U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Service
Office of Response and Restoration
Assessment and Restoration Division
290 Broadway, Rm 1831
New York, NY 10007

December 11, 2008

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, DC 20426

Dear Secretary Bose:

On behalf of the Department of Commerce, the National Oceanic and Atmospheric Administration's Office of Response and Restoration (NOAA OR&R), in its natural resource trustee capacity, works to protect and restore coastal resources from threats related to releases of hazardous substances and oil spills. NOAA OR&R appreciates the opportunity to comment on the Town of Massena Electric Department's (MED) October 2008 Initial Study Report Project Massena Grasse River Hydroelectric Project FERC Project No. P-12607 New York. MED's October 2008 Initial Study Report (ISR) provides the study status and reports on fifteen studies as well as an update on the cost of power.

NOAA previously submitted comments on several documents related to the proposed new dam in Massena, New York. These include comments on the January 2007 Massena Grasse River Hydroelectric Project Scoping Document 1, the May 2007 FERC Scoping Document 2, the Town of Massena's May 2007 Proposed Study Plan, the Oct 2007 FERC Study Plan Determination, and the January 2008 Proposed Final Study Modifications to the Study Plans for the Massena's Grasse River Multi-Purpose Hydroelectric Project.

<u>Lake Sturgeon Movement and Spawning Study</u>

The ISR documents lake sturgeon abundance, spawning and seasonal movements for the years 2006-2008.

The Grasse River is one of the most important tributaries in the Lake St. Francis watershed and provides habitat for lake sturgeon and other fish species reproduction. This type of tributary is not available on the Quebec side due to the lack of major or minor tributaries (Dumont 2008). Dams impact fish habitat and fish movement on both the Raquette and Salmon Rivers on the southern shore although the Ft. Covington Dam is slated for removal later this year. The lake sturgeon population in the Grasse River is unique to this section of the St. Lawrence River system. Because it appears to be a self-sustaining spawning population, it is critical to the recruitment of sturgeon in the Grasse River proper and potentially Lake St. Francis. This adds to the importance of understanding lake sturgeon population size, age distribution and growth rate and the immigration and emigration of fish into and out of the project area and between the Grasse River and the St. Lawrence River.

A continuous monitoring station near the mouth of the Grasse River should be installed to track sturgeon movement between the Grasse River and the St. Lawrence River as one means of determining bi-directional movement of lake sturgeon between the Grasse River and the St. Lawrence. The fixed station at RM 1.8 cannot affirmatively document movement between the Grasse and St. Lawrence Rivers due to its distance from the mouth. Welsch et al. (2008) evaluated genetic characteristics and structure of Laurentian Great Lakes lake sturgeon and determined three population groups: Hudson Bay – northern Lake Superior, southern Lake Superior and the rest of the Great Lakes. One consequence of dam construction is further isolation of this population group and an alteration of the genetic structure.

Tracking fish movement at the mouth of the Grasse River would provide a better picture of the number of sturgeon and their age class structure, in addition to the frequency of their movement in and out of the Grasse River. This is an important component of supplemental work and should include some tagging of Lake St. Francis fish to assess potential movement into the Grasse River. While we appreciate that manual tracking will extend to the mouth of the Grasse River, tracking fish movements into and out of the Grasse River requires both a continuous monitoring station and fish tagged beyond the geographic boundaries of the Grasse River. A monitoring station at RM 7.8 may not provide insights into habitat use upstream of RM 7.8 or the importance of this upstream habitat to downstream fish and habitats.

The fixed monitoring station at the mouth of the Grasse River is especially critical since the current study design may not detect sporadic ingress of sturgeon into the Grasse River for spawning. Sturgeon reproductive strategy is characterized by delayed maturation and protracted spawning periodicity which is further complicated by a reduced population size (Peterson et al. 2007). Studies in the Sturgeon River, Michigan (Auer 1999) carried out between 1987 - 1995, found that State threatened lake sturgeon returned to spawn at most 1 to 2 times over an 8 year period. Both the lake sturgeon life history and the reduced population size contributed to the lower probability of detecting spawning females (Dumont 2008). Therefore, an extension of the sampling period beyond what has been conducted is strongly supported scientifically and recommended by NOAA. The frequency of pre-spawning and spawning adults observed in the river may impact the ability to find eggs on spawning beds. Egg traps were removed prematurely in prior years. Several more years of sampling should be conducted. In addition, monitoring of the NYPA sturgeon spawning bed suggests that those egg traps were removed prematurely as fish activity was observed after the removal date. Egg traps should be reinstalled for all of May 2009, especially in the Massena riffle pool.

Secor et al. (2002) emphasized the importance of understanding egg, larval and juvenile abundance relative to the number of spawning sturgeon and relative to environmental parameters, in particular, habitat used by sturgeon during their first year. Environmental variables such as water flow and temperature are very important for spawning success. Sedimentation can adversely impact embryo and larval survival and bottom substrate is extremely important for young of the year survival. Supplemental lake sturgeon study is needed to provide the information necessary to evaluate these potential impacts, especially given their depleted population status coupled with their life history strategy. Secor et al. (2002) suggest a two year study is inadequate and emphasize the need for data collection over multiple years to capture pre-spawning and breeding adults to confirm spawning within the Massena pool area. These assessments should also evaluate the effects of temperature change, flow distribution and water depth on habitat usage, and the timing and success of spawning.

Dumont (2008) recommends placement of 500 um drift nets approximately 1 km downstream of egg traps as a supplemental approach to identify sturgeon spawning when waters reach 10^oC - 15^oC. The drift nets have the potential to traps eggs and fry that might go undetected through other sampling approaches. D'Amours et al. (2001) used this approach successfully in the Des Prairies River, a major St Lawrence River system spawning area near Montreal, to assess the temporal and spatial larval drift of lake sturgeon larval downstream. They found that the larval drift also comprised five other taxa. Incorporation of this approach into the 2009 activities has potential merits for both the lake sturgeon and fish community studies

Fish Community Study

The Fisheries Report entitled ""A General Fish Community Study of the Grasse River Near Massena, NY" documents studies conducted between 2006 and 2008. Twenty-three species were collected using gill nets, 40 species by boat electrofishing, 33 by PRAM electrofishing, 3 each by beach seining and eel pots, and 2 families of fish (Percide and Catostomidae) in egg traps.

Walleye eggs were identified in egg traps in Massena pool riffle area as part of lake sturgeon egg study. These findings support supplemental studies to evaluate whether this spawning habitat is used by Grasse River and or Lake St. Francis walleye, and what upstream habitat is utilized by walleye originating downstream of the proposed dam. These results should be fed into the design studies for fish passage. Additional egg trapping studies should be performed to evaluate the extent of spawning habitat use and production. Walleye is one of the preferred species of recreational anglers and loss of spawning habitat will impact walleye production within the Grasse River and possibly within Lake St. Francis. LaPan et al. (2001) identified two management objectives for St. Lawrence walleye. These included maintenance of existing, self-sustaining walleye populations and expansion of walleye populations into favorable habitats and where biologically and logistically feasible, enhancement of walleye spawning habitat. Mathers and Morrison (2002) and OMNR (2007) report low stable walleye populations in Lake St Francis based on catch data. Declines in Grasse River walleye reproduction could have negative effects on the Lake St. Francis population.

NYSDEC has identified the occurrence of greater redhorse *(Moxostoma valenciennesi)* in the Grasse River upstream of Massena (Richardson 2008). According to NYSDEC, the distribution of the greater redhorse in NY State is limited to several tributaries of Lake Ontario and the St. Lawrence River. The greater redhorse migrates from the St. Lawrence River into the Grasse River to spawn at Madrid. Redhorse distribution and habitat requirements within the Grasse River should be determined. To assess the impacts of dam construction on their populations, their movement patterns and the existence and location of other spawning habitat in the Grasse River needs to be evaluated. While Richardson (2008) further documents the presence of silver and shorthead redhorse in the river, 12% of the redhorse captured were not identified to species.

Habitat use by salmon is not well known. Young-of-year Chinook salmon were captured immediately downstream of the Parker Avenue Bridge and adult Chinook were present in the pool in the Madrid Dam tailrace. Their presence suggests that further studies are warranted to evaluate the habitats most important to salmon to the river that might be comprised by MED dam and tailrace construction.

Eastern sand darters were collected from sandy areas below the Route 37 Bridge and areas upstream of the Rod and Gun Club Island. Water quality and substrate type could be impacted in these areas from dam construction. Further evaluation should be collected on the potential effects of erosion and sedimentation, changes in temperature, vegetative cover and invertebrate community will have on darter populations.

While taxa richness within the lower river was higher than the upper and middle river during all seasons, these findings do not obviate the importance of habitat in the middle and upper sections of the river below Madrid to the lower Grasse River and St Lawrence River fish.

Benthic Invertebrate Study

The Benthos Report entitled “Baseline Investigation of Benthic Macroinvertebrates in the Grasse River, St. Lawrence County, New York” describes the results of spring, summer, and fall sampling using ponar and kick samplers. Because of stakeholder concerns about the closeness in timing of the spring and summer sampling events, samples were also collected in the spring of 2008. Taxa richness, percent dominant taxon, percent ephemeropteran, plecopteran trichopteran (EPT), Shannon-Weaver Diversity Index and Evenness, and Modified Hilsenhoff Biotic Index were reported.

Benthic community analyses are used to characterize typically patchy populations of invertebrates. Species presence, abundance and distribution can vary seasonally and annually. Quantitative benthic community studies should be performed in 2009 to evaluate inter-annual variability. In particular, this effort should focus on the area immediately downstream of the dam that will be altered by blasting to create the excavated channel and be dewatered under certain flow conditions. Study locations should also include areas upstream of the impoundment area as this section of river will serve as the source of benthic drift. The sampling effort should include winter collections. Modifications to flow and to ice cover and thaw during the winter can alter temperatures and the timing of hatching of winter (e.g, stoneflies) and spring emerging invertebrates.

Mussel Study

Freshwater mussels are an important component of riverine and lacustrine ecosystems. While the greatest diversity of freshwater mussels has been recorded from North America, these organisms have received special attention because of the dramatic reduction in biomass and elevated number of species afforded conservation status recognition. Freshwater mussels provide numerous ecosystem services including stabilization of substrates, increased structural complexity creating microhabitats and refugia, suspended sediment removal, nutrient cycling, improvements in water quality, increased macrobenthos densities, and increases in fish (Kreeger

2005, Metcalfe-Smith et al 1998 , Spooner and Vaughn 2008, USFWS and Commonwealth of Virginia 2004, Vaughn and Spooner 2006, Vaughn et al. 2008)

A mussel survey was conducted in 2007 and 2008 in portions of the Grasse River upstream of the Alcoa plant (Alcoa Bridge in Massena to Louisville Bridge) as part of a hydrofacility licensing project. The Mussel Report is entitled 'Baseline Investigation on the Freshwater Mussels (Unionidae) of the Grasse River, St. Lawrence County, New York". The mussel habitat throughout most of the river reach surveyed was considered high to moderate quality, primarily due to the preferred habitat conditions created by the predominately sand substrate, moderate flow and good water quality. High quality habitats had a substrate predominately composed of gravel, sand and silt and suitable flow to support mussels. Moderate habitat substrates had a higher percentage of coarse material, such as boulders and cobble, but still had an adequate amount of gravel, sand and silt to support mussels. Low quality habitats were in areas with torrential flow and a substrate predominately composed of bedrock, boulders and cobble with little interstitial sand and gravel to support mussels.

Eight freshwater mussels were identified including four New York State species of Greatest Conservation Need (http://www.dec.ny.gov/animals/9406.html) and three of special concern in North America (Metcalfe-Smith et al. 1998). The latter designation is given to a species or subspecies that may become endangered or threatened by a relatively minor habitat disturbance. Only one species was present in any significant numbers relative to the other species. Eastern Elliptio (*Elliptio complanata)* comprised 94% of mussel fauna, while Pocketbook (*Lampsilis ovata*) the second most abundant represented >1% of the mussel fauna. The other species were each less than 1% of the population.

Construction of the hydrofacility has the potential to alter sediment deposition, erosion, and stability in the river downstream of the dam and to impede movement of fish that serve as hosts for larval stages (glocidia) of freshwater mussels. It also has the potential to dewater areas of the river, alter river topography, change flow distribution, alter temperature and other water quality conditions that affect mussel distribution. We recommend implementation of a qualitative and quantitative freshwater mussel survey in the Grasse River downstream of the proposed location for the MED dam, especially in the tailrace impact area, but continuing down to the mouth. The objective of this study would be to collect baseline information, determine if any state or federally protected species are present, and to evaluate the future potential for upstream mussel beds to serve as reproduction nodes for downstream beds and vice versa. This should include the impact that bed loss and impediments to fish hosts would have on mussel populations elsewhere in the river. The last objective is of particular importance since the invasion of zebra and quagga mussels in the St. Lawrence River decimated native freshwater mussel populations (Riccardi et al. 1996). The tributaries currently serve as refugia for freshwater mussels and any impediment to movement of fish hosts between mussel beds upstream and downstream of the proposed dam can reduce the genetic diversity of the mussel population and has the potential to further reduce the viability, diversity and integrity of the mussel beds in the lower Grasse River. According to Vaughn and Taylor (1999), an increasing gradient of mussel abundance and richness was observed with increasing distance downstream of the impoundment created by dam construction. They attributed these impacts to alterations in flow and temperature regimes, habitats, fish host availability, and food.

Fish Passage Study

The report, “An Assessment of Fish Passage Design in Support of the FERC ILP for the Massena Grasse River Multipurpose Hydroelectric Project (FERC No. P-12607)” focuses on design parameters to minimize trashrack impingement and turbine entrainment. There is special emphasis on passage of a subset of Grasse River fish species including lake sturgeon, American eel, Chinook salmon, , and muskellunge. Ten upstream and six downstream fishway designs are presented. The Spiral Ramp Fishway and Eel Ladder were identified as the most viable for upstream passage and the Dual-Entrance Designed Bypass for downstream passage.

Construction of the proposed hydrofacility has the potential to significantly diminish fish passage. The proposed 26’ head dam is new construction of a concrete barrier with an underflow gated spillway, a powerhouse and tailrace less than a mile downstream of a former 3-4’weir that was breached in 1997. Construction will create a significant impediment to fish passage and no data is provided demonstrating a high level of usage and successful passage (i.e., comparable to 100% passage) by a wide variety of fish species.

Fishways installed on the dam should permit unobstructed and easy access to the river upstream to the Madrid Dam, the first current obstruction to passage. NOAA, in our February 25, 2008 comments to the January 2008 Proposed Final Study Modifications to the Study Plans, expressed concerns about habitat fragmentation and the expected decline in lake sturgeon passage opportunities relative to current conditions with the proposed spiral passage design. Dam construction on the Grasse River has the potential to sever or seriously limit access to historic spawning areas from Grasse River and St. Lawrence River sturgeon, destroy or degrade juvenile habitat and reduce movement of sturgeon upstream of the proposed project from reaching Lake St. Francis habitat.

One of NOAA’s Damage and Assessment Remediation and Restoration Program’s (DARRP) focus is restoration of fish access. NOAA had installed fish ramps, upgraded culverts and removed dams to enhance fish access to upstream habitat. We continue to support a free – flowing river with unimpeded access and recommend that fishways be designed to attain access comparable to conditions that exist prior to new dam construction. NOAA is evaluating the potential to restore fish passage in the St. Lawrence and other watersheds in New York and nationally. The design basis should be unimpeded passage and full protection for the following: migratory species such as lake sturgeon, salmon, American eel and white perch; species with specialized life history requirements such as those with specific spawning habitat needs (e.g, muskellunge, pike, greater redhorse, walleye); non-migratory species with relatively large home ranges; and species with smaller home ranges that would be fragmented by dam construction. Fish passage should address all of these species and should not harm species on state and federal protection lists and those with declining populations. Fish passage literature provides evidence that fishways may provide significant benefits to waterways already impeded by pre-existing historic dams since access is improved from something greater than 0%. In contrast, fishways have not ensured full access when associated with pending dams because fish access is diminished relative to a free-flowing river. This is because performance is reduced below the pre-dam level of 100% for all relevant species.

The US Fish and Wildlife Service in a letter dated Sept 16, 2008 to the Town of Massena Electric Department expressed concerns about whether proposed upstream and downstream fish passage would satisfy requirements as part of the licensing process for the proposed Massena hydrofacility. We concur with the opinions expressed in this letter that the river currently provides unimpeded (100%) upstream and downstream passage and are seeking the same level of passage with any dam design

The basis of design for the Spiral Ramp Fishway was a prototype constructed at the Conte Anadromous Fish Research Center Laboratory in Turners Falls, Massachusetts and included modifications based on discussions with stakeholders. In experimental trials on lake sturgeon passage in spiral ramp fishways at the Conte facilities, Kynard et al. (2004) documented a successful performance rate of 39-73%. A fish ladder of this design has the potential to significantly reduce movement of lake sturgeon above the dam relative to current conditions and could result in potentially significant degradation of an already depleted species.

The basis of design for the Eel Ladder was the St. Lawrence-FDR eel ladder. While installation of the St Lawrence FDR eel ladder doubled eel passage, tagging studies documented about an 85% success rate. A ladder of this design on the Grasse River would reduce eel passage by ~15% (McGrath and Tatham 2006).

The proposed conceptual basis for the Dual-Entrance Designed Bypass for downstream passage originated from designs provided by USFWS for planned or existing hydrofacilities. More information should be provided on the similarities of those hydrofacilities and fish communities to the proposed dam and fish communities of the Grasse River including passage rate.

An important component of evaluating fish passage designs is demonstration of performance. Additional studies should be performed and documentation submitted to demonstrate a high degree of successful upstream and downstream fish passage is achievable across a variety of fish species, including those of special interest. This can be instituted for the Spiral Ramp Fishway based on the proposed or updated design. Studies can also be performed by modifying the Eel Ladder to enhance success rate of the Eel Ladder above 85%. Additional studies might be recommended to demonstrate success of downstream passage once requested documentation is provided to and reviewed by stakeholders. Studies on proposed fish passage design options should also assess potential mortality associated with dam design.

Dumont et al. (2006) expressed the opinion that the depletion of the Lake St. Francis lake sturgeon population was at least partially attributed to dam construction. On the Richelieu River, they observed only a few large lake sturgeon (e.g., spawners) using the fishway constructed on the Saint-Ours dam. This dam is 2.3 m high and fish passage was specifically designed to meet the needs of migrating lake sturgeon and other migrating species (river and copper redhorse, American shad and American eel).

Dam construction proposals at the Lachine Rapids in the 1980s and more recently in 2006 at Courant Sainte-Marie in Montreal were denied because of environmental concerns associated with lake sturgeon and other migratory fish species. Because lake sturgeon are sensitive to habitat fragmentation and habitat degradation, the authors recommend several management steps including protection and potential enhancement of spawning grounds, avoiding supplemental habitat fragmentation, and further investigations on lake sturgeon biology and habitat. Their recommendations further support additional studies and reconsideration of the location of the proposed Massena dam.

Dumont (2008) does not believe that significant upstream movement of lake sturgeon on the Grasse River can be facilitated by fish passage incorporated into dam design. A key to improving lake sturgeon populations is through protection and creation of spawning habitat. Grasse River dam construction would destroy potential spawning beds through impoundment formation behind the dam and would cut off migration to beds further upstream. While fish passage would be a component of any design, to be successful fish passage needs to allow for migration of multiple species and to a significant percentage of the lake sturgeon seeking upstream access, due to their life history (long-lived, delayed sexual maturity, spawning periodicity) combined with depleted stocks. Dumont’s reservations on potential fish passage success are based on the lack of success for upstream sturgeon passage on the Richelieu River where dam height was 3 times lower than the proposed dam in Massena and on the degree of success attained for moving sturgeon past dams in the US and abroad.

Williot (1984) noted that elevators installed in Russia yielded upstream migration success of around 10% for sturgeon. Dumont 2008 considered this one of the more successful efforts. Parsley et al. (2007) documented 6 white sturgeon successfully ascended the fish ladder at the Dalles Dam on the Columbia River between March 2004 and November 2005. Webber et al. (2007) tested experimental fishways that incorporated baffles and ramps in an effort to improve white sturgeon upstream passage. The rate of successful passage varied by baffle configuration (e.g., vertical-vertical, horizontal-vertical, both) and velocity (e.g., slow, medium, high). Any fish passage designed and constructed for Grasse River MED hydroproject should demonstrate a high level of success in a tested prototype design and at a pre-existing dam on a river with similar hydrologic and physical conditions and similar fish species.

Pavlov (1989) reports on sluice bypasses, mobile fish collectors, and mechanical and hydraulic fish lifts, utilized in Russia. These lifts have different operational cycles and seasons of use. In some cases, operation cycle depended on fish species of interest. Fish passage design should consider the following: how fish distribute in the tailwaters of the dam; how seasonal and daily modifications to flow (assuming run of river design) and flow distribution associated with the excavated channel; fishway design, and barrier formed non-flow areas effect fish behavior; how fishway design can accommodate a high degree of successful fish passage during movement of all fish in the impacted stretch of river under all discharge conditions; how changes to river bottom topography, type and bathymetry might alter fish behavior; and how fish protection devices can be designed for the variety of fish and age classes in the river.

Kynard (1997) and Moser and Ross (1995), in NMFS (1998), suggest that shortnose sturgeon in the pre-spawning adult age class may migrate upstream before fish lifts or locks are in operation. Analysis of fish elevators or locks for passage must include studies determining the full migration period of lake sturgeon and other fish species and assessing whether the lifts or locks could operate successfully during the required periods.

SAV and Wetlands

Three reports contain the results of submerged aquatic vegetation and emergent wetland studies. The SAV Report is entitled "Identification and Mapping of Submerged Aquatic Vegetation in the Grasse River, from Louisville, NY to Massena, NY Final Report". The Wetlands Report is entitled "Assessment of the Effects of the Proposed Hydroelectric Project on Submerged Aquatic Vegetation and Wetlands". The ERM Report is entitled "Habitat Assessment, Wetlands Delineation and Field Surveys for Birds, Plants, and Reptiles in the Massena Grasse River Hydroelectric Project Area".

Submerged aquatic vegetation (SAV) beds are important features of ecosystems as they provide spawning, feeding, nursery, and refuge habitat for invertebrates, fish and wildlife, stabilize sediments, and are important to nutrient and oxygen exchange. SAV thrive under specific conditions of light penetration, water clarity, water depth, nutrients, flow and substrate. Construction of the dam will alter existing SAV habitat. Dam construction will elevate water levels upstream of the dam creating an 8-mile 300-acre reservoir with water depths of 22 feet extending almost to the Louisville Bridge. Water levels would rise 2-20 ft.

A study was performed to evaluate the presence of rare aquatic plants and SAV in the impoundment area and in the tailrace area downstream of the proposed dam to the Massena Power Canal. Aerial surveys initially identified SAV beds and field surveys to map SAV beds (~7.1 acres) of a given size and ground truth aerial results. Species composition, percent cover of each bed, range of water depth and substrate composition were recorded.

Three species dominated - *Vallisneria americana* (American eelgrass or tapegrass) (Figure 4.1-4), *Heteranthera dubia* (grassleaf mudplantain or water stargrass) and *Potamogeton nodosus* (longleaf pondweed or American pondweed). Other less dominant species included naiad (*Najas flexilis*), waterweed (*Elodea canadensis*), a hybrid pondweed that appears to be a cross between *P. illinoensis* and *P. gramineus,* and several pondweeds (*Potamogeton zosteriformis, P. epihydrus, P. perfoliatus, P. pusillus* var. *tenuissimus* and *Stuckenia pectinata*). One of the four rare species, the state-listed threatened species riverweed (*Podostemum ceratophyllum*) previously reported from the area was confirmed in downtown Massena, near the Firehouse, and in the rapids upstream of the footbridge. It had previously been recorded at the footbridge, Louisville, Chamberlain Corners, Madrid, Bucks Bridge and Morley. Some of the riverweed in the project area is anticipated to be lost due to elevated water levels.

Additional studies should be performed in the lower Grasse River below the dam to the mouth to confirm the presence or absence of RTE species including Hill's pondweed (*Potamogeton hillii*), northern pondweed (*P. alpinus*), riverweed (*Podostemum ceratophyllum*), and water starwort (*Callitriche hermaphroditica*) similar to surveys performed in the proposed impoundment area. Additional field work should be performed above and below the proposed dam location to delineate the locations where riverweed has been identified, delineate its presence in beds excluded during the initial survey (e.g., beds less than 3.3 ft wide) and record its percent cover. Upstream efforts should extend to Madrid as this may serve as seed and tuber source for any mitigation actions. In addition, modeling should be performed to predict suitability of upstream and downstream areas to support SAV post-construction based on pre-construction conditions and how the composition, density and quality of these beds will change.

Wetlands provide numerous structure and function including nutrient cycling; sediment stability; flood control; invertebrate, fish and wildlife habitat. Fourteen wetlands (20.6 acres) were delineated in the 8 mile reservoir impact area between the footbridge and the Louisville Bridge. Wetlands and upland vegetative communities (including medicinal plants) and the birds and reptiles were also surveyed in the study area.

No state-listed threatened or endangered plant species were observed but some have been identified along the St. Lawrence River and in the Town of Louisville. The report should address whether suitable habitat for these species occurs downstream of the dam in and along the Grasse River to its confluence with the St. Lawrence River.

Wetland plants have specific habitat requirements including degree and frequency of inundation. Modeling should be performed to evaluate the potential changes in plant cover type and vegetative communities with seasonal and annual changes in water depths associated with dam and fishway operation and specifically with discharge of flows through the tailrace and excavated channel (See Tailrace Study comments below). This effort should forecast anticipated expansion and shrinkage of native and invasive species presence and cover.

Tailrace

The Final Tailrace Study Report is entitled "An Assessment of Potential Impacts of Project Tailwater Flows on the Existing Wastewater Treatment Plant (WWTP) Diffuser Operations and its Accompanying SPDES Permit Requirements". The study was designed to assess flow distribution and flow characteristics downstream of the proposed dam for WWTP operation and on riffle habitat immediately downstream of the tailrace and to ensure flow release during low flow periods.

Bathymetric transects were surveyed upstream and downstream of the proposed dam and used to support modeling efforts. Baseline and excavated channel HEC-RAS models were used to develop water elevations, flow distributions, water velocity, and water depth and answer study questions.

Construction of a tailrace is part of the overall hydrofacility design. Discharges up to 1900 cfs from the tailrace would travel underground and emerge downriver through an excavated channel near the Massena Power Canal. Above 1900 cfs, discharge is through the flood gates.

Dam design appears to create non-overflow sections that disrupt flow distribution along the shoreline downstream of the dam displacing discharge further downriver near the Power Canal during low flow and substantially increase water depths by a foot during high flow. The excavated channel, immediately upstream of the ~7 mile stretch of the lower Grasse River contaminated with PCBs, also modifies the flow distribution.

Studies should be performed to evaluate the anticipated rate of discharge and flows into the river at the Power Canal on stratification of the water column downstream of the dam, on SAV and emergent vegetation, on mussel distribution, loss of fish habitat, contaminated sediment transport and fate and on potential remedial options that would leave contaminated sediments in-place (e.g, natural recovery/attenuation, capping, backfill). This exercise should also evaluate potential failure of the regulating gate and the consequences higher discharges through the excavated channel could have on habitat, contaminated sediment, and post-remedy river conditions.

Floodplain and Ice Management Study

NOAA previously commented to EPA on the DynaRICE model as part of Alcoa Grasse River Site remedial investigation. At that time we raised concern about model parameterization that is relevant to the FERC licensing process since those studies are being submitted as part of the ISR. One of the objectives of dam construction is to provide ice control to the stretch of river downstream of the dam contaminated with PCBs. The following comments are a subset of comments previously submitted to EPA on the model assumptions.

"The 100-year return period events are modeled using the combined probability of river discharge and ice cover thickness to discriminate between jam/probable jam occurrence and non-jam/unlikely jam occurrence. Since jam formation does not assure ice jam related scour the 100-year return period hindcasting and sensitivity simulations may not model "ice jam scour" event. This is an important consideration since ice control is being designed to address scour associated with jam formation and protect PCB-contaminated sediments in the lower Grasse River. If model assumptions are not conservative, the benefits obtained from the ice control structures on the dam may not be reflective of real world conditions. While it is a reasonable hypothesis that severity of ice jam scour would correlate with these two parameters, it appears that this is not always the case. While the 2003 event appears to have been the worse known ice scour event in the past 40 years, it may not be the most extreme event that has occurred in the past or will occur in the future. Due to concerns about climate change and climate variability, model runs should test out scenarios of more extreme repetitive storm events at greater frequency to examine worse case conditions. The 2003 event unlikely represents worse case scenario conditions.

The magnitude of the jam is considered a 60-year event in terms of discharge and ice thickness. This suggests either that another variable has not been considered, or that the amount of scour does not monotonically increase with ice thickness and discharge. There may be other events that have a greater potential for scour than those tested, where the return period is less than and greater than100 years. To determine this, a greater exploration of the potential "ice jam scour" probability space should be conducted. We therefore recommend performing an analysis of the ice-jam-scour probability space, rather than the discharge-ice thickness space because the potential for ice jam scour rather than ice jam formation is the criteria than should be used for remedial design. In addition, the critical discharge (river flow) is the discharge "at breakup", which often is precipitated by a thaw or rain which causes snow to melt quickly. It cannot be assumed that greater than average ice cover (resulting from lower than average temperatures over an extended time period) is always accompanied by a reduction in discharge during breakup."

MED assumes water elevations of 154.2 feet. According to recent information, the lowest water elevation on record is 153.4 feet. The IJC is currently evaluating water flow regulations for Lake Ontario and the St Lawrence River. The final decision on how to regulate water flow regimes and water levels could alter the minimum water elevations. Models should be run using the

153.4 foot elevation and sensitivity analysis should be run that assume more variability in water regimes and flows in the St. Lawrence River.

Sediment Transport

The Shoreline Erosion and Sediment Transport Study evaluated impacts of dam construction on sedimentation rate and sediment composition upstream of the dam, sediment loading downstream of the dam, and shoreline erosion in the backwater area of the dam.

Grain-size data was not available for the 8 mile stretch of river that will be converted to reservoir. For modeling purposes, grain-size information downstream of the dam was used since it is derived from upstream sources. Additional studies should be implemented to characterize sediments in the proposed impoundment area and the region just upstream of this reservoir (baseline conditions) and those results should be used in subsequent model runs. Model results should be used to inform estimates of changes to habitat conditions and suitability for invertebrates, fish and wildlife. It could also be used to parameterize the model assessing erosion potential. Changes in sediment accretion and erosion patterns alter habitat conditions and could expose unremediated contaminated sediments or capped contaminated sediments. Worse-case scenario flow conditions should be explored including cumulative effects of multiple and more frequent and severe storms.

The report assumes that most of the suspended sediments will be transported downstream of the dam rather than be deposited in the upstream reservoir because the dam is operated in instantaneous run-of-river mode. Data from constructed dams operating in this fashion should be supplied to the stakeholders to support these assumptions.

Higher sedimentation rates were modeled in the river upstream of RM 14.0 but these were assumed to be questionable results due to limited bathymetric information available in and around the bends of the river in this section of river. Bathymetric surveys should be conducted in these areas to fill in data gaps and rerun the model to confirm initial model results.

According to the model, suspended sediment load below the dam is reduced approximately 20 percent but construction of the dam on sediment loading and bedload transport is considered insignificant. The cumulative impact of the decline in suspended solids entering the river downstream of the dam should be further evaluated taking into account plans to armor portions of the bank and additional new erosion that might occur due to dam construction and failure of temporary floodwall protection structures. Bedload transport was not modeled downstream of RM 8.0 or upstream of RM 14.0. Since the bedload model is very sensitive to inputs from the upstream boundary, both these river stretches should be modeled. Additional information should be collected, as necessary, to fill data gaps prior to rerunning the models. The models should also be rerun coupling sediment loading and bedload transport.

Plans exist to remove the breached Massena weir as part of dam construction process. Sediments should be tested early in this process to determine the feasibility of weir removal and the impact of sediments behind the weir being released (assuming sediments are clean). Models should be rerun assuming the breached weir has been removed and include runs both with and without sediment removal.

Aesthetics

The design includes modification to shoreline vegetation and installation of temporary flood protection walls. Public opinion should be sought on these design components. Data should be provided demonstrating successful installation and use of the temporary flood protection walls over long periods of time. This recommendation is offered due to the proximity of some properties to the temporary flood protection walls, to the length of time these structures will have to be in-place annually and the potential consequences if these structures fail. Impacts on property values and insurance costs should be discussed.

If you have any questions, I can be reached at 212-637-3259 or lisa.rosman@noaa.gov.

Sincerely,

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