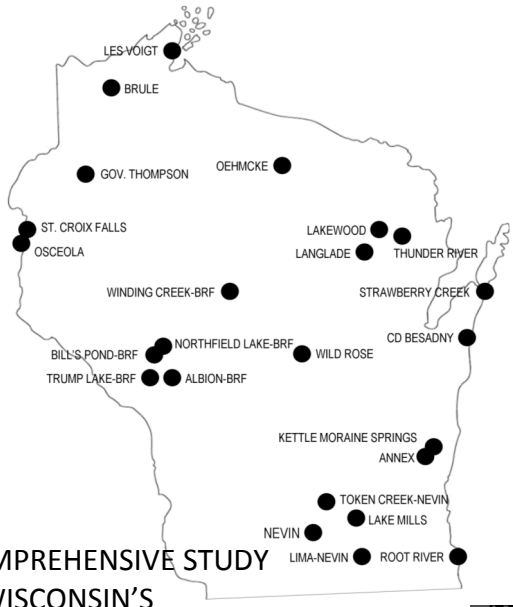

COMPREHENSIVE STUDY
OF WISCONSIN'S
FISH PROPAGATION SYSTEM

WISCONSIN
DEPT. OF NATURAL RESOURCES

VOLUME II

SECTION 5.
Art A. Oehmcke State Fish Hatchery (AAO)

HDR

5. ART OEHMCKE STATE FISH HATCHERY

Facility Inventory

General Facility Description

Art Oehmcke State Fish Hatchery (AAO) is located in northern Wisconsin in Oneida County between Madeline and Clear Lakes (see **Figure 5A,** USGS map) on an area of approximately 103 acres. The hatchery is primarily responsible for rearing the coolwater species muskellunge and walleye with the additional hatching of sucker fry for forage. The hatchery was originally constructed in 1901 with the addition of a 1,200 jar hatchery building in 1964 and a major renovation completed in 1995 which included water supply, wastewater treatment, and ponds improvements. Contact information for the facility is:

Supervisor	Bruce Underwood	Bruce.Underwood@wisconsin.gov
Facility Address	8770 Highway J	Woodruff, WI 54568
Telephone|Fax	715.356.5211 x 215	715.358.2679

Source: WDNR Facility Questionnaires, 2009

Water supply quality, quantity and biosecurity issues need to be addressed at this hatchery. There are biosecurity concerns as the main water supply is provided by non-disinfected surface waters of Madeline and Clear Lakes. The well water supply is poor in quality due to iron and hydrogen sulfide. Wastewater is pumped to a large zero discharge settling pond that has been adequate for the way the hatchery is presently operated.

Production goals for small and large walleye fingerlings are around 440,000 and 26,500 fish, respectively (WDNR database, 2009). In addition to walleye, the hatchery rears around 26,000 large muskellunge fingerlings. For forage purposes, approximately 63 million white sucker fry are hatched and stocked into production ponds for early feeding of walleye and muskellunge. Transfers from the hatchery have included lake trout eggs to Kettle Moraine and first fed lake trout to Besadny (Typical Transfer report).

An aerial photograph and existing site plans (**Drawings AAO-1 and AAO-2**) illustrate the hatchery boundary and general hatchery infrastructure features (e.g., water supply, fish rearing units, drainage piping, production buildings, support buildings, roads, and wastewater treatment facilities). The drawings are believed to be reasonable, to-scale representations of hatchery resources for planning purposes. Site and construction drawings (when available) from WDNR (see **Appendix B** for Existing Drawings list) and general questionnaires were filled out by WDNR staff to assist in developing the existing infrastructure analysis. Photographs taken at the Site Evaluation Visit (May 12, 2009) illustrate the existing conditions and highlight problem areas (see **Appendix C**).

0' 1,000' 2,000' 3,000'

ART OEHMCKE STATE FISH HATCHERY

Fig. 5A

Fish Production Summary

Historical Production

Historically, AAO has raised walleye, northern pike, muskellunge, hybrid muskellunge, smallmouth bass and white suckers. The primary species currently reared are walleye, northern pike, muskellunge, and white suckers. The most recent production for the past five years has included lake trout, muskellunge, and walleye. White sucker eggs are collected from the wild, disinfected, and hatched at the facility for first feeding of muskellunge and forage stocking into ponds for advanced fingerling production. **Table 5A** compiles the 2004-08 stocking data for AAO from stocking records supplied by WDNR (2004-2008).

Table 5A. AAO 2004-08 Stocking Summary

	LAT		MUE Fing.		WAE Sm. Fing.		WAE Lg. Fing.		WAE Fry		
Year	No.	Lbs.	No.	Lbs.	No.	Lbs.	No.	Lbs.	No.	Total No.	Total Lbs.
2004	55,593	1,238	25,757	5,633	952,653	640	12,940	2,309	8,730,400	9,777,343	9,820
2005	2,130	79	38,917	9,696	609,090	506	19,459	2,328	4,760,000	5,429,596	12,609
2006			24,431	5,269	452,639	309	47,859	7,185	6,710,000	7,234,929	12,763
2007			18,154	7,194	111,745	535	29,201	4,405		159,100	12,134
2008			29,998	6,523	393,126	450	29,023	3,049		452,147	10,022
Total	57,723	1,317	137,257	34,315	2,519,253	2,440	138,482	19,276	20,200,400	23,053,115	57,348
Average	28,862	658	27,451	6,863	503,851	488	27,696	3,855	6,733,467	4,610,623	11,470

Source: WDNR Database, 2009

In the July 1998 ***Production Capacities of the Wisconsin Department of Natural Resources' Fish Propagation Facilities*** report, it was reported that the facility should be capable of an Optimum Sustained Production Capacity of 19,274,765 fish weighing a total of 5,020 pounds. The majority of that number was to be comprised of fry stockings while the weight was attributed to fingerling production. Production and stocking priorities have changed since 1998. Fry stockings have been reduced with a corresponding increase or demand for fingerling stockings as the survival and return on investment is reported to be more positive. As indicated in Table 5A, there were no fry stockings for either muskellunge or walleye in 2007 or 2008. Consequently, the total number for stocking is drastically reduced from previous years while pounds of production remained reasonably steady with 12,134 pounds and 10,022 being stocked in 2007 and 2008, respectively. As a result, the facility has exceeded both the Optimum and Maximum Sustained Production Capacity for production poundage as reported in the July 1998 report, which was 5,020 and 4,430 pounds, respectively. This would indicate the facility has the capability to meet its production quota when growing conditions are optimum.

Muskellunge production for the 5-year period ranged from 18,154 fish in 2007 to 38,917 fish in 2005. However, as numbers of fish increase there is usually a corresponding decrease in size as the 2005 production was 9,696 pounds, which was an average of four (4) fish per pound, while the 2007 production poundage was 7,194 for an average of 2.5 fish per pound. The 5-year production average was 27,451 fish and 6,863 pounds resulting in an average size of four (4) fish per pound.

The 5-year walleye production has included fry, small fingerling and large fingerling stockings. Fry production occurred for the first three years of the 5-year period where an average of 6,733,467 fry was

stocked. Small fingerling production ranged from 111,745 fish with a weight of 535 pounds in 2007 to 609,000 fish and 506 pounds in 2005. The fish averaged 209 and 1,204 fish per pound, respectively. The 5-year average production was 508,851 fish and 488 pounds, resulting in an average size of 1,032 fish per pound. Large fingerling production occurred all five years where an average of 27,696 fish was produced that had an average weight of 3,855 or approximately seven (7) fish per pound in size. Production ranged from 12,940 fish at 2,309 pounds, to 47,859 fish weighing 7,185 pounds for a fish size of 5.6 and 6.7 fish per pound, respectively.

Production Quotas

Table 5B illustrates the assigned quota by number for 2008 and 2009 for Art Oehmcke Hatchery. Walleye fry were not produced in 2008; however, total small walleye stockings exceeded the quota by more than 35,000 fish. Large walleye fingerling production also exceeded the quota request of 15,560 fish by stocking 29,023 fish. Muskellunge fingerling stocking, however, did not meet the quota request of 57,882 as only 29,998 fish were stocked.

The 2009 production quota is also included in **Table 5B**. The challenge to the facility will be the muskellunge production request as the facility had a best production year in 2005 of 38,917 fish and the 2010 request is for 68,108. The walleye quota for both small and large fingerlings is attainable, but could also be problematic if the muskellunge production takes precedence and require more pond space. If intensive tank rearing cannot be accomplished, production numbers will most likely have to be modified as the facility does not have enough pond space to produce the numbers as requested.

Table 5B. AAO Production Quotas 2008 and 2009

Year	LAT No.	MUE Fing. No.	WAE Sm. Fing. No.	WAE Lg. Fing. No.	WAE Fry No.	Total No.
2008		57,882	357,795	15,660	3,931,200	4,362,537
2009		68,108	370,615	26,100		464,823

Source: WDNR Database, 2009

Prior to the VHS issue, the facility reared lake trout fingerlings in 2004 and 2005. Rearing lake trout was recognized as being a potential disease vector to the hatchery, as well as slow growth due to the cold water temperature of the surface water supply.

5-Year Stocking Average

Over the 5-year stocking period (2004 – 2008) Art Oehmcke Hatchery contributed the majority of large walleye fingerlings by number (58%) and weight (65%) when compared with the hatchery system wide stockings. The small fingerling stocking of 503,851 fish represents 19% of the total stocking that occurred over the 5-year period with the other coolwater hatcheries (Section 3, **Table 3I).** The hatchery also contributed 41% of the walleye fry stockings when they occurred. Additional fish production discussion and is included in **Section 3**, Fish Production Program Evaluation.

Aquaculture Water Supply

The water supply for AAO includes two lake water sources, which are described as follows:

Source	Descriptive Information	Peak Flow	Average Flow Range	Minimum Flow
Madeline Lake	Gravity flow to pump station, pumped to headtank, supplies ponds and building		2,000 gpm	
Clear Lake	Pumped to hatchery building, currently not in use due to low lake levels		500 gpm	
Total		**4,000 gpm**	**2,500 gpm**	**UNK gpm**

Source: WDNR General Facility Questionnaire, 2009

Surface Water Source

The main water supply source is from Madeline Lake through a 36" inlet pipe providing up to 4,000 gpm to the hatchery complex. Generally, the building utilizes up to 1,250 gpm and the remainder is used in the ponds. The intake structure is comprised of a linear concrete box with a bar screen for coarse screening of debris. During certain times of the year the bar screen becomes plugged frequently requiring debris removal several times a day. A second water supply source was developed from Clear Lake in 1995 to supply colder water (up to 500 gpm) for temperature manipulation in the hatchery building. An issue with this water source has been the inability to draw water into the sump when lowered lake levels occur. The hatchery is not limited to a maximum allowable flow or volume.

Wells

Production wells are not utilized at this facility due to iron and hydrogen sulfide in the groundwater.

Water Storage and Distribution

Supply to the hatchery building and pond complex is via PVC pipeline with a maximum diameter of 16". Total peak flow to the hatchery is approximately 4,000 gpm.

Water Quality

The surface water supply ranges in temperature from 34°F to 85°F, depending on the season. The water quality from Madeline Lake is reported as poor due to nitrogen gas super saturation in the spring, oxygen super saturation in the summer, high fertility and pH, and blue green algae blooms. The lake water is poorly buffered, very soft, resulting in rapid changes in pH. The Clear Lake water supply has no known water quality problems; however, it is reported that the lake has freshwater jellyfish and Chinese mystery snail infestations, which are recognized aquatic invasive species.

Water Treatment

The Madeline Lake water supply is filtered through a 150-micron drum screen to remove particulates. This water is then pumped to a headbox for aeration and de-gassing and distributed to both the hatchery building and production ponds. Water that is to be used at the hatchery building (up to 1,000 gpm) is screened again through a 27-micron drum screen. Water that is used at the ponds does not receive further screening. At the hatchery building additional aeration and gas super saturation issues are addressed with individual packed columns at the head of all hatching batteries and some start tanks. Boilers and heat exchangers are used in the hatchery building for temperature manipulation for hatching of eggs. Ultraviolet disinfection is utilized at some hatching batteries and start tanks. At this time, water from Clear Lake flows through packed columns at the hatching batteries with some batteries having UV treatment as well. There is no disinfection of either lake water supply and these supplies are considered biosecurity risks to the facility.

There is low pressure air available to the ponds for aeration and destratification.

Fish Rearing Units

Indoor Rearing Units

The hatchery building contains various tanks of different sizes, shapes and material (**Table 5C**). There are eight concrete tanks, five tanks constructed of laminated waterproof plywood, and 11 plastic or fiberglass circular tanks of various sizes. All of these tanks are utilized for hatched fry collection and early life stage production. Water supply is delivered to the tanks by way of overhead piping and drainage is via trench drains.

Egg Incubation

There are 1,000 regular sized McDonald jars; 10, two-gallon upwelling jars; and one vertical flow incubator in the hatchery building used in the production of walleye, northern pike, muskellunge and sucker fry. Separate jar batteries are identified and utilized for the segregation of these species within the building.

Ponds

Art Oehmcke Hatchery has 17 ponds, ranging in surface area from 0.4 acres to 1.2 acres in size. Water depths range from 3 to 6 feet for the lined ponds and depths of 2 to 5 feet for the earthen ponds. All ponds have aluminum perforated screens with two drains on each concrete outlet structure, one located on the bottom of the pond/kettle and one midway down the structure. The twelve lined ponds have Kansas style harvest kettles. The earthen ponds do not have harvest kettles. There are deep end water supply lines located on the lined ponds.

Table 5C. AAO Indoor Rearing Units

Building	Main Hatchery	Main Hatchery	Main Hatchery	Main Hatchery	Main Hatchery	Main Hatchery	Main Hatchery	Main Hatchery
Number	(8) A - H	(4) No ID #'s	(1) No ID #	(1) No ID #	(2) No ID #'s	(2) No ID #'s	(4) No ID #'s	(2) No ID #'s
Condition of Tanks	Good	Good	Good	Good	Good	Good	Good	Fair
Primary Use	Fry Collection, Early Rearing	MUE Fry Collection	MUE Fry Collection	Fry Collection, Rearing	Fry Collection, Rearing	Fry Collection	Fry Collection	Fry Collection
Shape (Rectangle/Circular)	Rectangle	Rectangle	Rectangle	Circular	Circular	Circular	Circular	Circular
Material	Concrete	Waterproof Plywood	Waterproof Plywood	Plastic	Plastic	Fiberglass	Plastic	Fiberglass
Dimensions	39'x3'x2.5'	4'x4'x2'	8'x4'x2'	8'x3'	5'x3'	4'x.1'	2'x1.8'	2'x1.8'
Operation Water Depth	26"	Varies	Varies	2.5'	2.5'	.8'	1.5'	1.5'
Operational Volume (ft^3)	254	21.4	48	125.5	49	10	7.35	4.7
Total Operational Volume (ft^3)	2,032	85.6	48	125.5	98	20	29.4	9.4
Avg. Water Flow Rate	Varies	Varies	Varies	20 gpm	15 gpm	5 gpm	5 gpm	< 5 gpm
Max. Water Flow Rate	142 gpm	15 gpm	15 gpm	Unknown	Unknown	Unknown	Unknown	Unknown
Serial Reuse	No	No	No	No	No	No	No	No
Source Water and Treatment	Lake, UV Treated, Heated, Screened	Lake, Screened, Heated, Packed Columns	Lake, Screened, Heated, Packed Columns	Lake, Screened, Heated, UV treated	Lake, Screened, Heated, UV treated	Lake, Screened, Heated, UV treated	Lake, Screened, Heated, UV treated	Lake, Screened, Heated, UV treated
Fish Feeders	Yes	No	No	No	No	No	No	No
Oxygenation/Aeration	No	No	No	No	No	No	No	No
Flow Baffles	No	No	No	No	No	No	No	No
Cleaning	Varies	As Needed, or Daily	As Needed, or Daily	As Needed, or Daily	As Needed, or Daily	As Needed, or Daily	As Needed, or Daily	As Needed, or Daily
Drain Time	< 1 min	< 1 min	< 1 min	< 1 min	< 1 min	< 1 min	< 1 min	< 1 min

See **Table 5D** for a pond summary that includes general condition of each pond. The photo report shows typical pond features and the generally good condition of the ponds and liners. Condition of ponds has been ranked as follows: poor (sometimes abandoned – needs extensive repairs or complete replacement), fair (needs medium improvements for optimal use) and good (no repairs needed). It is reported the ponds are fully drainable in less than a day, depending on size of pond. Pond outlets and harvest kettles are pre-cast concrete using aluminum screens and meshing. Non-skid galvanized catwalks link the drain structure to the levee. Each lined pond contains a two-foot deep U-shaped harvest kettle with a fresh water supply line to be used during harvest. Un-lined ponds do not have a harvest kettle. All earthen ponds have groundwater intrusion when empty and seep to the adjacent creek when full. Ponds 12 – 16 have groundwater seepage below the liners which causes them to lift when ponds are empty. Lined ponds are cleaned annually, but earthen bottom ponds are not cleaned. Existing conditions of the ponds range from Good to Poor. It has been reported the concrete water control structures need repair for cracks and broken concrete. Ponds 8–11 need membrane liners along with security fencing.

Table 5D. AAO Existing Pond Summary

Pond #	Year Constructed	Condition	Surface Acres	Deep End Depth	Shallow End Depth	Average Depth	Pond Volume ft³	Fill Time	Drain Time
#1 - 7	1993	Good	7	6'	4'	5'	1,524,600	24 hrs	24 hrs
#8 - 11	1994	Poor	2.9	3'	1.5'	2'	252,648	24 hrs	24 hrs
#12 - 16	1994	Good	4.8	6'	4'	5'	1,045,440	24 hrs	24 hrs
#21	NA	Poor	0.4	5'	3'	4'	69,696	24 hrs	24 hrs
	Total		15.1				2,892,384		

Source: WDNR Facility Questionnaires, 2009

Predation Control

Predation is reported as a problem with the addition of bird netting over the ponds reported as a need.

Buildings

AAO contains many buildings which are used to facilitate fish production efforts. Summarized information regarding the support buildings at AAO is provided in **Table 5E**.

Hatchery Building

The 8,160 ft² hatchery building was built in 1963 and contains a small office, visitor and aquaria area, restroom, boiler room, and production area. A temporary isolation space has been developed within the production area to provide separation and disinfection of eggs that are brought to hatchery from off site. The building is supplied with water from Madeline and Clear Lakes. The Visitor Area aquaria have been abandoned due to potential disease and biosecurity concerns. There is high pressure, non-chlorinated service water available for rinsing tanks and fish screens. The entire hatchery building area can be heated. The building is lighted with fluorescent and incandescent light fixtures, and is provided emergency power from an on-site generator. There is no fire alarm system within the building. The

Table 5E. AAO Support Building Information

Building Name (No.)	Year Constructed	Area SF	Condition	Number of Rooms	Electric	Lighting (Emergency)	Heating	Ventilation (Adequate)	Air Cond.	Emergency Power	Telephone (Internet)	Fire Alarm
Hatchery Building #240	1963	8,160	Good	5	277/480V 3 PH 4 Wire	Incandescent - Fluorescent - Emergency Lighting by generator	Natural Gas	Yes	No	Emergency Generator	Yes/Yes	No
Storage Garage #238	1947	600	Fair	1	277/480V 3 PH 4 Wire	No	No	Yes	No	No	No	No
Dust Collection Building #241	1964	120	Fair	1	277/480V 3 PH 4 Wire	No	No	Yes	No	No	No	No
Pesticide Building #6155	1994	99	Good	1	277/480V 3 PH 4 Wire	Fluorescent - No emergency	Electric	Yes	No	No	No	No
Madeline Lake Pump Station #6277	1994	1,188	Good	3	277/480V 3 PH 4 Wire	Fluorescent and emergency	Electric	Yes	No	Emergency Generator	No	No
Clear Lake Pump Station #6278	1994	144	Good	2	277/480V 3 PH 4 Wire	Fluorescent - No emergency	Electric	Yes	No	No	No	No
Generator Building #6279	1994	480	Good	1	277/480V 3 PH 4 Wire	Fluorescent and emergency	Electric	Yes	No	Emergency Generator	No	No
Effluent Pump Station #6280	1994	546	Good	2	277/480V 3 PH 4 Wire	Fluorescent - No emergency	Electric	Yes	No	No	No	No
Headbox #6281	1994	600	Good	1	277/480V 3 PH 4 Wire	Incandescent and emergency	No	Yes	No	Emergency Generator	No	No
Office #230	1929	3000	Good	3	277/480V 3 PH 4 Wire	Incandescent and Fluorescent and emergency	Natural Gas	Yes	Yes - Forced air with outside unit	Yes (partial), power outlets for systems computer	Yes/Yes	No
Net House #1 - #231	1936	3000	Good	1	277/480V 3 PH 4 Wire	Incandescent and no emergency	No	Yes	No	No	No	NO
Net House #2 - #232	1937	4200	Good	2	277/480V 3 PH 4 Wire	Incandescent and no emergency	No	Yes	No	No	No	NO
Net Room & Shop #233	1938	5000	Good	9	277/480V 3 PH 4 Wire	Incandescent and Fluorescent and emergency	Natural Gas	Yes	No	No	Yes/Yes	No
Boat House #234	1938	3000	Good	1	277/480V 3 PH 4 Wire	Incandescent and Fluorescent and emergency	No	Yes	No	No	No	No
Carpenter Shop #235	1938	2500	Good	4	277/480V 3 PH 4 Wire	Incandescent and Fluorescent and emergency	Natural Gas	Yes	No	No	Yes/No	No
Pond Building #236	1935	384	Fair	1	277/480V 3 PH 4 Wire	No emergency	No	Yes	No	No	No	No

Source: WDNR Facility Questionnaires, 2009

building is heated by natural gas forced air furnaces in the production area and by electric heaters in the office area.

Boiler Room

The boiler room has recently been updated (2009) with two new process water heating boilers and heat exchangers with pumps. There is a well pump and tank located in the room along with a domestic water heater. A chest freezer, toilet sump and pump are also located within this room.

Feed Storage Room

There is no formal feed storage room in the hatchery building. A chest freezer is available to hold small amounts of frozen feed with the dry feed being stored in Net Building #2. Dry feed is not kept in an air conditioned room.

Chemical Storage

There is no formal chemical storage room within the hatchery building as the main storage is in a Pesticide Storage Building. A small cabinet is available for limited amounts of chemicals.

Hatchery Office

The office is located within a 3,000 ft² building that was built in 1929. It is reported as being in good condition. Heating is by natural gas forced air furnace that was replaced in 2007. A new air conditioning unit was installed at the same time as the furnace. There is no fire alarm system.

Vehicle Storage Garage

The 600 ft² garage was constructed in 1947. The condition of the building is reported as Fair. The existing lead paint needs to be removed and the building re-painted.

Madeline Lake Pump Building

The 1,188 ft² building contains four pumps and controls, and a 150 micron drum screen filter that is in need of repainting. The building was constructed in 1994 and is reported to be in good condition. An air blower is located within the building for aerating ponds 1 through 7. The building is heated by an electric heater and is reported as being adequate for heating the building space. Lighting is by fluorescent fixtures. Emergency power is provided to the building.

Clear Lake Pump Building

The 288 ft² building was constructed in 1994 and is reported as being in good condition. The building contains two pumps and electrical control panels for pumping supply water to the hatchery. An electric heater supplies heat and is reported as adequate. Lighting is by fluorescent fixture. No emergency power is provided to the building. This building is located within the campground where the Clear Lake Intake structure is positioned. Low water levels in Clear Lake, due to drought, have adversely impacted the operation of this water supply system. The water supply line to the hatchery has manual air release valves and low point drainage valves.

Generator Building

The 480 ft² building located next to the hatchery building was constructed in 1994. The emergency generator (125 kW) provides power to the hatchery building during power outages. A blower is also contained in the building to provide air to ponds 8-11 and 12-16. The building is adequately heated by an electric heater. The building is in good condition.

Effluent Pump Building

The 546 ft² building was constructed in 1994 and contains three pumps and pump controllers. An electric heater provides adequate heat. A refrigerated effluent sampler is housed in the building. There is no emergency power provided to the building. The building is in good condition.

Headbox and Drum Screen Building

The headbox and drum screen building were constructed in 1994 to treat water for the hatchery building. The 27 micron drum screen is contained in a 20'x30' building. There are packed columns next to the drum screen building for the de-gassing of incoming supply water. The general condition is reported as good, but spalling of concrete on the floor and a need for re-painting of the drum screen has been identified.

Pesticide Building

The pesticide building is a pre-fabricated metal building used for the storage of various chemicals. It is heated with an electrical heater and has incandescent lighting. The general condition is reported as good.

Net House #1

Net House #1 was built in 1936. The 3,000 ft² building is used for vehicle and net storage. Ventilation is adequate. Lighting is by incandescent fixtures. General condition is reported as good. Needed repairs and modifications are listed as lead paint removal and repainting of the building.

Net House #2

This two level 4,200 ft² building was constructed in 1937. The first floor is used for storage of vehicles, boats, fuel, feed, and fertilizer. Other WDNR programs also use this building for storage. The second floor is used for additional general equipment storage. The general condition of the building is reported as good. Needed repairs and modifications are listed as lead paint removal and repainting of the building.

Net Room and Shop

Construction of this 5,000 ft² building was in 1938 with space for a net room, personnel break room, men's and women's restrooms, shop, shop office and furnace room. There is additional storage in the upper level. Natural gas heat is by two furnaces that were replaced in 2007 for the heating of the break room area. Lighting is by incandescent and fluorescent fixtures. General condition of the building is reported as good with needed repairs and modifications listed as lead paint removal, repainting of the building, ceiling insulation, and replace the windows with historically correct windows.

Boat House

The boat house was constructed in 1938. It has 3,000 ft² of area used for vehicle and boat storage. The general condition is reported as good with reported needed repairs and modifications listed as lead paint removal and repainting of the building.

Carpenter Shop

This 2,560 ft² building was constructed in 1938. Four rooms are contained within the building including the carpenter shop, office, storage, and furnace rooms. Heating is provided by a natural gas, forced air furnace that was replaced in 2007. Lighting is by incandescent and fluorescent fixtures. Reported general condition is good, with needed repairs and modifications listed as lead paint removal and repainting of the building.

Dust Collection Building

The dust collection building is next to the carpenter shop and is used to collect wood dust from the carpenter shop. The building is 120 ft² in size. There is electricity supplied to this building, but no heating or air conditioning.

Pond Building

The 384 ft² building is used for the storage of pond equipment, screens and dam boards. Electricity is not provided to the building. The general condition of the building is reported as fair with needed repairs and modifications listed as lead paint removal and repainting of the building.

Residences

There are no on-site residences.

Site

Domestic Water/Wastewater Systems

The hatchery complex is supplied with domestic water from three on site wells. Water quality is considered poor. A water conditioning system is located within in the Net Room Building to remove iron, but is not operational and needs replacement. A well on the north side of the hatchery is not used and should be properly abandoned. Tap and piping size is not known.

There are two septic systems to treat domestic wastewater. They are pumped out and serviced every two years.

Roads and Parking

The entrance road from the public road to the hatchery building complex is asphalt. The roads around the ponds and reservoir are gravel. The asphalt road surfaces are showing signs of cracking and crumbling. The gravel roads around the pond complex are in fair to good condition, but will require grading and additional gravel surface in the future. Visitor parking is adequate, located west of the hatchery and Madeline Lake dam.

Fencing and Security Lighting

The main hatchery complex has a 9' high, woven wire steel fence installed around the south pond area of the hatchery as well as Ponds 1-7 on the north side of hatchery. It is recommended that the entire perimeter of the complex be fenced along with fencing separating the auto shop and storage building from the hatchery production area. The fencing that is in place is reported to be in good condition. Site lighting is owned by the hatchery.

Site Drainage and Flooding

The southwestern portion of AAO lies within the 100-year flood plain (Zone A) according to the Flood Insurance Rate Map (FIRM) from the National Flood Insurance Program (Panel Number 55085C0075B, effective August 5, 1991, see **Appendix F**). Zone A is defined as an area inundated by 100-year flooding for which no base flood elevations have been established. The 100-year floodplain is also explained as a region that has a 1% chance of flooding every year.

Flooding has been an issue in the past when the creek located next to the hatchery building would overflow its banks and into the hatchery building. This was corrected in 1993 with the installation of larger culverts in 1993. There have also been some instances where there has been over topping of the dam on Madeline Lake, but has not resulted in any damage.

Aquaculture Wastewater

The facility is currently operating under a Wisconsin Permit Discharge Elimination System (WPDES) permit (WI-0058271-03-0). Effluent is currently discharged at three different outfall locations directly into the Minocqua Thoroughfare Creek. During normal overflow operation, water is discharged directly to the creek. When chemical treatments are applied and enter the waste stream, and final drainage of the lower half of production ponds occur, the waste stream must be diverted to the three-acre absorption/seepage pond. The following parameters are monitored on a variable frequency as follows: river flow, flow rate, BOD5, TSS, pH field, dissolved oxygen, total phosphorus, sodium chloride, hydrogen peroxide, acute and chronic WET, and potassium permanganate. An excerpt of the current WPDES permit is located in **Appendix H**.

Utility Systems

Utility	Electrical Power	Telephone	Internet
Company	Wisconsin Public Service	Verizon	Badgernet
Contact Information	UNK	UNK	UNK
Type	208/480V 3-Phase, 4 Wire	NA	Wireless, adequate speed
Condition	Good	Good	Good

Source: WDNR Facility Questionnaires, 2009

The site contains six metered service points with overhead distribution. There is no electrical power distribution at the ponds. The site is supplied by telephone service that is integrated with the state government telephone system. An electrical upgrade for the facility was completed in 2004.

Fuel Systems

The portable emergency generator that is used for back up power at the Madeline Lake pump building has a self contained diesel fuel supply. Fuel is not stored underground. Fuel is not dispensed on-site for grounds maintenance or highway vehicles. Natural gas is supplied to the hatchery complex with meters at the hatchery building, carpenter shop, net room, shop building, and office building and is used for heating of the buildings and water supply boilers.

Instrumentation & Alarm Systems

The hatchery has an alarm and instrumentation system that was installed in 1994. The dialer is manufactured by Verbatium. The hatchery control system uses Wonderware software with Windows NT for and interface on Dell computers, the pump station DTAM's and the master control PLC use s RS Logix 5 software and the hardware at the pump stations and hatchery is Allen Bradley. Other instrumentation is by various manufactures. The system transmits an alarm message via telephone dialer. The system can control functions at the Madeline Lake pump station, Clear Lake pump station, and hatchery building. The system monitors pumps, water levels and flows, temperatures on hatching batteries, and hot water systems.

Emergency Power

Emergency power is provided by two generators. One generator is portable (125 kW, diesel fueled) that is used at the Madeline Lake pump and drum screen building, the headbox and drum screen building, and moved to the Effluent and Clear Lake pump stations when needed. Another generator (125 kW, natural gas fueled) is located immediately north of the hatchery building that is used for supplying power to the hatchery building. They are listed as being in good condition and have capacity to take on additional load. They are auto starting and transfer. The generators are exercised regularly. It is reported the generators are used/needed three to five times per year from one to twenty four hours for power outages. The longest outage was for three days. It is recommended additional emergency generators be supplied for both the Effluent pump station and the Clear Lake pump station.

Public Visitation Information & Education Services

The hatchery has a visitor information center with aquariums; however with the advent of VHS, the aquariums are no longer used. There are public restrooms available at another building located off of the hatchery complex. Brochures and displays are available to the public, but fish viewing and feeding is restricted during incubation and hatching periods. In the past upwards of 3,000 visitors a year have come to the hatchery, but with the advent of viral hemorrhagic septicemia visitation number have dropped to around 790 because of reduced access to the hatchery site. Due to disease and biosecurity concerns, staff have indicated that an isolated visitor and aquaria area be developed away from the hatchery building.

Facility Problems & Improvement Alternatives

This Section of the report provides a description of individual facility infrastructure problems and a discussion of possible solutions to address these identified problems. The list of facility problems and needs was developed after the site inspection/meeting, and consultation with WDNR staff. A summary of facility problems and possible solutions is shown on **Drawing AAO-3**. The majority of the problems at the Wisconsin hatchery facilities are related to aging infrastructure, limited water availability and/or poor water quality, and lack of biosecure features. While the AAO facility has been recently updated, some infrastructure improvements can be completed to enhance production at or management of the facility.

This discussion and the Drawing's keyed notes address improvement recommendations in the following sequence:

A. Aquaculture Water Supply
B. Fish Rearing Units
C. Buildings
D. Site
E. Aquaculture Wastewater
F. Electrical and HVAC

Improvement item numbers in this discussion correspond to the keyed notes shown on the Drawings. It is suggested that the reader refer to keyed notes on the drawings to become familiar with the location and scope of improvements discussed in this section of the report. If further information regarding a particular improvement item is desired, **Appendix A** includes improvement item descriptions in more detail. **Appendix C** contains example photographs of some of the proposed improvements.

A. Water Supply

Item A1 – Disinfect Madeline Lake water supply to buildings and ponds

The open Madeline Lake water supply presents several issues for incubating, hatching, and rearing coldwater fish. Potential water quality concerns identified include nitrogen gas supersaturation in spring, oxygen supersaturation in summer, high fertility and blue green algae blooms. In addition, the open water supply also presents a potential issue for ANS/VHS and other biosecurity risks such as aquatic invasives (i.e., rusty crawfish, banded mystery and Chinese mystery snails).

Ultraviolet (UV) disinfection technology can be installed to treat a wide variety of water flow rates and piping configurations without toxic residuals. UV equipment can be of either chamber or open channel type configurations. If a chamber unit is selected, a low pressure industrial class UV system consists of an ultraviolet contacting chamber, ultraviolet light emitting bulbs, quartz sleeve, automatic tube cleaning mechanism (wipers), power supply, and all related piping interconnections. Channel immersion type systems are sometimes used in low-head applications to avoid pumping requirements and to simplify maintenance. These systems can be manually or automatically cleaned. In the past, only incubation and

early rearing water supplies were disinfected. However, biosecurity threats and VHS concerns are leading to ponds supplied by open water sources supplies also requiring disinfection. For optimal disinfection, microscreening will be required upstream (see **Item A7**).

Item A2 – Modifications to Clear Lake pump station

Clear Lake water supply pump station sump was not constructed deep enough so during periods of drought when the lake water levels drop by as much as four feet, water cannot flow into the sump through the existing intake pipeline. When this happens, this source of water is not available which can negatively affect hatchery production. Pump station renovation will include: removal of the sump floor, excavation for depth, re-pour the floor, cut in new lower pipeline connection and extend pump shafts to obtain water for production use.

Item A3 – Disinfect Clear Lake water supply to building

Being an open water supply source, Clear Lake, like Madeline Lake, has potential ANS/VHS issues and other biosecurity risks. Install UV disinfection system to treat Clear Lake water supply which feeds the building. Microscreen treatment will be required upstream of disinfection (see **Item A4**).

Item A4 – Microscreen Clear Lake water supply to building

Install a drum screen filter, a pressure strainer, or other filtration/straining device on the Clear Lake water supply. An enclosure is needed to insure the filtering device could work during all times of the year.

Item A5 – Treat domestic well water for iron and hydrogen sulfide

Well water at the facility contains elevated iron and H_2S levels, which limits its use for coldwater fish culture. To enhance the well water quality, a headbox with increased capacity and forced-draft high volume air packed aeration columns could be installed to aerate the water. This will remove the H_2S gas and precipitate the iron. Some form of filtering device will be needed to remove the iron floc after aeration.

Item A6 – Renovate Madeline Lake intake box and intake screen

The Madeline Lake intake box is exposed, which subjects the hatchery to many of the water quality issues identified in **Item A1**. In addition, staff must also routinely remove debris and vegetation from the intake screen. Reconfigure intake by extending intake pipe below Madeline Lake water surface. This extension along with a T-screen should prevent debris or biota from fouling the system. Another option would be construct a new intake box with automatic screening (traveling screen) and security features.

Item A7 – Renovate or replace microscreen filtration system

One of the two existing water supply microscreen units has experienced some corrosion. Determine whether repairs are needed to the unit and replace those parts, as needed. Alternately, the entire microscreen system could be replaced with new equipment which is recommended.

Sometimes water will also need to be sand filtered if obtained from an open water source prior to use in early rearing if background particulates are interfering with optimal fish production. AAO staff did not indicate that sand filtration was needed for their coolwater building.

Item A8 – Add emergency spillway at Madeline dam

Hatchery personnel have identified the need for an emergency spillway at the Madeline Lake dam. During periods of heavy rain the lake will overflow the dam and inundate ponds 8, 9 and 10. It is suggest that the dam be raised and a high water bypass be constructed. A preliminary report had sited an overflow north of the dam that flowed into the east end of Pond 21 and exited the west end to the creek. The spillway should be constructed at an elevation to address the need for having to pull water level control dam boards during high water situations.

Item A9 – Replace manual air release valves with automatic

The Clear Lake water supply pipeline current has manual air release valves. Replacement is needed with automatic air release valves. Automatic air venting will ensure optimal venting and water transmission to the hatchery complex.

Item A10 – Install water supply measurement

The site does not have any measurement options to determine flow rates. Install flow measurement devices in pipeline(s) between water supply source and rearing units. This will allow better monitoring and will assist in determining optimal water usage for the facility.

Item A11 – Install recirculation treatment system (UV, filtration, pump)

Coolwater species are incubated, hatched, and reared intensively within the hatchery building at AAO. If additional coolwater early rearing and coldwater rearing is added (see **Items B1 and B2**) and adequate new well water volumes are not feasible (see **Item A13**), recirculation could be an option for AAO (see **Item B2**) to meet water requirements. Use of first use disinfected lake water and/or well water is recommended whenever possible for egg incubation and early rearing.

If recirculation is practiced in the proposed new coldwater building and grow-our units, treatment will need to be completed using microscreening to remove particulates, disinfection, oxygen supplementation. A pump system will also be required. Depending on the selected recirculation ratio (e.g. >80:20), nitrification and carbon dioxide management might also be required. Sometimes water will be sand filtered if obtained from an open water source prior to use in early rearing. The recirculation system will be sized for about 2,500 gpm.

Item A12 – Perform a groundwater study to determine availability / quality of additional water

If coldwater rearing is to be completed at this facility, new water will need to be supplied. A hydrogeological study should be conducted to examine and confirm the quality and quantity of groundwater supplies in the area. This will help determine the potential for additional water to the facility. A groundwater model will also be developed to be used in any future environmental permitting efforts.

Item A13 – Install a new well

Pending a successful groundwater investigation (**see Item A12**), a production well could be installed to provide additional flows to the facility to be used for coldwater rearing (see **Item B2**) and/or the new coolwater early rearing tanks (see **Item B1**). An aeration/degassing headtank would be required to

remove dissolved gases from the groundwater. Total well needs to provide all the water for the proposed coldwater rearing is about 2,500 gpm. If recirculation is used, then about 750 gpm of new well water is needed to serve as makeup water.

B. Fish Rearing Units

Item B1 – Add coolwater early rearing space

Hatchery personnel have requested additional rearing space for coolwater species. These rearing units (linear or circular tanks) and associated piping and valves would be contained within a new building or a possible addition to the existing hatchery building. Early rearing will require separate facilities for coolwater production and coldwater production (see **Item B2**). If adequate water volume is not available, recirculation (see **Item A11**) and water treatment systems for disease, temperature and water quality control will be required.

An additional coolwater production room (1,820 ft²) with 16 six-foot diameter fiberglass tanks with each having around 71 ft³ of rearing volume resulting in an additional total volume of 1,130 ft³. These new tanks, with an R of 2, would require an additional 282 gpm (17.6 gpm each). Ideally, the extra flow requirements can be accommodated using Madeline Lake (up to 1,250 gpm) and the newly operating Clear Lake inflow (500 gpm). These tanks could be utilized for the intensive training and culture of muskellunge and walleye. Production might be expected to be between 280 pounds (0.25 lbs/ft³) and 625 pounds (0.55 lbs/ft³) of fingerlings, If additional water from Madeline and Clear Lake water cannot be used, the system could be operated on a recirculated water supply (80:20) with filtration, oxygenation, temperature control, and disinfection capability. It is recommended to renovate the existing visitor area (40' x 7') into a coolwater egg reception/disinfection area and staff restroom that is separated from the main hatchery building production area (see **Item B3**). This would require demolition and removal of the existing aquaria.

Item B2 – Add coldwater rearing space

A new coldwater hatchery building with production area, egg reception/disinfection room, staff locker rooms with bathroom facilities, and office space should be constructed. This building would contain space (800 ft²) for 60 egg incubation jars with collection tanks, 10 stacks of vertical incubation trays with egg disinfection and rinsing trough, sixteen 6' diameter fiberglass tanks (1,820 ft²), feed storage area (200 ft²), office area (144 ft²), staff locker and wash down/disinfection area (225 ft²), unisex bathroom (80 ft²) for a total of approximately 3,280 ft². Total water flow requirements for the building would be approximately 600 gpm. Total potential fingerling production would range between 280 and 625 pounds, 0.25 and 0.55 lbs/ft³ respectively, with all tanks being utilized. Coldwater rearing will also require the installation of a dissolved oxygen management system to optimize production.

Hatchery personnel have also requested additional rearing space for coldwater species to replace some or all of the units at local rearing stations in the service area. These rearing units (linear or circular tanks) and with associated piping and valves would be outdoors but covered with a pavilion (similar to the new Wild Rose SFH raceway cover). One configuration would be a 4,800 ft² pavilion containing two 100'x8'x4' raceways capable of producing approximately 14,400 lbs. of advanced salmonid fingerlings. These would have the capability of being operated on one pass water or recirculated, treated water. Total water flow needed would be approximately 1,000 gpm per raceway for an R of 4, or a total of 2,000 gpm.

Total new flow required for the coldwater additions to the facility are 2,600 gpm. It would be ideal to obtain this entire flow as fresh well water (see **Item A13**). However, if the local aquifer cannot support that flow, recirculation (see **Item A11**) along with appropriate treatment (i.e., filtration, oxygenation, and disinfection) could be used at an 80:20 ratio to meet rearing needs. The total makeup flow rate would be about 520 gpm and would need to be supplied either by a new well or by new lake water. In addition, well water should also be used for egg incubation purposes at a rate of about 150 gpm.

Item B3 – Add egg disinfection room or building

Hatchery personnel have constructed a makeshift egg disinfection room within the hatchery building. The current operation presents biosecurity issues to the facility. It is recommended to renovate the existing visitor area (40' x 7') into a coolwater egg reception/disinfection area that is separated from the main hatchery building production area. This would require demolition and removal of the existing aquaria. If this is not possible then construction of a separate, dedicated building where gametes can be properly disinfected would have to be completed.

Item B4 – Replace all wooden screens/weir boards for biosecurity

The existing screens and weir boards within the rearing units are constructed of wood, which can provide a substrate for disease causing organisms. Replace old screens and weir boards and install new units constructed of an inert (i.e., fiberglass or aluminum) material.

Item B5 – Line or replace remaining earthen rearing ponds (8-11)

The existing ponds have groundwater intrusion and leak into the adjacent creek when full. Line remaining earthen ponds (8-11) or replace with new lined ponds w/ harvest kettles. Underdrains will be required to reduce groundwater intrusion. Prior to lining, the ponds should be regraded, reshaped and compacted. The ponds could be deepened at that time if groundwater issues allow.

Item B6 – Replace existing pond liners

Most of earthen rearing ponds at the facility are currently lined. Many of these liners systems are approaching the end of the life span. Replace liners within these ponds. A wide variety of lining materials are available including High Density Polyethylene (HDPE), Very Low Density Polyethylene (VLDPE), Chlorosulfonated Polyethylene (CPSE), polypropylene (PP) and EPDM pond guard.

Item B7 – Provide shade/netting over selected ponds

Install an Area Suspended Netting System over the selected ponds for control of bird predation. Shade control can be provided by adding removable agricultural shade cloth to the netting system.

Item B8 – Underdrains for pond liners in Ponds 12-16

Ponds 12-16 have groundwater below the liner, which causes them to lift when ponds are empty.

Several of the existing ponds at the facility experience some groundwater infiltration under the existing liner systems, which can complicate fish harvesting and general pond maintenance. Remove liners (see **Item B6**) and install perforated plastic pipe underdrains with sediment socks and control valves to collect and drain seepage under the ponds.

Item B9 – Repair cracked and broken kettle concrete

Some concrete kettles have deteriorated due to ice damage. Damage occurs when ice flows push on water control structures and freezing/thawing resulting in concrete spalling. Repair cracked and broken concrete on existing harvest structures. Five units have been assumed as needing repairs for purposes of the report.

Item B10 – Coating for concrete rearing units A-H

Chemical and physical erosion has caused some of the concrete rearing/holding units (Units A-H) within the hatchery building to deteriorate. As the concrete within the concrete holding tanks/raceways has etched away, the underlying aggregate has become exposed making the rearing units difficult to clean and causing fin erosion to the fish. In addition, some concrete cracking and spalling has also occurred.

To improve the eroded concrete surfaces, options include concrete repair coating followed by a high-bond epoxy or polyester coating, a high-build (>50 mil) multi-layer fiberglass or similar high build plastic coating system that can be applied to provide a long-term smooth coating to prevent finish erosion and provide concrete protection. Prior to resurfacing the concrete, preparation is required (e.g., high-pressure water washing or sand/shot blasting). For these applications, costs include the high-build coating systems and surface preparation.

Item B11 – Replace egg incubation jars

The hatchery building at AAO maintains 1,000 regular sized McDonald egg incubation jars. Approximately 25% of the egg incubation jars need to be replaced.

Item B12 – Replace selected harvest kettles with larger harvest kettles

Hatchery personnel have stated that the existing harvest kettles are not large enough to accommodate larger fish. Replace existing structures and install new, larger kettles with associated water supply components.

Item B13 – Replace Pond Aeration System

The existing blowers, one each in the Madeline Lake Pump Building and the Generator Building should be replaced with new positive displacement blowers with variable frequency drives for more energy efficiency and improved air delivery to the ponds. The existing weighted perforated airline in the ponds should be replaced with Colorite aeration units for improved pond water column mixing and dissolved oxygen enhancement. If Ponds 8 – 11 are developed and lined (see **Item B5**), a new air distribution line from the generator building with a new blower will be required.

C. Buildings

Item C1 – Remove lead paint and repaint support buildings (Note: historically significant)

Several of the historic buildings at AAO likely contain lead-based paint. A licensed lead inspector and abatement contractor should conduct a lead inspection of the facility and evaluate lead abatement options (i.e., removal, containment or encapsulation) with WDNR. Test support buildings' exterior paint for lead, remove and repaint as needed

Item C2 – Add biosecure visitor center

Construct a new visitor center with accompanying parking area for up to 20 vehicles. Aquariums with water treatment will be required if live fish are to be viewed. Size of the building will be approximately 1,600 ft². Public access will be limited to the visitor building and restricted to the area immediately next to the building within the fenced area.

Item C3 – Hatchery building renovations

The office in the AAO hatchery building needs to be enlarged for technician workspace. The west wall of the office would be moved to west of the exterior entrance walk-in door, providing access to the office and isolation from the outside as well as enlarging the office space. An entrance to the office needs to be made to allow entry without going into the disinfected areas of the hatchery (see also **Item B3**). A staff restroom would be added to the east end of the renovated egg receiving/disinfection area with an exterior entrance doorway.

Item C4 – Add laboratory and restroom

AAO lacks a dedicated laboratory. Rearing space is currently used for this function. Convert the cold storage area of the Hatchery Office building to laboratory space. Add a unisex bathroom. Supply domestic water, plumbing and sewer system as the building does not currently have water or sewer systems.

Item C5 – Add temperature control to feed storage

AAO currently does not have climate controlled feed storage. An air-conditioning system for feed storage room in the Net Building (150 ft²) should be added to preserve fish feed quality. Feed for both coolwater and coldwater programs would be stored in this area.

Item C6 – Add employee gear lockers and storage space

Employee weather gear and protective gear storage space is needed at AAO. General storage should also be added. This could be accomplished with an addition on the existing hatchery building or when constructing the additional coolwater production area, or when constructing the new coldwater production building. Separate male and female locker and bathrooms would be required.

Item C7 – Add general storage

Additional storage space for vehicles and hatchery equipment is needed at AAO. Construction of a new five-bay building is recommended.

Item C8 – Replace HVAC duct in hatchery building

Replace the HVAC ductwork in the AAO hatchery building.

Item C9 – Office building renovations

Replace carpet in the AAO Office Building.

Item C10 – Net Room/Shop renovations

Several renovations with the Net Room and Shop are needed. These include window replacement to match historic windows and ceiling insulation. The net room needs a larger door, which will allow nets to be brought in for mending. The concrete floor needs resurfacing.

Item C11 – Renovate pond building

The Pond Building is reported to be in fair condition and was constructed in 1935. However, it is recommended this building be replaced with a new building that has concrete flooring as the present building has raised wood flooring.

Item C12 – Repair/replace concrete approach into shop area

The approach concrete in the shop area needs to be repaired or replaced.

Item C13 – Add building features to allow biosecure isolation of individual lots

To help insure the future biosecurity of AAO, separation within buildings to isolate the various fish species and lots on station maybe required. This would include dedicated, quality water supply, spaces for each species or lot incubated, hatched, and reared. Wall partitions and piping modifications might be required.

D. Site

Item D1 – Add truck/equipment disinfection area

Transporting fish for facility transfers and stockings has the potential to introduce disease vectors and/or invasive species into the hatchery system, all of which can compromise fish production and stocking. A dedicated disinfection area is recommended for hatchery equipment and fish transport and stocking vehicles.

Item D2 – Enclose entire facility with fence and automatic gates

To insure hatchery security, the entire hatchery should be enclosed with fencing and automatic gate controllers.

Item D3 – Abandon unused domestic well per code

A domestic well is not being used; the well needs to be properly abandoned in accordance with state regulations. The well, located north of the generator building, is considered a sand point and needs to be abandoned.

Item D4 – Replace Net Room/Shop domestic water conditioning system

The domestic water conditioning system in the Net Room Building needs replacement.

Item D5 – Separate other agencies/management operations from hatchery operations

AAO is shared with other state agencies and fisheries management operations. Hatchery operations, storage, and support areas should be separated from other fish management activities to avoid cross

contamination and biosecurity risks. Current building uses and traffic patterns are recommended to be modified for improvement in biosecurity. Additional fencing with automatic gates to control access to the hatchery proper is recommended. It is also recommended that management net storage be moved from the existing building into a new building located closer to the net hanging area. A new road should be constructed that enters the hatchery at the southeast corner of the property from the main road. This is a management decision as to what level of access by non-hatchery personnel should be allowed for biosecurity reasons so no costs have been assigned.

Item D6 – Install better stormwater runoff management system

Improve site drainage and stormwater management near hatchery building, net room/shop and around the site.

Item D7 – Create a video showing fish rearing and egg take

Video illustrating hatchery production and stocking procedures would enhance the visitor educational and interpretative opportunities at the hatchery, especially during off-season visits.

Item D8 – Add a visitor's ADA accessible restroom

The restroom in the new hatchery's visitor center should be ADA compliant (see **Item C2**). Alternately, if the visitor building is not added, a new visitor restroom should be added to the facility. For purposes of this study, Item C2 has been selected to be included in the cost projections to ensure that adequate funding is reserved and this item will be moved to the Other Group (Redundant).

E. Aquaculture Wastewater

Item E1 – Provide effluent treatment in the winter for building wastewater

Currently water is not discharged from this site (due to VHS potential). The Seepage bed is used. This appears to be adequate. However, if pond discharge is practiced in the future, additional wastewater treatment may need to be added.

Item E2 – Install wastewater treatment system for future coldwater production

If coldwater production is added at this facility, additional effluent treatment equipment may be required such as microscreens, clarifiers and sludge storage to meet effluent permit requirements. This equipment targets solids removal. If nutrient removal is required, additional biological or chemical treatment may also be required.

F. Utility Systems

Item F1 – Relocate and add more electrical outlets in the hatchery building

Relocate and add electrical outlets in rearing building to eliminate the use of extension cords. Other electrical hazards identified include additional GFCI protection, improved lighting near egg batteries and rearing tanks, and overhead outlets to avoid using power cords on potentially wet floors.

Item F2 – Replace/upgrade instrumentation system hardware and software

Replace/upgrade instrumentation control system hardware and software.

Item F3 – Emergency backup for the intake pump stations and effluent lift station

The hatchery intake pump stations (including Clear Lake pump station) and effluent lift station need permanent electrical backup. Any new water treatment and recirculation equipment will also need to be added. These electrical loads should be serviced by facility's emergency generator. A new generator could be added if the existing system cannot handle the proposed loads.

Item F4 – Replace temperature probes in the hatchery building

Replace temperature probes within hatchery building.

Item F5 – Upgrade main electrical panel

The existing electrical system has been prone to lightening strikes and damage. Provide additional surge protection.

Item F6 – Add microturbine at Madeline Lake intake for potential energy savings

To reduce facility electrical operational costs, a microturbine could be installed at AAO to generate electrical power to operate select electrical loads at the facility. The microturbine could be added at the Madeline Lake dam. However, a hydroelectric investigation and eventually permitting would be required to determine the applicability at this location.

Prioritization and Opinions of Probable Cost

The **Summary** and **Detailed Opinions of Probable Cost** for AAO are provided at the end of this Section. Item numbers match those already presented in the text and illustrated on the Drawings. The AAO improvements plan will cost about **$9.4 million to construct**. After the State design and construction contingencies are added to the total, **the project budget** will need to be about **$11.7 million**. See **Section 24** for an explanation of cost estimating methodologies, assumptions, unit prices, descriptions, and contingency explanations.

All provided costs are in 2011 dollars and will **require escalation (4% per year)** to the appropriate construction period. For example, if a $25 million job is not constructed until 2012, the cost becomes $27 million. Due to the recent natural disasters (e.g., hurricanes) and the oil price increases, the construction industry is faced with shortages, escalated prices, and a large demand for new and renovation construction in the affected areas. Recently bid projects have seen an increase in the range of 10% to 25% above normal opinions of probable cost.

The recommended improvements for each facility have been divided into implementation groups in order to provide optimal funding and construction sequencing flexibility for the entire project. WDNR can use these categories to assist in obtaining appropriate construction funding. These groupings may need to undergo revision as system-wide scheduling and State funding allocations change. These Improvement Groups have been developed by the Consultant along with input from the WDNR staff to reflect the following categories:

Group 1 - Human Health and Safety. These improvements are considered critical to the station's ability to comply with the State's Human Health and Safety laws and codes such as Commerce DILHR rules. These improvement items include all visitor safety improvements and worker safety improvements such as guard rails, chemical storage/ventilation, lead paint and facility/electrical code upgrades to meet worker safety rules. Staff restrooms and fire alarm systems are also included in this group.

Group 2 - Environmental Compliance. These improvement items were selected in order to comply with state environmental laws and WDNR environmental rules. Recommended effluent treatment systems are included in this grouping to assist in meeting the current WPDES permit limits. Water supply measurement systems are included to meet upcoming water supply regulations. Also any site drainage and erosion control items are included.

Group 3 – Fish Health & Biosecurity. These improvement items are intended as a set of preventive measures to reduce the risk of transmission of infectious diseases and pathogens, quarantined organisms, and/or aquatic nuisance species (invasive or exotic alien species) from being passed within the state fish hatchery system or into the state waters. Items related to fish health, biosecurity and medical separation are also included in this group such as water treatment, dissolved oxygen management, groundwater investigations. Other fish health features include emergency generation to meet current life support functions and low flow/oxygen alarms.

Group 4 - Major Building Maintenance. Each facility contains numerous support buildings which are used to support rearing efforts. Many buildings are antiquated and require extensive (i.e., > $5,000) renovations to allow continued usage. These types of improvements include major kitchen, restroom renovations, foundation work, wall/flooring replacement, and exterior siding/painting. Many buildings also required extensive HVAC upgrading or replacement.

Group 5 - Minor Building Maintenance. This group contains support buildings that require minor (<$5,000) renovation projects to allow continued support functions. Typical minor renovations to small buildings generally fall within this category.

Group 6 - Improvements Needed to Meet Stocking Goals. The majority of the remaining improvement items fall within the requirements to meet stocking goals category. Construction of these improvements is considered essential to the station's ability to meet current and future WDNR fish production goals. Renovation is generally required to repair deteriorated infrastructure and restore operational performance. Enhanced water supply, treatment and recirculation items are generally included in this category. Future enhanced new wastewater treatment systems are included in this group to meet requirements for proposed increased production. General site work items, all new support buildings and visitor restrooms also fall within this group.

An **Other** Group was added to include items that have been completed, do not appear to be feasible or are redundant to other selected alternatives. The costs associated with these items are not included in the overall facility subtotal. Sometimes specific issues are addressed by the facility between the time of the initial site visit and the printing of the final report. As the report evolved, either WDNR or further research has indicated that initially recommended items cannot be applied at a certain facility. These types of items have also been moved to the Other group. Sometimes items are not recommended because other similar category items have been selected. For instance, if a new well is able to provide adequate water, recirculation would not be recommended. Sometimes, several options are presented for one improvement item but only one has been selected for subtotaling in the project probable construction costs. The optional costs have been provided to allow WDNR the option to choose alternatives in the future if needs or preferences change.

Note: In the **Detailed Opinions of Probable Cost**, the costs are calculated by taking the number of units by cost per unit. This total is multiplied by the general conditions contingency (5%) and the estimating contingency (10%). This value is shown in the fifth column of the spreadsheet and titled **Subtotal+15% GC/Est**. This value is generally considered the **cost to construct**. The next column takes the previous subtotal and multiplies it by 1.25 to include the Design and Construction Contingencies. This column is entitled **Total Cost+25% Cont** and is generally considered to be the **cost needed to budget** for that improvement item. (See **Section 24** for further explanation regarding all contingencies).

Art A. Oehmcke SFH Summary Opinions of Probable Cost

ITEM	DRAWING I.D. #	ROUNDED CONST COST[a]	ROUNDED TOTAL COST[a]	
Total Cost for all Recommended Improvements		**$9,418,000**	**$11,689,000**	
Group 1 - Human Health and Safety		**$405,000**	**$505,000**	
Add emergency spillway at Madeline dam	A8	$104,000	$130,000	
Remove lead paint & repaint support buildings	C1	$223,000	$279,000	
Replace Net Room/Shop domestic water condition system	D4	$5,000	$6,000	
Relocate & add more electrical outlets in hatchery bldg	F1	$15,000	$18,000	
Upgrade main electrical panel	F5	$58,000	$72,000	
Group 2 - Environmental Compliance		**$249,000**	**$312,000**	
Install water supply measurement	A10	$35,000	$44,000	
Abandon unused domestic well per code	D3	$6,000	$8,000	
Install better stormwater runoff management system	D6	$35,000	$44,000	
Provide effluent treatment in winter for building WW	E1	$173,000	$216,000	
Group 3 - Fish Health and Biosecurity		**$1,951,000**	**$2,438,000**	
Disinfect Madeline Lake water supply to buildings & ponds	A1	$460,000	$575,000	
Modifications to Clear Lake pump station	A2	$144,000	$180,000	
Disinfect Clear Lake water supply to building	A3	$118,000	$147,000	
Microscreen Clear Lake water supply to buildings	A4	$128,000	$159,000	
Treat domestic well water for iron and hydrogen sulfide	A5	$64,000	$80,000	
Renovate or replace microscreen filtration system	A7	$403,000	$504,000	
Add egg disinfection room or building	B3	$21,000	$27,000	
Replace all wooden screens/weir boards for biosecurity	B4	$58,000	$72,000	
Replace pond aeration system	B13	$138,000	$173,000	*
Add biosecure visitor center	C2	$334,000	$417,000	
Add building features to allow biosecure isolation of individual lots	C13	$41,000	$51,000	
Add truck/equipment disinfection area	D1	$42,000	$53,000	
Group 4 - Major Building Maintenance		**$220,000**	**$274,000**	
Hatchery Building Renovation	C3	$51,000	$64,000	
Add temperature control to feed storage	C5	$5,000	$6,000	
Replace HVAC duct in hatchery building	C8	$12,000	$15,000	
Office building renovation	C9	$12,000	$15,000	
Net Room/Shop renovation	C10	$87,000	$108,000	
Renovate pond building	C11	$35,000	$44,000	
Renovate/replace concrete approach into shop area	C12	$18,000	$22,000	
Group 5 - Minor Building Maintenance		**$0**	**$0**	
None				

Art A. Oehmcke SFH Summary Opinions of Probable Cost

ITEM	DRAWING I.D. #	ROUNDED CONST COST[a]	ROUNDED TOTAL COST[a]	
Group 6 - Improvements Needed to Meet Fish Stocking Goals		**$6,593,000**	**$8,160,000**	
Renovate Madeline Lake intake box and intake screen	A6	$72,000	$90,000	
Replace manual air release valves with automatic	A9	$10,000	$12,000	
Install recirculation treatment system	A11	$1,146,000	$1,432,000	*
Perform groundwater supply study	A12	$311,000	$311,000	*
Install a new well	A13	$179,000	$223,000	*
Add coolwater early rearing space	B1	$419,000	$524,000	*
Add coldwater rearing space	B2	$1,482,000	$1,852,000	*
Line or replace remaining earthen rearing ponds (8-11)	B5	$422,000	$527,000	
Replace existing pond liners	B6	$679,000	$849,000	
Provide shade/netting over selected ponds	B7	$58,000	$72,000	
Underdrains for pond liners in Ponds 12-16 (See B6)	B8	$0	$0	
Repair cracked and broken kettle concrete	B9	$29,000	$36,000	
Coating for concrete rearing units A-H	B10	$27,000	$34,000	
Replace egg incubation jars	B11	$23,000	$29,000	
Replace selected harvest kettles w/ larger harvest kettles	B12	$159,000	$198,000	
Add laboratory	C4	$86,000	$107,000	
Add employee gear lockers & storage space (see B2)	C6	$0	$0	
Add general storage	C7	$374,000	$468,000	
Enclose entire facility with fence & automatic gates	D2	$87,000	$108,000	
Create a video showing fish rearing and egg take	D7	$6,000	$8,000	
Install wastewater treatment system for future coldwater production	E2	$690,000	$863,000	
Replace/upgrade instrumentation system hardware/software	F2	$69,000	$87,000	
Emergency backup for intake pump stations & effluent lift station	F3	$155,000	$193,000	
Replace temperature probes in the hatchery building	F4	$23,000	$29,000	
Add microturbine at Madeline Lake intake	F6	$87,000	$108,000	
Other		**$25,000**	**$32,000**	
Separate other agencies/mgmt storage from hatchery storage (No Cost Assigned)	D5	$0	$0	
Add a visitor's ADA accessible restroom (Redundant)	D8	$25,000	$32,000	

[a] Rounded Construction Costs include 15% Contingency: General Conditions (5%) ; Estimating (10%). Rounded Total Costs (or Costs needed to Budget) also include 25% Contingency: Planning & Design (8%); Construction Phase Engineering (7%); and State Construction (10%, Bidding and Change Order). [Total * (1.10+.05) * (1.10 + 0.08 + 0.07)]

Costs do **NOT** include: Design Reimbursables (Variable); State Agency Administrative Fee; or escalation beyond 2011 Construction. See Section 24 for further discussion and recommendations regarding contingencies.

* = Items associated with future increased production

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Project: Comprehensive Study of WI Fish Propagation System
Phase: Study **Hatchery:** Art. A. Oehmcke
By: Team **Date:** 12/1/2011

Art A. Oehmcke SFH Detailed Opinions of Probable Cost						
Dwg. I.D.#	ITEM	NO. UNITS	UNIT MEAS.	COST PER UNIT	SUBTOTAL +15% GC/EST	TOTAL COST +25% CONT.

See Report Section 24 for detailed explanation of fees & contingencies

A.	**Aquaculture Water Supply**					
A1	**Disinfect Madeline Lake water supply to buildings & ponds**				**$460,000**	**$575,000**
	UV Channel and Lamp Package	4	PK	$75,000.00	$345,000	$431,250
	UV Building/Found	500	SF	$150.00	$86,250	$107,813
	UV Electrical	1	LS	$10,000.00	$11,500	$14,375
	UV Plumbing	1	LS	$15,000.00	$17,250	$21,563
A2	**Modifications to Clear Lake pump station**				**$143,750**	**$179,688**
	Deepen Sump	1	LS	$75,000.00	$86,250	$107,813
	Piping Modifications	1	LS	$50,000.00	$57,500	$71,875
A3	**Disinfect Clear Lake water supply to building**				**$117,300**	**$146,625**
	UV Channel and Lamp Package	1	PK	$60,000.00	$69,000	$86,250
	UV Building/Found	200	SF	$150.00	$34,500	$43,125
	UV Electrical	1	LS	$4,000.00	$4,600	$5,750
	UV Plumbing	1	LS	$8,000.00	$9,200	$11,500
A4	**Microscreen Clear Lake water supply to buildings**				**$127,075**	**$158,844**
	Sump and Foundation	100	SF	$75.00	$8,625	$10,781
	Building	100	SF	$150.00	$17,250	$21,563
	Drum Microscreen or Pressure Strainer - 500 gpm	1	EA	$40,000.00	$46,000	$57,500
	Plumbing	1	LS	$25,000.00	$28,750	$35,938
	Electrical	1	LS	$8,000.00	$9,200	$11,500
	Backwash Treatment	1	LS	$15,000.00	$17,250	$21,563
	Sand Filtration System (Not Included in Subtotal)			*Subtotal*	*$230,000*	*$287,500*
	Package Sand Filtration System w/ Controls - 500 gpm	1	LS	$200,000	$230,000	$287,500
A5	**Treat domestic well water for iron and hydrogen sulfide**				**$63,250**	**$79,063**
	Iron Removal System	25	GPM	$1,500.00	$43,125	$53,906
	Hydrogen Sulfide Removal System	25	GPM	$500.00	$14,375	$17,969
	Enhanced aeration headbox	1	LS	$5,000.00	$5,750	$7,188
A6	**Renovate Madeline Lake intake box and intake screen**				**$71,875**	**$89,844**
	Renovate Concrete Structure	1	LS	$20,000.00	$23,000	$28,750
	Piping	1	LS	$5,000.00	$5,750	$7,188
	Gates and Fittings	1	LS	$15,000.00	$17,250	$21,563
	Excavation & Dewatering	1	LS	$5,000.00	$5,750	$7,188
	T-screens	1	EA	$17,500.00	$20,125	$25,156

Art A. Oehmcke SFH Detailed Opinions of Probable Cost						
Dwg. I.D.#	ITEM	NO. UNITS	UNIT MEAS.	COST PER UNIT	SUBTOTAL +15% GC/EST	TOTAL COST +25% CONT.
	New Intake and Automatic Screen (Not Included in Subtotal)			*Subtotal*	*$178,250*	*$222,813*
	New Intake Structure	1	LS	$30,000.00	$34,500	$43,125
	Automatic Screening	1	LS	$125,000.00	$143,750	$179,688
A7	**Renovate or replace microscreen filtration system**				**$402,500**	**$503,125**
	Renovate Microscreen System (Not Included in the Subtotal)			*Subtotal*	*$149,500*	*$186,875*
	Renovate Sump	1	LS	$20,000.00	$23,000	$28,750
	Renovate Structure	1	LS	$20,000.00	$23,000	$28,750
	Replace Screens	1	LS	$75,000.00	$86,250	$107,813
	Update Controls	1	LS	$15,000.00	$17,250	$21,563
	New Microscreen System (Recommended)			*Subtotal*	*$402,500*	*$503,125*
	Renovate Sump/Structure	1	LS	$40,000.00	$46,000	$57,500
	Drum Microscreen	4	EA	$55,000.00	$253,000	$316,250
	Plumbing	1	LS	$50,000.00	$57,500	$71,875
	Electrical	1	LS	$25,000.00	$28,750	$35,938
	Backwash Treatment	1	LS	$15,000.00	$17,250	$21,563
	Sand Filtration System (Not Included in Subtotal)			*Subtotal*	*$373,750*	*$467,188*
	Package Sand Filtration System w/ Controls - 1,250 gpm	1	LS	$325,000	$373,750	$467,188
A8	**Add emergency spillway at Madeline dam**				**$103,500**	**$129,375**
	Emergency spillway concrete	1	LS	$40,000.00	$46,000	$57,500
	Piping	1	LS	$50,000.00	$57,500	$71,875
A9	**Replace manual air release valves with automatic**				**$9,200**	**$11,500**
	Automatic air release valves	8	EA	$1,000.00	$9,200	$11,500
A10	**Install water supply measurement**				**$34,500**	**$43,125**
	Magnetic Flow meter w/ remote output	2	EA	$15,000.00	$34,500	$43,125
A11	**Install recirculation treatment system**				**$1,145,268**	**$1,431,585**
	Recirculation Pump Station			*Subtotal*	*$181,539*	*$226,924*
	Dewatering	1	LS	$2,500.00	$2,875	$3,594
	Sump Concrete	21	CY	$750.00	$18,113	$22,641
	Grating and Grate Support over Sump	185	SF	$6.00	$1,277	$1,596
	Pump w/fittings - 800 gpm each	3	EA	$16,000.00	$55,200	$69,000
	Metering Water Flow	1	LS	$10,000.00	$11,500	$14,375
	Piping, Reuse Pump Station to Building	500	LF	$50.00	$28,750	$35,938
	Variable Frequency Drives w/ Isolation and Bypass	3	LS	$10,000.00	$34,500	$43,125
	Pump Connections and Electrical	3	EA	$1,000.00	$3,450	$4,313
	Alarming and Instrumentation	1	LS	$22,500.00	$25,875	$32,344
	Ultraviolet Disinfection System			*Subtotal*	*$301,875*	*$377,344*
	Package UV System	2500	GPM	$105.00	$301,875	$377,344

Art A. Oehmcke SFH Detailed Opinions of Probable Cost						
Dwg. I.D.#	ITEM	NO. UNITS	UNIT MEAS.	COST PER UNIT	SUBTOTAL +15% GC/EST	TOTAL COST +25% CONT.
	Microscreen System			*Subtotal*	*$284,625*	*$355,781*
	Sump and Foundation	300	SF	$75.00	$25,875	$32,344
	Building	300	SF	$150.00	$51,750	$64,688
	Drum Microscreen	2	EA	$55,000.00	$126,500	$158,125
	Plumbing	1	LS	$40,000.00	$46,000	$57,500
	Electrical	1	LS	$15,000.00	$17,250	$21,563
	Backwash Treatment	1	LS	$15,000.00	$17,250	$21,563
	Nitrification System (Not Included in Subtotal)			*Subtotal*	*$152,950*	*$191,188*
	Blower System	1	PKG	$22,500.00	$25,875	$32,344
	Media	1	LS	$45,000.00	$51,750	$64,688
	Plumbing	1	EA	$22,000.00	$25,300	$31,625
	Structural Sump and Pit	1	LS	$35,000.00	$40,250	$50,313
	Electrical	1	LS	$8,500.00	$9,775	$12,219
	Headtank System			*Subtotal*	*$57,500*	*$71,875*
	Aeration Headtank System	1	EA	$50,000.00	$57,500	$71,875
	Recirculation Equipment Building			*Subtotal*	*$319,729*	*$399,661*
	Recirculation Equipment Building	1,685	SF	$165.00	$319,729	$399,661
A12	**Perform groundwater supply study**				**$310,500**	**$310,500**
	Groundwater Test Drilling (new well will serve as Backup)	1	LS	$135,000.00	$155,250	$155,250
	Aquifer Test	1	LS	$60,000.00	$69,000	$69,000
	Aquifer Modeling	1	LS	$75,000.00	$86,250	$86,250
A13	**Install a new well**				**$178,250**	**$222,813**
	New Well to Supplement Recirculation (Recommended)			*Subtotal*	*$178,250*	*$222,813*
	New Well - 750 gpm	1	EA	$125,000.00	$143,750	$179,688
	Headtank System	1	LS	$30,000.00	$34,500	$43,125
	New Well to Supply All Coldwater Needs (Not Included in Subtotal)			*Subtotal*	*$500,250*	*$625,313*
	New Well - 1000 gpm	3	EA	$125,000.00	$431,250	$539,063
	Headtank System	1	LS	$60,000.00	$69,000	$86,250

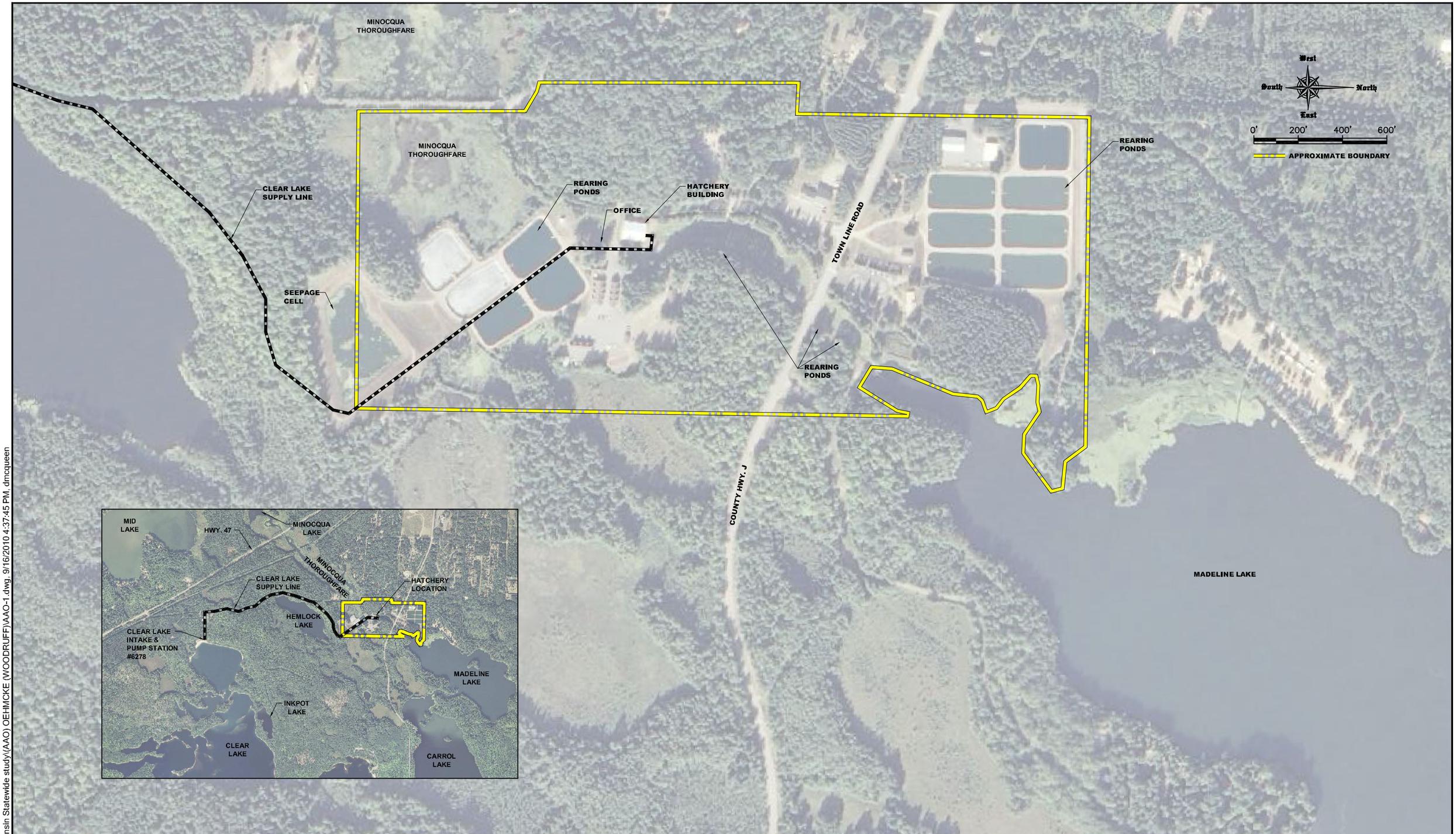
B.	**Fish Rearing Units**					
B1	**Add coolwater early rearing space**				**$418,600**	**$523,250**
	Circular Units (16-6' dia.)	1,820	SF	$200.00	$418,600	$523,250
B2	**Add coldwater rearing space**				**$1,481,200**	**$1,851,500**
	Coldwater Hatchery Building	3,280	SF	$200.00	$754,400	$943,000
	New Raceways with Pavilion (2-100')	4,800	SF	$90.00	$496,800	$621,000
	Dissolved Oxygen Management System	1	LS	$200,000.00	$230,000	$287,500

Art A. Oehmcke SFH Detailed Opinions of Probable Cost						
Dwg. I.D.#	ITEM	NO. UNITS	UNIT MEAS.	COST PER UNIT	SUBTOTAL +15% GC/EST	TOTAL COST +25% CONT.
B3	**Add egg disinfection room or building**				**$20,930**	**$26,163**
	Renovate visitor room for isolated egg disinfection	280	SF	$65.00	$20,930	$26,163
B4	**Replace all wooden screens/weir boards for biosecurity**				**$57,500**	**$71,875**
	Replace all wooden screens/weir boards for biosecurity	200	EA	$250.00	$57,500	$71,875
B5	**Line or replace remaining earthen rearing ponds (8-11)**				**$421,188**	**$526,484**
	Reshape, Regrade, Compact Ponds	2.9	AC	$2,500.00	$8,338	$10,422
	Deepen Ponds	9,400	CY	$10.00	$108,100	$135,125
	Underdrain System	2.9	AC	$10,000.00	$33,350	$41,688
	Liner ($ 0.8 / SF; 50,000 SF/AC)	2.9	AC	$40,000.00	$133,400	$166,750
	New Kettles and Piping	4	EA	$30,000.00	$138,000	$172,500
B6	**Replace existing pond liners**				**$678,500**	**$848,125**
	Liner ($ 0.8 / SF; 50,000 SF/AC)	11.8	AC	$40,000.00	$542,800	$678,500
	Underdrains for pond liners	11.8	AC	$10,000.00	$135,700	$169,625
B7	**Provide shade/netting over selected ponds**				**$57,500**	**$71,875**
	Suspended netting system	5	AC	$10,000.00	$57,500	$71,875
B8	**Underdrains for pond liners in Ponds 12-16 (See B6)**				**$0**	**$0**
	See Item B6					
B9	**Repair cracked and broken kettle concrete**				**$28,750**	**$35,938**
	Slight concrete repairs	5	EA	$5,000.00	$28,750	$35,938
B10	**Coating for concrete rearing units A-H**				**$26,910**	**$33,638**
	Preparation for Coating	1,872	SF	$2.50	$5,382	$6,728
	Concrete High-Build Coating	1,872	SF	$10.00	$21,528	$26,910
B11	**Replace egg incubation jars**				**$23,000**	**$28,750**
	Replace 1/4 total egg incubation jars	250	EA	$80.00	$23,000	$28,750
B12	**Replace selected harvest kettles w/ larger harvest kettles**				**$158,125**	**$197,656**
	Larger Harvest Kettle	5	EA	$20,000.00	$115,000	$143,750
	Piping	5	EA	$7,500.00	$43,125	$53,906
B13	**Replace pond aeration system**				**$137,741**	**$172,177**
	Replace LPA pond aeration (Recommended)			*Subtotal*	*$137,741*	*$172,177*
	Blowers (2 replacement, 1 new)	3	EA	$30,000.00	$103,500	$129,375
	Colorite Aerators	16	EA	$1,800.00	$33,120	$41,400
	Hosing	300	LF	$1.25	$431	$539
	Quick Couplings (Cam Locks)	24	PR	$25.00	$690	$863

Art A. Oehmcke SFH Detailed Opinions of Probable Cost						
Dwg. I.D.#	ITEM	NO. UNITS	UNIT MEAS.	COST PER UNIT	SUBTOTAL +15% GC/EST	TOTAL COST +25% CONT.
	New mechanical pond aeration (not included in subtotal)			*Subtotal*	*$110,400*	*$138,000*
	Paddle Wheel/Colorite Aerators & Indiv. Blower	16	EA	$2,500.00	$46,000	$57,500
	Pond Electrical Receptacles & Distribution	8	EA	$7,000.00	$64,400	$80,500
C.	**Buildings**					
C1	**Remove lead paint & repaint support buildings**				**$222,525**	**$278,156**
	Perform lead paint risk assessment and inspection	9	EA	$1,500.00	$15,525	$19,406
	Cleaning and Resurfacing	9	EA	$20,000.00	$207,000	$258,750
C2	**Add biosecure visitor center**				**$333,500**	**$416,875**
	New Visitor Building	1,600	SF	$175.00	$322,000	$402,500
	Domestic wastewater treatment	1	LS	$10,000.00	$11,500	$14,375
C3	**Hatchery Building Renovation**				**$50,830**	**$63,538**
	Convert space for Office	300	SF	$75.00	$25,875	$32,344
	Staff ADA restroom (12*15)	180	SF	$65.00	$13,455	$16,819
	Domestic Wastewater treatment	1	LS	$10,000.00	$11,500	$14,375
C4	**Add laboratory**				**$85,330**	**$106,663**
	Convert cold storage, add plumbing	500	SF	$85.00	$48,875	$61,094
	Staff ADA restroom (12*15)	180	SF	$65.00	$13,455	$16,819
	Domestic water and wastewater supply/treatment	1	LS	$20,000.00	$23,000	$28,750
C5	**Add temperature control to feed storage**				**$4,313**	**$5,391**
	Add temperature control to feed storage in Net House	150	SF	$25.00	$4,313	$5,391
C6	**Add employee gear lockers & storage space (see B2)**				**$0**	**$0**
	See Item B2				$0	$0
C7	**Add general storage**				**$373,750**	**$467,188**
	New Storage Building (5 bays, 50x100)	5,000	SF	$65.00	$373,750	$467,188
C8	**Replace HVAC duct in hatchery building**				**$11,500**	**$14,375**
	Replace HVAC duct in hatchery building	1	LS	$10,000.00	$11,500	$14,375
C9	**Office building renovation**				**$11,500**	**$14,375**
	New flooring for office building	2,000	SF	$5.00	$11,500	$14,375
C10	**Net Room/Shop renovation**				**$86,250**	**$107,813**
	Moderate renovation, large building	1	LS	$75,000.00	$86,250	$107,813
	windows, ceiling insulation, doors, floor resurface					
C11	**Renovate pond building**				**$34,500**	**$43,125**
	Moderate renovation, small building	1	LS	$30,000.00	$34,500	$43,125

Art A. Oehmcke SFH Detailed Opinions of Probable Cost						
Dwg. I.D.#	ITEM	NO. UNITS	UNIT MEAS.	COST PER UNIT	SUBTOTAL +15% GC/EST	TOTAL COST +25% CONT.
C12	**Renovate/replace concrete approach into shop area**				**$17,250**	**$21,563**
	Replace concrete approach	1	LS	$15,000.00	$17,250	$21,563
C13	**Add building features to allow biosecure isolation of individual lots**				**$40,250**	**$50,313**
	Add features to promote isolation (moderate)	1	LS	$35,000.00	$40,250	$50,313
D.	**Site**					
D1	**Add truck/equipment disinfection area**				**$41,688**	**$52,109**
	Truck Disinfection Station	1	LS	$15,000.00	$17,250	$21,563
	Water Supply to Disinfection Station	500	LF	$20.00	$11,500	$14,375
	Roadway Aggregate	250	SY	$15.00	$4,313	$5,391
	Electrical	1	LS	$2,500.00	$2,875	$3,594
	Detention Tank	1	LS	$5,000.00	$5,750	$7,188
D2	**Enclose entire facility with fence & automatic gates**				**$86,250**	**$107,813**
	Fence and Gates	3,000	LF	$25.00	$86,250	$107,813
D3	**Abandon unused domestic well per code**				**$5,750**	**$7,188**
	Abandon well	1	LS	$5,000.00	$5,750	$7,188
D4	**Replace Net Room/Shop domestic water condition system**				**$4,600**	**$5,750**
	Replace domestic water conditioning system	1	LS	$4,000.00	$4,600	$5,750
D5	**Separate other agencies/mgmt storage from hatchery storage (No Cost Assigned)**					
	No Cost Assigned, Management Issue					
D6	**Install better stormwater runoff management system**				**$34,500**	**$43,125**
	Storm Drain Piping (moderate)	1	LS	$30,000.00	$34,500	$43,125
D7	**Create a video showing fish rearing and egg take**				**$5,750**	**$7,188**
	Create video	1	LS	$5,000.00	$5,750	$7,188
D8	**Add a visitor's ADA accessible restroom (Redundant)**				**$24,955**	**$31,194**
	Add an ADA visitor's restroom	180	SF	$65.00	$13,455	$16,819
	Domestic wastewater treatment	1	LS	$10,000.00	$11,500	$14,375
E.	**Aquaculture Wastewater**					
E1	**Provide effluent treatment in winter for building WW**				**$172,500**	**$215,625**
	Add a new Zero Discharge Pond	1	LS	$150,000.00	$172,500	$215,625
E2	**Install wastewater treatment system for future coldwater production**				**$690,000**	**$862,500**
	Microscreen	1	LS	$250,000.00	$287,500	$359,375
	Clarifier	1	LS	$200,000.00	$230,000	$287,500
	Sludge Storage	1	LS	$150,000.00	$172,500	$215,625

Art A. Oehmcke SFH Detailed Opinions of Probable Cost						
Dwg. I.D.#	ITEM	NO. UNITS	UNIT MEAS.	COST PER UNIT	SUBTOTAL +15% GC/EST	TOTAL COST +25% CONT.
F.	**Electrical and HVAC**					
F1	**Relocate & add more electrical outlets in hatchery bldg**				**$14,375**	**$17,969**
	Add electrical outlets	50	EA	$250.00	$14,375	$17,969
F2	**Replace/upgrade instrumentation system hardware/software**				**$69,000**	**$86,250**
	Upgrade instrumentation system (moderate)	1	LS	$60,000.00	$69,000	$86,250
F3	**Emergency backup for intake pump stations & effluent lift station**				**$154,100**	**$192,625**
	Emergency Generator: 100kW with Outdoor Enclosure	2	LS	$40,000.00	$92,000	$115,000
	Automatic Transfer Switch: 600A, 4P	3	LS	$12,000.00	$41,400	$51,750
	Fuel Tank	2	LS	$9,000.00	$20,700	$25,875
F4	**Replace temperature probes in the hatchery building**				**$23,000**	**$28,750**
	Replace temperature probes	1	LS	$20,000.00	$23,000	$28,750
F5	**Upgrade main electrical panel**				**$57,500**	**$71,875**
	Electrical upgrade and distribution upgrade (minor)	1	LS	$50,000.00	$57,500	$71,875
F6	**Add microturbine at Madeline Lake intake**				**$86,250**	**$107,813**
	Add microturbine	1	LS	$75,000.00	$86,250	$107,813



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WISCONSIN DEPT. OF NATURAL RESOURCES

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

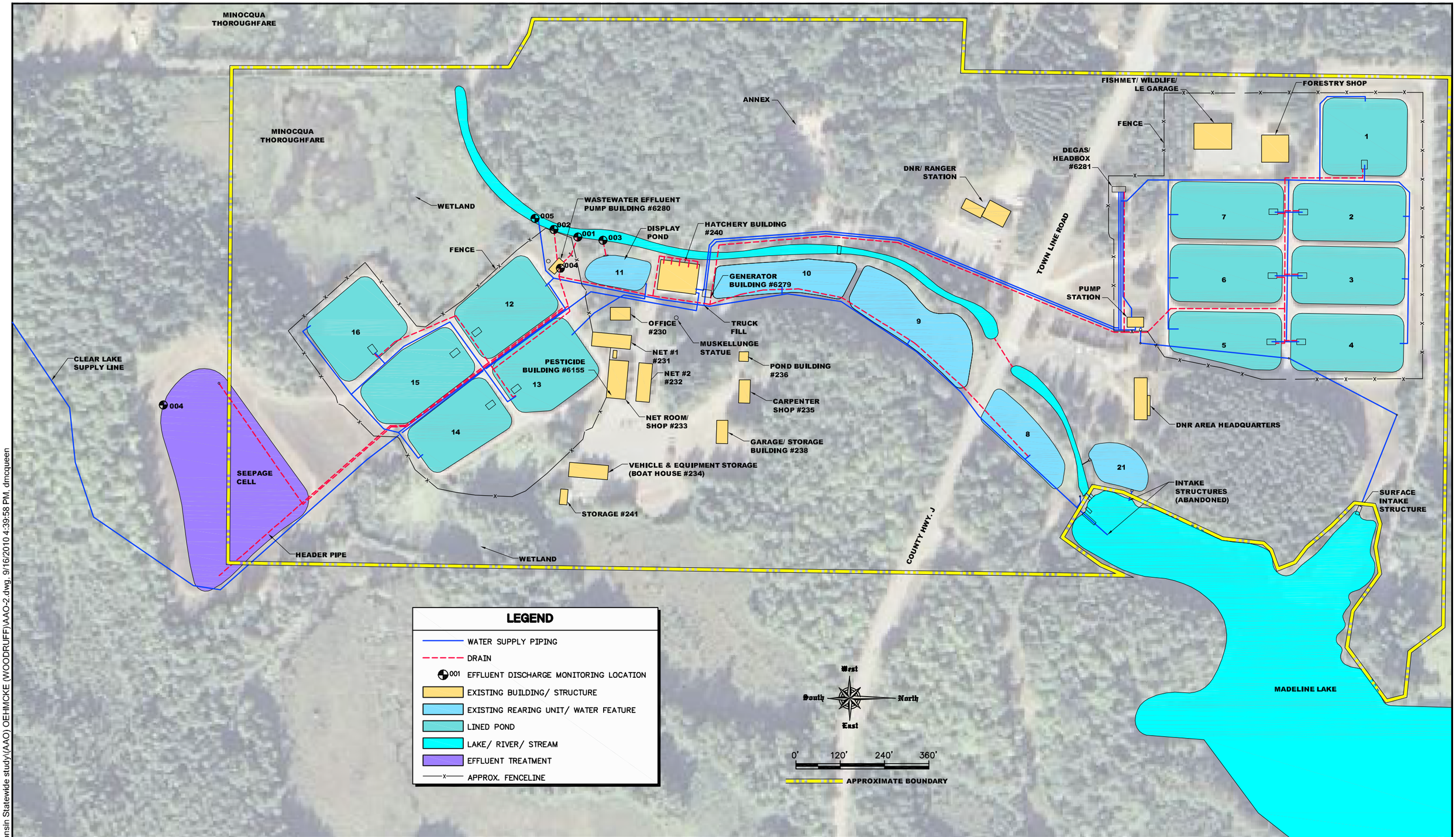
ART OEHMCKE STATE FISH HATCHERY
AERIAL PHOTO

COMPREHENSIVE STUDY OF WISCONSIN FISH PROPAGATION FACILITIES

PROJECT# 08K2U

9/15/10

SHEET:
AAO-1



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WISCONSIN DEPT. OF NATURAL RESOURCES

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

ART OEHMCKE STATE FISH HATCHERY
EXISTING CONDITIONS

COMPREHENSIVE STUDY OF WISCONSIN FISH PROPAGATION FACILITIES

PROJECT# 08K2U

9/15/10

SHEET:

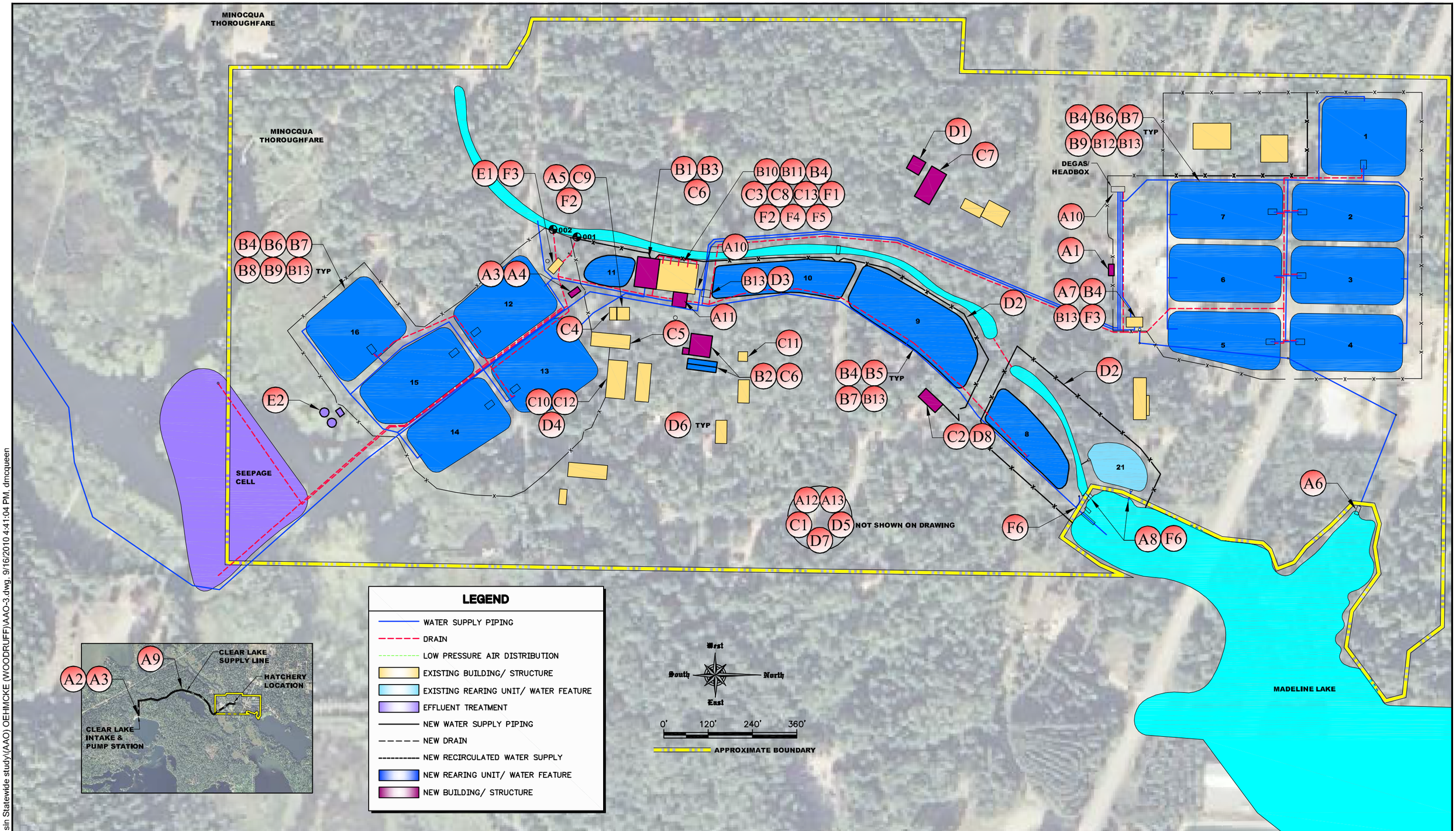
AAO-2

Art A. Oehmcke State Fish Hatchery
Improvements Legend

A	**Water Supply**
A1	Disinfect Madeline Lake water supply to buildings and ponds
A2	Modifications to Clear Lake pump station
A3	Disinfect Clear Lake water supply to buildings
A4	Microscreen Clear Lake water supply to buildings and ponds
A5	Treat domestic well water for iron and hydrogen sulfide
A6	Renovate Madeline Lake intake box and intake screen
A7	Renovate or replace microscreen filtration system
A8	Add emergency spillway at Madeline dam
A9	Replace manual air release valves with automatic
A10	Install water supply measurement
A11	Install recirculation treatment system (UV, filtration, pump)
A12	Perform a groundwater study to determine availability / quality of additional water
A13	Install a new well
B	**Fish Rearing Units**
B1	Add coolwater early rearing space
B2	Add coldwater rearing space
B3	Add egg disinfection room or building
B4	Replace all wooden screens/weir boards for biosecurity
B5	Line or replace remaining earthen rearing ponds (8-11)
B6	Replace existing pond liners
B7	Provide shade/netting over selected ponds
B8	Underdrains for pond liners in Ponds 12-16
B9	Repair cracked and broken kettle concrete
B10	Coating for concrete rearing units A-H
B11	Replace egg incubation jars
B12	Replace selected harvest kettles with larger harvest kettles
B13	Replace pond aeration system
C	**Buildings**
C1	Remove lead paint and repaint support buildings
C2	Add biosecure visitor center
C3	Hatchery Building Renovation
C4	Add laboratory and staff restroom
C5	Add temperature control to feed storage
C6	Add employee gear lockers and storage space
C7	Add general storage
C8	Replace HVAC duct in hatchery building

Art A. Oehmcke State Fish Hatchery
Improvements Legend

C9	Office building renovations
C10	Net Room/Shop Renovation
C11	Renovate pond building
C12	Repair/replace concrete approach into shop area
C13	Add building features to allow biosecure isolation of individual lots
D	**Site**
D1	Add truck/equipment disinfection area
D2	Enclose entire facility with fence and automatic gates
D3	Abandon unused domestic well per code
D4	Replace Net Room/Shop domestic water conditioning system
D5	Separate other agencies/management storage from hatchery storage
D6	Install better stormwater runoff management system
D7	Create a video showing fish rearing and egg take
D8	Add a visitor's ADA accessible restroom
E	**Aquaculture Wastewater**
E1	Provide effluent treatment in the winter for building wastewater
E2	Install effluent treatment for future coldwater production
F	**Utility Systems**
F1	Relocate and add more electrical outlets in the hatchery building
F2	Replace/upgrade instrumentation system hardware and software
F3	Emergency backup for the intake pump stations and effluent lift station
F4	Replace temperature probes in the hatchery building
F5	Upgrade main electrical panel
F6	Add microturbine at Madeline Lake intake for potential energy savings



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ART OEHMCKE STATE FISH HATCHERY
PROPOSED IMPROVEMENTS

COMPREHENSIVE STUDY OF WISCONSIN FISH PROPAGATION FACILITIES

PROJECT# 08K2U

9/15/10

SHEET: AAO-3