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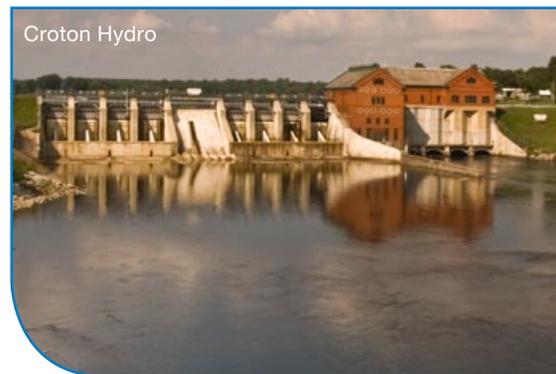
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Flood of 1986 Challenged Employees and Machines

TWENTY-FIVE years ago, as Consumers Energy celebrated the 100th anniversary of its 1886 founding, a two-day storm of epic proportions tested its Muskegon River dams and the people of west Michigan like no weather event has, before or since. By the time it was over, west Michigan was swamped with more than a foot and a half of rain, at least six people died, 89 more were injured and public and private property suffered millions in damages. The storm posed a real threat to the integrity of Rogers, Hardy and Croton dams. Had they failed, the scope of the disaster unquestionably would have been much worse.

The week of Sept. 7, 1986 started out as routine as any for the Muskegon River dam operations and maintenance staff. Periodic unit inspections were getting under way for Croton unit 1 and 2 and Hardy Pond had been lowered one foot to decrease the chances that it would need to pass flows through the spill gates at Croton while the two units were out. On Sunday, Hardy unit 1 had experienced a brake failure and also was pulled out of service for repair.

Such activities were a common occurrence and that September seemed a good choice for completing the unit inspections.



Croton Hydro

As dawn approached on Thursday, flow passage had to increase at all three plants as rising pond levels need to be controlled.

It had been a dry summer and that Monday, Sept. 8, the Muskegon reached its lowest flow in two years, about 1,100 cubic feet per second (cfs) at the Croton plant. Work was proceeding routinely on Tuesday Sept. 9, as a storm front began moving into Michigan. Unlike most storms, however, this storm did not move across the area and continue east. This front would stall over the Lower Peninsula.

By 10:00 a.m. on Wednesday Sept. 10 about two inches of rain had fallen in the Croton and Hardy area. Consumers Energy's Muskegon superintendent Charles J. Smith contacted the U.S. Weather Bureau office in Ann Arbor to obtain additional

Consumers Energy Muskegon River hydro plants were tested during the epic 1986 September rain event.



THE HYDRO REPORTER

Consumers Energy publishes The Hydro Reporter annually in conjunction with the Manistee-Muskegon-Au Sable Coordination (MMAC) Team to keep neighbors of the hydro plants and other interested citizens informed about progress in implementing the Federal Energy Regulatory Commission 40-year licenses issued in 1994. The MMAC Team, which includes representatives from Consumers Energy, state and federal Resource Agencies and an environmental coalition, coordinates the license implementation process. Contact information for MMAC Team members is listed below. The principal writer / editor of The Hydro Reporter is James R. Bernier, Consumers Energy Hydro Generation.

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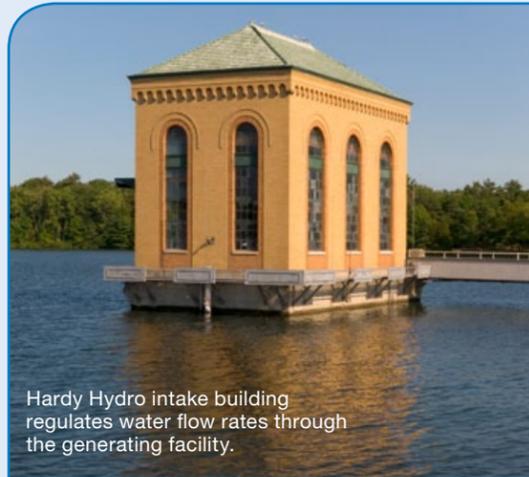
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Hardy Hydro intake building regulates water flow rates through the generating facility.

Measuring River Flow

On Thursday Sept. 11, 1986 at 6 p.m., the Muskegon River flow at Croton Dam was measured at 18,020 cubic feet per second. It was the highest river flow ever recorded at Croton Dam. For many that number is difficult to understand or relate to. How much water is one cubic foot per second (cfs), and by extension how much water is 18,020 cfs?

A gallon of gas. A quart of milk. Or even a two liter bottle of Coca Cola. We all are accustomed to these forms of liquid measurement. Measuring stream flow presents a different challenge, rather than measuring a stationary volume as in a bucket, a volume passing a given point must be determined.

At its stream gauging stations, the United States Geological Survey uses actual measurements to calculate an area across the stream at different heights or stages. At a dam the process is similar. The area of the intake tubes for the units and the area of the spill gates or tubes is measured. In both cases the resulting area is expressed in cubic feet.

A cubic foot is one foot on both sides and one foot deep, and it holds about seven and one-half gallons of liquid. The cfs measurement uses the number of cubic feet of area taken up by the water at any point in time, combined with the rate or speed at which the water is passing that location, to calculate a total volume of water. So, one cfs is seven and one-half gallons of water passing a given location per second.

On that very soggy and harrowing September evening in 1986 then, about 135,000 gallons of water were flowing through the Croton plant each second, that's more than 8 million gallons in a minute and nearly 500 million gallons in an hour.

Flood of 1986 Challenged Men and Machines CONTINUED FROM PAGE 1

weather information and the latest forecast. The Weather Bureau said it had no reports of heavy storms elsewhere and wasn't predicting severe weather at that time. Still, with the increasing river flows from the rain, Smith decided to take a cautious approach and discontinue the planned unit inspection on Croton units 1 and 2. He ordered the crew to reassemble the units and place them back in service. The units were ready by 2:30 p.m. that day.

Throughout the day on Sept. 10, while the crew has been working on the Croton units, the rain never let up. The severe rain inundated all of west Michigan. By 10:00 p.m. an additional four inches of rain has soaked the area, and all available hydro units were online. Spill gates were opened at Rogers Dam and at Croton Dam because there is more water flow than can be handled by the generating units. By Wednesday evening, Smith decided to place operators on extended overnight duty at all three dams. Croton's spill gates were opened to four feet. The one-foot drawdown at Hardy for the Croton routine unit inspections had been almost entirely refilled.

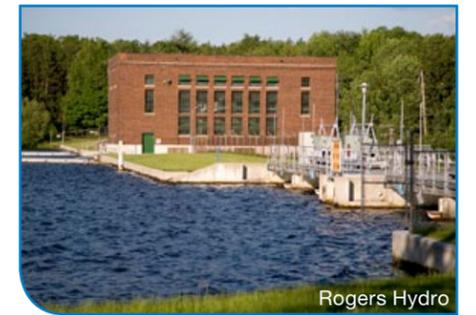
Constant heavy rain accompanied by thunder and lightning, fell throughout Wednesday night and into the early morning hours of Thursday, Sept. 11. At 2 a.m. spill tubes at the Hardy plant were opened. As dawn approached on Thursday, flow passage was increased at all three plants to help lower rising pond water levels. An emergency crew was brought in to get the damaged Hardy unit 2 repaired so it can go back online to help pass the increasing volume of water. Flooding was discovered in the basement of the Rogers plant and local volunteer firemen respond with pumps and sand bags to help keep machinery dry and prevent the units from tripping offline.

At 9 a.m. the amount of rain recorded in the past 24 hours range from about seven inches at Croton to nearly 11 inches at Rogers. By 11:30 a.m. Thursday the Hardy Pond has risen to 1.5 feet above normal full head and was near to flowing over the emergency spillway located at the top of the dam. The repair crew completed the Hardy unit 2 repairs and was placed back in service.

By that time, the basement flooding at Rogers was under control, but a new



Hardy Hydro



Rogers Hydro

concern has arisen that the tremendous amount of debris being dragged down the river from upstream was starting to plug up the Rogers spill gate area. Additional maintenance staff responded to the problem and were able to cut and dislodge the worst

Consumers Energy's operations and maintenance staff remained on duty in the plants at considerable personal risk to monitor and operate the equipment in order to safely pass the flood waters.

of the debris in the highly hazardous setting to maintain flows through the spill gates. By midday the worst of the storm finally passed and flows into Rogers Dam begin to abate slightly. Hardy and Croton were by no means out of the woods.

At 2 p.m. on Thursday, water begins to flow across 36th Street and down through the Hardy Dam emergency spillway. At this point the total flow at Hardy was approximately 17,700 cfs. At 4 p.m. the Emergency Action Plans (EAP) for a possible failure of Hardy and Croton Dams were initiated. The decision recognized that if the dams were to fail, a sudden additional torrent of water ten to 20 feet high would be sent downstream, threatening the lives and property of numerous residents on Croton Pond and downstream. The EAP triggered the evacuation by local emergency responders of all downstream residents in the Muskegon River floodplain. Despite the threat, Consumers Energy's operations and

maintenance staff remained on duty in the plants at considerable personal risk to monitor and operate the equipment in order to safely pass the flood waters.

In addition to the Muskegon River flows being passed through Hardy Dam, Croton also was receiving the flow of the Little Muskegon River. At 6 p.m. on Sept. 10, the flow at Croton peaks at 18,020 cfs with 56 feet of spill gates open, in addition to the plant's four units operating at 100 percent capacity.

Over the next 12 hours, the rain finally relented. The flows slowly decreased and pond levels gradually were restored to normal levels. The crisis at the dams was over, though many downstream residents would continue to battle flood waters and extensive damage in the coming weeks.

For Consumers Energy many lessons were learned. Programs to evaluate and make repairs and improvements to the dams to ensure they were safe were redoubled. Consumers Energy also has worked extensively with local units of government to strengthen Emergency Action Plan procedures for its dams. One of the most important lessons learned was the value of dedicated Consumers Energy employees who stand by their post throughout the storm and performed admirably under very adverse conditions.

Today, as Consumers Energy now celebrates its 125th anniversary, television and electronic weather map radar displays provide instant information about the weather. Yet we know that adverse weather never will be entirely predictable.

In two days, the week of Sept. 7, 1986 went from routine to the worst flooding disaster in west Michigan's history.

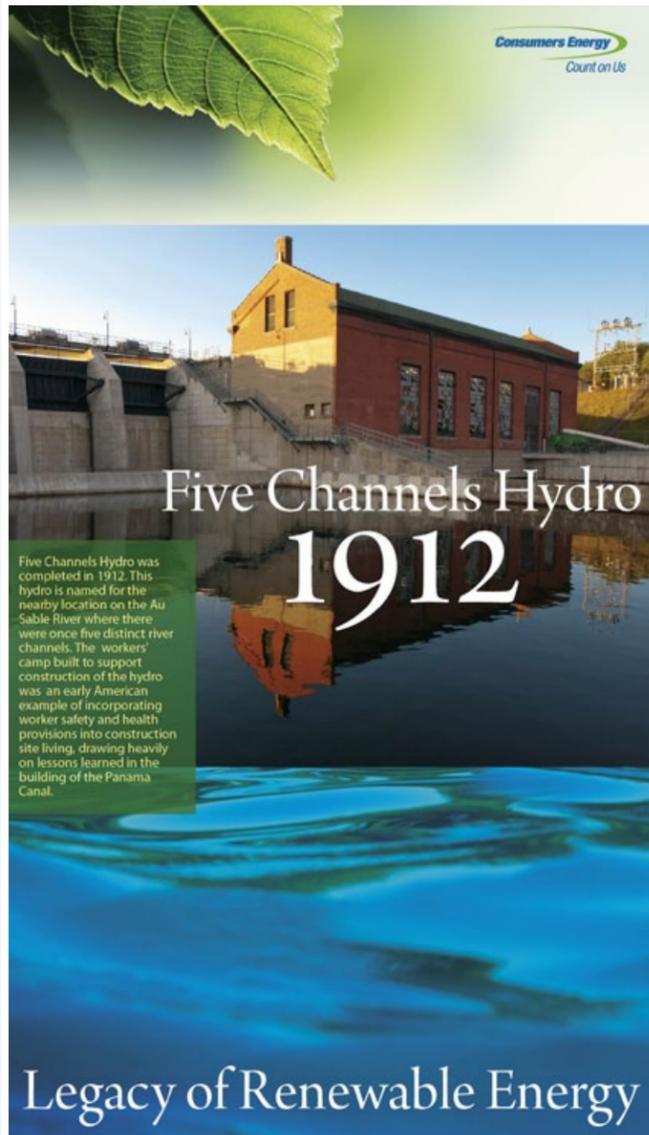
Cooke Dam Tours Featured During Centennial Celebration

MORE THAN 450 people took advantage of a rare opportunity to tour the Cooke Dam hydro plant as part of a centennial celebration for the first Au Sable River dam. The June 18 event celebrating Cooke's 1911 startup also included historical presentations and a special cruise on the Au Sable River Queen.

The construction of Cooke Dam was one of the first projects of the new Consumers Power Company, which had been formed just two years earlier by Michigan utility pioneers led by brothers William A. Foote and James B. (J.B.) Foote. Following Cooke's entrance into commercial operation in December 1911, the Five Channels Dam (pictured on the cover of this issue) was commissioned in 1912 and the Loud Dam came on line in 1913. The thousands of construction jobs that came with the dams were vitally important to the area.

Members of the Au Sable River hydro operations crew were on hand to provide visitors with information about the Cooke plant and how it produces electricity. Though many elements of the plant have been modernized and upgraded over the past 100 years, visitors learned that much of the plant's equipment remains original.

Many advances in equipment effectiveness and efficiency marked the early 1900s when Cooke and other plants like it were being built. Thanks to those innovations and the careful maintenance efforts of current Au Sable hydro staff and their predecessors, the equipment can still be counted upon as a reliable source of renewable energy. Cooke, Five Channels and Loud dams generate an average of 67 million kilowatt hours of electricity per year, enough to serve today's annual power needs for about 7,500 residential customers.



Above: Dale Nickell, Au Sable River hydro superintendent, explains how hydros work during a community Cooke tour.

Left: Five Channels display panel.

Cooling Outflow Water Temperatures In 2011

DURING 2011, Consumers Energy continued to work in cooperation with the resource agencies to enhance hydro plant outflow temperatures. The work at the hydro plants continues to focus on the design, installation and operation of "upwelling" systems that are being used during critical periods to bring cold water up from lower in the ponds, helping to cool outflows from the plants.

Upwelling systems at the Au Sable River Mio Dam and the Muskegon River Croton Dam, completed in 2010, in 2007 the one installed at Hodenpyl Dam on the Manistee River were in full operation in 2011. The modeling and design work for an upwelling system at the Manistee River Tippy Dam also was completed in 2011 and installation of the system is expected in 2012.

The study of summer hydro plant outflow temperatures, and efforts to improve those temperatures, continues to be an important part of Consumers Energy's hydro project environmental objectives. So far Consumers Energy has invested nearly \$1.5 million in this program as part of a \$1.75 million commitment to address temperature and dissolved oxygen issues associated with the Manistee, Muskegon, and Au Sable River hydros.

Fish generally are grouped into classes of cold, cool and warm water species. Each group requires different ranges of water temperature for optimum survival and growth. The Manistee and Au Sable Rivers and the section of the Muskegon River below Croton are managed by the Michigan Department of Natural Resources as cold water fisheries, focused on species such as trout, salmon, and steelhead.

While Consumers Energy's hydropower dam ponds provide excellent cool and warm water fisheries, managing the dams to support downstream river segments for cold water species presents some special challenges. Water temperatures in the outflows from the dams are affected by the size, depth and shape of their ponds. Other less obvious factors such as water chemistry also affect these cold water fisheries, especially during hot summer weather.

Water in the upper portion of the ponds absorbs more sunlight and becomes warmer than it would be under natural river conditions. Outflow temperature concerns rarely arise during the winter, spring, and most of the fall when natural conditions allow the water to mix throughout the pond, and there is less sunlight and heat from the water to absorb. During the heat of mid-summer, however, the water in the deeper ponds forms temperature layers. This is known as stratification and it happens in natural lakes, as well as the dam ponds. The deeper portion stays colder and a boundary called a thermocline forms that prevents this colder water layer from mixing with the warmer water layer near the surface.

Most of Consumers Energy's hydro plants draw water from about the upper-third to upper-half of their ponds. In the summer when that shallower layer has warmed, the resulting plant outflows can be warmer than is optimal for cold water fish species. The cooperative efforts of Consumers Energy and the resource agencies have focused on methods of tapping the colder water layer in the hydro ponds.

This project, which began in 2003, has been complex. The depth of each pond, the volume of cold water available, how the cold water is replenished by inflows, determining when the cold water reserve



should be tapped and determining how it could best be tapped are just a few of the questions that had to be answered for each dam. The cold water resource is limited, so simply changing to a "bottom draw," which has been suggested in the past, would deplete the supply of cold water during the spring and early summer when the river temperatures are already cool. This would result in little or no cooler water being available later in the summer when it would be most beneficial to fish.

The upwelling systems were developed to address this issue. They are designed to provide a mechanism that enables managers to control when the cold water layer is tapped. The systems use compressor driven air bubbler systems to upwell the colder water into the plant intake area. The systems are activated during the portions of the summer when they are most needed. Based on extensive data and computer modeling, each system is operated differently to match the characteristics at the dam pond where it is installed.

At Hodenpyl in 2011, the upwelling system was activated on July 11, when outflow temperatures began to average 71°F. Based on previous modeling and testing, the Hodenpyl system is operated between midnight and 6 a.m. when it builds on natural night time cooling to maximize the river cooling impact downstream. The studies showed that running the system continuously would exhaust the pond's supply of colder water before the end of the warmest summer period in mid-August.

Once the Hodenpyl system was activated, based on the trigger temperature agreed to with the resource agencies, it was operated on a daily basis through September 3 when the average outflow temperatures consistently had fallen below 68°F. During the time the system was in operation, the outflow water temperatures were observed to drop about 1.80°F to 2.5°F.

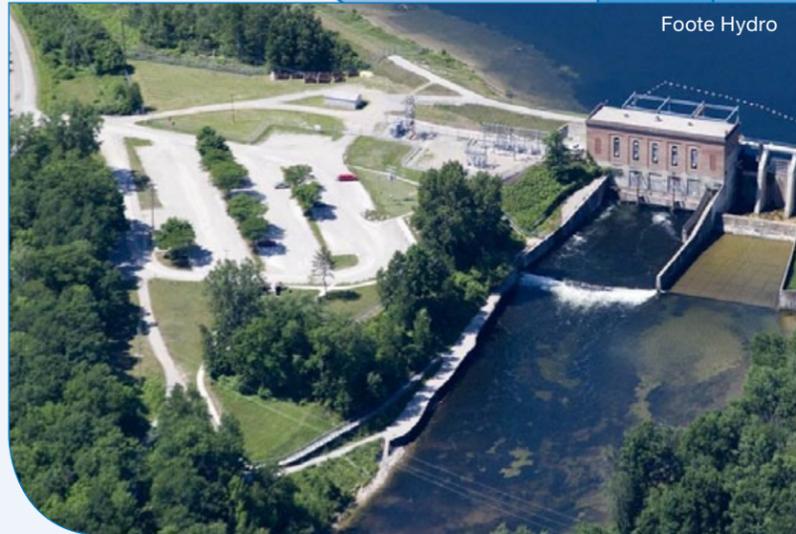
Foote Dam Tailwater Access Being Readied for Reconstruction

FOR MANY decades, one of Michigan's most popular fishing access locations has been the tailwater area at Foote Dam on the Au Sable River. Angling enthusiasts from all over the state are attracted to the salmon and steelhead that move up the Au Sable to Foote each spring and fall, along with resident steelhead, walleye and other species available throughout the season. Deterioration along the sheet pile wall that provides the principal shore fishing access at the site has led to plans for the closure of a

The complete reconstruction of this site will ensure that the Foote Tailwater Access remains one of Michigan's most popular fishing access sites and that it will continue to serve the public for decades to come.

portion of the area in 2012 and a complete reconstruction of the site in 2013 that will require the site to be closed to public use for most of the construction season.

The Foote Tailwater Access is operated by the Michigan Department of Natural Resources in partnership with Consumers Energy. In recent years MDNR staff and Consumers have observed increased stress along the sheet pile installation, particularly along the lower half of the wall. Concern about the resulting angle of the railing at the top of the wall led to an interim measure in 2008 to install a new safety rail that had to be set back up to several feet from the top of the wall. The need to develop long term plans for rebuilding the site was recognized at that time.



In 2012, the lower half of the sheet pile wall will be closed off from public access. Engineers working on the design of the rebuild determined that this closure is necessary to maintain an adequate margin of public safety at the site. Anglers still will be able to fish the upper half of the access area and also will be able to gain access by way of an existing stairway to the river below the end of the sheet pile wall. The fenced closure area is expected to be in place by April 15, 2012.

The 2013 access site reconstruction will be a component of a larger dam safety project. The design work is in process and is being conducted in consultation with the MDNR. The final design requires the review and approval of the Federal Energy Regulatory Commission. Once site plans have been finalized and approved, Consumers Energy will place a design drawing at the site for public information along with additional details regarding the dates of the 2013 closure as they become available.

Consumers Energy regrets the inconvenience to the public that will result from temporary closure in 2012 and the construction project site closure in 2013. However, the complete reconstruction of this site will ensure that the Foote Tailwater Access remains one of Michigan's most popular fishing access sites and that it will continue to serve the public for decades to come.

Hardy Pond Trail Development Effort Delayed

Efforts to develop a new 30-mile long hiking and mountain biking trail that would encircle the lower two-thirds of the 4,000 acre Hardy Dam Pond have been delayed. The Federal Energy Regulatory Commission (FERC) has advised that additional planning is needed before it can rule on the trail project.

The trail project is led by Big Prairie Township, with assistance from the Croton-Hardy Business Alliance, Michigan State University Extension and other outdoor recreation interests. The trail would be located almost entirely on Consumers Energy lands surrounding Hardy Pond.

The trail, as envisioned, would provide a new recreation opportunity for area residents and visitors. The existing network of campgrounds and day-use facilities that dot the shoreline of Hardy Pond would allow hikers and mountain bikers to enjoy the trail for single or multi-day adventures. With its natural setting and chances for excellent views of Hardy Pond, local organizers believe the trail would attract a wide variety of users.

During 2011, Consumers Energy prepared an initial submittal of the proposal to the FERC, whom must approve the proposed trail as an additional public recreation use under the Hardy FERC license. FERC advised that additional information regarding the financing, scheduling and management plans for the trail would be needed before it could make a determination on the proposal.

The trail will require 23 foot bridges of various lengths, and the financing and schedule for completion of the bridges was one of the items that FERC staff cited. Management and oversight of the trail use, once it is completed, was another area where additional details were requested.

Consumers Energy has reviewed the issues that were outlined by FERC staff with Big Prairie Township. The Township and other Hardy Pond trail project supporters are working to address the concerns that were raised and hope to resubmit the project to Consumers later this year or in 2013. People interested in learning more about the trail project or participating in the effort can contact Township Supervisor Dave Wright at (231) 689-1250.



COOLING OUTFLOW WATER • CONTINUED FROM PAGE 5

The Mio upwelling system was activated on July 3, 2011 when average outflow temperatures began to rise above 68°F. The dynamics of the Au Sable River at Mio have dictated that the system be operated differently than Hodenpyl. The Mio Pond is not as deep as Hodenpyl and studies showed that the cold water inflow at Mio is carried through the pond more rapidly than at Hodenpyl. As a result, once activated the Mio upwelling system is operated on a continuous basis, rather than cycling on and off.

With the continuous operational method, it is not possible to compare system temperature differences as was done at Hodenpyl. Based on downstream gauge data, the system was effective in preventing the outflow from rising beyond 77°F and generally kept the outflow in the range of 71°F to 73°F.

Croton Pond's upwelling system includes both an inner diffuser near the plant intake, similar to that at Mio and Hodenpyl, and a second outer diffuser placed farther out in the pond. This arrangement is based on the bottom shape of Croton Pond. The two systems also are operated differently. The Croton inner diffuser began operating July 6 when the average outflow temperature reached 72°F and like the Mio diffuser was operated continuously until Sept. 23.

The outer diffuser, which is placed where the pond drops off to a deeper area, is operated midnight to 6 a.m. similar to the Hodenpyl system. Operating the outer diffuser continuously would deplete the cold water supply

too quickly, leaving little or no cooling potential later in the summer. As was the case at Mio, the system was effective in preventing the outflow from rising above 77°F and it generally kept the outflow in the range of 70°F to 73°F.

Tippy Dam Upwelling System Set For Installation

During 2011 Consumers Energy and the resource agencies completed the consultation and computer modeling that has led to the design of an upwelling system for the Manistee River Tippy Dam. That process required additional time and the system could not be fabricated and deployed in 2011 as originally hoped. That system now is scheduled for installation this spring and is expected to be operational for this summer.

Similar to Croton, the Tippy system will utilize both an inner and outer diffuser array. The trigger temperatures and exact mode of operation for the system will be determined based on initial results and adjusted as needed after the 2012 season.

Consumers Energy is pleased with the overall effectiveness of the 2011 upwelling systems operation. These cost effective systems are helping to address one of the most challenging aspects of hydropower operation and fulfill the water quality objectives that are part of the 1994 hydro project Federal Energy Regulatory Commission licenses.

Trumpeter Swans of the Au Sable Valley

THE PAST winter brought a remarkable wildlife presence to the lower Au Sable River. Au Sable Valley Audubon Society members recorded 283 trumpeter swan observations in a single day on the Alcona, Loud and Cooke Dam hydros. Consumers Energy played a major role in the reestablishment of the trumpeter swan, one of Michigan's native waterfowl, to the Au Sable valley. Since that effort began in 1997, not only has a self-sustaining population become established on the hydro ponds, but the area has become a winter mecca for trumpeter populations from there and elsewhere.

Trumpeter swans once were common in Michigan, but virtually were eliminated by the early 1900s. The chief culprits that brought about their demise were unregulated hunting to supply feathers for high



Left: Trumpeter swans at Alcona hydro.

with the fact that the land surrounding the reservoirs has been protected from development, are the principal factors that made them ideal candidates for the trumpeter swan project.

Over a three-year period Consumers Energy released 14 birds. The swans were raised at the Kellogg Bird Sanctuary near Battle Creek at a cost of \$700 per bird, which was funded by Consumers Energy. The company's environmental staff conducted the trumpeter swan releases.

The success of the nesting pairs on the Au Sable and the strong productivity they have shown was the kind of success that was hoped for when the reintroduction plans were developed.

The native trumpeter is easily distinguished from the exotic mute swan. While the adults of both species are all white, the trumpeter swan has a smooth, jet-black bill, while the mute swan's bill is orange with a black knob on the upper bill near the head.

Also, as their names imply, trumpeter swans have a distinctive foghorn-like call, while mute swans have no distinct call and make no sound louder than a hiss.

The Au Sable trumpeter releases have proven remarkably successful. There are one or more resident nesting pairs of trumpeters from the original releases and their offspring at the Alcona, Loud, Cooke and Foote reservoirs.

In addition, there are also resident pairs at several beaver flowages and small inland lakes in the area. They are the largest North American flying bird and can live for up to 30 years or more. A male, called a cob and

a female, called a pen, mate for life, unless one of the pair dies, when they will seek out another mate.

The success of the nesting pairs on the Au Sable and the strong productivity they have shown was the kind of success that was hoped for when the reintroduction plans were developed. What was completely unexpected is the level to which the Au Sable has become a draw for wintering trumpeter pairs from a much wider area.

Trumpeter swans normally migrate south only as far as they need to in order to find open water areas with suitable forage to

CONTINUED ON PAGE 11

Mio Dam Tailwater Fishing Access Improvements

Two projects to provide better access to the excellent rainbow and brown trout fishery below Mio Dam on the Au Sable River are under way. The south side access to the fishing area below the dam is being

upgraded as part of dam maintenance project that will be completed in early summer 2012. A new access facility on the north side also is being developed and is targeted for completion by the end of 2012.

The fishery

below the Mio Dam has gained steadily in quality and popularity in recent years thanks to Michigan Department of Natural Resources efforts. This segment of the Au Sable River has benefited from a variety of habitat improvement efforts and a companion rainbow trout stocking program that takes advantage of those habitat enhancements. Habitat Improvement Account funds, contributed to the state by Consumers Energy under the hydro project licenses, were key in making many of the habitat enhancement projects possible.

MDNR has followed up the fisheries work with new regulations that include provisions for year round fishing in this portion of the river. The result has been an increased interest in better access, including barrier-free access for disabled anglers.

The existing south side access at Mio, completed in 1999, includes a parking area, vault toilet and a canoe launch site. The facility connects to the downstream MDNR Park below the M-33/72 bridge over the Au Sable River with a barrier-free walkway that crosses under the bridge. The site also provides barrier-free access to a fishing area at the foot of the Mio Dam spillway. The dam

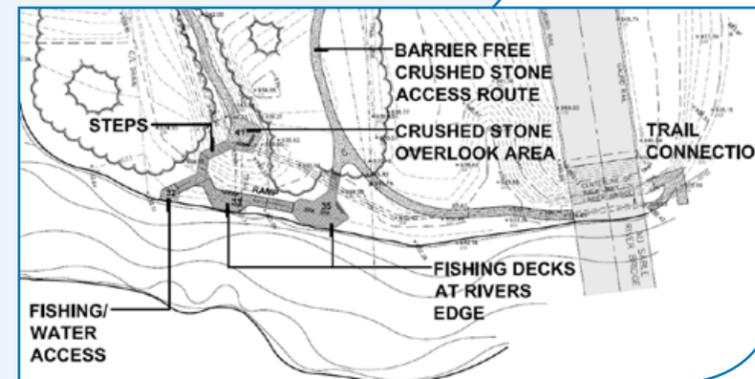
maintenance project being completed by Consumers Energy includes an expansion of that fishing area with greater access to the water's edge for wheelchairs and the installation of a railing for public safety.

On the north side of the Mio Dam tailwater, Big Creek Township has developed a proposal in cooperation with Consumers Energy to construct and operate a new access site. The site has been designed by M C Smith Architects of Grand Rapids to provide barrier free fishing access through an advanced system of boardwalk structures and a barrier-free stream access station. The site also would provide parking, a toilet building and access stairways built into the boardwalk system for able-bodied anglers.

Big Creek Township has received a grant from the U.S. Forest Service to cover a portion of the project cost. Additional funds have been provided by Consumers Energy and the township. The remaining funds for the project, estimated to cost about \$200,000, are being sought from the Michigan Habitat Improvement Account and other local grant sources.

Consumers Energy has prepared an application to the Federal Energy Regulatory Commission (FERC) for approval of the Mio North Tailwater project. FERC approval by mid-summer 2012 is being sought. This would allow for construction to proceed this fall.

The fishing access improvements at the Mio North and South Tailwater sites are another element in a multi-party effort to enhance the Au Sable River segment downstream of the dam, both for natural habitat goals and for making the area more accessible to the public. The combined efforts of the Michigan DNR, the U.S. Forest Service, Big Creek Township and Consumers Energy will provide a rewarding opportunity for anglers and many others who will enjoy the cool, clear waters of the Au Sable River and its outstanding fishery for many years to come.



Above: Plans for Mio Dam Tailwater improvements.



A nesting trumpeter swan.

society headgear, introduction of exotic mute swans from Europe, and loss of habitat as wetlands were drained and inland lakes throughout the state were developed.

Efforts to reestablish the trumpeter swan in Michigan began in the mid-1980s using stock obtained from Alaska and birds from remnant Montana and Wyoming populations that were maintained in zoos. By the early 1990s, a healthy swan population had been reestablished in the eastern end of the Upper Peninsula.

In 1997 Consumers Energy became a part of a Michigan DNR and Michigan State University - Kellogg Bird Sanctuary program targeting the reintroduction of trumpeter swans along the Au Sable River.

The lake and wetland habitat created by Consumers Energy's dams, combined





Improving Fish Habitat – The Habitat Improvement Account Program

SINCE THE Au Sable, Manistee and Muskegon River hydro project licenses were issued in 1994, Consumers Energy has provided more than \$6 million to the Michigan Department of Natural Resources (DNR) – Fish Habitat Improvement Account (HIA) program.

These HIA funds, which were agreed upon as a way of mitigating any fish damage caused by the hydro plant turbines, have been invested in a combination of fisheries research and projects that include habitat improvement, fishing access and erosion control. For 2011 Consumers Energy contributed about \$237,500 to the HIA. The company's HIA contribution is increased annually at the rate of inflation.

Projects eligible for HIA funding can be located anywhere in the watersheds of the Manistee, Muskegon and Au Sable Rivers. Priority for project selection is based on addressing management needs identified in the river assessments that the DNR has completed for each of the three rivers.

The assessments may be found online at the DNR website: www.michigan.gov/dnr. Once there, select Fishing, then the "Fisheries Library" near the bottom of the "On-line Services"

listing. The river assessments are in the Fisheries Special Reports section of the library. Fisheries Special Report No. 19 is the Muskegon River Assessment, No. 21 is the Manistee and No. 26 the Au Sable Assessment.

Projects funded from the HIA program in 2011 included the placement of large trees on a section of the Au Sable River between the Alcona Dam and the Loud Dam Pond. This effort is part of an ongoing strategy aimed at replacing large trees along the Au Sable that typically fell into the river along the shorelines before the major logging drives began 200 years ago.

The trees improve fish habitat by providing fish cover and nutrients as well as by adding complexity to the river habitat by altering stream flow in their immediate vicinity. The Au Sable large wood restoration project was a joint effort of the U.S. Forest Service and Huron Pines Resource Conservation. The HIA contributed \$27,500 toward this \$85,000 project.

The Lower Manistee Restoration Partnership and Conservation Resource Alliance (CRA) were awarded \$80,000 in HIA funding as part of a multi-party effort to remove an abandoned road crossing on Cole Creek in Wexford County and restore the stream in that area. A county

road that crossed the Manistee River tributary was washed out in 2008 flooding.

The resulting condition of the crossing was causing excessive sedimentation and acting as a dam on Cole Creek. The road was closed to public use at the time of the flooding and the

Overall the HIA supported \$301,400 of fisheries research, habitat improvement and stream restoration activities in 2011.

decision was made in 2010 to remove rather than rebuild the crossing. Several other major grants were secured to support the \$150,000 project in conjunction with the HIA grant,

The Anglers of the Au Sable were awarded \$46,300 in HIA funding toward a \$96,300 project to lead a multi-party effort to collect baseline water temperature and flow data in the upper Au Sable and Manistee River watersheds.

The Michigan Department of Environmental Quality (DEQ) has issued a number of permits to drill new wells for natural gas in these areas using the hydraulic fracturing process. The long-term potential impacts of such activities on cold water trout

fisheries are largely unknown. This study, similar to a project now under way in Pennsylvania, is designed to provide baseline data for an assessment of possible future impacts. The monitoring and data analysis will be done through the Geology Department at Michigan State University.

The Michigan DNR and other partners will utilize an \$85,000 grant to lead a multi-agency study on the Higgins Lake lake level control structure in the upper Muskegon River watershed.

The purpose of the study is to evaluate the likely effects of removing the control structure (returning the lake levels to their "natural" condition) on Higgins Lake and the Cut River system; including evaluation of surface water levels, shore-line characteristics, erosion, and fishery habitat.

Participating stakeholders in this project include DNR Fisheries Division, DEQ Water Division, the Muskegon River Watershed Assembly (MRWA), the Higgins Lake Property Owners Association, the Higgins Lake Foundation, Huron Pines as well as Michigan State University and University of Michigan researchers. The Roscommon County Board of Commissioners oversees the lake level dam and is supportive of this project. The study will take place over a two-year period and will include future management recommendations.

Michigan DNR will receive \$35,000 in HIA funding to conduct a late fall to early spring creel survey on the Au Sable River below Foote Dam.

A major focus of the survey is to assess the success of steelhead trout stocking in the Au Sable River. The DNR is spending a significant amount on the stocking program and would like to have more details regarding the success of those stockings. It is anticipated that the survey would take place in 2013.

A \$27,600 HIA grant to the Michigan DNR will fund 50 percent of the cost of a project designed to collect data on a watershed site inventory of dams and road crossings in the Muskegon River and tributaries, using Geographic Information System (GIS) technology.

Information collected in this project will be entered into the standard barrier inventory database recently developed (through a 2010 HIA Grant) for Michigan DNR and other agencies bordering Lake Michigan. The database was developed to insure information gathered will be consistent across watersheds for each barrier, can be used by any agency or organization, and can be used for prioritizing barrier removal. The information gathered in this project will be used to determine the needs and costs of dam and road stream crossing project to improve fish passage and water quality.

Overall the HIA supported \$301,400 of fisheries research, habitat improvement and stream restoration activities in 2011. More information about the HIA project proposal and selection process is available from Michigan DNR Agency Representative Kyle Kruger, whose contact information appears in the Manistee – Muskegon – Au Sable Coordination Team listing on page 2 of this issue.

TRUMPETER SWANS • CONTINUED FROM PAGE 8



carry them through the winter. The operation of the hydro plants helps to keep an area of open water downstream of each plant. Shortly after the birds began to establish themselves on the Au Sable, wintering flocks were seen on the ponds, particularly on upper Cooke Pond where the outflow from Five Channels Dam kept the area free from ice and the wetland character of the area provides especially good foraging opportunities.

Each winter additional birds have been seen in the area. As a result, in 2003 the National Audubon Society designated the lower Au Sable as an Important Birding Area (IBA).

The IBA program is a global effort to identify and conserve areas that are vital to birds and other biodiversity. This past winter, which proved to be unusually mild, brought a great deal more open water in the upper pond wetland areas of all the Au Sable hydros. As a result more trumpeters than ever were attracted to the area as a wintering oasis.

During a January 6, 2012 observation effort, members of the Au Sable Valley Audubon counted 70 trumpeter swans on Alcona Pond, 102 on Loud Pond near the U S Forest Service Westgate Overlook site, and 111 trumpeters at three locations on Cooke Pond, a total of 283 swans.

About one-third of the birds were young of the year, called cygnets, indicating that the breeding population is very successful. The cygnets are distinguished easily because they remain a mottled grey throughout their first year, before molting to the white plumage.

Consumers Energy is continuing to work with the multi-party effort to ensure the trumpeter swans and their habitat remain protected and that the public understands the importance of the return of this native species to Michigan's riparian landscape.



HYDRO reporter 2012

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