Existing Conditions and Facility Evaluations – New Hampton

POWDER MILL FISH HATCHERY FEASIBILITY STUDY

New Hampshire Fish and Game Department

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Contents

Tables

Figures

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1 Introduction

New Hampton State Fish Hatchery (Hatchery) is located in the town of New Hampton on the western edge of Belknap County, New Hampshire (NH) on NH Route (RT) 132. Situated on approximately 163 acres (~100 developed acres) of state-owned land, the Hatchery consists of 104 raceways, a broodfish/spawning house, an incubation building, a water supply pond, and various artesian water supply wells. The station has traditionally produced Brown Trout, Rainbow Trout, Brook Trout, and Atlantic Salmon. The hatchery produces approximately 37,000 (19,000 lbs) of Rainbow Trout 177,000 (13,000 lbs) of Brown Trout and 204,000 (40,000 lbs) of Brook Trout that are stocked in public waters throughout the state. The annual average production is about 72,000 pounds, which accounts for 19 percent of the State's total fish pounds production.

New Hampton at a Glance

- Constructed in 1919
- Water sourced from springs and Dickerman Pond
- Fish rearing begins with spawning
- Produces approximately 425,000 fish (72,000 lbs) of fish annually
- Stocks out between end of March and early July

Existing Site Plans (Figure 1-1 and Figure 1-2) illustrate the hatchery boundary, approximate topographical information and general hatchery infrastructure. The study drawings were developed using digitized (i.e., traced) Computer Aided Drafting (CAD) techniques and map overlay technology. The drawings are believed to be a reasonable, to-scale representation of hatchery resources for planning purposes and have been updated where necessary to reflect conditions as of 2022. The drawings are not intended to be used for construction phase engineering.

The hatchery's production water sources are springs and Dickerman Pond. The springs are at or near the eastern end campus. Some spring water is from well points and some spring water is evident in a few places rising through the bottom of a fractional acre spring pool. These springs supply water to the upper A-Series portion of the station, including the Hatchery Building via gravity flow pipes. Surface water and unused spring water comprises Dickerman Brook, which flows past some of the springs and continues past the Hatchery Building and A-Series raceways into Dickerman Pond near RT 132. At the junction of Dickerman Brook and Dickerman Pond, outfalls from the east side of the facility have been consolidated into two outfalls, one on each side of the brook. Dickerman Pond is the main supply of water for the lower B- and C-Series portion of the hatchery. These water sources and the rearing units they supply are shown on the facilities process flow diagram in Figure 1-3.

Dickerman Brook water supply temperature varies seasonally, but the spring is a constant temperature water source. In general, water temperatures in the A-series remain constant with a 5-degree delta (45-49 degrees (°) Fahrenheit (F)) while temperatures in the B- and C-Series were much more variable with a 22-degree delta (36-59°F). There are no United States Geological Survey (USGS) river gaging stations or other measurement devices located in the immediate area to provide local flow measurement. The hatchery utilizes a flow rate of approximately 600 to 1,800 gallons per minute (gpm) with an average flow of 1,200 gpm.

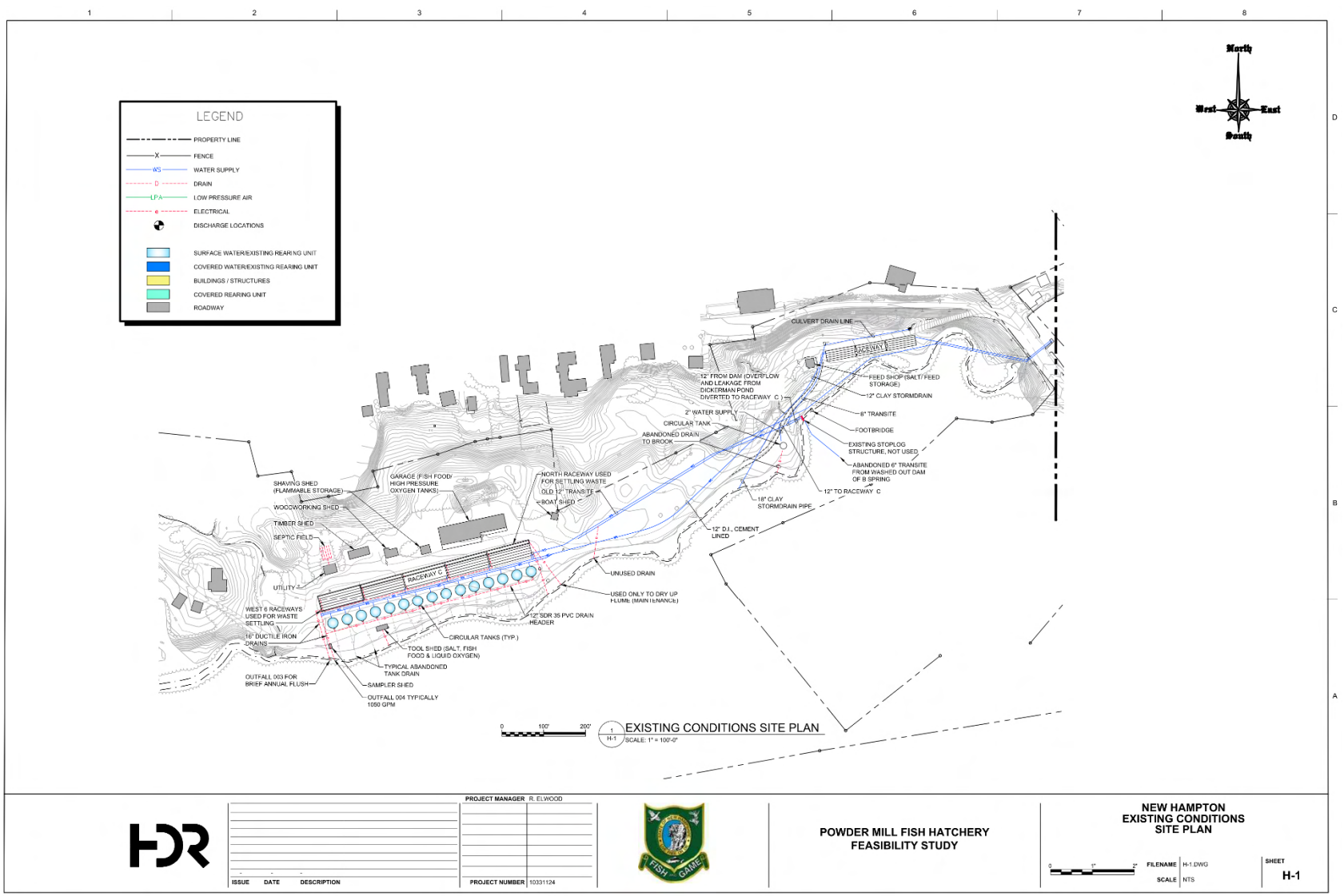

Figure 1-1: Existing New Hampton Site Plan B- and C-Series

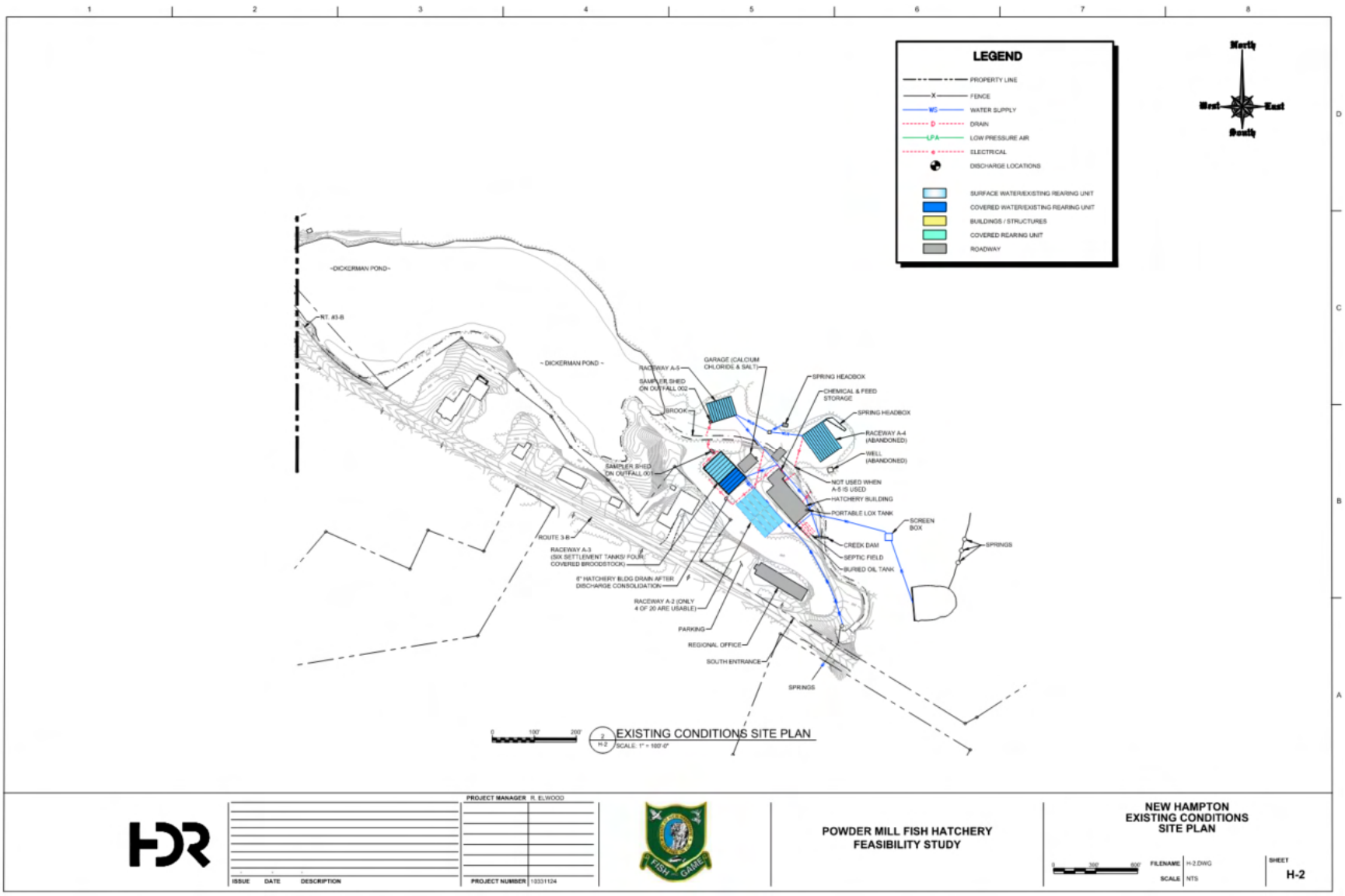

Figure 1-2: Existing New Hampton Site Plan A-Series

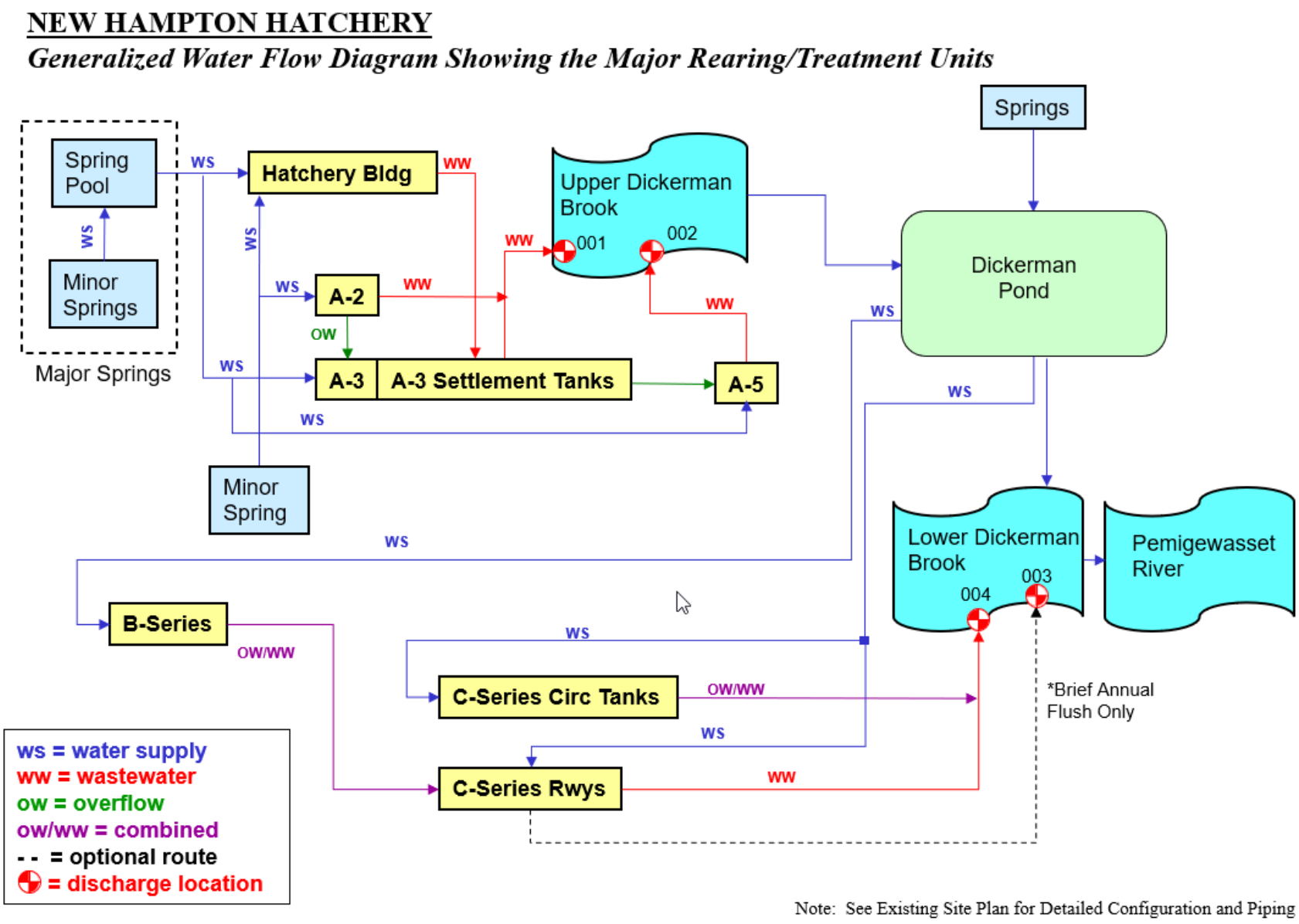

Figure 1-3: Existing New Hampton Flow Diagram

NPDES has authorized New Hampton State Fish Hatchery to discharge its hatchery effluent through Outfalls Numbered 001, 002, 003, 004 and 005 into Dickerman Brook (shown in Figure 1-3). Sampling and reporting requirements are summarized in Table 1-1. In 2021 the Region 1 Final Aquaculture General Permit (AQUAGP) was released (NHG130000), which superseded New Hampton's individual permit issued in 2011 (NH0000752).

Table 1-1: New Hampton Effluent Discharges based on NPDES Permit

Outfall Number	Receiving Water Body	Raceways Served
001	Upper Dickerman Brook to Dickerman Pond	Hatchery Building, A-2, A-3
002	Upper Dickerman Brook to Dickerman Pond	A-4 (abandoned), A-5
003	Lower Dickerman Brook to Pemigewasset River	Dewatering of B-Series
004	Lower Dickerman Brook to Pemigewasset River	B-Series, C-Series Raceways, C-Series Circular Tanks
005	Lower Dickerman Brook to Pemigewasset River	Dewatering of C-Series Raceways and C-Series Circular Tanks

A condition assessment field visit was performed by HDR on May 2, 2022. The team of engineers included process, mechanical, structural, electrical, and architectural disciplines. The goal of the condition assessment was to understand the remaining useful life of the existing facilities, understand deficiencies inherent in the existing design, and develop an understanding of whether existing facilities that are in poor condition can be rehabilitated or require complete replacement. The sections below review the conditions of the hatchery as witnessed on-site as well as through discussions with hatchery staff.

2 Best Management Practices

Small quiescent zones at the ends of many raceways are vacuumed clean, generally weekly, with a trailer-mounted pump and 1200-gallon tank. This vacuum cleaning is also conducted on each of the circular tanks that are utilized for production. This procedure was implemented in 2002 to reduce the solids in the hatchery effluent and is very labor intensive for the staff.

When vacuuming was implemented, several sections of the existing raceways were converted into settling tanks as follows:

- six most downstream raceways of Raceway A-3
- six most downstream C-Series Raceways
- north row of C-Series

In winter, the contents of the portable tank containing the vacuumed solids are discharged into these raceways converted into settling tanks. In non-winter months NHFGD will either discharge the vacuumed solids into the settling tanks or directly land apply the settled solids. Additionally, in non-winter months, NHFGD will vacuum the settling tanks is vacuumed and land apply the solids to ensure adequate storage space is maintained.

3 General Site Conditions

The site is divided into two major sections, east and west, with RT 132 and several homes/businesses intersecting the middle of the hatchery. The site generally drains to the northwest. The eastern part of the site contains source waters, several sets of raceways, the broodstock/spawning building, the photo manipulation building, and a garage. The western part of the site contains additional raceways, circular tanks, maintenance buildings, and storage buildings.

3.1 Predator Control System

Fish predators include herons, osprey, eagles, king fishers and mink. Many different methods of predation control are employed at New Hampton based on existing facility attributes as follows:

- A-Series:
    - Raceway A-2 – Four of the raceways of are covered by a wooden shed structure. The other raceways of Raceway A-2 have plastic mesh fence around the perimeter and are partially covered overhead with mesh screening.
    - Raceway A-3 – The four raceways currently in use are protected overhead by a Quonset hut-style metal frame covered with tarpaulin.
    - Raceway A-5 – Chain link fencing on all four sides, with plastic mesh netting and monofilament line is utilized for predator protection.
- B-Series:
    - B-Series is protected by metal framing covered by plastic mesh.
- C-Series:
    - Circular Units – The 15 circular rearing units located in C-Series are covered with polyvinyl chloride (PVC) metal frame “dome” covers like at the Milford Hatchery for predation control. The last of the circular rearing units serves as the show pond, with mature fish for public viewing, and does not have the cover installed.

Hatchery staff noted that by their current estimation, predation loss is non-detectible due to predation controls already in place, including trapping of fur bearing nuisances. The condition of predator control systems is discussed in the sections that follow for each individual rearing train.

3.2 Holding Ponds for Disease Treatment

The hatchery process effluent (i.e., rearing unit overflow and drain water) receives no formal treatment prior to discharge into Dickerman Brook except for the settling that has occurred naturally in the rearing units. Hatchery staff note that they have no capacity to treat the existing broodstock as chemicals would be sent directly to the outfall. It is recommended that the need for holding ponds be evaluated as part of any facility modernization.

3.3 Roads and Parking

The main entrance road to the hatchery is gravel. The main road and main pond roads require routine grading maintenance and are in fair condition.

3.4 Fencing and Security

The hatchery does not presently have complete perimeter security fencing. Security fencing is desirable for key areas of all NHFGD hatcheries. Due more to safety hazards to the public and a moderate risk of facility security, it is recommended that full perimeter fencing be added as part of any facility modernization.

3.5 Site Drainage and Flooding

New Hampton State Fish Hatchery is within the 100-year floodplain (Zone A) according to the Flood Insurance Rate Map (FIRM) from the National Flood Insurance Program (Community-Panel Number 330007B-8 effective April 2, 1986).

According to hatchery staff, flooding is not a common occurrence at the site. However, during extremely high flood stages pond drainage is impacted and flooding of the ponds or raceways has occurred.

3.6 Domestic Water/Wastewater Systems

The hatchery is supplied with metered public domestic water lines. The domestic wastewater generated from the east side of the facility is treated by the public wastewater treatment facility. On the west side of the facility, an onsite septic system treats the generated wastewater. The condition of the existing septic system is unknown.

3.7 Electrical

Electricity is provided to the facility by the utility New Hampton Village Precinct via overhead medium voltage and low voltage distribution lines at several service points. Utility supply is reliable with infrequent outages noted by hatchery personnel. The northern portion of the site containing the A-Series Raceways and the Hatchery Building is served at 3-phase, 208/120V from a utility line that runs along RT 132. B-Series area on the southern side of the facility is served at 1-phase, 240/120V from a low voltage utility line that runs along Church Lane. C-Series area is served at 1-phase, 240/120V from a utility line that runs along Hatchery Road.

In general, the overhead utility supply lines are routed through heavily treed areas and are vulnerable to weather/wildlife-related outages such as falling branches. The electrical service in the A-Series area was replaced in 2015/2016 with a new 3-phase service and is in good condition. The service to the C-Series area appears to have been replaced within the last 5-10 years as well. There are several instances of utility supply lines that have been replaced and abandoned in place.

The facility does not have any backup power capability. According to hatchery personnel, there are currently no critical loads that would require backup power, except for a sewage pump in the hatchery, raceway blowers, and the Conservation Officer’s evidence locker at the garage near C-Series. Additionally, future system upgrades to a re-use system may introduce more of a need for

backup power. It is recommended that the need for backup power be evaluated further after required modernization improvements have been determined.

The hatchery utilizes utility-owned site lighting, although coverage is insufficient. It is recommended that additional site lighting be installed as part of any facility improvements and should be negotiated with the utility. There are no alarms or instrumentation systems on the site. Personnel provide routine checks of water flow and pond water quality. Hatchery staff have expressed a desire for system monitoring/alarm capability, and this should be evaluated for inclusion in future facility improvements.

3.8 Other Utilities

The facility has telephone/internet service to the hatchery building. Fuel oil and propane are used for heat for various on-site buildings. No on-site system exists to refuel gasoline or diesel vehicles.

3.9 Public Visitation Information & Education Services

Although the Hatchery is open to the public, there are limited visitor facilities at the site. One of the circular tanks in the C-Series area is not covered so that it can be used as a show pool for visitors. The metal framing for the cover remains over the pool to provide protection from visitors getting too close and falling into the tank. There is no visitor's center, and no informational displays were observed during the site visit. However, it was mentioned by hatchery personnel that there are some signs indicating the types of fish raised at the facility.

There are no accessible facilities at this hatchery, including bathrooms, and there is no dedicated or signed parking for visitors. Adequate fall protection around tankage to ensure visitors maintain a safe distance from the edge is not present in all necessary locations. For these reasons, NHFGD may want to consider closing the facility to the general public until improvements are made, in particular to address safety-related issues.

4 Water Supply and Control Structures

Water used for production at New Hampton is sourced from natural spring and surface waters collected in and upstream of Dickerman Pond. Available flow of water supply is summarized in Table 4-1. Hatchery staff noted that flow from these source waters has been declining, particularly since a new housing development was constructed nearby. Water temperatures stay between 48-50°F year-round at the Hatchery Building.

Table 4-1: Available Flow from Water Supply

Water Supply	Min Flow	Max Flow	Rearing Area Served	
	gpm	gpm	First Use	Serial Reuse
Major Springs	250	700-800	Hatchery, A-Series	A-3
Minor Springs	100	200	Hatchery, Raceway A-2	A-3
Dickerman Pond		1500	B- and C-Series	C-Series

4.1 Major Springs

A-Series' major water source is a series of springs flowing into a ravine in the woods to its east. It is estimated that there are five shallow well points along the ravine. Water not directed into the piping overflows and continues down the ravine to a spring pool impounded by a low concrete dam. In a few places in the spring pool, spring water rises up through its bottom.

A couple of concrete structures in the ravine have slots for bar screens or stoplogs and pipe connections. A typical structure is shown in Figure 4-1. No drawings of these springs, structures, or pipes have been found. The concrete condition of these structures is fair, with minor cracking and spalling and some vegetation growth. One of the structure's pipe connections appears to be cast iron. The other structure's pipe connection appears to be 16-inch asbestos-cement (AC). At least one of the pipes leads to Raceway A-4; but this line is assumed to be abandoned.

A low concrete gravity wall structure impounds the water of a Spring Pool (Figure 4-2), which has spring water rising up into it and has spring water flowing into it from an upgradient ravine. Broadly spaced wires are stretched across the pond to deter waterfowl. The pool has aquatic vegetation, a buildup of trapped sediment, and an outlet structure with a perforated plate screen and a corroded butterfly valve.

The concrete dam is in fair to good condition. There are surface cracks spaced at approximately 2- to 3-feet along its length (Figure 4-3). Most of the cracks have been sealed. There were no significant areas of spalling or loss of concrete along the length of the dam. The dam impounds a relatively shallow (2- to 3-foot max depth) area of water from the creek above. There is some leakage underneath the dam, but it appears to be minimal and does not pose a threat to the dam integrity.

Water collected in the pool is piped to a screened concrete box enclosed by a wooden shed. Metal pipe carries the water from the screen box across Dickerman Brook to various A-Series units, beginning with the hatchery building. The major springs typically provide 700-800 gpm, dropping to 250 gpm during the dry season.

It is recommended that the concrete structures in the ravine be cleaned free of moss and resurfaced to maintain the concrete for as long as possible. Bar screens, stoplogs, pipe connections, and valves should be replaced if defective. It is recommended that the pipes that carry source water be inspected. It is recommended that the Spring Pool be cleared of sediment on a yearly basis, as this buildup of sediment and leaves can contribute to maintenance issues downstream if not properly maintained.

Figure 4-1: Major Springs' Typical Stoplog Structure

Figure 4-2: Spring Pool

Figure 4-3: Sealed Surface Cracks in Spring Pool

4.2 Minor Springs

There is a minor source of spring water (shallow well points) across/south of RT 132 in another wooded ravine (Figure 4-4 through Figure 4-9). It is estimated there are seven shallow 2- to 3-inch diameter well points and three natural springs in the area. Hatchery staff have surged some well points with 8-foot of garden hose. A perforated plate screened, low concrete headbox diverts water from these springs into an 8-inch diameter ductile iron pipe (DIP), most of which is exposed, under the highway to a concrete distribution box with a buried butterfly valve on its inlet pipe. Year 2003 sewer drawings indicate 12-inch PVC from the distribution box to Raceway A-2 and the hatchery building. Some piping near the low headbox is reportedly clay. The minor springs can provide 100-200 gpm.

It is recommended that the minor springs be found, and their location, elevation, depth, diameter and material of construction be documented. They should be cleaned and surged by a well maintenance company and their flows measured and documented. The wooden bar screen in front of the intake box should be replaced with an aluminum or stainless steel profile bar screen. The wood framed and wood covered screen box over the pipe entrance should be replaced with one fabricated of longer life materials such as concrete, stainless steel or fiberglass or other composites. The wooden stop logs of the impoundment box should be replaced with composite stoplogs. Fallen and dying trees in an around the impounded spring water should be removed. The impounded water body seems small enough to feasibly cover at least partially with a structure with roof and screened walls to deter many animals and leaves and reduce direct sunlight that promotes detrimental algae growth and solar heating.

Figure 4-4: Minor Spring Concrete Distribution Box/Inlet Piping Below Crossing of RT 132

Figure 4-5: Pipe Support Across RT 132 from Minor Springs

Figure 4-6: Minor Spring Concrete Headbox

Figure 4-7: Wood Framed Inlet Screen at Minor Spring

Figure 4-8: Wooden Stoplogs at Screen Upstream of Wood Framed Inlet at Minor Spring

Figure 4-9: Head Box at Minor Water Source Across RT 132

4.3 Dickerman Pond

The total impounded area in Dickerman Pond is 5.0 acres with a 20-foot average working depth for a volume of 100 acre-feet (Figure 4-10). The “surface” nature of the pond water supply makes the system vulnerable to pathogens. The water supply piping from Dickerman Pond consists of a 6-inch DIP to B-Series and a 12-inch DIP to C-Series and the adjacent round tanks with a 2-inch branch to a lone round tank midway. These supply lines are fed from an inlet box in Dickerman Pond near the center of the dam and it is believed that the pipes were installed in 1995. The piping has never been cleaned but is fully drainable. Together these two supply lines can provide up to 1500 gpm. Inspection and condition assessment of Dickerman Pond was beyond the scope of this work. NHFGD notes that this dam is not owned by them, but by the state of NH and that both NHDOT and NHDES have both expressed concerns regarding the condition of this dam in the recent past. It is recommended that any improvements to this dam that are required be performed at the same time as any other significant hatchery upgrades are.

The 6-inch DIP (Figure 4-11 and Figure 4-12) crosses over Dickerman Creek twice between the dam and the raceway. At the upper crossing, the pipe is supported by concrete cradles. The pipe run has shifted over time so that it is no longer supported by the majority of the concrete cradles. This does not pose a short-term hazard, but as part of routine maintenance the situation should be investigated further to determine if the DIP should be shifted back to its original position with metal tiedown strapping or if the supports should be modified to help support the shifted piping. At the lower crossing of the creek the pipe is supported by concrete cradles and a steel beam. That crossing is in fair condition, with no short- or mid-range repairs required.

The 12-inch DIP supplying C-Series runs through the dam at Dickerman Pond and then overground down the slope to the B-Series area, before going underground. The pipe crosses over Dickerman Creek twice between the dam and the B-Series area. At the upper crossing the pipe is supported by concrete cradles (Figure 4-11). That crossing is in fair to good condition, with the pipe in contact with all but one of the cradles. At the lower crossing of the creek the pipe is supported by concrete cradles and a steel beam. That crossing is in fair condition with no need for repair at this time (Figure 4-13).

Figure 4-10: Dam at Dickerman Pond

Figure 4-11: B-Series inlet piping shifted at support cradles at upper creek crossing

Figure 4-12: B-Series inlet piping at lower creek crossing

Figure 4-13: Lower crossing of Dickerman Creek for C-Series inlet pipe

4.4 Abandoned Well

There is an abandoned well, presumably once pumped, adjacent to Raceway A-4. Its operation was reportedly detrimental to the springs.

4.5 B Spring

B Spring is not currently used as its dam is washed out. Thus, its 6-inch transite supply pipe does not add water to the supply piping where it intersects near the lone round tank between B-Series and C-Series. B Spring's estimated capacity was 30 gpm. There is a stoplog structure with intake in Dickerman Brook near the lone round tank too. Hatchery staff have never seen this brook dam used or heard of plans to use it.

4.6 Water Supply and Control Structures Summary

To summarize, the following limitations, deficiencies, and conditions were noted for the water supply and control structures during the on-site condition assessment:

- The overall conditions of water lines have not been determined since they require special inspection procedures to access; although exposed pipe exteriors did not appear corroded or otherwise compromised.
- Stoplogs are treated as measuring weirs to estimate flows. The weirs are not sharp crested and some of the structures in which they are located are not long straight flumes, uninterrupted by screens; so, accuracy is unknown. There are no other water meters.
- Major Springs:
    - Concrete structures in the ravine be cleaned free of moss and resurfaced to maintain the concrete for as long as possible.
    - Bar screens, stoplogs, pipe connections, and valves should be replaced if defective.
    - Pipes that carry source water are recommended for inspection for damage that could be contributing to loss in flow and other site abnormalities associated with the Hatchery Building.
    - The Spring Pool should be cleared of sediment on a yearly basis.
- Minor Springs:
    - All springs should be found and their location, elevation, depth, diameter and material of construction be documented. They should be cleaned and surged by a well maintenance company and their flows measured and documented.
    - The wooden bar screen in front of the intake box should be replaced with an aluminum or stainless steel profile bar screen.
    - The wood framed and wood covered screen box over the pipe entrance should be replaced with one fabricated of longer life materials such as concrete, stainless steel or fiberglass or other composites.
    - The wooden stop logs of the impoundment box should eb replaced with composite stoplogs.
    - Fallen and dying trees in an around the impounded spring water should be removed. The impounded water body seems small enough to feasibly cover at least partially with

a structure with roof and screened walls to deter many animals and leaves and reduce direct sunlight that promotes detrimental algae growth and solar heating.

- Dickerman Pond:
    - As part of routine maintenance, the DIP feeding B-Series from Dickerman Pond should be shifted or the support cradles modified so that the pipe is better supported.

5 Incubation and Rearing Facilities

Originally constructed in 1919-1920, the hatchery consists of 72 concrete raceways which are divided into three (3) Series (A, B, and C) corresponding to their respective locations within the Station. Incubation and early rearing occur in the Hatchery Building while intermediate and late rearing occur in Raceways A-2, A-3, A-5, B-Series, Round Tanks, and C-Series. A-Series contains 30 raceways , B-Series contains twelve raceways (8-feet by 63-feet by 2-feet), and C-Series contains 30 raceways (5-feet by 100-feet by 1.5-feet) and fifteen 25-foot-diameter circular tanks (Figure 5-28 and Figure 5-29).

The upstream-most four raceways of the ten that make up Raceway A-3 flow to the lower six. The upper four are used for production and the lower six are used as settling tanks. Hatchery Building effluent is piped to lower parts of A-3 for treatment. Culture water from the upper parts of A-3 flows serially into the lower part of A-3 used for treatment as well. All outdoor rearing units are routinely vacuumed with a trailer mounted pump and tank. In winter the tank is emptied into the north most row and eastmost of the C-Series raceways until it can be re-vacuumed, and land applied.

5.1 Hatchery Building

The Hatchery Building consists of a main building (100-feet by 45-feet), which was constructed in 1919, and a small addition (21-feet by 34-feet) on the north end of the building (Figure 5-1). The original main building houses an office, two bathrooms, storage area, mechanical room, and the main rearing production area, with an attic space above. A lab space and boot storage / changing space are located within the addition at the north end. The date for the addition is unknown.

Figure 5-1: Hatchery Building Exterior View

5.1.1 Process

The main rearing production area consists of egg incubation, four circular tanks, a four-pack of small semi-square tanks, and twenty-eight (28) concrete raceways, which are used for early rearing and fingerlings (Figure 5-2 and Figure 5-3). Half of these concrete tanks are 15-feet-long by 2.75-feet-wide by 1.75-feet-deep and serially feed into the remaining tanks, which are 12-feet-long by 2.75-feet-wide by 1.58-feet-deep. Water in the building is used twice before discharging. The rearing units drain to a 6-inch main while cleaning that goes to the lower A-3 Raceways, which are used for settling solids. After water flows through hatchery rearing tanks it's reused at either the A-3 series or the A-5 series, or a combination of the two.

Egg incubation units within the Hatchery Building consist of 192 Heath vertical flow incubation trays that are divided into 24 batteries of 8 trays. There's also a small RAS series comprised of 18 McDonald hatching jars and three semi-square small tanks used for the water hardening of eggs. Sanitation disinfection for biosecurity in the building is performed with iodine and ethyl alcohol.

Most rearing units are equipped with oxygenation/degassing columns connected to a low-pressure air distribution system to provide for degassing and oxygenation of the spring water supply. A one horsepower (HP) Sweetwater blower acts as a vacuum line. The hatchery has a pressure swing adsorption (PSA) oxygen generator that is not working. Instead, a semi-portable liquid oxygen (LOX) tank is used. In May of 2022 there were three high pressure oxygen cylinders beside the LOX tank for manual backup, see Figure 5-4 and Figure 5-5 (these tanks are no longer in use).

Oxygen is distributed through a red hose and some fittings used appear to be PVC and transparent hose to flow meters where tank diffusers can be connected. Either copper pipe with copper or brass fittings or stainless steel tubing with stainless fittings would be more appropriate for oxygen mains due to mechanical damage resistance and fire resistance. The National Fire Protection Association (NFPA) does not condone the use of PVC fittings in oxygen distribution piping. A high pressure manifold at the tanks would allow backup cylinders to be semi-permanently connected for automatic backup and monitoring with alarm.

Figure 5-2: Hatch House Main Production Rearing Area

Figure 5-3: Egg Incubation Trays

Figure 5-4: High Pressure Oxygen Cylinders

Figure 5-5: Liquid Oxygen (LOX) Tank

5.1.2 Structural

The Hatchery Building consists of a concrete foundation and slab-on-grade, with a wood-framed first floor, attic, and roof structure. The exterior foundation walls of the hatchery building have cracks and periodically get water leakage from outside during heavy rains or high groundwater conditions. The attic is supported by a series of three round steel columns located between each set of concrete tanks, supporting wood beams running the length of the hatchery building. The columns and wood framing appears to be in good condition (Figure 5-6 and Figure 5-7).

Figure 5-6: SE Corner Foundation Cracks Hatch House Main Production Rearing Area

Figure 5-7: North Facade Foundation Cracks and Spalling

The concrete of the rearing tanks and concrete floor slab appear to be in good condition. The concrete tanks drain into a series of 12-inch wide by 5-inch deep drainage channels that are cut into the floor slab. This cleaning channels are covered by steel grating (Figure 5-8). Directly adjacent is an overflow channel which is covered with a concrete cover. Staff noted that when they drain the water from the tanks into this concrete covered channel, water spills out of the drainage channels and sometimes can be seen coming up out of the joint between the floor slab and the foundation walls. A demonstration was given, where a few stoppers were removed. Water was seen coming up out of the overflow channel at the gaps between the concrete cap and the tanks, but no water was seen coming up from the joints at the walls during this site visit.

Due to the concrete caps, the condition of the overflow channels could not be inspected but based on the information provided and what was visually observed, it is likely that water from the drains is leaking into the soil below the slab. It is recommended that concrete cores through the floor slab are taken to inspect, sample and evaluate the underlying subgrade for erosion due to water leakage and infiltration.

The mechanical room floor slab, which is approximately 2-feet below the main floor level, was observed to be wet and the bottom joints of the CMU foundation wall on the south side of the mechanical room appear to have been recently repointed (Figure 5-9). Staff noted that there is typically water on this floor. This indicates there is likely hydrostatic pressure on the floor slab and foundation walls, pushing water through into the building.

Figure 5-8: Drainage Channels

Figure 5-9: Mechanical Room Floor and CMU Wall

The water table at this location is unknown, however, based on the location of the Hatchery Building to the creek, it is expected that the water table is close the foundation, and rises during periods of high rain which leads to water being pushed up through the joints in the slab. At the time of the site visit, the weather had been dry for a few days, which likely impacted the demonstration and what was observed. It is recommended a core boring be performed to verify the condition of the floor slab, soil beneath the slab, and water table elevation to ensure there are no underlying conditions that could not be visually observed.

5.1.3 Architectural

The Hatchery Building exterior consists of a concrete foundation, vinyl siding at the first floor, and cedar shingle siding at the attic level and gable roof with asphalt shingles and a metal edge at the eaves (Figure 5-10). The cedar shingles appear to be in poor condition, as they are visually weathered, warping and broken and should be replaced. The roof appears to be in good condition, and no visual signs of water infiltration were observed in the attic. The vinyl siding appears to be in fairly good condition, except at the corners, where the corner trim is cracked and broken. On the east side of the building, moss is growing on the concrete base, and black staining was observed on the vinyl siding.

Figure 5-10: Hatch House - South (Front) Elevation

The exterior windows consist of double hung wood windows with aluminum storm windows on the exterior. The wood windows appear to be the original windows with single pane glass. Considering the quantity of windows, and uninsulated nature of single pane glass, these likely contribute to difficulties in maintaining temperatures inside the building, especially during the winter. In some locations, the windows have been covered on the inside to help mitigate heat loss. The windows are operable and appear to be in fair condition. The exterior wood sills have peeling and missing paint, but no major signs of rotting were evident, these should be painted as part of routine maintenance.

There are eight (8) exterior doors on the Hatchery Building. All the doors are original solid wood doors with vision panels. The exterior doors were observed to be operable condition (Figure 5-11 and Figure 5-12). All of the doors were observed to have faded or peeling paint, and with the exception of the two doors on the north addition, the bottom of the doors were observed to shows signs of rotting, with noticeable gaps between the bottom of the doors and the sill. No weather stripping was observed on any of the doors. The vision panels appear to be single pane glass. At the storage room, the base of the door is below grade with a concrete block in front of the door, trapping any water between the door and the concrete block. At the main entrance on the south façade, there is a similar condition, however an aluminum screen door has been installed on the outside of the wood door to prevent water penetrating the door. It is recommended that doors be repaired or replaced and weather hardening be conducted on exterior doors.

Figure 5-11: Main Entrance

Figure 5-12: Door to Storage Room

The floor of the Hatchery Building is below grade along the south and west facades of the building and requires a step down from grade as you enter the building. The main entrance on the south side for access to the office leads to a narrow 3-foot 6-inch wide corridor, through an exterior door that is 30-inch wide. A 64-inch wide double door provides direct access into the production rearing area from the west façade, with a 7-inch step down from grade. Along the north façade, separate access into each of the spaces (production area, lab, and boot storage) via a 3-foot wide door, which are approximately 6-inches above grade.

The interior finishes typically consist of an unfinished concrete slab, painted concrete base / foundation walls, and painted wood slat walls and ceilings. The wood slat walls and ceilings appear to be in fairly good condition other than a few loose slats and some paint cracking. The concrete wall bases appear to be in good condition, other than the paint finish appearing to be faded or spalling in some locations. It is unknown if there is any insulation in the exterior walls.

The office space is approximately 11-feet by 12-feet and laid out with a desk, filing cabinets, shelves, a water cooler, and a small closet under the stairs to the attic. Due to the step down and the narrow doorway, the office space is not accessible (Figure 5-13 and Figure 5-14).

Figure 5-13: Office

Figure 5-14: Office Closet Under Stairs

There are two bathrooms located on the south side of the building, which are accessed from the outside (Figure 5-15 and Figure 5-16). One of the bathrooms is currently being used as a storage space. Unlike the main floor, the floors of these bathrooms are level with the exterior grade so there is no step down as you enter the bathroom. Each bathroom is approximately 5-feet-6-inches wide by 5-foot 10-inches deep. Neither bathroom is currently set up to be ADA compliant, as they do not have ADA compliant fixtures, grab bars, and doors are less than the 32-inch minimum width.

The storage room, which is located in the southeast corner of the building, measures approximately 12-feet wide by 14-feet 6-inches deep (Figure 5-17). This room can be accessed from the exterior via a small vestibule with an exterior door on the south façade or through doorway from the production rearing area. This room is used for the storage of miscellaneous parts and tanks.

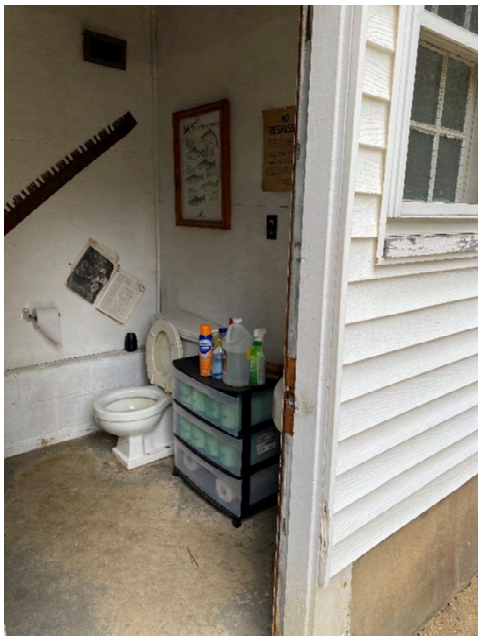

Figure 5-15: Hatch House Bathroom

Figure 5-16: Bathroom used for storage

Figure 5-17: Storage Room

The mechanical room (15-feet by 7-feet 7-inches) is located between the bathrooms and the production area, and is accessed via the vestibule connected to the storage room, and a set of concrete steps (Figure 5-18 and Figure 5-19). The floor of the mechanical room is approximately 2-feet below the main floor. Two large metal screens in the wall between the mechanical room and production area allow airflow between the spaces. Standing water was observed on the floor in the mechanical room along with rusting of the bottom of the equipment and deterioration at the bottom of the concrete walls.

Figure 5-18: Stairs and Vestibule to Mechanical Room

Figure 5-19: Mechanical Room Floor & Screens

The main production rearing area is a large (85-feet by 45-feet) open room with concrete rearing tanks and walkways between the tanks and along the west wall. The interior finishes in this space are consistent with the finishes in other rooms. Refer to the structural writeup above for notes on the floor slab and drainage channels. Staff did note that this room is difficult to maintain consistent temperatures, especially during the winter, and during hot summer days. This is likely due to the amount of windows and doors, and lack of insulation in the walls (Figure 5-20 and Figure 5-21).

Figure 5-20: Double Doors on West Facade

Figure 5-21: Main Production Rearing Area Overall View

The attic consists of a large open area that spans over the entire length of the original building, with a small room in the middle of the south wall (Figure 5-22 to Figure 5-25). The attic is accessed from the Main Production Rearing Area via a narrow 3-foot wide set of stairs at the south east corner. The stairs do not have any handrails. The attic space is currently used for the storage of miscellaneous materials and the room along the south wall is used for storing old documents and artifacts. The attic space appears to be in good condition, other than a few broken floor boards. There is no insulation on the underside of the roof or walls of the attic, no insulation was visible where the floor boards were broken, so there may be no insulation between the attic and Main Production Rearing Area below. There were no visual signs of water infiltration through the roof, however plastic sheeting has been installed on the inside of the separated room, either for leak protection or to offer some insulation.

Figure 5-22: Attic Storage Room

Figure 5-23: Attic Stairs with missing railing and no handrails

Figure 5-24: Attic overall view

Figure 5-25: Attic broken floor boards

The lab space is located in the north addition and has a floor that is 6-inches lower than the main floor of the building, to avoid any contamination from spills (Figure 5-26). Plastic covers have been built onto the windows in the lab to provide added insulation. A layer of painted plywood has been installed over top of the wood slat walls.

The boot storage area is located directly to the east of the lab space, and can be accessed either through the lab space, or from the exterior through a door on the north wall (Figure 5-27). The floor of the boot storage area is approximately 6-inches higher than the lab floor. This walls and ceiling in this space are covered with unfinished plywood.

Figure 5-26: Lab Space looking south into Production Area

Figure 5-27: Boot Storage Area

HVAC & Plumbing

Heating for the Hatch House is provided by a three-hundred thousand British Thermal Units (BTU) per hour (MBH) oil fired furnace located in the mechanical room. Domestic hot water is provided by an electric tank water heater located in the disinfection room. The furnace and water heater appeared to be in good condition at the time of the site visit, however staff have since indicated the furnace failed in February 2023.

Electrical

Electricity is provided to the A-Series area at 3-phase, 208/120V from a medium voltage utility distribution line that runs along RT 132. There is a single meter/service point at the hatchery building. The MV distribution line is tapped at the road and circuits routed overhead through the trees to the hatchery building. A 45kVA pole-top transformer located within the trees steps down to the service voltage. The lines/transformer are vulnerable to falling branches, and other weather/wildlife-related threats. Electricity is further distributed underground from the hatchery building to the garage and the Raceway A-2 covered structure (“lighthouse”). The electrical service was replaced in 2015/2016 with a new 3-phase service and is in good condition.

A slack span is routed overhead to the meter on the west side of the building. The “Main Panel” is located in the second level attic space. The panel is rated 208/120V, 200A 3-phase. The panel sub-feeds down to the old hatchery panel on the first floor, and out to the Garage Building. In addition to

general building lighting/outlets/HVAC loads, the panel powers several process loads including a 3 HP water pump, a 1 HP sewage pump, an ultraviolet (UV) system, and several dedicated equipment receptacles. The main panel in the attic is approximately six years old and in good condition. The hatchery space panel is older and showing deterioration; replacement may be required in the future. In general, conduit/wire appears to be in good condition. Capacity is sufficient for the current requirements of the facility.

Building lighting is provided by surface-mount LED fixtures. Fixtures are new LED replacements with appropriate ratings and protection for the environment. Light levels in the facility are sufficient, and fixtures are in good condition.

There is no backup power or instrumentation in the facility.

5.2 Raceway A-2

Within the A-Series there are four banks of raceways (A-2 through A-5). Series A-1 has been filled in. A-2 has eight raceways, each with baffles/control structures near their midpoint to divide them in half, for a total of 16 raceway units, each approximately 5-feet by 50-feet by 1.5-feet water depth. Four of the raceway units have not been utilized for numerous years due to failing concrete and lack of flow. Two of the raceways are covered by a wooden shed-type building and were in use. Of the six uncovered raceways, only two were used for rearing at the date of inspection, with the others used for settling/treatment/storage.

The broodstock shed over the raceways gives beneficial shade to the fish and weather protection and lighting for the staff to monitor and feed the fish and conduct spawning, harvesting or transfer operations. The lighting can also be used for photo period control to influence the spawning schedules of the fish.

Minor Springs' water is piped to A-2 in buried 12-inch PVC pipe with buried valves. It branches to exposed PVC header piping with PVC ball valves. Pairs of parallel raceways in the upper or southeastern half flow serially into pairs in the northwestern half.

Figure 5-28: Two of Four Raceways A-2 Enclosed by Wooden Shed Used for Broodstock/Spawning

Figure 5-29: Uncovered/Outdoor Raceways in Raceway A-2

5.2.1 Structural

The concrete of the exterior A-2 raceways is in fair to poor condition, with numerous areas of spalling at the top of the walls that have been previously patched. The two exterior raceways nearest the hatchery house are used for solids storage/treatment and are in the most deteriorated condition, with heavy spalling and vertical full-height cracks in the exterior walls. The remaining four raceways not within the shed structures are in fair condition, with vertical surface cracking of the walls, loss of wall concrete below water line to a depth up to 1/8-inch with exposed aggregate, and intermittent spalling. The concrete of the raceways enclosed by the shed is in good condition, and have been rehabilitated recently. There is no appreciable cracking, spalling or erosion of concrete surfaces below the water line.

The wood shed structure that covers two of the raceways consists of a concrete curb base with wood framing for the walls and roof, ship lap wood siding and a metal single slope roof. The roof, siding, framing and concrete curb all appear to be in good condition. There is a sliding barn style door in the middle of the structure for primary access, and smaller wood frame doors on either end of the structure for access from the sides. There are wood panel window openings that can be removed along with wall vent fans on one side of the structure for ventilation.

5.2.2 HVAC

Ventilation for the Raceway A-2 building is provided by a wall-mounted exhaust fan and intake louver.

5.2.3 Electrical

The “light house” structure is sub-fed underground from the hatchery building and has a 240/120V, 100A load center. The building has fluorescent lighting controlled by a time-clock to control photoperiod and manipulate when spawning occurs. There’s an electric centrifugal water pump used for filling stocking trucks. The electrical infrastructure is in good condition. Replacing fluorescent with LED fixtures will reduce energy consumption and potentially improve quality of light and control. Note that there is insufficient safe working space in front of the panelboard.

5.3 Raceway A-3

Raceway A-3 has ten concrete raceways, each approximately 8-feet by 50-feet. Four have been covered by a metal frame-supported plastic cover, while the six westward raceways are unprotected. The covered Raceway A-3 area is used for growing broodstock. The exterior Raceway A-3 area is used for water treatment and settling (Figure 5-30 to Figure 5-32). These ten raceways flow in parallel. They have buried supply piping from both spring groups and Raceway A-2 2 and reuse water from the hatchery building. Culture water enters the most northeastern corner and then flows serially through the others in a serpentine pattern. Hatchery Building cleaning water is piped to the lower six of these ten raceways for treatment.

Figure 5-30: Metal Framed Plastic Cover over 4 of the 10 Raceways in Raceway A-3

Figure 5-31: Protected Raceways used for Growth in Raceway A-3

Figure 5-32: Unprotected "outside" raceways in Raceways A-3, used for treatment/settling

5.3.1 Structural

The concrete of the covered area of Raceway A-3 is in fair condition and appears to have been rehabilitated in the past. There are vertical surface cracks on the raceway walls spaced every 3- to 5-feet, but most of the cracks have been sealed. There is only minor surface erosion of concrete below water level in the walls, and there is a small number of minor spalls at the top of the raceway walls. The concrete of the uncovered area of Raceway A-3 is in fair to poor condition, with advanced cracking and spalling of the raceway walls and baffles. Discussion with hatchery personnel indicated that they would prefer to demolish or fill over Raceway A-3 and replace it with circular tanks.

The cover structure consists of curved steel trusses set on wood blocking at the base with horizontal bracing connecting the trusses (Figure 5-33). The wood blocking bases are attached to concrete curbs with metal angle brackets. The cover and structure appear to be in generally good condition, however most of the anchor bolts that connect the brackets to the concrete are beginning to rust.

Figure 5-33: Raceway A-3 Broodstock Covering

The covering over the raceways is open at the two ends. The west end is closed off with netting, while the east end is closed off with a wood shed structure connected to the adjacent historic garage. Access to the covered raceways is through the shed structure on the east side, through a door, and down a set of concrete steps, as the raceways are approximately 2-feet below adjacent grade at the entrance point. The wood shed structure appears to be in fair condition (Figure 5-34 and Figure 5-35).

Figure 5-34: Raceway A-3 Covered Entrance Shed Structure

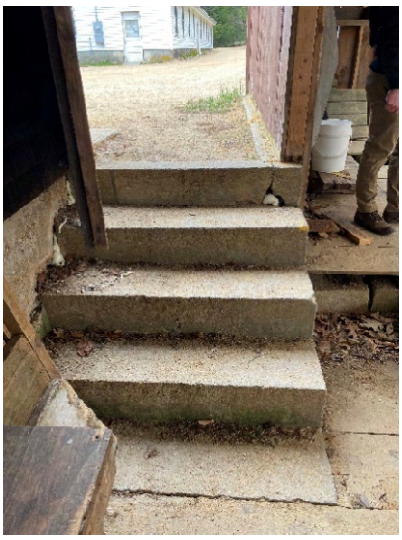

Figure 5-35: Raceway A-3 Covered Entrance Stairs

5.4 Raceway A-4

Raceway A-4 consists of ten concrete raceways, each approximately 5-feet by 70-feet, that have been abandoned for over 30 years (Figure 5-36). These raceways were supplied water from the upper main springs by a buried 15- or 16-inch AC pipe; but it is abandoned. The ten raceways are in parallel. It appears that spring water flowed into the most northeastern one and then flowed serially through the others in a serpentine pattern. Their effluent goes to Raceway A-5 in buried pipe. The concrete of Raceway A-4 is in poor condition, with cracking, efflorescence and spalling. Hatchery personnel indicated that removing or filling over Raceway A-4 and replacing it with circular tanks is preferable to repair.

Figure 5-36: Abandoned Raceways A-4

5.5 Raceway A-5

Raceway A-5 has ten concrete raceways, each approximately 5-feet by 50-feet, that are protected by chain link fencing on the perimeter and monofilament line and some netting overhead. They are seasonally used for rearing fish. At the inspection, most of the raceways were used for settling/treatment (Figure 5-37).

These raceways have supply piping from a reuse line from the hatchery building and from Raceway A-4. The ten raceways are in parallel. Spring water flows into the most northeastern one and then flows serially through the others in a serpentine pattern. Their effluent goes to Outfall 002.

The concrete of Raceway A-5 is fair to poor, with deep vertical cracking of the raceway walls that allows leakage to and from area groundwater and between raceways. There is minor surface erosion of concrete wall vertical surfaces. If Raceway A-5 is to be used for future rearing or growth operations, there should be a rehabilitation of the concrete to inject sealer into cracks and to re-line exposed concrete surfaces with cementitious epoxy concrete or similar.

Figure 5-37: Raceway A-5

5.6 B-Series

Water is supplied to B-Series by a 6-inch diameter cement-lined DIP from the intake above the dam at Dickerman Pond (Figure 5-38). B-Series contains four sets of three raceways, each approximately 7-feet by 50-feet, using serial water reuse of 404-gpm peak water flow. There is between 1.5- to 2.5-feet of head drop (i.e., fall) between each set of raceways. Water temperatures within this series fluctuate with a maximum of 58°F in the summer. They are protected from predation by metal-framed covers and netting.

Figure 5-38: B-Series looking upstream

5.6.1 Process

Two 6-inch-diameter DIPs flow water into a single open concrete header at the beginning of B-Series. One pipe is direct and exposed from Dickerman Pond while the other comes from underground, near where the 12-inch Dickerman main to C-Series becomes buried. Water flows serially through the four 3-packs of raceways and then continues serially to C-Series. There is also a wastewater pipe from the end of B-Series to Dickerman Brook; but it is not used since the raceways are now routinely vacuumed.

5.6.2 Structural

The concrete of B-Series is in poor condition. There are vertical cracks, efflorescence and heavy spalling at approximately 20 percent of the wall top surfaces (Figure 5-39 and Figure 5-40). The raceway is oriented so water flows from east to west. The northmost exterior wall, adjacent to hatchery road, is in the worst shape with major spalling and cracking at the interface with the bottom of the wall and the floor of the raceways. During the inspection, leakage through the north outer wall was enough that water was flowing along the edge of the road. The concrete surfaces of the walls and floor below normal water line are eroded to an average depth of 1/8-inch. The spalling and cracking of the concrete is also more extensive at the baffles where water flows from one set of raceways to the next. The B-Series concrete has been patched in many locations as part of routine

maintenance. These raceways should have a major structural rehabilitation if they are to remain in service.

The supports for the predatory netting system over the raceways was observed to be in poor condition, and unstable. Staff noted that during the winter, they have to take down the netting, because the netting and supports cannot take the load of snow on the netting. Increased predation control is recommended.

Figure 5-39: Severe leaking from north outside wall at B-Series

Figure 5-40: Concrete spalls, cracking and deterioration at B-Series baffles

5.6.3 Electrical

Electricity is provided to B-Series at 1-phase 240/120V from a low voltage utility line that runs along Church Lane. The circuit is routed overhead through the trees to the meter/service point at the Feed Shed. The lines are vulnerable to falling branches, and other weather/wildlife-related threats.

5.7 C-Series

C-Series is comprised of five sets of linear six pass serial reuse raceways. The southerly five raceways were enclosed by metal-framed covers and netting at the time of the site visit, but have since collapsed. All of the C-Series raceways are unprotected. At the inspection, the four southerly raceways of the four upper sets were being used for rearing. The two northerly raceways of the four upper sets were being used for settling/treatment, as were all six of the westernmost (uncovered) set of raceways (Figure 5-41 to Figure 5-43).

Generally, pond water is used for B-Series and C-Series water supply. Fish feeding is accomplished by hand. The raceways are not equipped with electrical service. The raceways are swept and cleaned frequently and appear to have minimal sediment build-up. Many raceways have been kept dormant due to lack of water supply or inability to hold water. Many of the active raceways are severely deteriorated and require large amounts of water to maintain constant levels. Severe concrete spalling of C-Series and leakage dictates replacement.

Figure 5-41: C-Series looking downstream

Figure 5-42: Northerly raceway at C-Series not protected by frame/netting (typical)

Figure 5-43: Westmost set of C-Series raceways used for treatment

5.7.1 Process

A mostly buried 12-inch DIP from Dickerman Pond is branched to the southeastern corner of C-Series. Effluent from B-Series also arrives here in buried 12-inch AC pipe into a concrete head box. The C-Series head box leaks significantly below ground level. Water flows through the first six parallel raceways and through fish screens and over stoplogs and drops a few inches into the next six raceways and so on. Each raceway also has a drain standpipe to flush settled solids to the six westmost raceways used for settling/storage. A 16-inch DIP takes all the effluent to Dickerman Brook and is joined by effluent from the round tanks.

5.7.2 Structural

The condition of the C-Series concrete is fair to poor. Facility personnel indicated that there was a significant rehabilitation of the top of the concrete walls at the upper two sets of raceways at C-Series approximately 20 years ago (Figure 5- to Figure 5-45). That rehabilitation is beginning to fail, with cracking and spalling exposing the older deteriorated concrete surfaces. The concrete at the lower three sets of raceways is largely original with local repairs and crack sealing only. The concrete walls are cracked and spalled, with cracks across the entire width and full height of the walls spaced approximately every 2- to 3-feet. There are spalls up to 2- to 3-inches wide over approximately 10-inches of top of wall surfaces in areas that have not been previously repaired. There is significant erosion of vertical concrete surfaces below normal water line in all the raceways, to an average depth of 3/4-inches, with exposed aggregate.

Figure 5-44: Previously repaired concrete surfaces at C-Series upper raceways

Figure 5-45: Original, unrepaired concrete surfaces at C-Series

5.7.3 Electrical

Electricity is provided to the C-Series area at 1-phase 240/120V from a medium voltage utility line that runs along Hatchery Road. There are several service points for the facilities in the area: 1) Garage, 2) Woodworking Shed (shop), Timber Shed (office), and Sampling Shack, 3) unused receptacles for old pumps. A 5kVA transformer appears to power services (1) and (3). The transformer is deteriorated due to potential overloading and in poor condition. A 15kVA transformer powers service (2) and is in good condition. The service to the Tool Shed appears to no longer be in use.

There are abandoned and damaged/exposed underground cables and hand-holes along the road. If future recirculation system modifications are considered for this area, new/upgraded electrical distribution will be required.

5.8 C-Series Circular Tanks

In addition to the linear raceway complex, rearing units at C-Series include 15 circular tanks. The circular units are 25-feet in diameter and 1.3-feet deep (operational depth). A mostly buried 12-inch DIP from Dickerman Pond runs past all of the round tanks and has 2-inch PVC supply branches from buried valves to each tank. The branches go over the tank walls through PVC ball valves to spray bars (inlet headers).

Each tank has a drain and side overflow box that was previously piped to Dickerman Brook, but they have been retrofitted to be intercepted with a 12-inch PVC consolidation drain that joins all the round tanks' effluent to the 16-inch DIP drain from C-Series. This retrofit consolidated the number of discharge points for the facility. The round tanks have abandoned PVC low pressure air distribution piping.

The concrete of the C-Series circular tanks is in good condition, with minor cracking and minor spalling, typically at surfaces not protected by their dome covers. The circular tank used for the show pool has more deterioration due to its lack of a cover, but it is still in good condition.

5.9 Incubation and Rearing Facilities Summary

To summarize, the following recommendations were noted for the incubation and rearing facilities during the on-site condition assessment:

- The conditions of water lines have not been determined since they require special inspection procedures to access. Any water lines suspected of loss of integrity, leaking, or blockage should be inspected.
- Hatchery Building
    - Additional investigation into the condition of the concrete foundation and load bearing soils in the incubation and rearing space by core drilling should be undertaken and analyzed prior to any improvements on this building being implemented.
    - Additional investigation into the condition of the concrete foundation and load bearing soils in the mechanical room by core drilling should be undertaken and analyzed prior to any improvements on this building being implemented.
    - PVC pipe and fittings in the oxygen mains should be replaced with either copper pipe and copper or brass fittings or stainless steel tubing and stainless fittings. The current use of PVC violates safety codes by NFPA and should be corrected. Use of a high-pressure manifold at the tanks would allow backup cylinders to be semi-permanently connected for automatic backup and monitoring with alarm.
    - Replace cedar shingles.
    - Rectify the vinyl siding at the corners where the corner trim is cracked and broken as part of regular maintenance.
    - Correct all rotting and weather stripping on exterior doors.
    - The electrical panel in the hatchery space is older and showing deterioration replacement is recommended.
- Raceway A-2
    - Rehabilitate heavy spalling and vertical full-height cracks in the exterior walls.
- Raceway A-3
    - Abandon, demolish, or fill over and replace it with circular tanks.
- Raceway A-4 - Abandoned
    - Remove or fill for proper abandonment.

- Raceway A-5
    - Rehabilitation of the concrete to inject sealer into cracks and to re-line exposed concrete surfaces with epoxy concrete or similar.
- B-Series
    - Major structural rehabilitation is needed if they are to remain in service.
    - Increased predation control is recommended.
- C-Series
    - Severe concrete spalling of the C-Series raceways and leakage dictates replacement.
    - The transformer is deteriorated due to potential overloading and requires replacement.
- C-Series Circular Tanks
    - No recommendations currently.

6 Effluent Discharge and Sampling

There are two sampling sheds in the A-Series area on either side of Dickerman Brook: one adjacent to Raceway A-3 is Outfall 001, which is the discharge from Raceway A-3, A-2 and the Hatchery Building (Figure 6-1) and the other adjacent to Raceway A-5 is Outfall 002, which is the discharge from Raceway A-5 and A-4 (Figure 6-2). The sampling shed at Raceway A-3 appears newer and in good condition. The sampling shed at Raceway A-5 is a little smaller and appears in fair to good condition, other than some minor damage to vinyl corner trim and fascia.

Figure 6-1: Sampling Shed at Raceway A-3

Figure 6-2: Sampling Shed at Raceway A-5

There is a third sampling shed at the north end of C-Series (Figure 6-3). It is on Outfall 004 which is discharge from C-Series. This shed appears to be relatively new and in good condition.

Figure 6-3: Sampling Shed at C-Series

Hatchery staff report that Outfall 003 is a pipe that allows the C-Series supply main and round tanks' supply main to be flushed. This is normally done annually, and only briefly.

The outfall downstream of C-Series is a reinforced concrete headwall supporting two side-by-side outlet pipes. The embankment behind the headwall climbs steeply to the level of the roadway around the circular tanks and has eroded, partially exposing the top of the pipes. There are wooden stairs that provide access to the area of the headwall from the C-Series area. The concrete of the headwall is in good condition. Fill or gravel should be added above the outlet piping behind the headwall to help support the embankment and slow added loss of embankment by erosion.

7 Garages and Storage Areas

New Hampton State Fish Hatchery includes several support buildings that provide storage, shop, and garage spaces for the facility. Each of these areas are described in more detail and their conditions discussed in the sections below.

7.1 Upper Garage

The upper garage is located within the upper portion of A-Series area adjacent to Raceway A-3 (Figure 7-1). The exact age of the garage is unknown, however staff noted that this structure is historically registered. The upper garage serves as the primary feed storage area for A-Series area and is also used for the storage of other equipment such as tractors and nets. While the garage works well for the storage of netting and other miscellaneous equipment, it is not ideal for feed storage, since there is no means of maintaining temperature, and the barn doors have gaps at the bottom and provide no protection from rodents.

Figure 7-1: Upper Garage Front (South) Façade

The Upper Garage consists of a concrete curb foundation with wood frame walls, roof and attic, and a concrete slab-on-grade floor inside the concrete curb (Figure 7-2and Figure 7-3). The structure appears to be in good to fair condition, with some minor cracking of the concrete foundation curb at the entrance doors. The interior slab-on-grade has three sections, and there is a slight difference in height between the sections, indicating some differential settlement of the various slab segments.

Figure 7-2: Example of cracking at foundation curb

Figure 7-3: Interior view showing feed storage and slab height difference

The exterior of the garage is finished with cedar shingle siding which appears to generally be in good condition, except at the southeast corner, where the shingle siding comes in contact with grade. The roof is a gable style roof with asphalt shingles, and appears to be in good condition, other than some moss growing on the north side. There is a gutter on the south side of the roof over the barn doors. The gutter appears to be pulling off the roof in places and sagging, and it does not have any downspouts. The windows appear to be the original single pane wood window and were observed to be in fair to poor condition with some broken and missing panes (Figure 7-4 and Figure 7-5).

Figure 7-4: Broken windowpanes at east elevation

Figure 7-5: Rusted door slide rail and damaged gutter

The interior walls and ceiling are finished with asbestos paneling, which appears to be in fair condition, other than a multitude of surface scratches. There is a series of three sliding barn doors on the front (south) façade that provide access into the garage. The doors are rotting at the bottom, increasing the gaps between the bottom of the doors and foundation curb. The steel slide rail is also rusting, making the doors more difficult to operate. There is an attic space that runs the length of the garage, that is accessed through an access hatch opening in the ceiling. There are no stair providing

access to the attic space, so it is currently accessed via a wood step ladder. The attic is currently used for storing various netting.

7.2 Feed Shop

The Feed Shop is a shed structure located adjacent to B-Series that was built in 1995 and is used primarily as a local feed storage area for B-Series along with some other miscellaneous storage (Figure 7-6). The shed consists of concrete sonotube foundations with wood girders supporting a simple wood structure shed, all of which appear to still be in good condition. The exterior walls are finished with vertical wood paneling which appears to be in good condition. The roof is a gable style roof with asphalt shingles and is still the original roof from 1995. The roof appears to be in fair condition, and no water leaking was reported, or observed. The interior has a plywood floor, with exposed studs and rafters.

Figure 7-6: Feed Shop

The Feed Shop is accessed via a man door with wood stairs on the east façade and an overhead garage door on the north façade. The doors are operable, however neither seals fully. The man door is rusted at the bottom and leaves gaps for weather and rodents, while the overhead door is not tight to the frame, leaving gaps between the door and wall. Due to rodent access and the inability to maintain consistent temperatures, similar to the Upper Garage, the Feed Shop does not function as an efficient feed storage structure (Figure 7-7 and Figure 7-8).

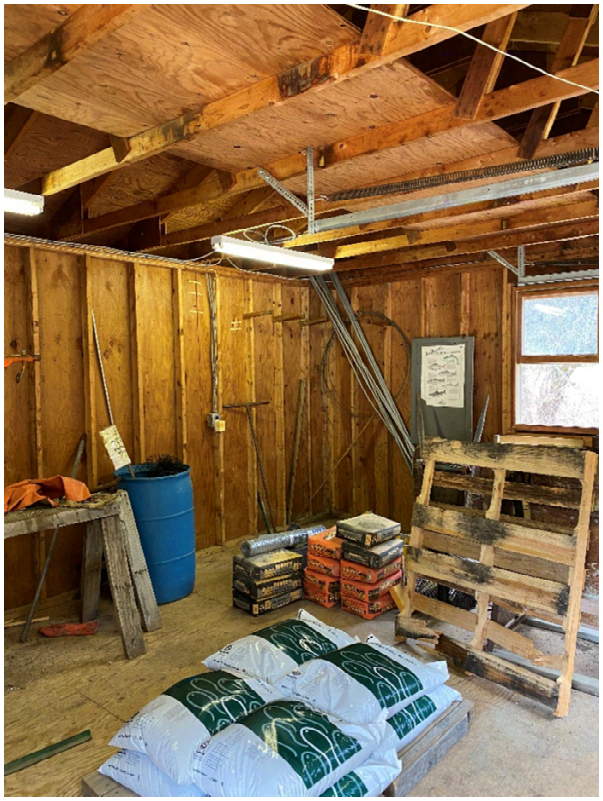

Figure 7-7: Interior View of Feed Shop

Figure 7-8: View of gaps in overhead door

The Feed Shop has a separate meter/service point. Power is routed overhead to a pole directly next to the shed. A 240/120V, 100A load center provides power to lighting/receptacles in the building. The building also powers a site light pole, and a receptacle with on/off controller for plug-in aerators in B-Series. Electrical infrastructure is in adequate condition.

7.3 Boat Shed

The boat shed is a partially enclosed wood structure that is used for the storage of boats and other miscellaneous equipment that does not require complete protection from the elements, located at the eastern edge of C-Series (Figure 7-9). The south side of the structure is open to allow for loading and unloading. The wood structure is supported by loosely laid CMU blocks sitting on the ground, many of which appear to have shifted and do not appear stable. The CMU blocks do not appear to be secured to the ground, and the wood structure appears to be sitting on the blocks with no visible means of attachment. This structure appears to serve the function of its intended use but appears to be in overall poor condition.

Figure 7-9: Boat Shed

7.4 Garage

There is a large multi-bay garage building that houses a boat bay with a workshop, wildlife bay, storage bay, feed storage bay, marine biology bay, state police bay, and an open covered area for a cold storage freezer (Figure 7-10). The Garage is constructed of a concrete slab foundation with wood framed walls and roof, which appear to be in good condition. The exterior is finished with vertical wood paneling, and the roof is a gable style metal roof. The roof appears to be in good condition; however, the roof soffit along the north side of the garage consists of screening material, which has been damaged, leaving openings for animals and insects to get into the garage. The vertical wood paneling is in good condition, except in some locations at the bottom of the of the paneling where it comes in contract with the ground. These locations show signs of the paneling rotting or warping and pulling away from the structure. This building is uninsulated and is not heated or cooled (Figure 7-11 and Figure 7-12).

Figure 7-10: Garage - Overall View

Figure 7-11: Damaged Wood Paneling Base

Figure 7-12: Damaged Soffit Screening

The Garage is broken into three sections: the main larger section, which consists of six bays, each approximately 15-feet wide by 38-feet deep; the law enforcement garage (Conservation Officers), which consists of a double-wide bay that is 34-feet wide by 29-feet deep; and a covered, open sided storage area, where an outdoor cold storage unit is located. Each bay is accessed from a large overhead garage door, and there are man doors on the side walls of each bay. The man doors on the outside walls of the outer two bays allow for access and egress from the garage, and the interior man doors allow access between the garage bays.

The Auto Bay is the bay farthest west in the Garage. It is a single width bay, in which the back 12-feet are separated from the front for use as parts storage and a workshop space. This space is used for maintenance of vehicles. Staff noted that it is difficult to keep this space warm enough to work in the winter (Figure 7-13 and Figure 7-14).

Figure 7-13: Boat Bay

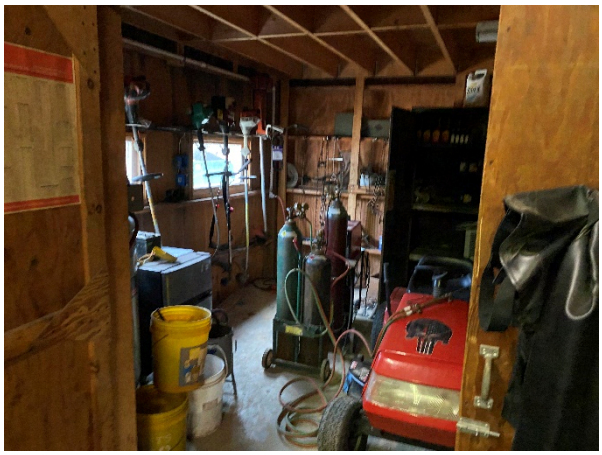

Figure 7-14: Auto Bay Workshop

The next bay over from the boat bay is the Law Enforcement Bay (Figure 7-15). This is a double wide bay used by the Law Enforcement Division for storing smaller vehicles such as ATVs, snowmobiles, and trailers.

Next to the Law Enforcement Bay is the Wildlife Bay (Figure 7-16). This is a single bay with a 12-feet deep storage room and loft space at the rear of the bay. This bay is used for general storage of larger materials for use at the C-Series raceways.

Figure 7-15: Law Enforcement Bay

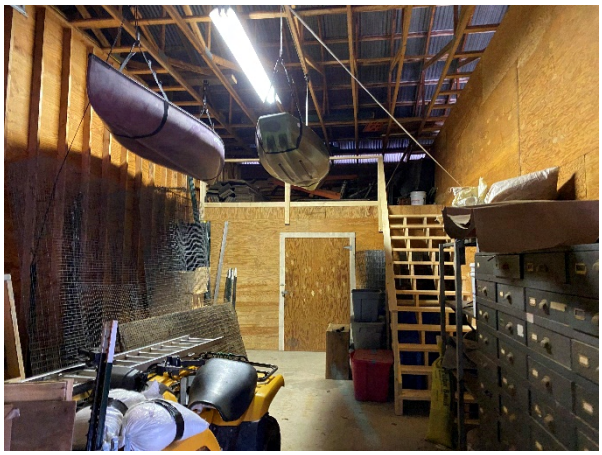

Figure 7-16: Wildlife Bay

Beside the Wildlife Bay, is the Feed Bay, which serves as the feed storage area for C-Series area (Figure 7-17). Staff noted that similar to the other feed storage areas, this space does not provide protection from rodents, and is difficult to maintain the temperature. As noted above, the roof soffits are compromised, and since the walls separating the bays are not fully closed up to the roof, and the doors between bays are often left open, rodents have several possible ways of getting into this bay.

Next to the Feed Bay is the Inland Fisheries Bay, which is the last bay in the main section of the garage (Figure 7-18). This is a single bay with a storage room and loft at the back of the bay. This bay is used for the storage of biological equipment.

Figure 7-17: Feed Bay

Figure 7-18: Inland Fisheries Bay

The garage building has a separate meter/service point. Power is routed overhead from the nearby 5kVA pole-top transformer. A 240/120V, 100A load center provides distribution within the building. Loads are primarily lighting/receptacles including some 240V welding receptacles. There are no HVAC or process loads. The electrical infrastructure is deteriorated due to age, but in adequate working condition. The electrical supply transformer may not be sized adequately for the building load. The transformer is showing signs of over-loading.

7.5 Shaving Shed

The Shaving Shed is an elevated wood structure for the use of collecting and storing sawdust generated from the Woodworking Shed next door (Figure 7-19). The upper sawdust storage area is connected to the Woodworking Shed via a PVC duct. Staff noted that this structure is no longer used for storing sawdust, however, the lower section of the structure is still used for miscellaneous storage. The age of this structure is unknown. It is recommended that this structure be demolished before it collapses and causes further issues.

Figure 7-19: Shaving Shed

7.6 Woodworking Shed

The Woodworking Shed is a woodworking shop with an outdoor covered storage area located along the north side of C-Series between the Shaving Shed and the Timber Shed (Figure 7-20). The age of this structure is unknown. This structure consists of a concrete block foundation with wood frame walls and roof structure, vinyl siding and a metal gable style roof. The interior consists of wood plank floors, exposed stud walls and a plywood ceiling. The structure and finishes appear to be in good condition.

Figure 7-20: Woodworking Shed exterior view looking east

The walls of the shop space are not insulated, and the windows appear to be the original single pane windows. The windows are not operable, but are designed to be able to be removed to allow for ventilation. However, due to the lack of insulation, blocks have been installed around the windows making it difficult to remove them, and some of the windows have been covered with plastic to provide additional insulation. Staff noted that it is difficult to get adequate ventilation in the space. During the winter, this shop is rarely used since it is hard to keep warm (Figure 7-21).

Staff noted that they used to fabricate all of the wood signs used for state parks and other state agencies in this shop, but it is no longer used to that extent. However, it was noted that this shop is still undersized for type of woodworking projects that are performed, and that it is extremely difficult for more than one person to be working in there at a time.

The shop has a 240/120V, 100A service from the nearby pole-mounted transformer and distribution panel. The panel powers lighting and receptacles in the building. The electrical infrastructure is deteriorated due to age, but remains in adequate working condition, and appears to meet the needs of hatchery personnel.

Figure 7-21: Woodworking Shed Interior View

7.7 Timber Shed

The Timber Shed is 3-sided wood frame storage structure with a metal roof, used for the storage of miscellaneous materials, located adjacent to the Woodworking Shed (Figure 7-22). The wood framing appears to be in fair condition, and concrete blocks appear to still be in fairly good condition. There is a makeshift wood deck along the front of the structure to allow for easy access to the storage bays. The wood deck does not appear to be properly supported as it is visually sagging and leaning away from the structure.

Staff noted the Timber Shed was originally designed to hold the wood for the wood signs fabricated in the Woodworking Shed, which were used by all of the hatcheries and other state facilities. However, they no longer make all of the wood signs, so they no longer need to store nearly as much wood as when this was originally built. The staff noted the Timber Shed should be removed.

Figure 7-22: Timber Shed

7.8 Tool Shed

The Tool Shed is a wood frame structure on the south side of the C-Series circular tanks (Figure 7-23 and Figure 7-24). It is currently still being used for storage of netting and other similar items used locally at C-Series. This structure is in overall poor condition and is not suitable for use. The wood paneling at the back is pulling away from the framing, and the roof has multiple holes in the south side. Water damage to the wood slat finishes on the interior is evident and the wood is showing signs of rotting. It is recommended this structure be removed as part of any renovation work performed at this facility.

Figure 7-23: Tool Shed (Front)

Figure 7-24: Tool Shed (Rear)

7.9 Utility Shed (C Station Office)

The Utility Shed, which the staff refer to as the “C Station Office”, serves as the breakroom and primary office space for most of the staff. The building consists of an open office space, bathroom, loft storage area, and outdoor covered storage area. The construction consists of a concrete foundation and first floor slab, and wood framed walls, loft, and roof. The roof is a gable style roof with asphalt shingles. The exterior is clad with vertical wood panels, while the interior consists of an unfinished concrete floor slab and plywood paneling on the walls and ceiling. The structure, roof, and finishes all appear to be in good condition (Figure 7-25 and Figure 7-26).

The main office area (23-feet by 19-feet) can be accessed via a man door on the east façade. There is also an overhead garage door on the west façade, but staff noted they only use that in the summer on occasion for ventilation purposes, and noted that in the winter, the garage door makes it difficult to keep the space warm.

The windows are original single-pane, double hung wood windows with aluminum storm windows on the exterior. They appear to be in good to fair condition and are all operable.

Staff noted that spatially, the space meets their current needs, but the garage door does not allow the space to be fully utilized.

Figure 7-25: Utility Shed (C Station Office) East Façade

Figure 7-26: Utility Shed - West Façade

This building is heated with a gas-fired wall-mounted unit heater and has an old wood burning stove to provide supplemental heating. This building does not have air conditioning. Domestic hot water for the utility sink is provided by an electric instantaneous water heater. Equipment appears to be in good condition (Figure 7-27 and Figure 7-28).

The office has a 240/120V, 100A service from the nearby pole-mounted transformer and distribution panel. The panel powers lighting and receptacles in the building. The panel is severely deteriorated due to age, and replacement should be considered in the near future if the building is to continue to

reliably operate as an office space. The lighting appears to be new LED fixtures, sufficient for space/function.

Figure 7-27: Utility Shed Interior 1

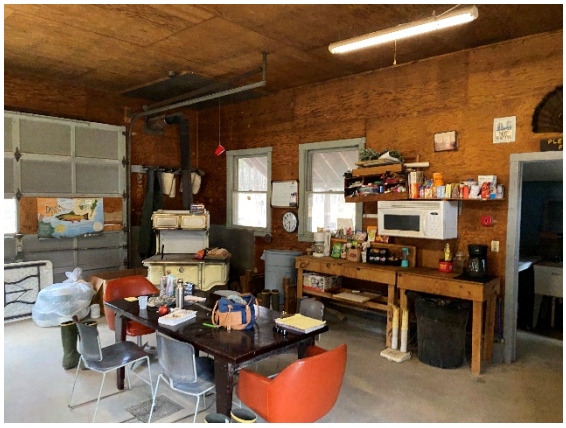

Figure 7-28: Utility Shed Interior 2

7.10 Garage and Storage Area Summary

To summarize, the following recommendations were noted for the garages and storage areas during the on-site condition assessment:

- Upper Garage
    - Not ideal for feed storage, since there is no means of maintaining temperature, and the barn doors have gaps at the bottom and provide no protection from rodents. Recommended that a new feed storage location be found or a built. However, given there is no temperature conditioning, a new feed building is recommended.
    - Routine maintenance on shingles, gutters, windows, and sliding doors should be provided.
- Feed Shop at B-Series
    - Routine maintenance on door seals on man doors and overhead doors to maintain an interior not exposed to weather or rodents. However, given there is no temperature conditioning, a new feed building is recommended.
- Boat Shed
    - Improvements are necessary to adequately secure and support this structure.
- Garage at C-Series
    - Routine maintenance on siding and gutters is required.
    - Building space does not provide protection from rodents and is difficult to maintain the temperature. These should be corrected or a new space for feed storage should be found or built.

  - The electrical infrastructure is deteriorated due to age. The electrical supply transformer may not be sized adequately for the building load as it is showing signs of over-loading. The transformer should be investigated for replacement.

- Shaving Shed
  - It is recommended that this structure be demolished before it collapses and causes further issues.
- Woodworking Shed
  - No recommendations at this time.
- Timber Shed
  - Removal of this structure is recommended.
- Tool Shed
  - Removal of this structure is recommended.
- Utility Shed (C Station Office)
  - Consider removing overhead door and extending the wall to cover the opening so that space can be better heated and utilized.
  - Electrical distribution panel should be replaced.