinning rod and a spook and that's all you need. Just cast up river into that fast water. You know and you'll hammer them.

Paul: What about shad? More shad?

Lars: Haven't seen any. Nope no shad. Not many left at all.

Paul: That's funny because where I live, Holyoke Massachusetts there's a dam there and we're getting good shad runs and herring and a lot of striper action now.

Lars: There's some big sturgeon around here that jump up and slam down.

Paul: How big do they get because earlier I saw a big fish jump, how big do they get?

Lars: They get up to twelve, what we're seeing is about eight foot.

Lars Friend: Every once in a while you drive down the Augusta bridge and you see them jump. Come straight up out of the air and you'll see them slam down.

Lars: My buddies got a little tin boat and they were just drift fishing down, and they were down near the bridge street bridge on almost clocked um right in the freakin head. I've had them come within feet of me and just get me totally soaking wet when I'm wading. It's scary. On woman was knocked out of her kayak on time and that was about two or three years ago.

Paul: So they don't care if anyone's around. They just jump?

Lars: Oh yea, we figure they're jumping to get the parasites off of their body.

But it just ain't the same, if you look up river, you see how the banking appears, and you see the green coming up with the bush line, that's how high the water used to be. From that point across and we're standing from where the old mill was. And over there they had some more service buildings. They put the coffer dam through here and were gutting the center of the bridge out. It's just not the same anymore. There's beautiful fishing now if you go up across here onto the other side. You'll see savage park on your left hand side, park go down the back and you've got about 5 miles of flats on the eat bank. Beautiful wade fishing. But you gotta cover every inch of those flats to pick up some good fish.

Paul: Smallmouth you're talking about?

Lars: Yea smallmouth or the stripers.

Paul: See I've looked up stuff online before I came, and everything I've read made it sound like the removal of the dam was real good.

Lars: No it was real evil, haha. Most of the guys that used to fish with us, gone. When the dam was up in downtown Augusta it was wall to wall fishing. We've been arguing with the biologists, because basically they're BS'n people because they're saying the fishings beautiful down here and it's a crock, not down in this end. If you go up and fish under the Sebasitcook or the Messaionskee or under Ticonic falls, yes the fishing will be good there because that's where the fishing stops. Now if the FERC let them keep the plant and put in their fish ladder, they would have had it made. But in the mean time we got screwed. I mean down in the Saco they put in an 8 million dollar fish lift. And that's only hauling a 2,000 gallon tank full of fish when they can fill it. So every body has just had their hand in telling the state house as far as I'm concerned, and a number of us have got really

screwed. When they had their one year anniversary, I was the only guy down here fishing, and they had all the people out there all talking about how good it is. I saw Angus roll by with two buddies in his boat and they got skunked. You know and I'm trying to fish and I'm trying to fish, and they had their reporter idiots and one of them just completely cost me a $50 Airflo line when he run it over with his trolling motor. So I yelled some nice things to him, oh I was pissed. And then they had another guy come down and he left his whole portfolio of all the dam information and I was like jackpot. So I read it out, put most of what I could of it online, and handed it over to my buddies. And that made the circle and everyone was rip-pissed by then.

Paul: So that proved that weren't as many fish coming back?

Lars: Well they were just bullshitting people basically, because the fishing here sucks now. The states not, well every time I call up, well we'll stock up river but we're not gonna stock down river. You know and I mean come on man what's the matter? Afraid the stripers are gonna eat your precious little trouts. I'd love it if they'd start stocking this place. Put it back to the way it was, they seem to think it's gonna do it on its own and it's just not gonna happen. Every year you've got the stripers, and when they come in, you'll see them down there and they will boil the fish up, and along that freaking river for 3, 5, 6 hundred yards across and back until every one of those fish have been eaten. And that includes perch, the white perch, smallmouth, any largemouth, or any other trout that has snuck out from the brook. It's vicious.

Paul: So you get some real big ones here too then?

Lars: Yes, I've caught some 50-55" fish outta that trestle.

Paul: That's the same situation that we have with the fish coming up. How far is the ocean from here?

Lars: 40 miles, just to the other side of Bath Iron Works. I don't know. Another great thing is the way they wrote the rules for the Androscoggin, the Kennebec and the Penobscot. Now if you wanna striper fish you can only have one lure or hook, only one fish per day, and to be able to keep them now it is July 1st or is that only to use marine bait. But you can use (Him and friend debate about when you can use bait)

It's just not the same anymore. The town died. Once that dam was gone and the fisherman stopped coming. If you roll downtown you can see all the empty stores. I mean everything went right down the crapper.

Paul: Yea the way everyone made it sound was that the economy was getting better, and the river was alive with boaters. When I came down here though no one was even here.

Lars' Friend: Yea even the Thompson Dam is better than this, you've got salmon and everything going through there.

Lars: The other part of it the mills were polluting. Every Sunday morning the American Chemical Treatment Plant. They've got a drain right into the middle of the river. And every other Sunday when they drain the tanks. It's all over and they don't care because they're making more money than they'll get fined per day. There was quite a big thing within the last 8 years. So they've been kinda crushing that out. MTBE, PCBs, dioxins, mercury, there's another I can't even remember how the hell to say it but its in here. Now up on the Penobscot I think it was they put in this chemical that would turn the benzenes an orange color and one day I say it. It was just this goddamn slick. That just kept going and going. I still feel we were ripped off by the whole system. There was only one real

fisherman when they had that to do up here, and they didn't even invite the guy but he had some words to say, but they shot him down too. The point of the matter was that they didn't wanna listen to the fishermen, they wanted it all in their pockets. And then when this freakin dam was gone they didn't tell anybody that they were going to get their taxes upped because of the new river frontage they've just received from the dam. So everybody kinda got screwed for that too. And instead of our power bill going down they actually went up.

Paul: So where does everybody get their power from now?

Lars: Aw jez I'm not sure it's coming from CMP from some place. I'm not even sure if the nuke downriver is in operation or not. I don't know that's about as much as I can think of. I only wish I had all the paper work to save for you.

Paul: Well we had a feeling, I was talking to my advisor and he's a fisheries biologist and we've heard everything had been such a good thing. But he wanted me to go down and find out what the true story. The report doesn't have to be sided. It just should tell the truth the way it is.

Lars: Well it depends on who you're talking to. If you're talking to the Trout Unlimited guys they gotta say oh it's good because now we got stripers. And what led to that, now the trout are yanked form the Sabasticook, so they can get the stripers all the way to Benton. Well what about all the native trout that are here. They're gonna get nabbed down, and that's the fierce boot of choice. It was a great river, you could sit out here. You could see eagles, there goes a heron, that's a great blue. You'll see the osprey the hawks the fisher eagles and you don't see many of them now.

Paul: Yea I would like to talk to some of the TU guys to see what they have to say. I mean they like it because the stripers are up in their part of town now and they don't have to drive down.

Lars: Exactly, well it's a catch 22 with those folks. Like I said the ones that didn't want the dam taken out were the dedicated fly fishing only trout guys. They wanted things left alone like it was, at least the few I knew. And the majority of those that wanted the stripers were the great big push behind this. I refused to join them. I'm not gonna back any organization that's gonna tucker to us. As far as the state goes they had BS'd us every which was but loose and we stilla rent getting out stocking programs. And down here everyone you talk to about that, well we'll think about it, and twenty years later where are we now.

Paul: You would think TU would have trout in mind when taking down the dam. But I guess its personal interest. I would rather catch stripers than trout if you look at it that way.

Lars: I can't remember his name but the idiot was over here at the Bourne brook dam, heavin' the lampreys over the dam. Helping them to their native environment. And people were ticked off. They come down here and they were gonna bust him sideways. And they were really gonna hurt this boy if he didn't get the hell out of there. Granted the lampreys are just gonna spawn out and die, but it will eat anything it can in the mean time. It's just not the same anymore.

Paul: Is the water low right now?

Lars: Well when the dam was up this water would get lower by about 2 or 3 more feet. And you might get another half a foot out of it at dead low. Late in the summer it might get a little bit lower than that but not by much

Paul: So is that high water by now then?

Conversation changes subject to unrelated matter.

Interview at Fly Fishing Only Fly Shop
Location: Fairfield, ME
Time: May 2003
Used with permission

Shop attendant: I was just saying that I was involved with T.U., I was involved with T.U. at the time, and just the fight to remove the dam at the time took years and years. When it finally came to pass, and when it was coming to pass all the politicians jumped on, but as far as I'm concerned it was a good thing for the river. There's been more fish habitat, and I can understand how the people in Augusta feel, you know they're fish aren't all bottle necked in one area, but I think for the river, the Kennebec, much better

Paul: For the long term and everything?

Shop attendant: And here's another man that knows. He's a guide that works on the river.

Fishing guide: How are you doing?

Paul: Hi, I'm doing a project on the removal of the Edwards Dam

Fishing guide: Oh, you're that guy I saw on the net?

Paul: Yea, I'm the guy

Shop attendant: Yea from Worcester Polytech

Paul: Hey how are you, I going down and getting everyone's opinion on the removal of the dam. So you think it's a good thing then?

Fishing guide: Of course it's a good thing,

Paul: Okay because that's not what I've heard from everyone

Fishing guide: It's a free flowing river

Paul: See I've run into some complaints down in Augusta.

Fishing guide: Yea you'll find that, yea you'll find it down near the city of Augusta. The political department in the city, just the city not the legislature, you know there looking to

find ways of making money. You'll find out more, you'll see. There's some resistance. You know a lot of old timers, and it's basically a lack of knowledge. People think that property values go down, but that's not true and it's why everyone's building along the river now. And a free flowing river is much more valuable. You don't think so, go up to Caratunk, God that place has gone from ghost town to boom town, almost overnight.

Paul: So you think the populations of the fish are up too then?

Fishing guide: It's been great for the fish

Paul: Ever the trout, don't the stripers go to town on them?

Fishing guide: No, no nope. You have to understand, when you get an anadromous fish they cannot pass the dams, so, so the traditional fishes that go from the ocean to the lakes and rivers and use the lakes and the rivers in the east, like shortnose sturgeon, American alewives, blueback herring, sea lamprey, American eels, elvers, all those fishes. Those fishes form a forage bass for the larger ones like striper bass and the Atlantic salmon. And the sea run fishes that turn sea run are brown trout so all of those fishes, the big ones eat the little ones, and those are the ones that use the rivers when they can get by. Now if there's an impediment like a dam they can't get by. They can't get over and they can't swim and they get bottled up there. And that's what some of the people in Augusta think well they took that dam out and now no more bottle neck. The fish were stuck there, they couldn't go anywhere, but they still have to eat so people fished for them and they though " oh isn't this marvelous" Well the trouble is that the life cycles of the fish that wanted to go upstream, those lifecycles were interrupted, and they had to find alternate routes. The migrations of these Atlantic salmon and these anadromous fish changed, and what would

you do? You'd find a different river to spawn in. They have to full fill their genetic destiny. So it's a restorative thing.

Paul: So any improvement in Atlantic salmon?

Fishing Guide: Well we probably won't notice that for years. And there's no way to tell because we cant fish for them, however just yesterday I was being told by my friend Jim Tibberdel, which is another guy you outta call 873-3921. You should give him a call. And Jim was saying that they dropped the water lever at the Lockwood dam. So Jimmy went down with Florida power and light people and they were netting alewives and one shortnose sturgeon 18" long and they put them where they could survive because they were trapped in these pools. So they had to free them and there was a lot of American elvers, little eels and they come out of the Sargasso Sea and they spawn and they come back, but there was a lot of fish trapped up there, and he netted them for four hours to try to save them.

Paul: Now eventually would you like to see the removal of every dam?

Fishing guide: Well I would live to see fish passage. The dams can stay as long as the fish have the ladders, so they can go up, so it's not dam removal but it's the passage of anadromous fish.

Paul: See I'm from Holyoke Mass, I fish a lot and we have the shad lift, now why not a lift on the Edwards.

Fishing Guide: Some places it's cost effective. The dam wasn't making money for the power plant anyways, it was a losing deal. So that's why the dam was taken out because the owners weren't making any money. And they still had to pay taxes to the city of

Augusta and Augusta was making a cool million dollars a year, and now that's probably why that those people in Augusta.

Paul: They mentioned the tax problem.

Fishing Guide: But the fish go right by them and here's another man to talk to. He's from Holyoke doing a paper on the removal of the dam.

The crowded shop makes it hard to hear

Paul: To shop owner: So has business picked up for you after the removal of the dam?

Owner: Yes, business is just really starting to come around.

Fishing Guide: See the next dam down is ready for a ladder to be installed. They didn't put it in because there was no fish that could get to it. So the dam that's above the falls in Winslow is all ready to go but they're not going to do anything about it

Crowded shop makes it hard to hear.

Interview with Tom Squires 7/11/03
Location: Phone conversation
Maine Department of Marine Resources
207-624-6348
tom.squires@state.me.us
Used with permission

Paul: I've found plenty of information about before the dam was removed but now I'm having trouble finding information after the removal.

Tom: Okay, well, we've done some limited studies as far as fisheries studies go, and it would be available in some annual reports which we could send you. But basically what happened was we worked for years on restoring the alewife trucking alewives to lakes and up river habitat. And that run has really built up to 1.5-2 million fish and they now migrate to Waterville/Winslow, actually to the Sabisticook River which was where we have been stocking. So seventeen miles up river they migrate now. Hopefully in another tear or two we will have free passage for them into these lakes. We've documented all these species except sea run smelt going upriver. We've observed Atlantic sturgeon, shortnose sturgeon, although we didn't catch any. Although one shortnose sturgeon was caught this year at the base of the dam in Waterville. Ah what other species…Striped bass go upriver now, and there's a nice little recreational fishery for striped bass in the summer in Waterville/Winslow. American shad is the other specie that we are really have put a lot of effort into restoration. We have a hatchery program and we're stocking juvenile shad, a lot more shad above the dams and we're sampling from Augusta to Waterville and we're finding both wild and YOY and some hatchery YOY shad, so we're find some natural reproduction of shad in that stretch. But as far as seeing huge expansion in the population of sizes it is too early to tell because of the life history of the species.

Paul: Yea, that's what I figured

Tom: Yea, the American shad their life cycle is that they come back to spawn for the first time when they are 5-6 years old. And the dam was taken out in 99' and so its gonna take 5 or 6 years to get the results of the first year back, and actually in 99' it came out in, it was completely removed in, August, so that's after the spawning season for most of these species. So it was actually 2000 was the first year that most of these fishes had free access up river, so 2005 and beyond. For sturgeon, Atlantic sturgeon you're talking 20 years. 20-25 years before you see any results, as far as the adults come back. As far as juvenile reproduction we just haven't documented that yet. So it'll take a lot of years for these fish populations to build back up.

Paul: But you do think that they will, because of the dam being removed.

Tom: Right, the habitat as been restored for the marine spawners. Before it was just an impoundment for most of that stretch. It wouldn't of been conducive for spawning of sturgeon or striped bass or smelt. Those species don't readily use fishways, so even if you did put a fish way in the Edwards dam the sturgeon, stripers, and the smelt wouldn't of been able ot get up. And I think that the shad habitat is of higher quality now. Without the dam in there and I think we'll see a good increase in their population Another species we will see a good increase in is the blueback herring, which of course is related to the alewife, and it spawns in marine habitat. We've seen quite a few blueback herring in Waterville, and those are 4-5 years old and they return to spawn, so we'll see some very good expansion in those.

Paul: What about aquatic life? Aquatic insects?

Tom: The DEP did some work, and I don't have that report and I can give you a name to call at the DEP if you want.

Paul: Yea that would be good

Tom: they did studies for 2 years in a row I believe and in the year 2000 there was just an unbelievable increase in quantity and species. There was an immediate response there.

Paul: So there was an immediate response?

Tom: and I believe the second year of the study the numbers went down a little and I believe that was because of an increase in predation by fish. But that was a dramatic change.

Paul: Anything about economic growth from the dam removal?

Tom: No, there hasn't been any that I know of, but on the other hand just from observation the rivers seeing a lot more recreational use now by both kayakers and canoes and boats. Although the river, you cant really use a big boat in the river now because there are a lot of riffles now. But I think you're seeing a lot more recreational use of that river through that stretch than we did historically. So I think we've had an impact there. And there's an increase in recreational angling mainly in the Waterville area. I think it's decreased in Augusta, so I think it might be a wash there. But overall there has been an increase in recreational use. There's been an increase of people just going to the river to observe. I know this year people have just been going to the river to observe Atlantic sturgeon and shortnose sturgeon jumping. Originally, I don't have all the documentation, but it as been a controversial subject in the local area, there was a lot of opposition to it, but once the dam was out the majority of people that were opposed to it are now happy that it happened.

Paul: Yea, I've been starting to find that out.

Tom: So overall it was a very wise decision.

Paul: Ok then, I appreciate your time

Tom: Let me give you this guys name at the DEP. Dave Courtemanch and his number is area code 207-287-7789 and he can probably send you the reports on the insect studies. I don't know what the time frame is on your report, but we could send you some reports also.

Paul: I pretty much have everything about the past history, but I need some more about what has been done recently.

Tom: Give me your address and we'll send some annual reports out.

Paul: My name is Paul Ruszala……

Tom: Okay we'll send some reports out to you.

Paul: That would be great thank you

Tom: No problem.