

In partnership with: NOAA-Fisheries, U.S. Fish and Wildlife Service, Maine Department of Marine Resources, and Penobscot Indian Nation

Collaborative Management Strategy for the Gulf of Maine Distinct Population Segment of Atlantic Salmon

2021 REPORT OF 2020 ACTIVITIES

Assembled by: NOAA-Fisheries, Maine Field Station, Orono, Maine.
5-6-2021

GOM DPS Atlantic Salmon Collaborative Management Strategy

The Final Atlantic salmon recovery plan was released in 2019. The final plan incorporates the strategies and many of the associated actions that were developed through the Atlantic salmon framework process that was established in 2011. It also details recovery goals, objectives and criteria needed for recovery, with three Salmon Habitat Recovery Units (SHRUs) representing the spatial scale of recovery (Merrymeeting Bay, Penobscot Bay and Downeast Coastal SHRUs.) Each SHRU is expected to meet certain criteria before a down listing or delisting decision can be made.

In the fall of 2018 we initiated an internal review of the framework process aimed at aligning our governance structure with the Recovery Plan and addressing the challenges associated with communications and decision making. Ultimately, this review resulted in what is now called the Collaborative Management Strategy (CMS). The fundamental purpose of the CMS is to:

- Provide clarity on roles and responsibilities
- Provide clarity on where decisions are made
- Increase the speed of decision making
- Increase accountability and transparency
- Incorporate external partners

The CMS recognizes that the path to recovery in each of the SHRUs may be different based on land use patterns, habitat conditions, and the relative degree to which the specific threats identified in the recovery plan occur across the landscape. Therefore, the intent of the structure is to empower the different SHRU committees to coordinate recovery efforts in their geographic region. The SHRU teams are responsible for planning, coordinating and tracking recovery efforts in each SHRU; as well as developing and maintaining work plans that incorporate goals, priorities and actions, including stocking recommendations. Additionally, they are tasked with developing annual reports that describe progress towards meeting recovery goals. The 2020 annual reports are contained within this annual report.

While the SHRU teams coordinate the recovery strategy in their respective regions, the implementation team (IT), which includes the management board, their support staff, and the SHRU chairs, ensures vertical and horizontal communications across SHRUs, across agencies, with the Tribe, and among leadership. The IT provides a venue for collaboration and communication on substantive issues that affect the program as a whole, or affect another agencies' ability to carry out its programs.

The CMS envisions that committees (ad hoc or standing) will be established that will conduct specific tasks geared towards providing essential information necessary for the Implementation Team to make informed decisions in respect to the direction of the program. The management board authorizes and sets the charge for committees, and each committee is guided by a terms-of-reference. In 2020, the management board determined that they would not stand up any additional standing committees until after the pilot year review. Therefore, only one standing committee has been established to review studies associated with FERC projects in the GOM

DPS. The annual report from this committee is included in this report ([Chapter 5](#)). In addition to the existing FERC standing committee, two additional standing committees have been proposed (an outreach/communication committee, and a database committee). As indicated, the management board has deferred making a decision on those committees until after the pilot period has been completed.

In March of 2020, the management board established two ad hoc committees to develop contingency plans to address the primary effects of the COVID-19 pandemic on the salmon program: 1) Fish passage and broodstock collection, and 2) stocking. The committees were made up of representatives of NOAA, USWFS, PIN, and MDMR, and were charged with developing alternatives for addressing potential modifications to operations associated with limited staff capacity attributed to social distancing requirements dictated by the state, tribal, and federal governments, as well as by private industry. The resulting contingency plans were attached to the 2019 annual report, and are available on the Atlantic salmon recovery website (<https://atlanticsalmonrestoration.org/resources/documents/cms-annual-reports-2020>).

This report includes four sections. The first is a high-level summary of the status of the GOM DPS of Atlantic salmon in relation to the reclassification and delisting criteria laid out in the 2019 recovery plan. The remaining three sections provide additional information at the SHRU level, and are developed by the SHRU coordinating committees with significant input from stakeholders in their respective SHRUs.

1. GOM DPS Annual Summary

As detailed in the 2019 Final Recovery Plan, in order for the listing status of Atlantic salmon to change, each of the relevant biological criteria must be met in two (downlisting) or three (delisting) of the recovery units.

The biological criteria for reclassifying (downlisting) the GOM DPS of Atlantic salmon from endangered status to threatened status are:

1. **Abundance:** The DPS has total annual returns of at least 1,500 adults originating from wild origin, or hatchery stocked eggs, fry or parr spawning in the wild, with at least 2 of the 3 SHRUs having a minimum annual escapement of 500 naturally reared adults.
2. **Productivity:** Among the SHRUs that have met or exceeded the abundance criterion, the population has a positive mean growth rate greater than 1.0 in the 10-year (two-generation) period preceding reclassification.
3. **Habitat:** In each of the SHRUs where the abundance and productivity criterion have been met, there is a minimum of 7,500 units of accessible and suitable spawning and rearing habitats capable of supporting the offspring of 1,500 naturally reared adults.

The biological criteria for removing Atlantic salmon from the endangered species list are:

1. **Abundance:** The DPS has a self-sustaining annual escapement of at least 2,000 wild origin adults in each SHRU, for a DPS-wide total of at least 6,000 wild adults.
2. **Productivity:** Each SHRU has a positive mean population growth rate of greater than 1.0 in the 10-year (two-generation) period preceding delisting. *In addition*, at the time of delisting, the DPS demonstrates self-sustaining persistence, whereby the total wild population in each SHRU has less than a 50-percent probability of falling below 500 adult wild spawners in the next 15 years based on population viability analysis (PVA) projections.
3. **Habitat:** Sufficient suitable spawning and rearing habitat for the offspring of the 6,000 wild adults is accessible and distributed throughout the designated Atlantic salmon critical habitat, with at least 30,000 accessible and suitable Habitat Units in each SHRU, located according to the known migratory patterns of returning wild.

In the below sections, we summarize the return data and habitat accessibility data from 2019 in reference to the reclassification and delisting criteria.

Abundance

In 2020, 1,705 prespawn salmon returned to the GOM DPS (Table 1.1). Of those, approximately 11% returned to the Downeast Coastal SHRU; 85% returned to the Penobscot Bay SHRU; and 4% returned to the Merrymeeting Bay SHRU. The total abundance of returning salmon was well above the 10-year average (Table 1.2), and the proportion of the run that was naturally reared (22%) was higher than what has been seen on average over the last decade (18%) (Figure 1.1). Regardless, the abundance of wild and naturally reared returns remain well below what is needed for either reclassification or delisting (Table 1.3).

Table 1.1 Summary of adult returns for the GOM DPS in 2020 by SHRU. These numbers represent trap counts when available and redd based estimates of returns to the remaining rivers. Determination of origin is based on proration of adults at traps, smolts from corresponding cohort or primary lifestage stocked.

SHRU	Total Returns	Hatchery	Wild/naturally reared
Downeast Coastal	194	115	79
Merrymeeting Bay	72	11	61
Penobscot Bay	1439	1196	243
<i>Total</i>	<i>1705</i>	<i>1322</i>	<i>383</i>

Table 1.2. The 10-year average number (2011-2020) of adult returns to the GOM DPS by SHRU.

SHRU	Total Returns	Hatchery	Wild/naturally reared
Downeast Coastal	131	63	68
Merrymeeting Bay	55	16	39
Penobscot Bay	992	879	113
<i>Total</i>	<i>1178</i>	<i>958</i>	<i>220</i>

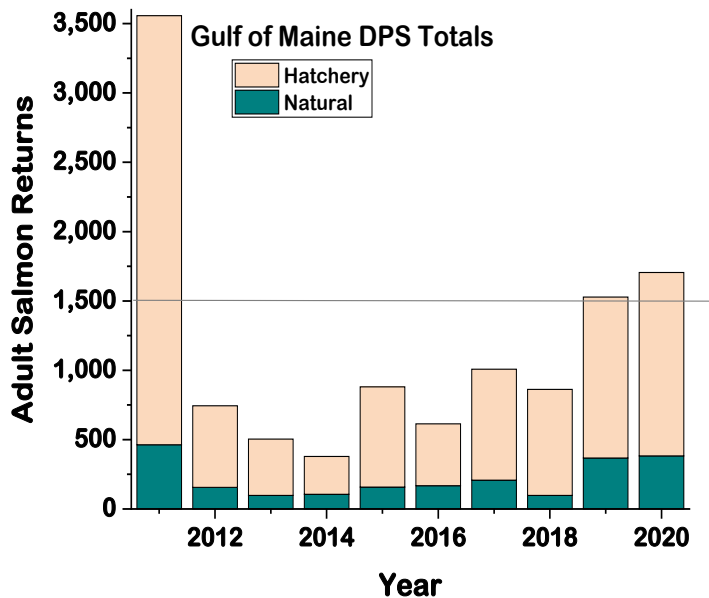


Figure 1.1. Adult returns of Atlantic salmon from 2011 to 2020. Blue shaded area represents naturally reared origin salmon (wild, and egg or fry stocked). Pink shaded area indicates hatchery origin salmon (fall parr, smolt, adult).

Table 1.3. The average number (2011-2020) of wild or naturally-reared returns to each SHRU in relation to the reclassification and delisting goals described in the 2019 recovery plan.

SHRU	Wild/natural reared returns (average)	% of Downlisting goal	% of Delisting goal
Downeast Coastal	68	13.60%	3.40%
Merrymeeting Bay	39	7.80%	1.95%
Penobscot Bay	113	22.60%	5.70%

Productivity

In 2020, the 10-year geometric mean population growth rate for the GOM DPS was 1.12 (95% CL 0.60 - 2.09), making it the ninth consecutive year where that composite threshold rate estimate encompassed 1.0 (Figure 1.2). However, the reclassification and delisting productivity criteria require that *each SHRU* sustain a population growth rate of more than 1.0, in addition to meeting the relevant abundance criteria. As indicated above, no SHRU meets the abundance criteria. However, in 2020 the population growth rate was met in both the Merrymeeting Bay and Penobscot Bay SHRUs, but not in the Downeast Coastal SHRU. It should be noted that replacement rate considers naturally reared fish not wild fish. This index is influenced by the life stage of salmon that is stocked. For instance, adults that were stocked as eggs and fry or of wild origin are classified as naturally reared in terms of the rate, whereas adults stocked as parr and smolts are not. Therefore, the stocking practices in the three SHRUs influence the replacement rate. For more information, refer to the enclosed SHRU reports.

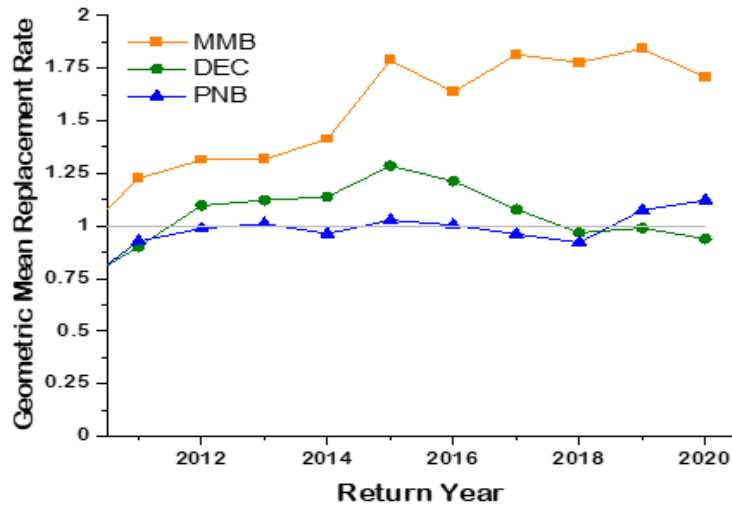


Figure 1.2. Replacement rate of naturally-reared salmon in the GOM DPS from 2011 to 2020.

Habitat

In 2020, a minimum of 42 connectivity projects were conducted that improved access to 95 stream miles (Table 1.4). This is a preliminary estimate as projects and habitat gains are still being tabulated. Only projects that are accessible from the ocean are considered when estimating the amount of habitat that has become accessible in terms of the recovery criterion. For example, a dam or culvert removal that occurs upstream of an existing barrier to passage would not be included. In 2020, 619 habitat units were made accessible in the Penobscot Bay SHRU. It should be noted that the number of projects reported in the 2020 SHRU reports are likely an underestimate of the number of projects actually conducted.

Table 1.4. The number of connectivity projects (culverts and dams) that have been reported in the SHRU annual reports for 2020, and the cumulative amount of stream habitat where access has been improved.

SHRU	Projects Reported	Stream Miles
Merrymeeting Bay	18	18
Penobscot Bay	20	55
Downeast Coastal	4	22
GOM DPS	42	95

As of 2020, all three SHRUs have achieved the reclassification (downlisting) goal of at least 7,500 accessible habitat units (Table 1.5). However, none of the SHRUs have yet to achieve the delisting goal of 30,000 accessible habitat units. Figure 1.3 shows the HUC 12 watersheds in the GOM DPS that we considered accessible in terms of recovery in 2020, as well as those that are partially accessible, and those that are not currently accessible. Although numerous connectivity projects were conducted in 2020, no additional HUC 12 watersheds were made accessible to Atlantic salmon.

Table 1.5. The amount of habitat (1 habitat unit=100m²) in critical habitat that is considered accessible in each of the SHRUs, and how that relates to the habitat recovery goals.

SHRU	Suitable and Accessible Habitat	% of 7,500 units (Downlisting)	% of 30,000 units (Delisting)
Merrymeeting Bay	12,423	166%	41%
Penobscot Bay	19,202	256%	64%
Downeast Coastal	28,594	381%	95%

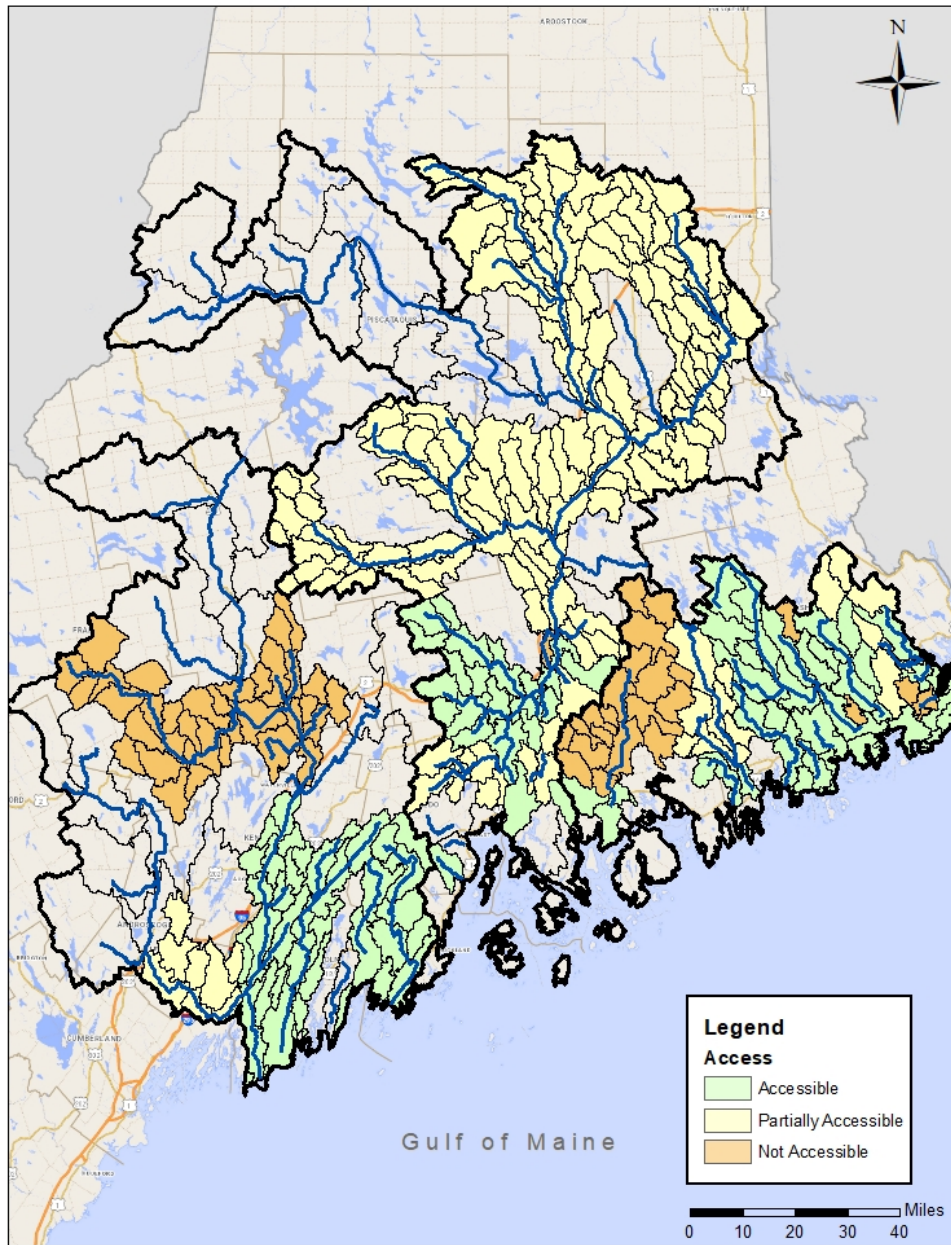


Figure 1.3. HUC 12 watersheds that have been determined to be accessible in 2020. Accessible watersheds have no mainstem dams, or else have dams that have fishways that have been evaluated and determined to be highly effective. The habitat in these watersheds meet our recovery criteria for accessibility. Partially accessible watersheds are above dams that have fishways that have yet to be evaluated. Not accessible watersheds are above dams that do not have swim through fishways. Watersheds above impassable dams where adult salmon are trucked are not considered accessible in terms of recovery. This map does not consider the effect of road stream crossings.

Marine Return Rate 2020 Synopsis

The United States Atlantic salmon Assessment Committee (USASAC 2020) updates marine return rate metrics for Penobscot River hatchery origin smolts and naturally reared smolts produced in the Narraguagus, Sheepscot, and East Machias Rivers. Previously, all systems used total smolts stocked or estimated total smolt abundance and subsequent adult returns by sea age to generate a smolt-to-adult return rate (SAR). For the Penobscot River, a revised estimate was developed that used the methods of Stevens et al. (2019) to decouple losses of smolts in-river, at dams and in the estuary to provide an estimate of postsmolts entering the Gulf of Maine. This method accounts for both stocking location and flow-specific mortality. This postsmolt estimate was then applied to subsequent age-specific adult returns to calculate a postsmolt to adult age-specific return rate (PSAR) for the Penobscot. The USASAC discussed the concept and agreed it would provide a better estimate of marine return rates and recommended adoption of the PSAR metric for use in marine return rate work for the Penobscot River hatchery component. With the removal of in river, dam, and estuary mortality PSAR is generally higher than SAR but follows similar trends of substantially lower marine return rates after 1991 (Figure 1.4). The difference in rates (SAR vs. PSAR) within a year in also illustrate the conservation benefit of stocking smolts above as few dams as practical for management goals. In years with minimal interannual

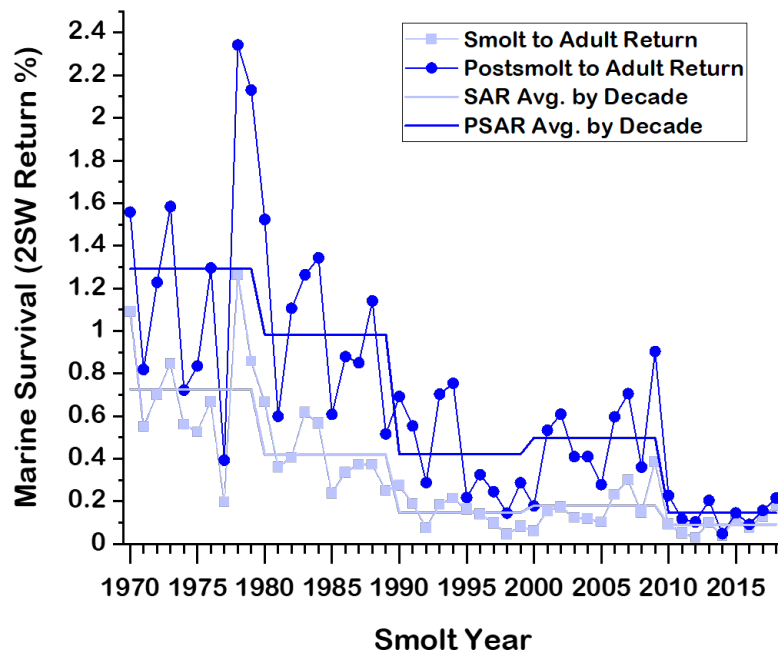


Figure 1.4. Marine return rate of Two Sea Winter (2SW) Atlantic salmon returns for 1970 to 2018 smolt stocking cohorts to the Penobscot River as indexed by Smolt to Adult Returns (SAR) and the preferred Post Smolt to Adult Returns that removed freshwater and estuary mortality (Stevens et al. 2019). Lines indicate average by decade.

differences smolts are generally stocked lower in the river as managers targeted maximizing adult returns and maintaining genetic diversity.

Population estimates of naturally reared smolts are available for 3 additional Maine Rivers. These estimates are derived from mark-recapture population estimates. When combined with redd-based adult population estimates or trap counts by age, these provide additional indices of marine return rate for Maine populations. It is important to note that for these 3 estimates, parr stocked fish were included in naturally reared smolt estimates. These parr were reared at Craig Brook National Fish Hatchery for the Sheepscot and Narraguagus and the Peter Gray Parr Hatchery for the East Machias. The longest time series is for the Narraguagus River starting with the 1997 smolt cohort. Sheepscot River smolt monitoring started in 2009 and East Machias monitoring in 2013.

Marine return rates for 2SW salmon in the last decade for the Penobscot Hatchery population have a PSAR averaging 0.22% (Figure 1.5). This is substantially lower than estimated average SAR for the Narraguagus River (1.25%) and Sheepscot River (0.57%). For the East Machias, only a 6 year time series is available but this averages 1.93%. While the variability is larger in these smaller populations, these data suggest much better marine production for naturally reared smolts. For 2020 returns (2018 smolt cohort), measured Penobscot PSAR was 0.22%, Narraguagus SAR was 2.65%, Sheepscot was 0.72%, and East Machias was 2.01.

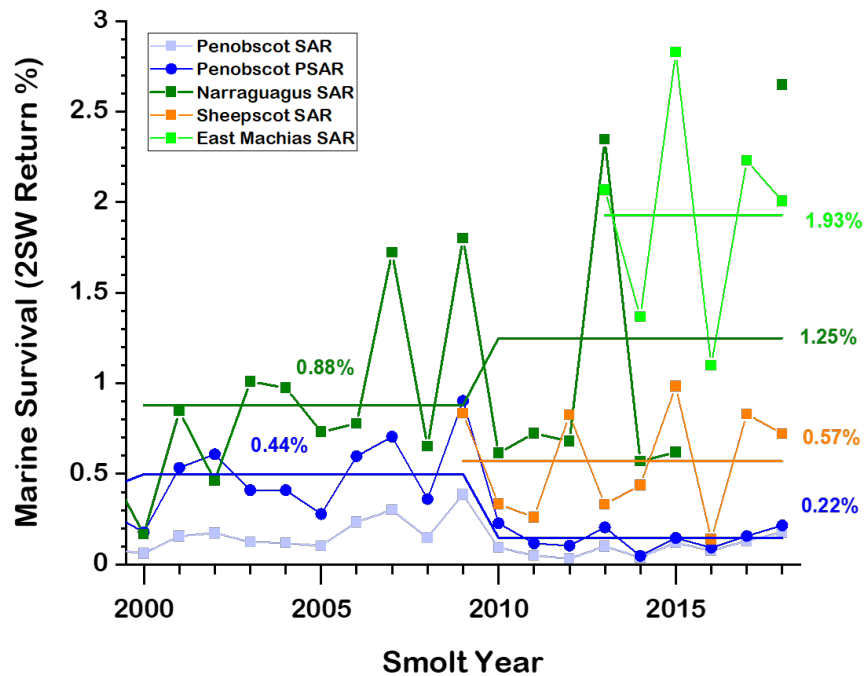


Figure 1.5. Marine return rate of Two Sea Winter (2SW) Atlantic salmon returns since the 2000 smolt cohorts for the Penobscot, Narraguagus, Sheepscot, and East Machias Rivers as indexed by Smolt to Adult Returns (SAR) for all rivers and the Post Smolt to Adult Returns that removed freshwater and estuary mortality for the Penobscot (Stevens et al. 2019). Lines indicate average by decade or available time series in case of East Machias.

Marine return rates for 1 SW salmon showed similar trends in the last decade for the Penobscot Hatchery population PSAR averaging 0.07%. This is also lower than the estimated average SAR for the Narraguagus River (0.35%), Sheepscot River (0.57%) SAR and the 6 year time series for the East Machias (0.53%). Again, these data suggest much better marine production for naturally reared smolts.

These entire time series suggest that marine return rate of naturally reared fish is often higher than hatchery reared smolts (Figure 1.5). Future work will focus on the variability of these estimates and continuing these time series to better understand overall marine return rate and differences between hatchery and naturally reared smolts. In the future, PSAR estimates will be reviewed for their utility in the Narraguagus River population where telemetry estimates of lower river and estuary survival are available for 8 years of the time series. Marine return rate remains a primary threat to the recovery of all Gulf of Maine Atlantic salmon stocks. While modest increases in PSAR the last 3 years provide some encouragement, reviews of marine return rate indicate the best short-term strategy to address current ocean conditions is to maximize the production of wild or naturally reared smolts.

2. Annual Report for the Downeast Recovery Unit

Report prepared by the Downeast SHRU Coordinating Committee

Abundance and population trends

Adult returns of Atlantic salmon to the Downeast SHRU for 2020 were slightly lower (194) than 2019 (236; Figure 2.1). The adult-to-adult replacement rate in 2020 is estimated to be 0.93 (Figure 2.2) with the 10-year geometric mean of adult-to-adult replacement is estimated at 0.94 (0.52 to 1.69). The adult return information and replacement rate presented below is from the work of the U.S. Atlantic Salmon Assessment Committee (USASAC 2021); therefore, the definition of “naturally reared” salmon does not include adults resulting from parr and/or smolt stocking.

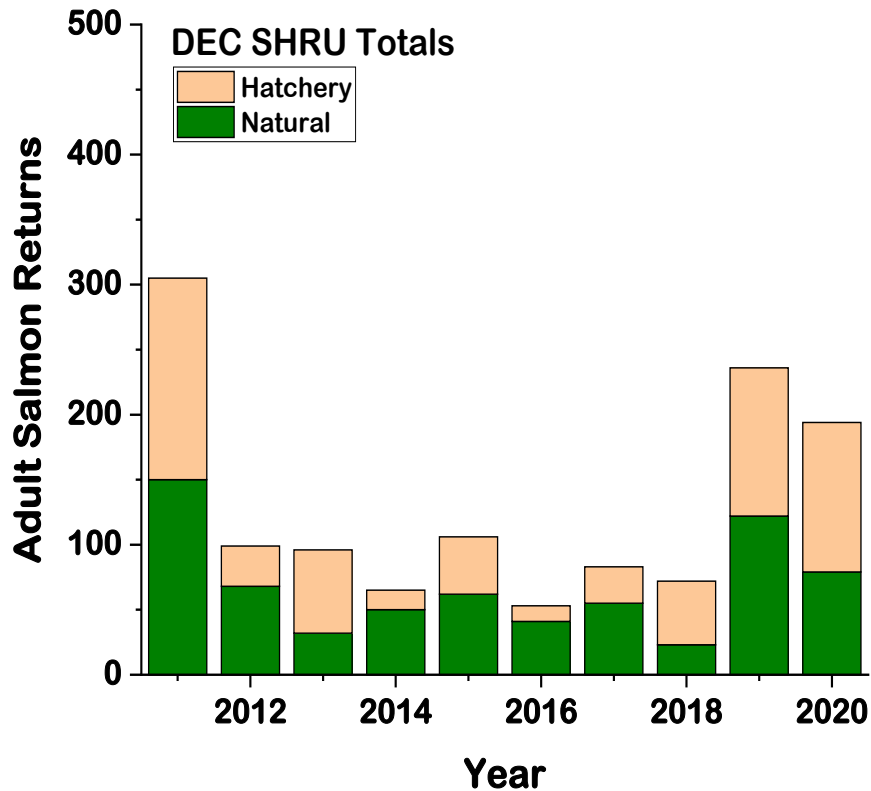


Figure 2.1 Adult returns of Atlantic salmon from 2011 to 2020. Green shaded area represents naturally-reared origin salmon (redd, egg, or fry). Tan shaded area indicates hatchery-origin salmon (fall parr, smolt, adult; USASAC 2021). The term “DEC SHRU” refers to the Downeast SHRU.

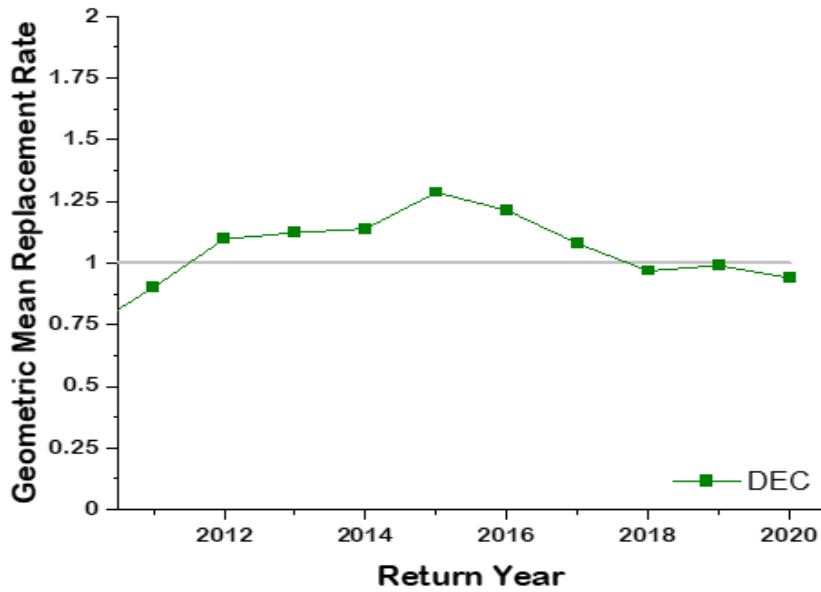


Figure 2.2. Replacement rate of naturally-reared salmon in the Downeast SHRU from 2011 to 2020. Solid horizontal reference line indicates a spawner to spawner replacement rate of 1 based on a 5-year lifecycle (USASAC 2021). The term “DEC” refers to the Downeast SHRU.

Table 2.1 Summary of adult returns for the Downeast SHRU in 2020. These numbers represent trap count from the Narraguagus and Union Rivers and redd-based estimates of returns to the remaining rivers. Determination of origin is based on proration of adults at traps, smolts from corresponding cohort or primary lifestage stocked.

River	Adult returns	% naturally reared	% Hatchery Origin
Union	3	33%	67%
Narraguagus	108	16%	84%
Pleasant	9	100%	0%
East Machias	24	8%	92%
Machias	29	100%	0%
Dennys	21	100%	0%

Spatial Distribution

Given contemporary abundance levels that are well below spawning targets, spatial distribution of Atlantic salmon is closely correlated with stocking activities. The primary strategy currently used in the Downeast SHRU is unfed fry followed in numbers by eyed egg planting in the Narraguagus, Machias and Pleasant Rivers, and fall parr in the East Machias River (Table 2.2). These salmon are stocked into accessible habitat across the Downeast SHRU (Figure 2.4). As new reaches are accessed through barrier removals, they are assessed for rearing suitability and included in fish distribution.

A total of 963,323 salmon were stocked into the DE SHRU in 2020. Of these, the majority were stocked as fry (585,000) or eyed eggs (293,000). Additionally, 84,000 fall parr were stocked into the East Machias and Machias Rivers; 1,323 post-spawned broodstock were also stocked (Table 2.3).

The Downeast SHRU, with 72 HUC-12 areas, had cohort occupancy of between 9,800 and 10,300 units in 21 HUC-12 areas (29%) where these 3 cohorts had a proportion occupancy above 0.01 (Figure 2.3). While still at only modest occupancy, the Downeast SHRU has a generally broad distribution of juveniles in the Dennys, East Machias, Machias, Narraguagus, and Pleasant Rivers.

Mean occupied rearing habitat for the DE SHRU was 41% with a minimum of 0% and a maximum of 97% occupied. Since stocked drainages are limited to the Narraguagus, Pleasant, Machias, East Machias, and Dennys Rivers, a large portion of the SHRU is presumed to be unoccupied or underutilized (Figure 2.3).

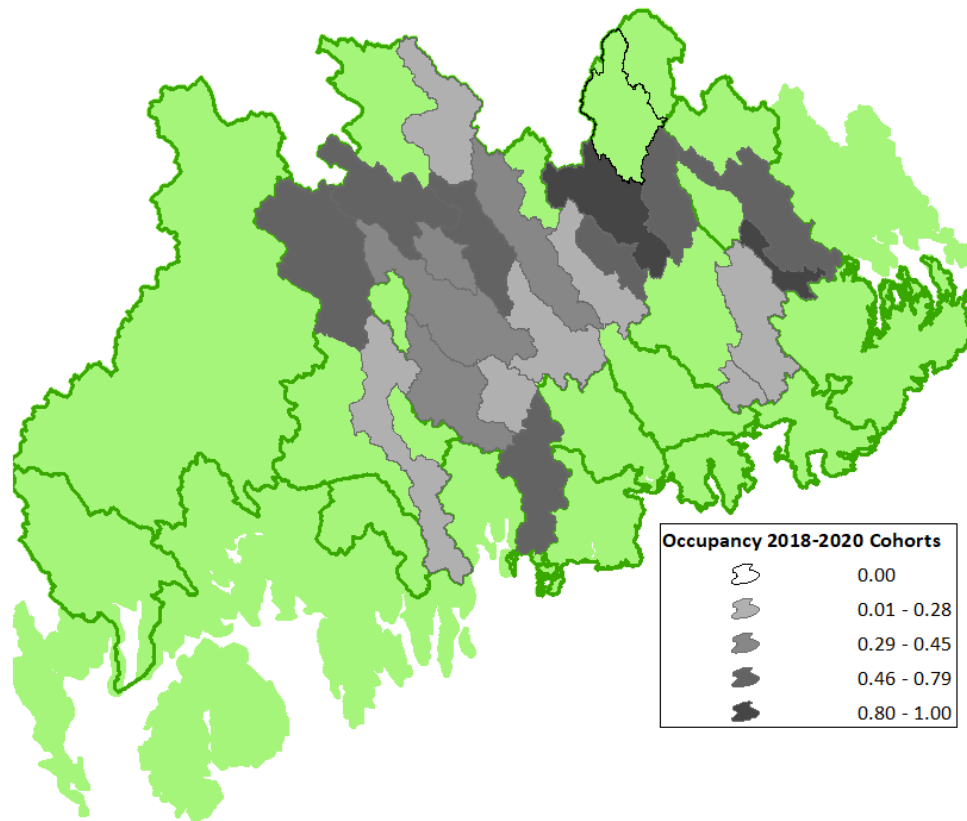


Figure 2.3 Mean occupancy across three cohorts (2018 to 2020) as of December of 2020 that will contribute to 2021 smolt production in the Downeast SHRU. Occupancy is the ratio of rearing habitat occupied by at least one salmon to the estimated rearing habitat.

Table 2.2 Summary of salmon stocked by river in 2020. Note, all post-spawn adult salmon stocked in the Downeast SHRU are captive broodstock.

River	Life stage	Number
Union	Fry	2,000
Narraguagus	Egg	66,000
	Fry	164,000
	Post-Spawn adult	291
Pleasant	Egg	85,000
	Fry	89,000
	post-spawn adult	169
East Machias	0+ parr	68,000
	post-spawn adult	220
Machias	Egg	102,000
	Fry	181,000
	0+ parr	16,000
	post-spawn adult	198
Dennys	Egg	40,000
	Fry	149,000
	post-spawn adult	198

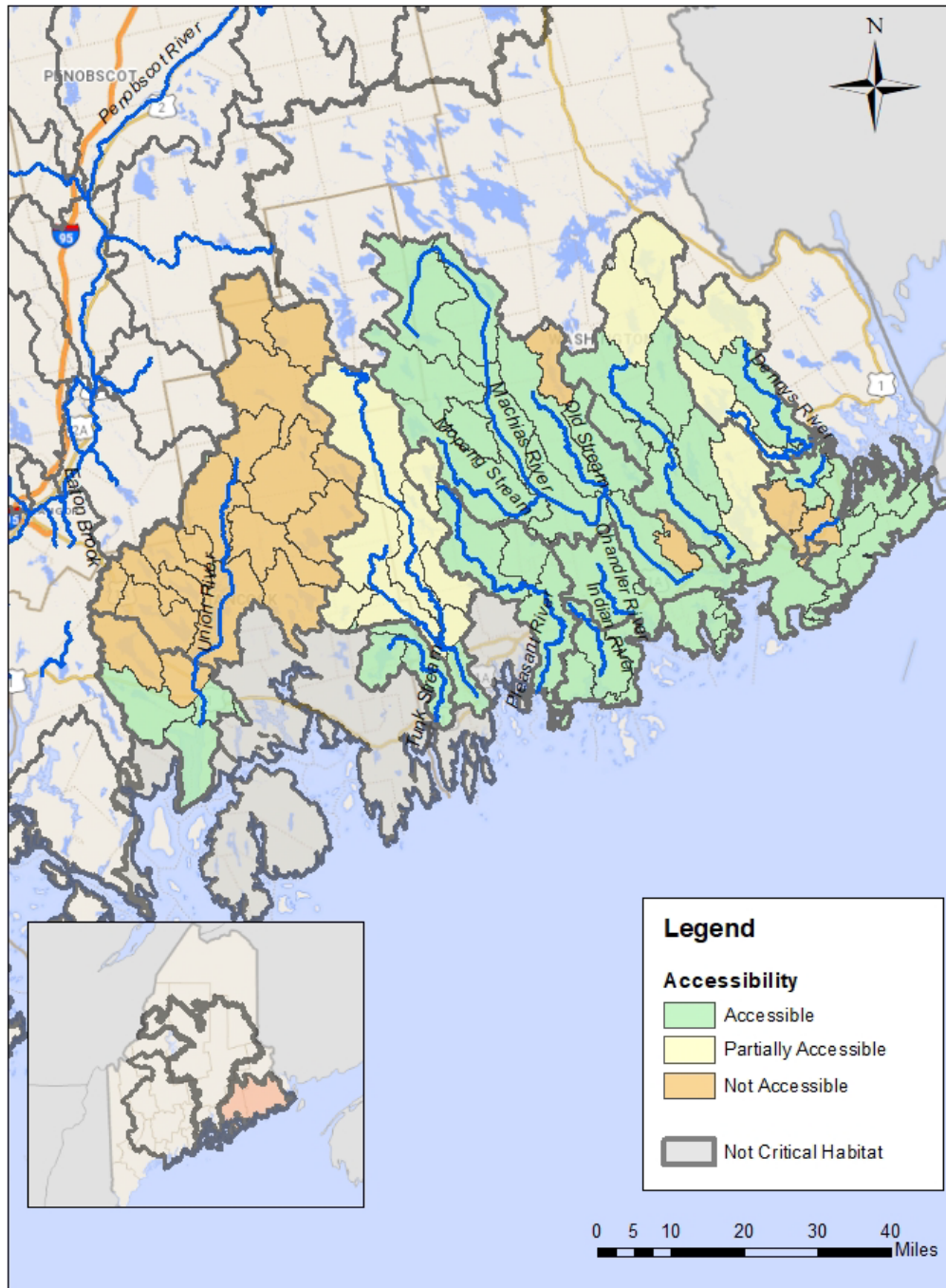


Figure 2.4 Map of currently accessible habitat at the Hydrologic Unit 12 level within the Downeast SHRU. *Accessible* watersheds have no mainstem dams, or else have dams that have fishways that have been evaluated and determined to be highly effective. The habitat in these watersheds meet our recovery criteria for accessibility. *Partially accessible* watersheds are above dams that have fishways that have yet to be evaluated. *Not accessible* watersheds are above dams that do not have swim through fishways. Watersheds above impassable dams where adult salmon are trucked are not considered accessible in terms of recovery. This map does not consider the effect of road stream crossings.

Table 2.3 Summary of recovery related connectivity projects completed in the Downeast SHRU (2020).

Project Type: Culvert, bridge, dam, fishway	Sub- basin	Stream	Town	Barrier class before: (e.g. barrier)	Barrier class after: (accessible)	River/Stream miles opened	Salmon Hab Units opened
Remove culverts and decommission road	Maine Coastal	Elisha Brook	Cherryfield	Partial barrier	Accessible	1.50	UNK
Culvert Replacement	Maine Coastal	Ingersoll Brook	Columbia	Potential barrier	Accessible	1.81	0.21
Bridge	Maine Coastal	Jellison Meadow Brook		Potential barrier	Accessible	12.00	UNK
Remnant dam removal	Maine Coastal	Northern Stream		Partial barrier	Accessible	6.50	UNK

* To be considered fully accessible, the habitat above connectivity projects must be consistent with delisting criteria in part 2F/2G of the final recovery plan and described in detail on p. 23.

Table 2.4. The following updates were submitted to the [Maine Stream Habitat Viewer](#) aquatic connectivity database (n=10).

Watershed	Name	Site I.D.	Update
Dennys	Cathance Lake Dam	D1482	Photograph not correct. New Photo and updated comments
Dennys	Great Works Dam	D1486	Added Photograph
Dennys	Unknown	51861	Site not the Sunrise Trail RR Bridge. Remove.
East Machias	Barrows Lake Dam	D1488	Dam was removed in 2013- remove.
East Machias	Pokey Dam	D1487	Denil fishway was replaced in 2014. New photo and comments
Machias	Mopang Second Lake Dam	D1510	Ground truth location and dam no longer exists- remove.
Pennamaquan ¹	Lower River Dam	D1739	Lower fishway was replaced in 2020. New photo and comments
Pennamaquan ¹	Pembroke Cottage Dam	D1740	No longer barrier and should be Upper Fishway. New photo and comments
Union	Ellsworth Water Co Dam	D1468	Dam removed in 2019.
Union	Jellison Meadow Brook	50864	2 perched culverts replaced with Bridge 2020.

¹ Not in Downeast SHRU, but project will significantly aid in recovery action C1.2 “Remove all fish passage impediments” as both Dennys & Pennamaquan flow into Passamaquoddy Bay.

Other Recovery Actions in the Downeast SHRU

Thermal profiles (F3.2) were conducted in the East Machias River (Aug. 20, 2020 Rkm 25.93-26.48) and Orange River (Jul. 21, 2020 Below Whiting Dam 0.69 km).

Large wood additions (F3.5) were conducted in the Upper Narraguagus River (Rkm 50.9-62.9). See Project SHARE stakeholder report.

Diversity

For each broodstock reared at Craig Brook National Fish Hatchery for the Downeast SHRU, a target of 200 parr to collect and rear was initiated with the 2017 collection year. The results below represent the mean number of alleles per locus (based on 18 microsatellite loci) for each broodstock population, measured within the most recent collection of parr (Figure 2.5).

Estimates of allelic diversity have remained constant (Dennys, Narraguagus, and Pleasant), or have slightly decreased (East Machias, Machias) but remain within the range of previous variation. More detailed summaries of genetic diversity are found in Section 2 of the 2021 USASAC report. Evaluation of origin (hatchery or naturally reared) based on genetic analysis of parentage indicated that all parr collected for broodstock from the East Machias were of hatchery origin, whereas the average composition between the 2005 and 2018 collection years was 75.5% hatchery origin). For the other parr broodstock collections, the hatchery composition was above average for that same time period, but still included some portion of naturally-reared origin individuals not assigned to hatchery broodstock. More detailed summaries of genetic diversity are found in Section 2 of the 2021 USASAC report.

Allelic diversity (Figure 2.5) of the five broodstocks in the Downeast SHRU remain relatively stable over the time period measured. Continued monitoring of estimates of genetic diversity is

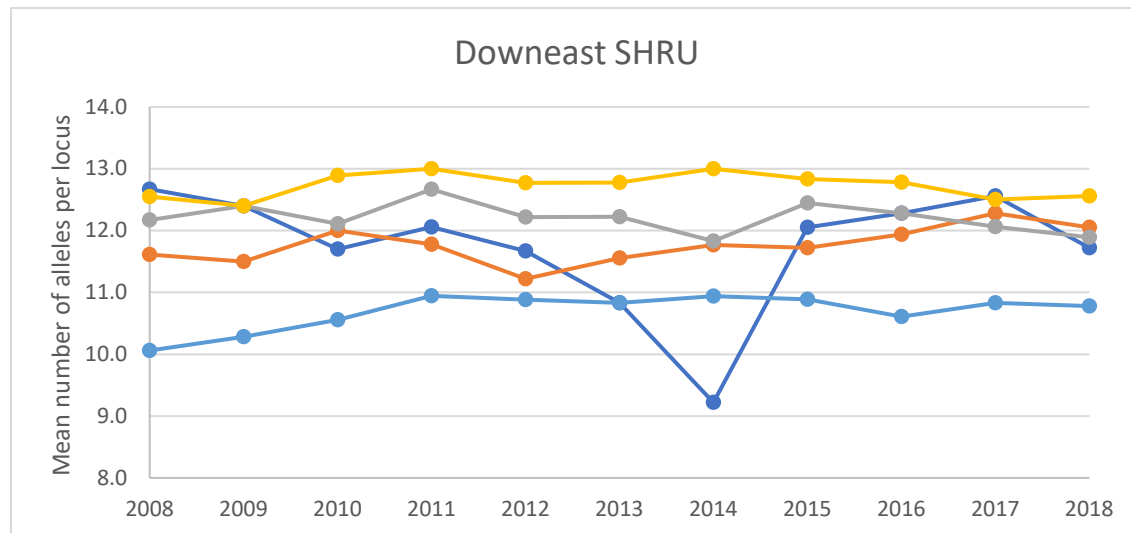


Figure 2.5 Graph of the mean number of alleles per locus for the five Downeast SHRU broodstocks, based on parr collected annually for broodstock collection surveys from 2008 to 2018. Results represent the mean number of alleles per locus (based on 18 microsatellite loci) for the parr broodstock collected annually.

very important as the Downeast SHRU contains five of seven total river-specific stocks remaining in the entire United States.

Table 2.5 Proportion by sea age for returning adults to the Narraguagus and Union Rivers in 2020. Also shown are proportion of age at smolt for each returning cohort.

River	%1SW	%2SW	%3SW	%Repeat spawners	%Age 1 smolt	%Age 2 smolt	%Age 3+ smolt
Narraguagus	12	84	3	1	82	18	
Union	0	100	0	0		100	

Emerging issues and priorities

- The coordinating committee has drafted a five-year work plan, including a five-year stock enhancement plan, as requested by the Implementation Team. Engagement with stakeholders on the plans and the work therein remain the top priority for the coordinating committee.
- Considerable progress toward evaluating the efficacy of enhancing habitat complexity in the Narraguagus River is expected in 2021. This remains an urgent need given the reality that freshwater production of smolts in the Downeast SHRU (as indexed in the Narraguagus River) remain near historical lows.
- Though there were setbacks in 2020, restoration of fish passage is now underway at the Meddybemps powerhouse on the Dennys River. With assistance from the Department of Marine Resources, the Downeast Salmon Federation (DSF), the U.S. Fish and Wildlife Service, and the Smith family, the site will be accessible to sea-run species, most notably sea-run alewives.
- Feasibility of improving fish passage at the Stillwater Dam in Cherryfield, on the Narraguagus River, continued in 2020 with more work on the horizon in 2021. Recently an ice control study was conducted by the Cold Regions Research and Engineering Laboratory (part of the U.S. Army Corps of Engineers) with funding from the DSF and the National Oceanic and Atmospheric Administration (NOAA). This work is critical because the Stillwater Dam is the only remaining mainstem dam on the Narraguagus River and the only mainstem dam on any river containing river-specific salmon in the Downeast SHRU.
- The DSF is moving forward with plans to raise Narraguagus-origin salmon 0+ parr at the Peter Gray Hatchery with funding available from the U.S. Fish and Wildlife Service. The coordinating committee notes that recent evaluations indicate the smolt to adult survival rates in the East Machias River, as a result of on-going fall parr releases from the Peter Gray Hatchery, were considerably higher than the Narraguagus suggesting that increased returns may be on the horizon following implementation of these plans.
- Gravid adult stocking is planned by DMR in the Machias River (2022 and 2023).

- The future of the Ellsworth Dam in the Union River remains uncertain as the Department of Environmental Protection recently denied the water quality certification for the facility. Such certification is required in order for the Federal Energy Regulatory Commission to issue a new license.
- The Maine Department of Transportation has recently paused design work on the in-kind replacement of the Machias Dyke Bridge. This affords opportunities to re-evaluate the project purpose and need as well as to reconsider a larger range of alternatives (including alternatives with improved fish passage and habitat conditions) through the National Environmental Policy Act (NEPA) process.

Section 5 – Stakeholder input

The following section is input solicited from some of the primary partners involved in Atlantic salmon recovery efforts in the Downeast SHRU. The input is provided directly from each organization.

Maine Coast Heritage Trust: Jacob VanDeSande

Maine Coast Heritage Trust (MCHT) is a statewide land trust that works on land protection in coastal Maine. Our work on salmon habitat restoration focuses on the Narraguagus River and Orange Rivers, though we partner on projects throughout the Downeast SHRU. All of our work is undertaken in collaboration with partners including the Downeast Salmon Federation (DSF), U.S. Fish and Wildlife Service, Project SHARE, Maine Department of Inland Fisheries (MDIFW) and Wildlife, Maine Department of Marine Resources, The Nature Conservancy, NOAA, and others. A primary focus of our rivers work is on riparian land protection to maintain natural buffers on rivers and streams, and to protect cold-water inputs. In the Narraguagus, we partnered with DSF to complete 4 projects that protect over 900 acres of riparian habitat in the lower watershed, including two cold-water tributaries, since 2019. We are also dedicating staff time and funding to work with partners and the Army Corps of Engineers to assess options for improved fish passage at the Cherryfield Ice Control Dam. An assessment of dam's ice control function by the Cold Regions Research and Engineering Lab is nearing completion. That study will provide the necessary groundwork to begin a multi-stakeholder discussion of fish passage options. MCHT also continues to support Project SHARE large wood addition work in the upper watershed; and working with partners to plan and implement large wood additions along the lower main stem.

In the Orange River watershed, MCHT continues to work with DSF, the Town of Whiting, MDIFW and other partners to assess fish passage options at three dams that are current barriers to fish passage. Restoring fish passage would re-connect hundreds of acres of alewife habitat, significantly enhancing the availability of forage fish and prey buffers in Whiting and Cobscook Bay. At the same time, MCHT has also completed several projects in the watershed that protect riparian buffers, enhance recreational access, including purchase of a property on Orange Lake that restores access to a traditional portage route, and completion of new recreational amenities

on our Rocky Lake Preserve, increasing public awareness of the Orange River and its important aquatic resources.

Downeast Salmon Federation: Dwayne Shaw

The following are actions that the Downeast Salmon Federation (DSF) have been involved or recommend to the SHRU committee for inclusion in their list of actions:

- New state and federal permit allowances for expansion of liming and water chemistry treatments should have a working group assembled to explore this;
- Cooperative agency funding of expansion of Pleasant River Hatchery to produce 0+ parr;
- Large Wood project planning for private lands in Lower Narraguagus;
- Opportunities for acquisition of riparian buffers - particularly on the Dennys and Machias in cooperation with the state to expand their corridors;
- Stocking plan for Union River;
- Utilization of the University of Maine's Center for Cooperative Aquaculture Research (CCAR) for broodstock;
- DSF participated in an NGO coalition focused on placing Atlantic salmon on Maine's Endangered Species List;
- DSF suggested establishment of a bass control working group to implement experimental efforts on the Narraguagus in 2021;
- DSF suggested establishment of a working group to explore best practices for river herring commercial fishing methods in rivers containing endangered Atlantic salmon with initial focus on Cherryfield as a starting point;
- DSF suggested that MDMR begins to work with NGOs to encourage removal of Leonard Lake Dam on the Union River based upon justifications used to call for dam removals on the Kennebec River;
- DSF suggested that MDMR and MDIFW create and sign a memorandum of understanding for management of fish passage at state-owned dams within designated Critical Habitat. The process could begin at two impassable state dams on the Orange River and should be coordinated with NGO's to create model and fund implementation.

Project SHARE: Chris Federico

Project SHARE is a nonprofit organization that focuses on Atlantic salmon habitat restoration in the Downeast SHRU. SHARE works directly with state and federal biologists to complete projects in the highest priority sub-watersheds. SHARE's current focus is on the upper Narraguagus River. We have assembled a team of scientists to help prioritize, plan, and implement our habitat enhancement projects. Partners include DMR, NOAA, USFWS, NRCS, Maine Coast Heritage Trust, University of Maine, Connecticut College, and the landowners. The main project objective is to increase the smolt population leaving the watershed. To achieve this, we need to reconnect all of the existing habitat and increase the suitability of the habitat. Since the formation of the Upper Narraguagus Watershed Restoration Project in 2014 SHARE has reconnected 625.3 units of habitat (1 unit = 100 m²) and added ~900 pieces of large wood into ~400 habitat units. To date 99.9% of the habitat in the upper Narraguagus is connected to Beddington Lake, the downstream-most point in the sub-watershed.

In our view there are 3 major issues with the U.S. Atlantic salmon program, an overall lack of funding, a lack of communication between funders and resource managers, and a lack of fish. Funding habitat suitability/complexity projects has been extremely difficult often taking multiple rounds of grant writing to fund projects that state and federal salmon biologists tell us should be top priority projects. While we agree that allowing salmon to return to previously inaccessible habitat is important, we, and many of the biologists responsible for managing the species, believe that they are returning to severely degraded habitat. Salmon recovery in the Downeast SHRU needs a much greater emphasis on enhancing the habitat that is already accessible. As an example of the lack of fish, DMR fully stocks the habitat in the upper Narraguagus in support of our project; but to do that the rest of the watershed is either not supplemented or supplemented at an extremely reduced rate.

Work plan for the next calendar year

The coordinating committee looks forward to finalizing the five-year work plan and the five-year stocking plan in close coordination with partners. Projects that's are ongoing and /or scheduled for completion in 2021 include:

Meddybemps Powerhouse: Thanks to persistent efforts by the DSF, permission has been received from the adjacent landowner and de-construction and stream improvement work should proceed during the summer of 2021 pending permitting and funding. This project is located in the headwaters of the Dennys River and will provide access to Meddybemps Lake primarily for river herring.

Curry Brook: Curry Brook is a cold water tributary to the Dennys River. The culvert at the road crossing has been an ongoing issue with beaver activity and a failing structure. Project SHARE, MDMR and FWS will replace the culvert this summer.

Cherryfield Dam: Work will continue improving fish passage at the Cherryfield Dam that partially obstructs the Narraguagus River. Work includes a study into the feasibility of alternate structures that will satisfy the U.S. Army Corps of Engineers (USAOCE) need to manage ice damage at the same time improving upstream and downstream passage for all diadromous species.

Habitat complexity Project at Route 9: Located just downstream of the Route 9 crossing of the Narraguagus River above Beddington Lake. Project SHARE will be conducting an intensive stream rehabilitation project involving mechanized equipment. This work aims to add sinuosity and structure to a 200meter reach.

0+ parr stocking in the Narraguagus River: The Down East SHRU committee has recommended that 0+ parr raised at the Peter Gray Parr Hatchery be raised for the Narraguagus River. The DSF has acquired permits and funding that will allow them to raise parr for multiple drainages. As a result, 0+ parr will be stocked into the Narraguagus in the fall of 2021. The Narraguagus offers several assessment tools to thoroughly evaluate this strategy to further understand its use in salmon restoration.

List of Reports and Publications resulting from Projects within SHRU

Annual Report of the US Atlantic Salmon Assessment Committee Report No. 33 – 2020 Activities. Held virtually because of the COVID-19 Pandemic.

Final Report on Bog Brook Flowage Fishway. Site: D1428. USFWS MeFWCO. 14 p. Feb. 17, 2021.

Final Report on Sabao Dam Fishway Assessment. Site: D1483. USFWS MeFWCO. 11 p. Jan. 28, 2021.

Northern Stream Rock Dam Report for Agreement F20AP00206. USFWS MeFWCO. 4 p. Oct. 28, 2020.

Thermal Profile below Orange River Dam. Site: D1527. USFWS MeFWCO. 4 p. Aug. 21, 2020.

East Machias Thermal Profiles- Update at Munson Rips. USFWS MeFWCO. 9 p. Aug. 24, 2020.

Appendix 2-1: Annual estimate of Juvenile Atlantic salmon productivity in the Narraguagus River

Downeast SHRU coordination team assembled a simple dataset to estimate summer juvenile Atlantic salmon productivity in the Narraguagus River based on USGS gage [01022500](#) and water temperature data collected at river kilometer 48.2 (above Route 9). Overall, 2020 summer rearing conditions (based on low discharge and high water temperature metrics) were like conditions that occurred in 2016 and 2018 (Figure A). Juvenile production and fitness were likely adversely effected in 2020.

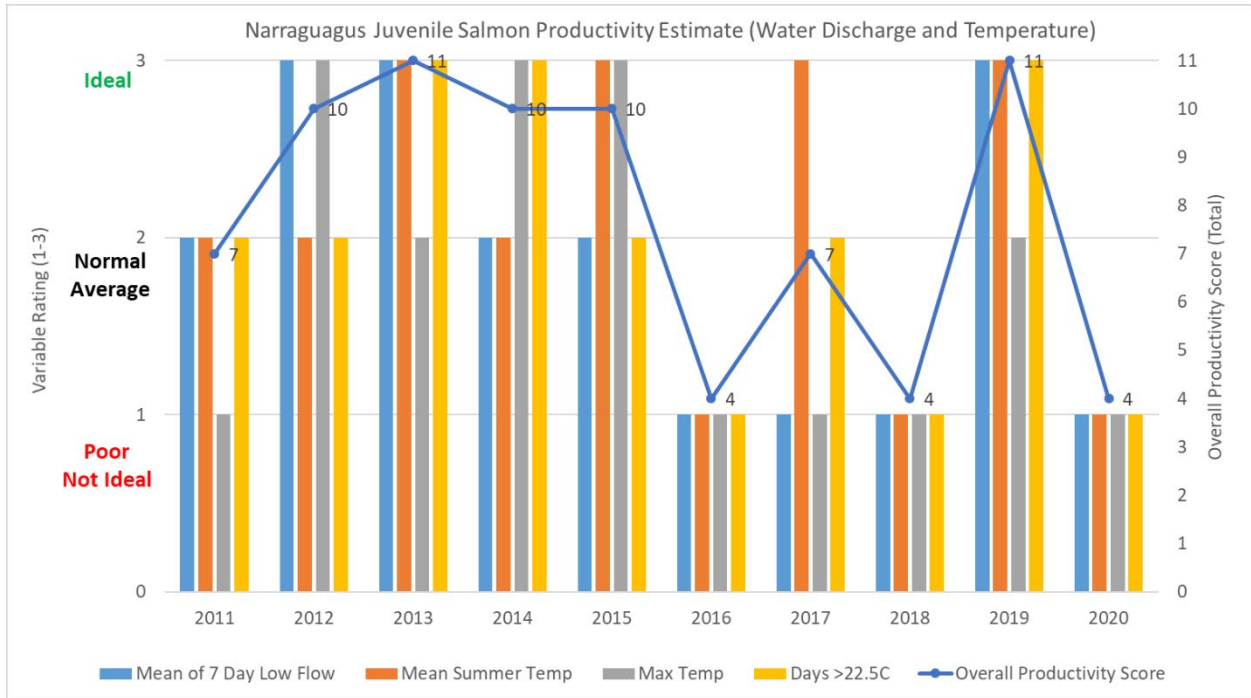


Figure A. Narraguagus River Atlantic salmon juvenile productivity estimate (2011-2020)

3. Annual Report for the Penobscot Salmon Habitat Recovery Unit

Report prepared by the Penobscot SHRU Coordinating Committee

The goal of the annual report is to summarize progress toward achieving recovery goals for each Salmon habitat Recovery Unit (SHRU). The 2021 Annual Report for the Penobscot SHRU includes activities that were conducted the previous year (2020). During 2020, the Penobscot SHRU developed a Work Plan to identify activities for the next five years. The Work Plan represented a collaborative development effort between various participants to Atlantic salmon conservation throughout the Penobscot SHRU. This annual report will in highlight some of the progress that has been made towards the priorities identified in the work plan.

The most significant event in 2020 were the impacts to operations from COVID-19. To maintain staff and public safety, many aspects of typical management activities were altered to follow public health guidelines for social distancing and travel to minimize the spread of the virus. Within the Penobscot SHRU, these actions included alterations to broodstock collection, stocking, and spawning, as well as impacts to habitat restoration activities.

Summary of adult returns and redd counts for the previous year (abundance and population trends)

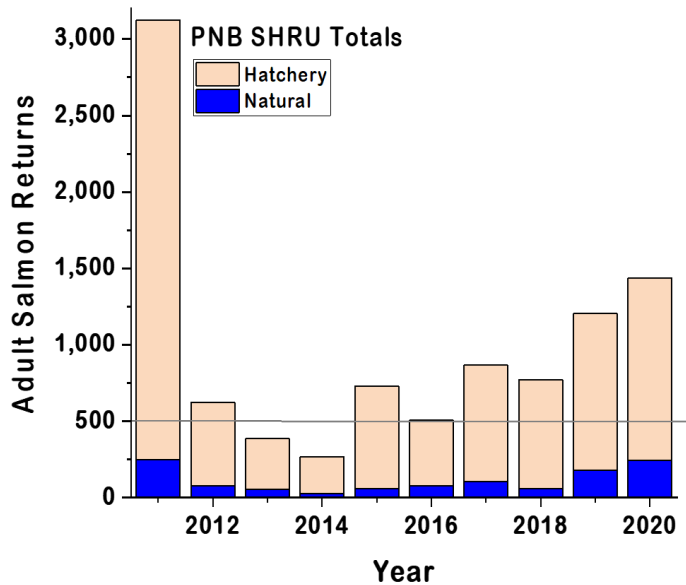


Figure 3.1. Graph of adult returns for the last 10 years (from 2010 to 2020).

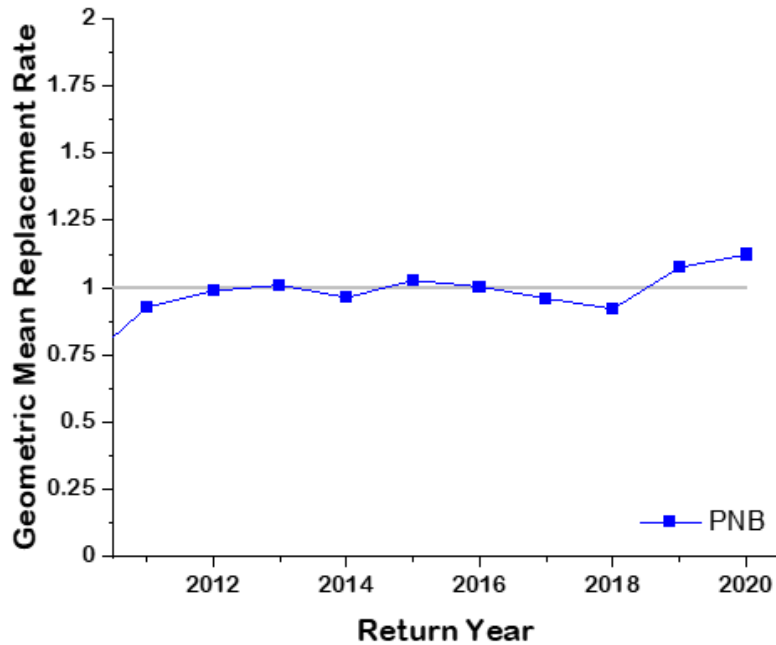


Figure 3.2. The replacement rate for the Penobscot SHRU for the past 10 years. The replacement rate reflects only naturally reared Atlantic salmon, and the average replacement rate for naturally reared fish in the Penobscot SHRU from 2010 to 2020 is 1.12.

Table 3.1 The number of returns to the Penobscot SHRU and their origin (hatchery or naturally reared) between 2010 and 2020.

Return Year	Number hatchery reared	Number of naturally reared
2010	1239	88
2011	2878	247
2012	547	77
2013	334	54
2014	239	29
2015	670	61
2016	429	78
2017	761	105
2018	711	61
2019	1028	177
2020	1196	243

Table 3.2 Summary of adult returns for the Penobscot SHRU. (Table 2.2.1 from USASAC 2020)

River	Adult returns	# Naturally reared	# Smolt stocked
Cove Brook	0		
Ducktrap	0		
Penobscot (Above	1,439	243	1,196
Kenduskeag	0		
Souadabscook	0		

The number of returns in 2020 continued an increasing trend since 2014, including a slight increase in the proportion of naturally reared contribution to the total return. Returns in 2020 totaled 1,439. The geometric mean replacement rate for the Penobscot SHRU was slightly over 1 (mean replacement rate was 1.12). The proportional contribution of hatchery fish to the returning adults in the Penobscot SHRU is high (83.1%). The current total number of returns for 2020 is less than the total of at least 1,500 originating from wild or hatchery origin, and the number of naturally reared in 2020 is less than the required minimum annual escapement of 500 naturally reared adults in at least 2 of the 3 SHRUs (USFWS and NMFS 2018). As part of the reclassification criteria, additional parameters specific to habitat accessibility are also required (See [Spatial Distribution](#)).

Adult returns in 2020 continued to increase from previous years, to a total of 1439. Due to Covid-19, safety protocols such as social distancing and other activities impacted the number of adults that could be handled for biological samples and for transport to Craig Brook National Fish Hatchery (CBNFH) for broodstock purposes. Therefore, most of the fish were passed upstream, following limited or no handling. Broodstock collection began on June 15, 2021. Any adult returning before then was released upstream.

Returns were only documented to the Penobscot River, whereas in 2019 adults were observed in both Kenduskeag and Souadabscook rivers.

Spatial Distribution

As described in the Final Recovery Plan (2018), the life history of the Atlantic salmon requires a high degree of access between freshwater, estuarine, and marine environments, and sufficiently suitable natural habitats must be available to support wild populations. Habitat access is categorized as: (1) Habitat with No Access, (2) Habitat with Impeded Access, (3) Habitat that is Accessible, and (4) Habitat that is Fully Accessible.

To ensure the long-term sustainability of wild populations, there must be sufficient access to suitable habitat to support spawning and juvenile rearing. Ultimately, returning adults will dictate the actual amount of habitat needed. But the minimum amount of suitable habitat that must be accessible to returning adults for achieve delisting criteria is 30,000 Habitat Units per SHRU. In 2020, the total estimated habitat units that are suitable and accessible in the Penobscot SHRU is 19,219 units, a slight increase from 2019.

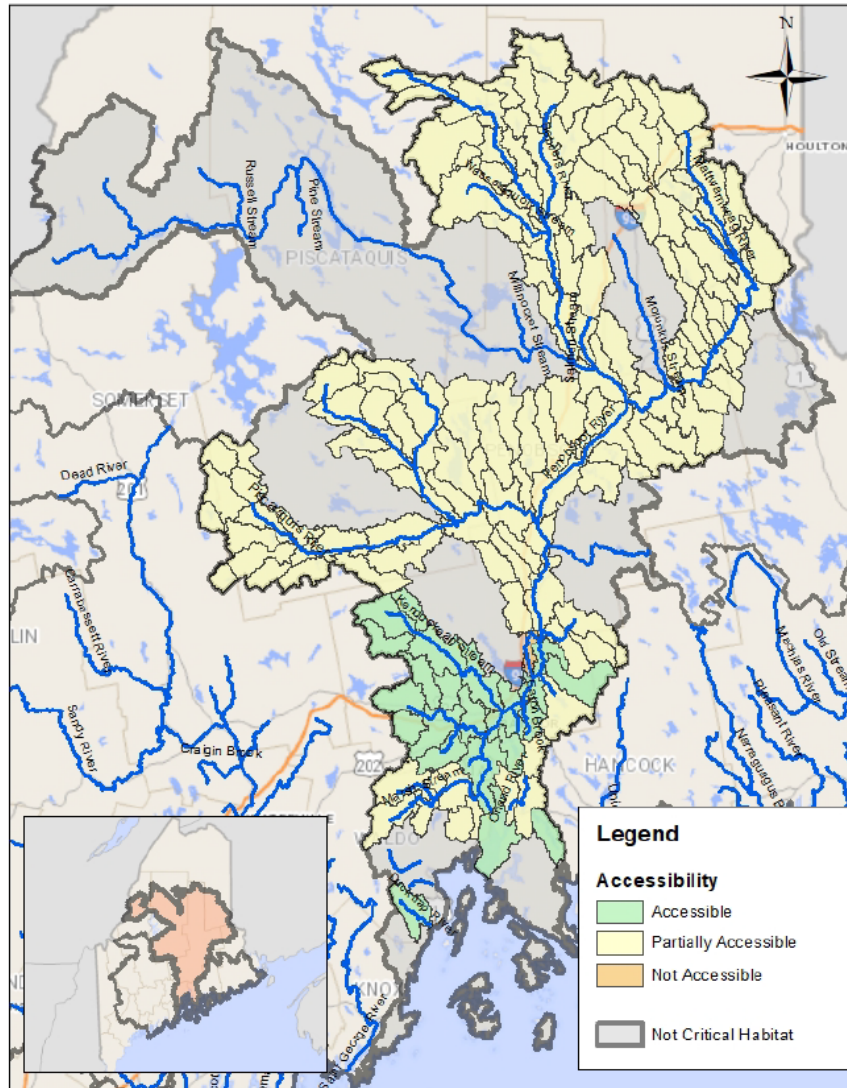


Figure 3.3 Map of currently accessible habitat. *Accessible* watersheds have no mainstem dams, or else have dams that have fishways that have been evaluated and determined to be highly effective. The habitat in these watersheds meet our recovery criteria for accessibility. *Partially accessible* watersheds are above dams that have fishways that have yet to be evaluated. *Not accessible* watersheds are above dams that do not have swim through fishways. Watersheds above impassable dams where adult salmon are trucked are not considered accessible in terms of recovery. This map does not consider the effect of road stream crossings.

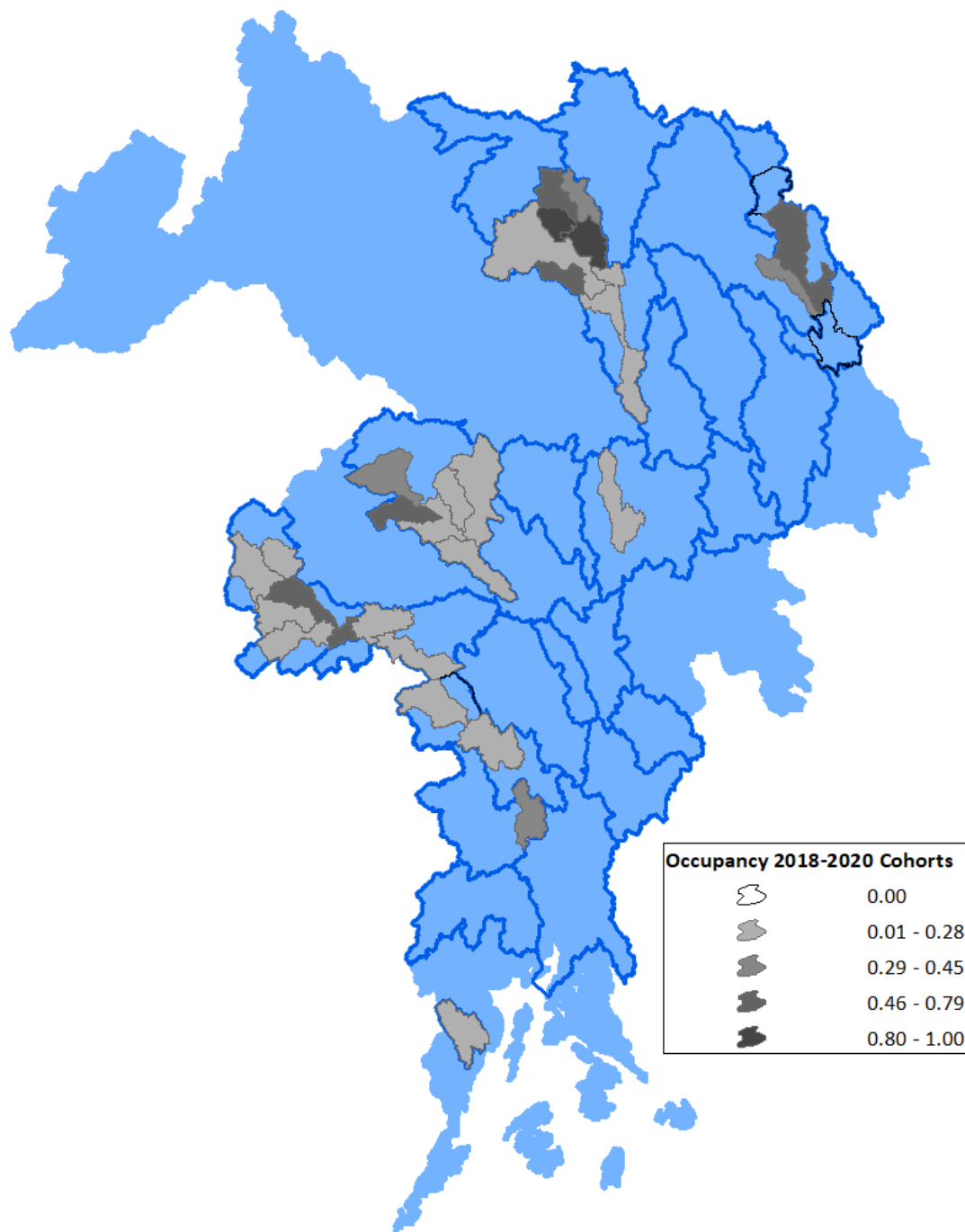


Figure 3.4 Map for mean occupancy across the 2018 to 2020 cohorts as of December 2020. This does not include the 2021 cohort from last fall's wild spawning. Taking the mean across these three cohorts ties to potential sources of smolts for 2021. Also, the proportion is the total amount of habitat that has at least one salmon, divided by the total available rearing habitat based on the Wright et al. (2008) Salmon habitat model.

Table 3.3 Summary of salmon stocked by river in 2020 in the Penobscot SHRU.

River	Life stage	Number
Penobscot	Smolts	648,000
Penobscot	Fry	614,000
Penobscot	Parr	70,000
Penobscot	Eggs	498,000
Penobscot	Adults (pre-spawn)	2*
Penobscot	Adults (Post-spawn)	953

* Non-pathogenic ISA v sea-run adults.

Table 3.4 Summary of fish passage projects completed in the previous year. Project types include aquatic organism passage (AOP Crossing), decommissioned dams, culvert replacements, and culvert extensions. The total stream miles made accessible according to Recovery Plan criteria in 2020 was 55.4 miles, and an estimated of 618.8 additional habitat units are opened and now considered accessible according to the definitions in the final recovery plan. If blank, values for river/stream miles opened or the number of salmon habitat units opened was not provided.

Project Type: Culvert, bridge, dam, fishway	Sub-basin (HUC-8, e.g. Sandy)	Stream	Town	Barrier class before: (e.g. barrier)	Barrier class after: (accessible)	River/ Stream miles opened	Salmon habitat Units opened
replace culvert with bridge	Passadumkeag	Sucker Brook	Hampden	barrier	accessible	0.75	7.8
replace culvert with box bridge	Lower Penobscot	tributary of Crooked Brook	Charleston	barrier	accessible	0.23	3.5
replace culvert with bridge	Lower Penobscot	tributary of Crooked Brook	Charleston	potential barrier	accessible	6.45	33.1
replace culvert with box bridge	Lower Penobscot	tributary of Crooked Brook	Charleston	barrier	accessible	1.8	
replace culvert with open bottom box bridge	Lower Penobscot	tributary of Crooked Brook	Charleston	barrier	accessible	1.28	13.5
replace culvert with open bottom concrete box bridge	Lower Penobscot	tributary of Crooked Brook	Charleston	barrier	accessible	2.64	32.2

replace culvert	Lower Penobscot	Allen Stream	Exeter Corners	potential barrier	accessible	5.5	
replace culvert	Lower Penobscot	Allen Stream	Exeter Corners	potential barrier	accessible	12.5	
replace culvert with bridge	Piscataquis	Roaring Brook	Williamsburg Twp.	barrier	accessible	13.7	430
replace culvert with bridge	Piscataquis	Stinking Brook	Williamsburg Twp.	barrier	accessible	2.8	26.7
replace culvert with concrete box bridge	East Branch Penobscot	tributary of Kimball Brook	T5R7 WELS	barrier	accessible	0.27	1
remove culvert and replace with bridge	Piscataquis	Spruce Mountain Brook	Katahdin Iron Works Twp.	barrier	accessible	2.59	
remove culvert and replace with bridge	Piscataquis	tributary to White Brook	Katahdin Iron Works Twp.	barrier	accessible	1.42	
Culvert Replacement	Lower Penobscot	Emerson Runaround	Howland	barrier	accessible	0.23	
Culvert Replacement	Lower Penobscot	unnamed	Stockton Springs	barrier	accessible	0.14	1
replace culvert with bridge	Kingsbury	tributary of Kingsbury Stream	Kingsbury Plantation	barrier	accessible	0.42	
replace culvert with bridge	Kingsbury	tributary of Kingsbury Stream	Kingsbury Plantation	barrier	accessible	0.72	
replace culvert with bridge	Lower Penobscot	Mountain Brook		barrier	accessible		
replace culvert with bridge	Piscataquis	tributary of Marble Brook	Blanchard Twp.	barrier	accessible	1.5	
replace culvert with bridge	Piscataquis	tributary of Thorn Brook	Blanchard Twp.	barrier	accessible	0.5	

The U. S. Atlantic Salmon Assessment Committee (USASAC) estimated December 2020 mean proportion occupancy for each of the 3 SHRUs at a HUC-12 resolution (USASAC 2021, Figure 2.4.1.2). While the 3 SHRU vary in size and number of HUC-12 units, the amount of occupied juvenile rearing area is typically around 8,800 to 13,600 units of habitat in each SHRU. The Penobscot SHRU with 148 HUC-12 areas had cohort occupancy of between 10,300 and 18,400 units for the 3 cohorts in 22 areas (15%) where these 3 cohorts had a proportion occupancy above 0.01 (USASAC 2021, Figure 2.4.1.2). Dispersal was relatively broad but mean proportion occupancy was lower (USASAC 2021, Table 2.4.1.2). In addition, changing management focus is notable with 14 HUC12 areas being occupied for all 3 cohorts and 8 being occupied in only 1 of the 3 years.

Although stocking occurred in 2020, some salmon stocking procedures deviated from previous years to accommodate safety protocols such as social distancing were implemented in response to Covid-19. Specifically, Green Lake NFH stocked out the smolt production starting on March 23rd, about 3 weeks earlier than normal. Smolt stocking of 64,000 smolts in the Piscataquis River did not occur as planned due to Covid-19 operational changes. Instead, those smolt were stocked below the Milford Dam with the rest of the Penobscot smolt production.

Fry stocking from Craig Brook NFH was streamlined and only point stocking was used for fry distribution.

Fish passage improvement activities occurred in 2020 despite limitations to operations. Over 20 fish passage improvements were able to be completed within the Penobscot SHRU, and the list likely does not fully reflect all activities completed. In total, 55.4 miles of stream were made accessible from the 20 improvement activities listed, resulting in an estimated 618.8 salmon habitat units made accessible.

Diversity

Diversity within the SHRUs are evaluated based on estimates of genetic diversity and life history variation based on age at return and age at smolting.

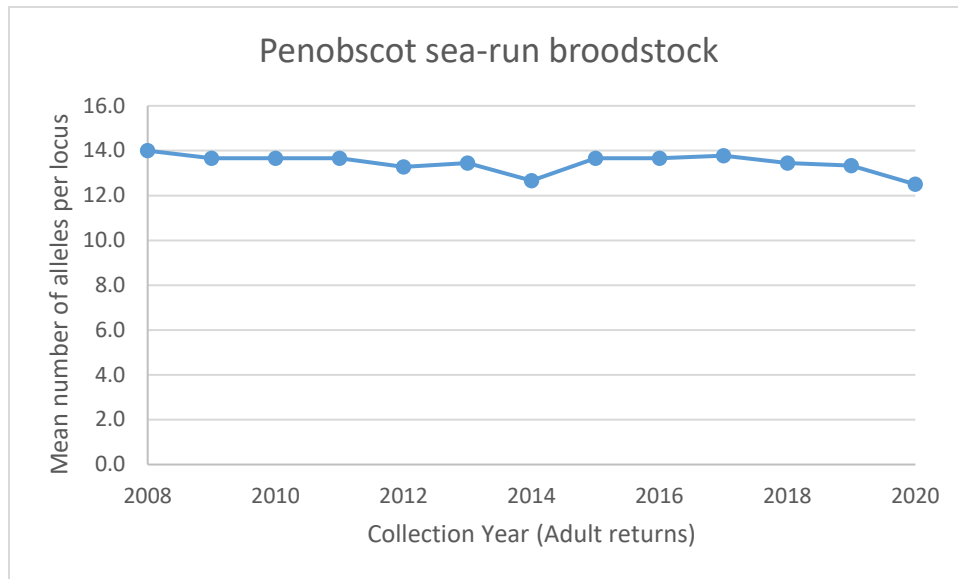


Figure 3.5 Graph of the mean number of alleles per locus for the Penobscot River broodstock, based on the adults sampled at Milford Dam for transport to Craig Brook National Fish Hatchery from 2008 to 2020. Results represent the mean number of alleles per locus (based on 18 microsatellite loci) for the sea-run broodstock collected annually.

Table 3.5 Life history attributes from adult returns from 2020 for rivers with available information. Age 1 smolts are primarily hatchery origin since hatchery produced smolts are stocked at age 1. Age 2 and age 3 smolts are considered naturally reared origin.

River	%1SW	%2SW	%3SW	%Repeat spawners	% Age 1 smolt	% Age 2 smolt	% Age 3+ smolt
Penobscot	13.6%	84.7%	1.3%	0.4%	83.1	15.2	1.7

Of the six river-specific broodstocks maintained for the Gulf of Maine Distinct Population Segment of Atlantic salmon, the Penobscot River broodstock represents the largest number of individuals spawned and estimates of genetic diversity are higher than any of the other five broodstocks. In 2020, estimates of allelic diversity in the sea-run broodstock decreased in comparison to previous years (Figure 3.5), likely due to a decrease in the number of broodstock

collected due to limitations in operations resulting from COVID-19 (n=221 compared to an average of 533.0 broodstock collected since 2002). Other metrics of genetic diversity such as estimates of effective population size also decreased from previous years ($N_e=417.9$) but was near average observed between 2008 and 2020 (average $N_e=417.3$).

The 1 sea-winter (SW) component of the 2020 returns was 13.6%. This was a decrease from 2019 (24.7%) and the lowest percentage of the previous five years. Conversely, the 2SW (54.7%) and the 3SW (1.3%) components were the highest percentages documented in the previous five years. Many factors can contribute to the relative differences in returns based on sea age. The increased survival of 2 SW adults is good news. Coupled with the increased escapement to the river and there is the potential for bump in wild production. The proportions of adult returns based on smolt-age is driven by the relative number of hatchery verse naturally reared returns. This is because the hatchery returns are the result of the 1-year smolt program. Therefore, with the increased proportion of naturally reared fish (see Figure 3.1) observed in 2020 there was also a similar increase in the proportion of age 2 smolts (15.2%) and age 3 smolts (1.7%) from 2019 (13.1% and 0.9%, respectively).

Emerging issues and priorities

The Management Board of the Collaborative Atlantic Salmon Management Strategy requested each SHRU provide “must-do” projects that were of priority for the upcoming year. In developing the Penobscot SHRU work plan, six Keystone Issues identified that included multiple actions within the work plan that were identified as priority for the Penobscot SHRU team. Most of the same Keystone Issues were identified as part of this “must-do” list, however all actions within the work plan are still considered necessary to contribute to recovery of Atlantic salmon.

1. Conduct a feasibility assessment to implement a basin-wide marking program
2. Evaluate opportunities to increase escapement and natural reproduction in the Piscataquis River
3. Support the Salmon for Maine’s Rivers project in the East Branch Penobscot River
4. Encourage planning associated with the potential for the West Branch Penobscot to contribute to recovery
5. Complete a stocking plan for the Penobscot SHRU.

Stakeholder input- Appalachian Mountain Club, Steve Tatko

Appalachian Mountain Club’s (AMC) 75,000-acre ownership and impending acquisition of 27,000 additional acres covers the headwaters of the West Branch and Middle Branch of the Pleasant River. The additional 27,000 acres represents 2,460 salmon habitat units, representing 8.2% of the 30,000 habitat units to be preserved in the Atlantic salmon 2018 Recovery Plan (USFWS and NMFS 2018), which is currently accessible. Both sub-watersheds of the Piscataquis drainage originate in the 100-mile wilderness region, a large matrix of undeveloped and now conserved forest spanning 300,000 acres. This region is a stronghold for native brook

trout with many waterbodies having never been stocked. AMC's conservation acquisition efforts have now protected 78% of the West Branch of the Pleasant watershed's acreage and 90% of the Middle Branch. Since 2016 with the completion of the Howland bypass these two watersheds are now accessible to sea-run Atlantic Salmon with adults having been found in both. AMC's main objective is to restore ecosystem connectivity across the region through restoration forest management and terrestrial and aquatic habitat conservation.

In 2019 Trout Unlimited (TU) in partnership with AMC received an NRCS Regional Conservation Partnership Program grant to develop and implement an NRCS based funding scheme for large wood additions in Maine, New Hampshire, and Vermont with AMC's Middle Branch ownership serving as one of the pilot watersheds. The Middle branch had seen a huge amount of disturbance from river driving activities of the 1950s and 60s when large sections were bulldozed clean and channels straightened. As 90% of the middle branch watershed is now conserved through AMC's acquisition efforts, it is possible to prioritize suitable stream reaches within the system and develop and implement large woody installations to improve habitat complexity and suitability for Salmon spawning. The first large wood installation covering ½ mile in the watershed was completed in 2020 by a TU crew on Ashworth brook, a tributary of the Middle Branch and accessible to Atlantic Salmon. Using the RCPP resources the program is targeted to expand to 1-2 miles of large woody additions per year throughout the watershed using both hand crew and mechanical means. The methods implemented in the watershed will be used to refine the cost share mechanisms NRCS uses to implement practices in the three states that are part of the RCPP. Commitments are in place for two more miles of large woody additions in 2021 for the Middle Branch watershed.

Given the significance of the watersheds found on AMC's ownership, aquatic organism passage (AOP) work has been a management priority for the club since 2011. Prior to the start of this work hundreds of connectivity issues existed out on the over 300 miles of logging roads found on the property. To date AMC has completed 64 fish passage projects in conjunction with NRCS and other partners reopening 66 miles of spawning habitat for brook trout and Atlantic Salmon. AMC has a goal of removing all barriers to fish passage on its current ownership by 2030 with a total of 110 stream miles reopened. This work will be complimented by the large wood addition projects as both are critical to ensure long-term ecosystem functionality within these watersheds.

The ME DMR have been conducting egg planting operations in the West Branch and Middle branch since the Howland bypass was constructed in 2016. In the winter (February) of 2020 170,00 eye-up salmon eggs were planted in various locations along the Middle branch by ME DMR through access provided by AMC. AMC is committed to aiding in these egg planting operations within the watersheds it controls and will work to keep large wood projects and AOP installations in balance with continued egg planting operations. AMC hopes that this fully integrated approach linking habitat function, fish passage, and egg planting within one watershed through the work of many partners will serve as a landscape laboratory for future Atlantic Salmon recovery efforts in the upper reaches of the Penobscot.

Work plan for the next calendar year

A number of projects to contribute to improving fish passage within the Penobscot SHRU have been identified and are planned for 2021 (Table 3.6) and are consistent with activities already described in the work plan to improve fish passage. These habitat improvement activities include participation from a variety of partners, and additional projects are likely depending on funding and operational capabilities due in response to COVID-19 status.

No new activities to the work plan for 2021 were identified beyond the priority projects and existing activities already described in the work plan.

Table 3.6 Table of proposed actions for next calendar year (including a worked example from the Penobscot SHRU).

Watershed	Threat	Activity	Recovery Action	Location
East Branch Penobscot	barrier	Replace culvert with concrete arch	Improve fish passage	Unnamed tributary to Twin Ponds
East Branch Penobscot	partial barrier	Replace culvert with concrete box bridge	Improve fish passage	East Branch Mud Brook
Penobscot	Partial barrier	Improve passage at a road crossing	Improve fish passage	American Thread Road (project 1)
Penobscot	Partial barrier	Improve passage at a road crossing	Improve fish passage	Messer Pond Road (project 1)
Penobscot	Partial barrier	Improve passage at a road crossing	Improve fish passage	Messer Pond Road (project 2)

Penobscot	Partial barrier	Improve passage at a road crossing	Improve fish passage	American Thread Road (project 2)
Penobscot	Partial barrier	Improve passage at a road crossing	Improve fish passage	Seboeis River Road
Penobscot	Partial barrier	Improve passage at a road crossing	Improve fish passage	Swift Brook Road
Penobscot	Partial barrier	Improve passage at a road crossing	Improve fish passage	Whiting Road

List of Reports and Publications resulting from Projects within SHRU

U.S. Atlantic Salmon Assessment Committee. 2021. Annual report of the U.S. Atlantic Salmon Assessment Committee [online]. US Atlantic Salmon Assessment Committee, Report no. 33 – 2020 Activates, Portland, Maine.

Literature Cited

U.S. Atlantic Salmon Assessment Committee. 2021. Annual report of the U.S. Atlantic Salmon Assessment Committee [online]. US Atlantic Salmon Assessment Committee, Report no. 33 – 2020 Activates, Portland, Maine.

U.S. Fish and Wildlife Service and National Marine Fisheries Service. 2018. Recovery Plan for the Gulf of Maine Distinct Population Segment of Atlantic Salmon (*Salmo salar*): Final Plan for the 2009 ESA Listing.

Wright, J., J. Sweka, A. Abbott, T. Trinko. 2008. GIS-based Atlantic salmon habitat model. https://www.researchgate.net/profile/Jed-Wright/publication/238053462_GIS-Based_Atlantic_Salmon_Habitat_Model/links/544a4e660cf2f6388084ffbb/GIS-Based-Atlantic-Salmon-Habitat-Model.pdf Appendix C

4. Annual Report for the Merrymeeting Bay Recovery Unit

Report prepared by the Merrymeeting Bay SHRU Coordinating Committee

Effective coordination of planning and implementation efforts throughout the Gulf of Maine Distinct Population Segment (DPS) is required for the successful restoration of Atlantic salmon. An effective governance structure is key to charting a comprehensive long-term recovery program that facilitates interagency and intergovernmental cooperation along with the strategic involvement of a full range of partners and interested parties. The Collaborative Management Strategy is the current Atlantic salmon governance structure. Implemented in the fall of 2019, it is the result of significant stakeholder and agency input and collaboration.

The Collaborative Management Strategy for the Gulf of Maine Atlantic Salmon Recovery Program, which is subject to change, includes Salmon Habitat Recovery Unit (SHRU) Teams for each major geographical area identified in the Recovery Plan for Atlantic Salmon in GOM. The SHRU Teams, in part, develop five-year work plans that include SHRU specific projects aimed at the goal of recovery of Atlantic salmon. This is a report of the 2020 activities of the Merrymeeting Bay (MMB) SHRU Team.

Section 1. Abundance and Adult Population Trends

In the past ten years within the MMB SHRU, the adult population has increased, yet also been highly variable. In particular, adult returns have increased in the Kennebec River. This is likely a result of an increase in supplementation to the Sandy River that began in 2010 as well as improvements to marine survival, and improvements in downstream passage. The other shift that has occurred in the Kennebec River is the decreased proportion of adult returns that are of hatchery origin. Hatchery origin adults captured in the Kennebec River are likely strays from other programs that have smolt releases as part of their supplementation programs. Since 2014, the proportion of hatchery origin adults has decreased to two or less annually. The change in proportions is partially a result of the increase in wild and naturally reared adults; however, other factors such as stocking practices in other watersheds likely play a role. The Androscoggin River has not seen a positive population trend in the past 10 years. Likely due to the lack of supplementation program, the Androscoggin sees few returning adults. Like the Kennebec River, the number of hatchery fish documented on the Androscoggin has declined in the past five years. The reasons for this decline are not entirely clear but could be the result of changes to the stocking practices in other rivers. The Androscoggin River's proximity to the Kennebec River, in Merrymeeting Bay would make it a likely destination for straying Kennebec River salmon. In turn, as the population in the Kennebec River increases, an increase in adult returns to the Androscoggin River is also expected. The Sheepscot River has not displayed any major changes in adult returns.

MMB SHRU Total Salmon Returns

Adult returns of Atlantic salmon from 2011 to 2020

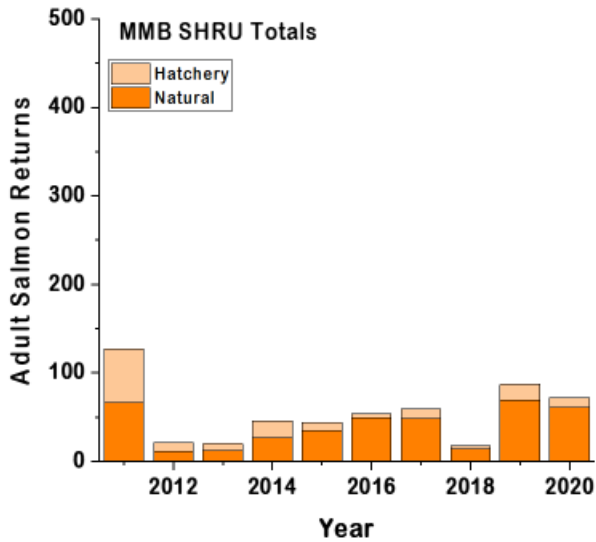


Figure 4.1 Adult returns of Atlantic salmon in the Merrymeeting Bay SHRU for the last 10 years.

GOM DPS – MMB SHRU 10-Year Series

Geometric Mean Replacement Rate

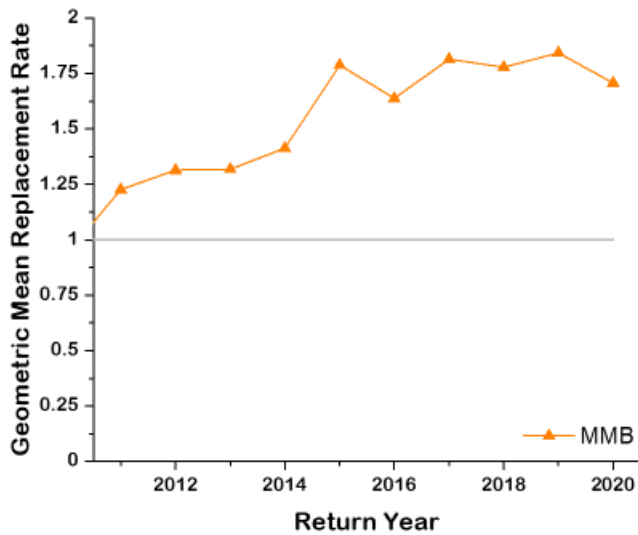


Figure 4.2 The geometric mean replacement rate for the Merrymeeting Bay SHRU.

Adult Returns in 2020

Androscoggin River

The Brunswick fishway trap was operated from 01 June to 06 November 2020 by a combination of MDMR and Brookfield Renewable Partners (BRP) staff. The Brunswick fishway is generally open on May 1 however due to social distancing guidelines as a result of covid-19 the trap was not open for the month of May. Five adult Atlantic salmon were passed at the Brunswick fishway trap. BRP staff reported one multi-sea-winter adult passing Pejepscot fishway – this adult is presumed to be previously counted at Brunswick fishway. No mark was observed but given that only 1 out of the 5 fish were marked, it is assumed that this fish had already been counted at Brunswick fishway.

Occasionally an adult Atlantic salmon will pass undetected through the fishway at Brunswick during maintenance/cleaning, so a minimal redd count effort was conducted. Three small sections of the Little River where redds have been documented in past years were surveyed for redd presence, totaling 1.07 river kilometers covered. Redd counts were also conducted on the Sabattus River, totaling 0.95 river kilometers covered. No redds or test pits were found in these sections of river.

Kennebec River

The Lockwood Dam fish lift was operated by BRP staff from 1 May to 31 October. Fifty-one adult Atlantic salmon were captured at the lift. In addition, due to the dam configuration adults are occasionally rescued from a set of ledges in the bypass canal. In July one additional salmon was captured in the canal as well as one that was accidentally captured by an angler, bringing the total captures at Lockwood Dam to 53. Biological data were collected from all returning Atlantic salmon in accordance with MDMR protocols, and the presence of marks and tags were recorded. Of the 53 returning Atlantic salmon, 49 (92.4%) were 2SW, 4 (7.5%) were grilse (1SW). All 53 were naturally reared in origin. Redd surveys were conducted in 57.13% of known spawning habitat primarily within the Sandy sub-drainage. Ninety-three redds were observed in the Sandy River and none in Bond Brook or Todus Stream for a total of 93 redds in the Kennebec Drainage.

Sebasticook River at Benton Falls fish lift facility was operated by MDMR staff from 01 May to 31 October 2020. No Atlantic salmon were captured.

Sheepscot River

There were 10 redds observed in the Sheepscot River; eight were observed in the mainstem and two were observed in the West Branch. The 10 redds were likely from sea-run adults. A total of 88.00% (59.06km) of known spawning habitat was surveyed in the Sheepscot River drainage. According to a redd-based estimate the Sheepscot River had a return of 14 adults. Using the estimate the MMB SHRU had 72 adult returns.

Table 4.1 Adult returns to rivers where traps are used in the Merrymeeting Bay SHRU in 2020. Most adult salmon are caught at the Lockwood fishlift on the lower Kennebec River, Benton Falls fishlift on the Sebasticook River and Brunswick fishlift on the lower Androscoggin River.

River	Open Date	Median Catch	Close Date	Hatchery					Naturally Reared/Wild					Total Sea-run Returns
				1 SW	2 SW	3 SW	RPT	Total	1 SW	2 SW	3 SW	RPT	Total	
Lower Kennebec River	1-May	15-Jun	31-Oct	0	0	0	0	0	4	49	0	0	53	53
Sebasticook River	1-May	n/a	31-Oct	0	0	0	0	0	0	0	0	0	0	0
Lower Androscoggin River	1-Jun	2-Jul	6-Nov	0	3	0	0	3	0	2	0	0	2	5

Distribution within the Merrymeeting Bay SHRU

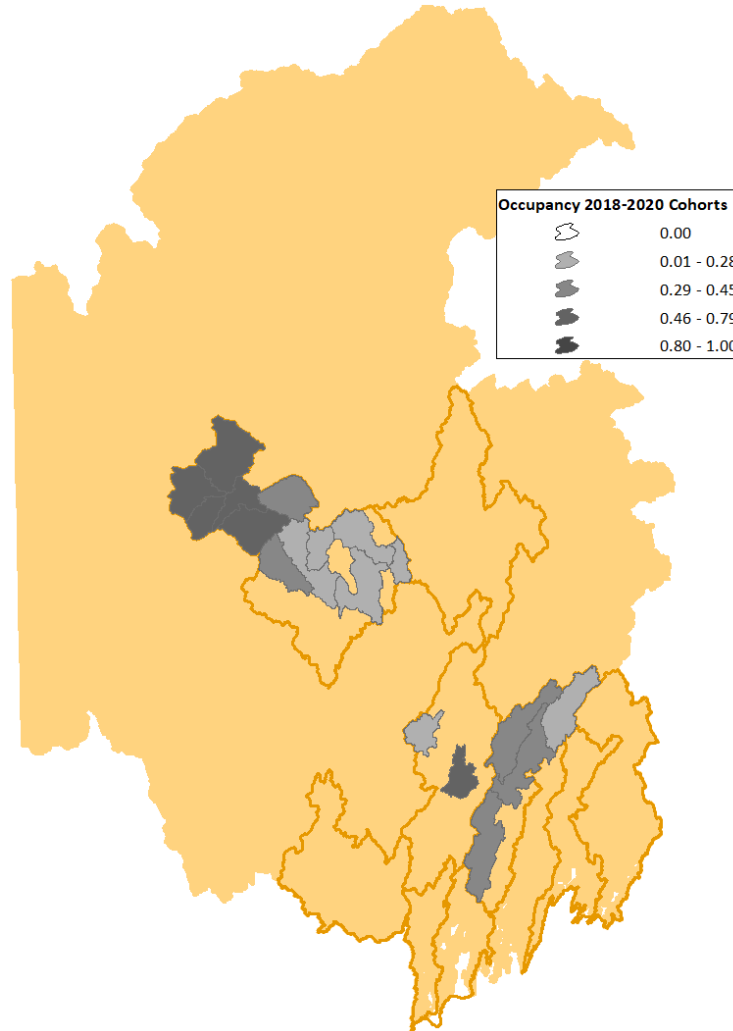


Figure 4.3 Map of designated Critical Habitat highlighting the relative proportion of river habitat occupied for the MMB SHRU (see figure legend) by the 2018-2020 cohorts at a HUC-12 watershed summary level. Production is a synthesis of modeled distributions from spawning surveys of Atlantic salmon in 2019, winter 2020 egg planting and spring 2020 fry stocking.

The stocking effort in the MMB SHRU is focused in the Sandy River and the Sheepscot River with three age classes of juveniles (Figure 4.3 and Table 4.1). The primary supplementation strategy in the MMB SHRU is the planting of eyed eggs. In the Sandy River 678,609 eggs were planted between January and February. In addition to eggs the Kennebec River received 88,753 smolts in the spring of 2020. The smolts are part of an effort to boost wild reproduction and releases are expected to continue annually for the next several years. In the Sheepscot River 177,854 eggs were planted during the same timeframe. Eggs are generally divided between mainstem and tributaries according to the amount of juvenile rearing habitat in the vicinity of the planting site as well as estimated emergence rates. In the Sheepscot River a small number of fry are released annually in areas of the river where winter access may be preventative for egg planting. In 2020, 24,064 fry were released in the upper West Branch and the mainstem Sheepscot River above Sheepscot Pond. In 2020, a small number of eggs (6,236) were planted in Togus Stream, a tributary to the Kennebec River in Randolph Maine. These eggs were of Sheepscot River origin and were planted to assess the potential of reintroducing Atlantic salmon to this historic habitat.

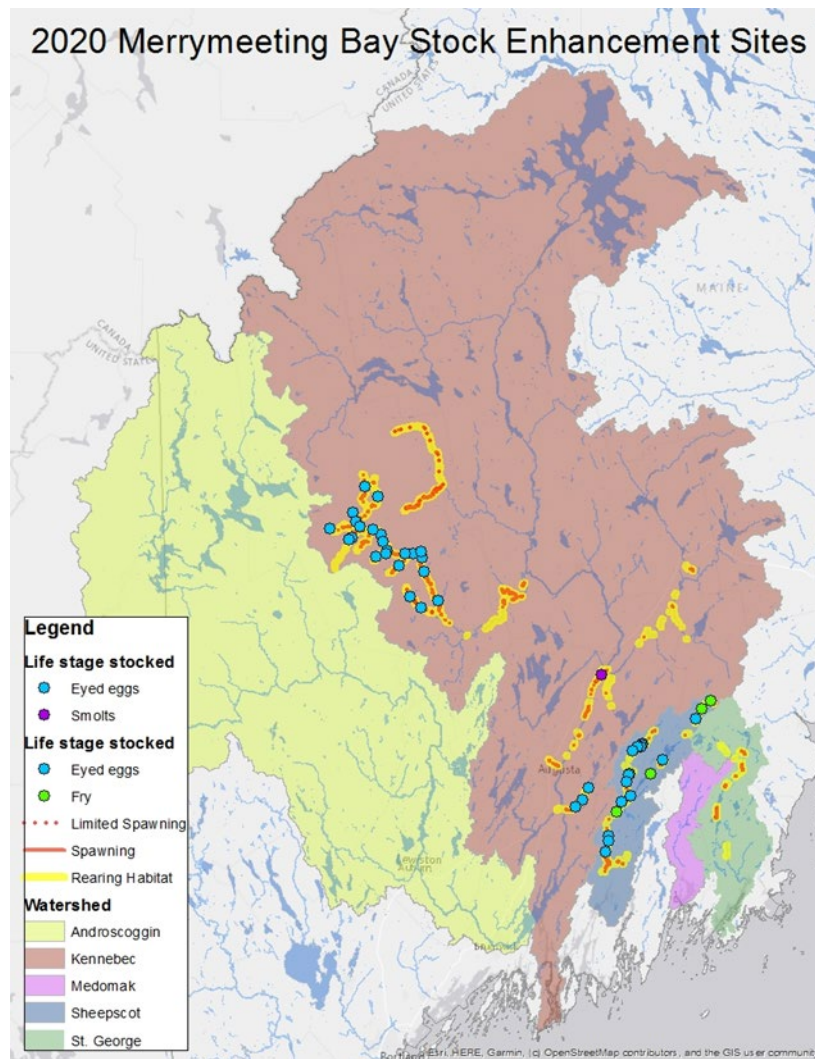


Figure 4.4 Map of stocking locations in the Merrymeeting Bay SHRU.

Table 4.2 Atlantic salmon released in the Merrymeeting Bay SHRU.

2020 Merrymeeting Bay Atlantic Salmon Released						
Drainage	Watershed	Eyed eggs	Fry	Fall Parr	Smolts	Captive Reared Adults
Kennebec	Sandy River	672,373	-	-	-	-
	Togus Stream	6,236	2,092	-	-	-
	Mainstem	-	-	-	88,753	-
Sheepscot	All	166,787	24,064	-	-	-

Table 4.3 Fish passage projects completed in 2020 in the Merrymeeting Bay SHRU. If blank, values for river/stream miles opened or the number of salmon habitat units opened was not provided.

Project Type: Culvert, bridge, dam, fishway	Sub-basin (HUC-8, e.g. Sandy)	Stream	Town	Barrier class before: (e.g. barrier)	Barrier class after: (accessible)	River/Stream miles opened	Salmon Hab Units opened
replace culvert with aluminum box	St. George- Sheepscot	Pettingill Stream	Appleton	potential barrier	accessible		1.2
replace culvert with open bottom arch	St. George- Sheepscot	unnamed	Bowdoinham	barrier	accessible	1	20
replace culvert with open bottom arch	st. George- Sheepscot	unnamed	Bowdoinham	barrier	accessible	0.5	
replace culvert with open bottom crossing	Lower Kennebec	Clover Mill Stream	Farmington	barrier	accessible	2.72	28.3
replace culvert with concrete arch		tribuary of Vaughn Brook	Hallowell	potential barrier	accessible	0.4	
replace culvert with open bottom box bridge	Lower Kennebec	Black Brook	Phillips	barrier	accessible	1.83	38.9
replace culvert with concrete box bridge	Lower Kennebec	unnamed	Pittston	barrier	accessible	2.18	19.6
replace culvert with concrete arch	Lower Kennebec	Morton Brook	Pittston	barrier	accessible	0.31	6
replace culvert with open bottom concrete box bridge	Lower Kennebec	Smith Brook	Starks	barrier	accessible	4.7	35.13
replace culvert with bottomless concrete arch	Lower Kennebec	unnamed tributary to Webber Pond			accessible	2.3	0.01

Bridge Replacement	Lower Kennebec	Beales Brook	Farmington	potential barrier	accessible	0.73	16.39
Culvert Replacement	Lower Kennebec	Little Norridgewock Stream	Chesterville	potential barrier	accessible		
Culvert Replacement	Lower Kennebec	Wilson Stream	Farmington	potential barrier	accessible	1.51	35.99
replace culvert with bridge	Lower Kennebec	tributary of Orbeton Stream	Madrid	barrier	accessible		
replace culvert with bridge	Lower Kennebec	tributary of Orbeton Stream	Madrid	barrier	accessible		
replace culvert with bridge	Lower Kennebec	tributary of Orbeton Stream	Madrid	barrier	accessible		
replace culvert with bridge	Lower Kennebec	tributary of Temple Stream	Temple	barrier	accessible		
replace culvert with bridge	Lower Kennebec	tributary of Joshua Brook	Industry	barrier	accessible		

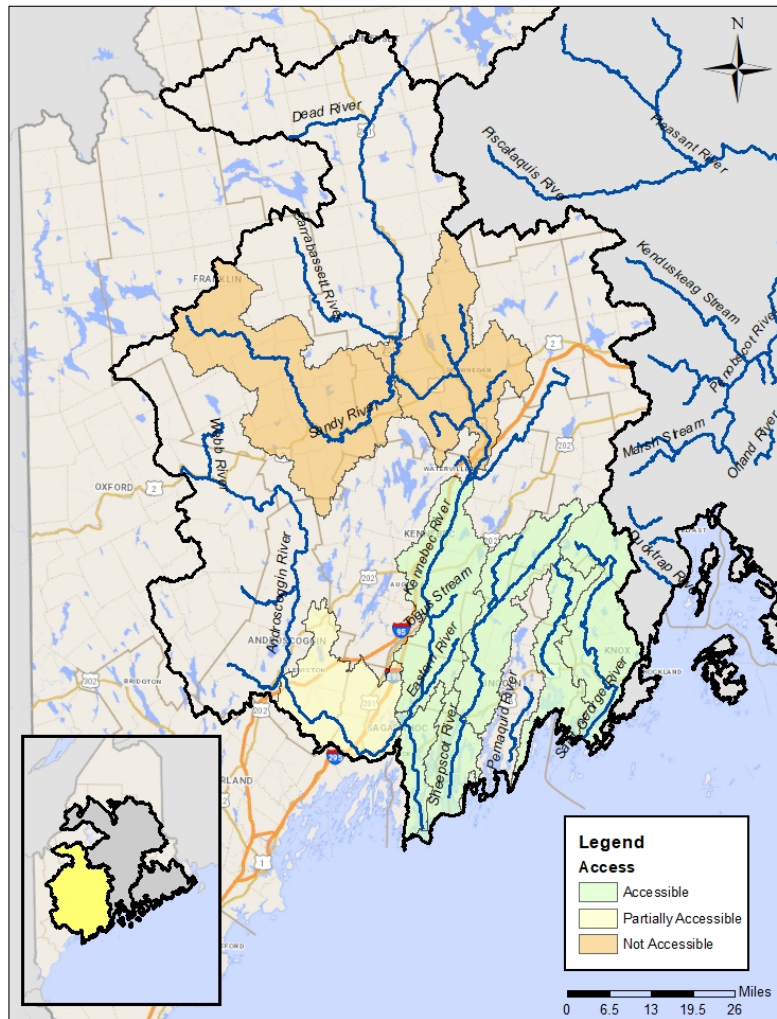


Figure 4.5 Map of the MMB SHRU showing river and stream reach accessibility for Atlantic salmon.. Accessible watersheds have no mainstem dams, or else have dams that have fishways that have been evaluated and determined to be highly effective. The habitat in these watersheds meet our recovery criteria for accessibility. Partially accessible watersheds are above dams that have fishways that have yet to be evaluated. Not accessible watersheds are above dams that do not have swim through fishways. Watersheds above impassable dams where adult salmon are trucked are not considered accessible in terms of recovery. This map does not consider the effect of road stream crossings.

Update to the 2020 Work Plan

The 2020 annual MMB SHRU report included a work plan consisting of a goal to accomplish 13 projects between team members and partners. Despite the challenging year that occurred in 2020, we were still able to make progress on some of these projects. Below are not only updates regarding projects listed on the 2020 work plan, but also other completed projects that are important to Atlantic salmon recovery in the MMB SHRU.

Sheepscot River

Broodstock Stocking

All broodstock were distributed as eyed eggs or fry in 2020. See Table 4.2.

Branch Pond Fishway

Engineering designs are being finalized for the fishway. Designs should be ready in 2021, groundwork starting 2022.

0+ Parr Program

Green Lake NFH is rearing approximately 17,000 Sheepscot River origin 0+ Atlantic salmon parr. These fish are being reared under ambient water temperature conditions as opposed to the heated water used to produce the 1-year smolt. These fish will be stocked in in late August or September when river conditions are acceptable.

Kennebec River

Species Protection Plans at Lockwood, Hydro Kennebec, Weston and Shawmut

Four mainstem Kennebec dams waiting on SPP delayed until 2022.

Togus Pond Fishway

The fishway is in place and ready for 2021 season. The only thing left is for DMR to determine fish counts for sustainability.

Walton Mills Dam Removal

Final designs are completed with construction starting summer 2021.

Completed Road-Stream Crossing Upgrades:

- Smith Brook: Crossing # 15174
- Black Brook: Crossing # 15066
- Clover Mill Rd. Crossing # 15270

Androscoggin River

Species protection plans at Brunswick and Lewiston Falls:

Consultations were expected on SPP's in 2020 but are now shifted to occur in first quarter of 2021.

Sabattus River Passage Improvements

Tentative funding for removal of two dams. Plan will be removing Upper Town Dam in 2021 and remove Farwell in 2022. Fishway will also be installed at Farwell for fall 2022.

Diversity

For each broodstock within SHRU's, a target of 200 parr to collect and retain for broodstock is being used starting with the 2017 collection year. Results below represent the mean number of alleles per locus (based on 18 microsatellite loci) for the Sheepscot River broodstock, measured

within the most recent collection of parr for broodstock (in this case, the 2017 collection). For the 2017 parr collection, allelic diversity decreased over the previous (2016 estimate) and is slightly less than the 10-year average (of mean number of alleles = 11.51). More detailed summaries of genetic diversity are found in the USASAC report.

The genetic diversity in the Kennebec River is unknown but given the supplementation program stock origin is a large portion of the F-2 Penobscot River domestic broodstock program, which represents similar estimates of genetic diversity to the Penobscot River stock. The Penobscot River origin stock currently has the largest effective population size and greatest allelic diversity among the contemporary Maine populations. In addition to the supplementations from the F2 program, in 2018 approximately 287,000 eggs were planted in the Sandy River from the Denny's River specific origin stock. If these eggs were to produce adult returns the 2021 and 2022 adult cohorts.

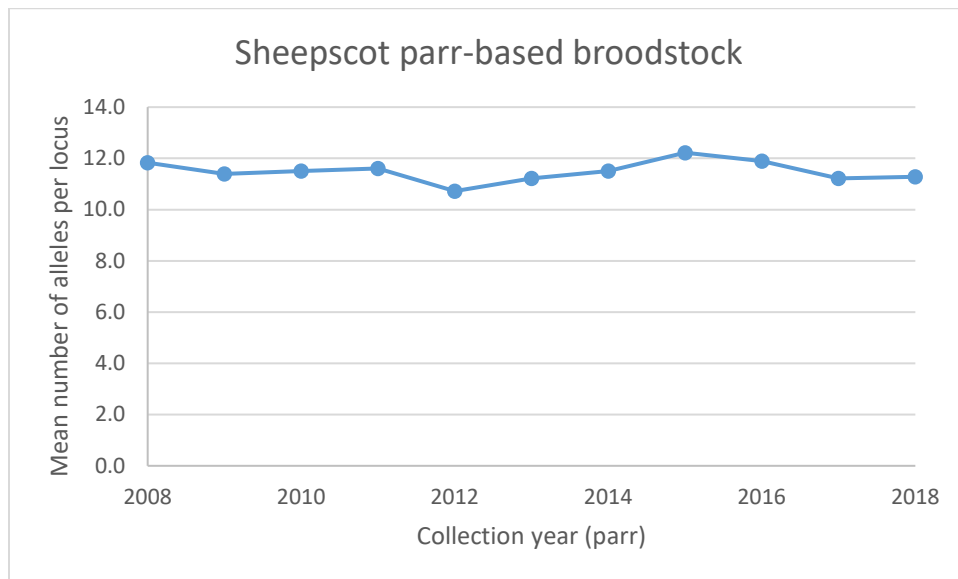


Figure 4.6 Graph of the mean number of alleles per locus for the Sheepscot broodstock, based on parr collected annually for broodstock collection surveys from 2008 to 2018. Results represent the mean number of alleles per locus (based on 18 microsatellite loci) for the parr broodstock collected annually.

Table 4.4 Age and origin of adults returns in the Merrymeeting Bay to rivers that are trapped. Most adult salmon are caught at the Lockwood fishlift on the lower Kennebec River and Brunswick fishlift on the lower Androscoggin River.

Adult Returns to the Kennebec and Androscoggin Rivers										
Total Adult Returns to the Kennebec	Hatchery					Naturally Reared / Wild				
	1SW	2SW	3SW	RPT	Total	1SW	2SW	3SW	RPT	Total
53	0	0	0	0	0	4	49	0	0	53
	0.00%	0.00%	0.00%	0.00%	0.00%	7.55%	92.45%	0.00%	0.00%	100.00%
Total Adult Returns to the Androscoggin	Hatchery					Naturally Reared / Wild				
	1SW	2SW	3SW	RPT	Total	1SW	2SW	3SW	RPT	Total
5	0	3	0	0	3	0	2	0	0	2
	0.00%	60.00%	0.00%	0.00%	60.00%	0.00%	40.00%	0.00%	0.00%	40.00%

Emerging Issues and Priorities

COVID 19 will impact efforts to recover Atlantic salmon in 2021. To date the pandemic has affected recovery project fundraising, planning, and execution and it is expected to do so in the near future. Related, economic factors within the state are expected to influence recovery efforts. Economic factors are associated with impacts from COVID -19, however other factors such as the rising costs of construction and high demand for restoration planning and implementation with few funding available funding sources are likely to affect recovery efforts.

Addressing climate change is a high priority for the State of Maine, and in December of 2020 “Maine Won’t Wait: A Four-Year Plan for Climate Action” was released. The action plan calls for bold strategies to address the impacts of climate change in Maine. This may present opportunities to link recovery actions with strategies outlined in the plan.

An additional emerging issue is the Kennebec Management Plan. If successful, this effort will safe timely and effective passage in the Kennebec River. Establishing effective passage in the Kennebec is a priority for this SHRU as identified in the five-year workplan. The Kennebec Management Plan will provide a potential road map for future recovery efforts. Engagement in the process by SHRU Team members will be integral to success and future action.

Stakeholder Input

The stakeholders were invited to share any issues that were not part of this reports emerging issues and priorities. As of the writing of the report did not choose to report any.

Work Plan 2021

Table 4.5 Proposed actions for 2021.

Sheepscot Focus Area

Project	Action	Partners
Branch Pond Dam	Remove the dam or install fish passage at the Branch Pond outlet dam to allow for unimpeded passage of river herring	Dam owner, MDMR, USFWS, NOAA, NGOs
Taylor Road Bridge	Remove bridge remnants	Property owner, MDMR, USFWS, NOAA, NGOs
Inadequate culvert (Trout Brook)	Replace culvert	Road Owner, NRCS, NGOs
Culverts	Identify and perform outreach.	Road owners, MEDMR, USFWS, NOAA, NGO's

Kennebec Focus Area

Project	Action	Partners
Lockwood Dam	Restore up- and downstream accessibility (accessible or fully accessible) via dam removal or by implementing safe, timely, and effective upstream and downstream passage.	Dam owner, FERC, NOAA, MEDMR, USFWS, NGOs, MEDEP, MEIFW
Lockwood Dam	Develop a Species Protection Plan (SPP) for inclusion in the project license that: 1) includes measures for the protection and enhancement of Atlantic salmon; 2) includes provisions for monitoring the safety, timeliness, and efficacy of up- and downstream passage; and 3) includes provisions to adaptively manage the project to ensure highly effective fish passage.	Dam owner, FERC, NOAA; Partners: MEDMR, USFWS, MEIFW, MEDEP, NGOs
Hydro Kennebec Dam	Restore up- and downstream accessibility (accessible or fully accessible) via dam removal or by implementing safe, timely, and effective upstream and downstream passage.	Dam owner, FERC, NOAA, MEDMR, USFWS, NGOs, MEDEP, MEIFW
Hydro Kennebec Dam	Develop a Species Protection Plan (SPP) for inclusion in the project license that: 1) includes measures for the protection and enhancement	Dam owner, FERC, NOAA; Partners: MEDMR, USFWS,

	of Atlantic salmon; 2) includes provisions for monitoring the safety, timeliness, and efficacy of up- and downstream passage; and 3) includes provisions to adaptively manage the project to ensure highly effective fish passage.	MEIFW, MEDEP, NGOs
Shawmut Dam	Restore up- and downstream accessibility (accessible or fully accessible) via dam removal or by implementing safe, timely, and effective upstream and downstream passage.	Dam owner, FERC, NOAA, MEDMR, USFWS, NGOs, MEDEP, MEIFW
Shawmut Dam	Develop a Species Protection Plan (SPP) for inclusion in the project license that: 1) includes measures for the protection and enhancement of Atlantic salmon; 2) includes provisions for monitoring the safety, timeliness, and efficacy of up- and downstream passage; and 3) includes provisions to adaptively manage the project to ensure highly effective fish passage.	Dam owner, FERC, NOAA; Partners: MEDMR, USFWS, MEIFW, MEDEP, NGOs
Weston Dam	Restore up- and downstream accessibility (accessible or fully accessible) via dam removal or by implementing safe, timely, and effective upstream and downstream passage.	Dam owner, FERC, NOAA, MEDMR, USFWS, NGOs, MEDEP, MEIFW
Weston Dam	Develop a Species Protection Plan (SPP) for inclusion in the project license that: 1) includes measures for the protection and enhancement of Atlantic salmon; 2) includes provisions for monitoring the safety, timeliness, and efficacy of up- and downstream passage; and 3) includes provisions to adaptively manage the project to ensure highly effective fish passage.	Dam owner, FERC, NOAA; Partners: MEDMR, USFWS, MEIFW, MEDEP, NGOs
Walton's Mills Dam (Temple Stream)	Impoundment drawdown and site preparations to begin removal of the dam to allow for unimpeded passage and restoration of stream banks.	Dam owner, MEDMR, USFWS, NOAA, NGO's
Henry Mitchell Brook (Temple Stream)	Work with the road owner and complete existing conditions site survey. Assess and design feasible options for road crossing replacement. Site #15726	Road owner, MEDMR, USFWS, NOAA, NGO's
Sandy River Culverts	Work with towns of Temple, Phillips, Avon, and Madrid to complete existing conditions site surveys at priority culverts. Assess and design feasible options for road crossing replacements.	Road owners, MEDMR, USFWS, NOAA, NGO's
Cummings Brook (Temple Stream)	Remove undersized culvert and replace with open bottom structure to restore free-flowing stream and continues stream banks. Site #15272	Road owner, MEDMR, USFWS, NOAA, NGOs

Cobboosecontee Connectivity	Work with owners of the three mainstem dams to explore opportunities for dam removal or installation of fish passage for river herring,	MDMR, NOAA, USFWS, Maine Rivers
Comprehensive Plans	Develop or finalize comprehensive/management plans.	MDMR, USFWS, NOAA, MDIFW, MEDEP

Androscoggin Focus Area

Project	Action	Partners
Sabattus River Connectivity	Work with dam owners to explore dam removal or fish passage improvements that maximize the production potential of river herring in Sabattus Pond, and allow for the survival and recovery of Atlantic salmon	Dam Owners, NGOs, MDMR, NOAA
Brunswick	Develop/implement a Species Protection Plan (SPP) for inclusion in the project license that: 1) includes measures for the protection and enhancement of Atlantic salmon; 2) includes provisions for monitoring the safety, timeliness, and efficacy of up- and downstream passage; and 3) includes provisions to adaptively manage the project to ensure highly effective fish passage.	Dam owner, FERC, NOAA; Partners: MDMR, USFWS, MIFW, MEDEP, NGOs
Pejepscot	Participate in FERC relicensing; request studies, provide comments, recommendations, terms and conditions, section 18 prescriptions, WQC conditions.	Dam owner, FERC, NOAA; Partners: MDMR, USFWS, MIFW, MEDEP, NGOs
Worumbo	Participate in FERC relicensing; request studies, provide comments, recommendations, terms and conditions, section 18 prescriptions, WQC conditions.	Dam owner, FERC, NOAA; Partners: MDMR, USFWS, MIFW, MDEP, NGOs
Upper Barker	Participate in FERC relicensing; request studies, provide comments, recommendations, terms and conditions, section 18 prescriptions, WQC conditions.	Dam owner, FERC, NOAA; Partners: MDMR, USFWS, MIFW, MEDEP, NGOs
Hackett Mills	Participate in FERC relicensing; request studies, provide comments, recommendations, terms and conditions, section 18 prescriptions, WQC conditions.	Dam owner, FERC, NOAA; Partners: MDMR, USFWS, MIFW, MDEP, NGOs
Oxford (Little Androscoggin)	Grade control structure	

MMB SHRU Team Actions

Project	Action
Annual Report	Submit Annual Report in accordance with CMS guidelines
Annual Meeting	Conduct Annual SHRU Team meeting in accordance with CMS guidelines.
FERC Sub-Committee	Convene FERC sub-committee to: 1) track and maintain information regarding the status of FERC processes; 2) encourage coordination, planning, and participation in FERC relicensing processes; and 3) to encourage coordination, planning, and participation in the post-license compliance monitoring and adaptive management of FERC projects in an effort to achieve the best possible passage outcomes.
Mapping/GIS	1) Compile or develop maps that depict mapped/predicted salmon habitat, barriers, and critical landscape elements and integrate this effort with similar initiatives (e. g. NOAA USGS); 2) Provide tools through the Maine Stream Habitat View or other interface to make the information available for use within the SHRU Team.

Table 4.6 New activities added to the Merrymeeting Bay SHRU work plans.

<i>No new activities were added to the SHRU work plan.</i>
--

Reports and Publications from the Merrymeeting Bay SHRU

Eisenhauer, Z. J., P. M. Christman, J.-M. Matte, W. R. Ardren, D. J. Fraser, and J. W. A. Grant. 2020. Revisiting the restricted movement paradigm: the dispersal of Atlantic salmon fry from artificial redds. *Canadian Journal of Fisheries and Aquatic Sciences* 11(November):1–11.

Craig, Scott D. 2020. MEFWCO Final Branch Pond Report for 2020 activities.

Craig, Scott D. 2020. Quantabacook MEFWCO Annual Report 2020.

5. Committee Reports

FERC STANDING COMMITTEE

Role of Committee

- Review research and monitoring studies at FERC hydro projects.
- Make recommendations to improve Atlantic salmon survival, abundance, and distribution at FERC hydro projects.
- We also discuss other diadromous fish species including herring, shad, and American eels.

Responsibilities

- Provide input and coordination concerning priorities for the use of hatchery origin and wild Atlantic salmon for research and monitoring purposes at FERC hydro projects.
- Review and provide technical input concerning the methods, results, data analysis, and conclusions of newly issued research and monitoring study reports concerning FERC hydro projects in the GOM DPS.
- To help guide the development of opportunities to improve the survival, abundance, and distribution of Atlantic salmon at various FERC hydro projects based upon the results of research and monitoring.

Ways of Working

- The Group typically meets once a month.
- Chair distributes newly issued research and monitoring study reports prior to meetings for review and discussion
- After meeting, the Chair distributes notes for review and comment.
- Consists of members from State and Federal Resource Agencies, PIN, and University Researchers

In 2020, the group held seven meetings. Activities included:

- We reviewed three draft fish passage study plans and three draft study reports in 2020 including:
 - Draft downstream alosine passage study plan for the Milford, Orono, and Stillwater Projects.
 - Downstream alosine passage report for the Milford, Orono, and Stillwater Projects.
 - Draft downstream alosine desktop survival study plan at the Milford, Orono, and Stillwater Projects.
 - Downstream alosine desktop survival study at the Milford, Orono, and Stillwater Projects.
 - Draft downstream American eel downstream passage study plan at the Medway Project.
 - Downstream American eel downstream passage report at the Medway Project.
- UMO Presented:
 - Penobscot River American Eel Studies (M. Mensinger)
 - Piscataquis Smolt Studies (A. Moctezuma)
 - Update on Atlantic salmon Upstream Study in the Penobscot River (J. Zydlewski)
 - Overview of Atlantic salmon predation study (J. Zydlewski)
- Other
 - Multiple updates on FERC relicensing's in Penobscot, Kennebec and Union Rivers
 - Multiple updates on fish passage studies in these watersheds
 - Penobscot Net Pen Project
 - Grand Lake Mattagamon - We determined that since the project is in critical habitat and salmon are in the project area, it was necessary to evaluate the impacts of the project on salmon restoration in the Penobscot River. We are working on scheduling a site visit for our fish passage engineers. We are also working to organize a sub-committee to develop plans to assess impacts.

Emergency Ad Hoc Fish Passage Committee

April 13, 2020 Meeting Notes

Attendees: MDMR (M. Brown; S. Ledwin); USFWS (A. Harris; O. Cox); PIN (D. McCaw); NMFS (M. Buhyoff; J. Murphy); Brookfield (K. Maloney; Richard Dill; Kevin Bernier; Jason Seyfried; Matt LeBlanc; Adam Brown)

Note: This was the third Ad Hoc Committee meeting. During the meeting, the Committee reviewed potential contingency measures to ensure safe passage of Atlantic salmon and other anadromous species at the above mentioned projects with staff from Brookfield. Brookfield Power is the FERC Licensee of each project under consideration.

Introductions

A draft table presenting potential mitigations options under various Covid 19 staffing scenarios was provided to the participants on April 9th for discussion purposes during the meeting. The table is attached separately.

Brookfield provided an overview of their current state of operations under Covid 19. There are presently no limitations to operating each fish passage facility under existing Covid 19 conditions. Brookfield also stated that hiring additional staff to operate fishways at the Milford, Orono, Ellsworth, Lockwood, and Brunswick Project are not feasible given time constraints concerning their contracting processes (e.g., background checks, training, etc.). Brookfield also stated that crews may not be able to shift operations among different river systems (e.g., Orono crews may not be permitted to operate Lockwood facilities) due to ownership issues. Brookfield will however investigate this option.

DMR stated that existing social distancing practices remain in place for State employees; however, their operations at Milford and Lockwood remain achievable. Staff shortages may effect operations at the Brunswick Project.

Anna stated the health and safety of our visitors and employees are the top priorities for the U.S. Fish and Wildlife Service. To guide our operational response to the novel coronavirus (COVID-19), the Service is following current guidance from the Centers for Disease Control, Office of Personnel Management, DOI Office of Emergency Management, and state and local public health authorities.

NOAA staff remain in teleworking status.

Saco River

While not among the projects currently under consideration of the Ad Hoc Committee, Brookfield provided an update on current conditions of fish passage facilities. All sites on the Saco River will remain in normal Operations, however, the trucking of American shad may be impacted by the limited resources.

Ellsworth Project

The Ad Hoc Committee reviewed three potential options at Ellsworth with Brookfield Power including:

1. Consult with Brookfield on potential to hire qualified additional contractor to truck migrants upstream. Goal would be to truck ~30 - 40k.
2. MDMR staff operate fish trap and truck migrants. Truck no more than upstream stocking goal of 315,000 herring.
3. Close fishway and cease trucking operations.

Brookfield reiterated that Option 1 is not feasible for the corporation due to hiring constraints. MDMR stated Option 2 is not feasible for their agency. Thus, the group concluded that Option 3 is the only viable option should Brookfield staff or contractors be unable to operate the Ellsworth fishway due to Covid 19 restrictions (e.g., illness or access restriction).

There was discussion regarding a scenario of a significant number of Brookfield staff out due to illness, but still able to provide one crew member to operate the lift. Some portion of the alewife stocking goal may still be attained if MDMR were able to assist with trucking, even if just a couple days per week. While there was no commitment to this option, it was agreed that it may be discussed further in a worst-case scenario.

Milford Project

The Ad Hoc Committee reviewed three potential options at Milford with Brookfield Power including:

1. If MDMR is not available, open crowder and Denil to permit volitional passage on an interim basis. Allow early run to pass (May) and re-evaluate weekly to assess potential to collect broodstock.
2. If USFWS staff not available, MDMR transports broodstock to hatchery.
3. Provide volitional passage of all upstream migrants (i.e., open fishlift crowder gate and operate Denil)

The participants concluded that Option 1 would provide the best mitigation option should DMR crews be unable to collect broodstock and FWS are unable to truck broodstock to the hatchery due to Covid 19 restrictions (e.g., illness or access restriction).

While not directly related to any current Covid 19 restrictions, the Ad Hoc Committee recommended that Brookfield open the Denil fishway concurrently with the fishlift on April 15 as DMR will not be collecting any broodstock under existing conditions in April and perhaps May. However, Brookfield intends to follow the license requirements of operating the fish lift as the means for upstream passage and will operate the Denil fishway as a contingency fish passage if the fish lift becomes non-operational for any reason (e.g. mechanical issues, lack of staff to inspect and make daily operational adjustments).

Orono Project

The Ad Hoc Committee reviewed three potential options at Orono with Brookfield Power including:

1. Consult with Brookfield on potential to hire qualified additional contractor to truck migrants upstream.
2. MDMR staff operate fish trap and truck to Milford headpond.
3. Close fishway and cease trucking operations.

Brookfield reiterated that Option 1 is not feasible for the corporation due to hiring constraints. MDMR stated Option 2 is not feasible for their agency. Thus, the group concluded that Option 3 is the only viable option should Brookfield staff or contractors be unable to operate the Orono fishway due to Covid 19 restrictions (e.g., illness or access restriction).

Lockwood Project

The Ad Hoc Committee reviewed three potential options at Lockwood with Brookfield Power including:

1. Consult with Brookfield on potential to hire qualified additional contractor to truck migrants upstream.
2. Agency staff truck salmon upstream. Herring not passed.
3. Close fishway and cease trucking operations.

Brookfield reiterated that Option 1 is not feasible for the corporation due to hiring constraints. MDMR stated Option 2 is not feasible for their agency. Thus, the group concluded that Option 3 is the only viable option should: a) Brookfield staff be unable to operate the fishlift; or b) MDMR staff are unable to transport salmon to the Sandy River, The Ad Hoc Committee did recommend Brookfield consider relocating staff from the Orono Project (if it is shut down due to Covid 19) to transport river herring to the Mainstem of the Kennebec and/or salmon to the Sandy River if MDMR staff be unable to transport fish due to due to Covid 19 restrictions (e.g., illness or access restriction).

Brunswick Project

The Ad Hoc Committee reviewed three potential options at Brunswick with Brookfield Power including:

1. Consult with Brookfield on potential to hire secondary contractor to cull invasive species, pass salmon, and truck herring upstream.
2. Fishway is set in volitional mode to allow anadromous passage. No culling and no trucking.
3. Fish passage facility is closed until June 1st and trucking operation discontinued.

Brookfield reiterated that Option 1 is not feasible for the corporation due to hiring constraints. MDMR stated Option 2 is not feasible for their agency. MDMR objected to Option 2 due to concerns for invasive species and the lack of access to suitable spawning habitat upstream and unnecessary impacts to fish moving upstream and downstream of the

Brunswick Project. NMFS did not recommend Option 3 as it could affect Atlantic salmon and there is little evidence that white catfish are passed at the project in April or May.

The group was unable to reach a consensus recommendation for the Brunswick Project.

Next Steps

The Ad Hoc Committee will prepare a brief report of these conclusions for the Atlantic Salmon Implementation Team. The Ad Hoc Committee will present their preliminary findings to the Atlantic Salmon Implementation Team on April 12.

April 4, 2020 Meeting Notes

Attendees: MDMR (M. Brown; S. Ledwin); USFWS (A. Harris; O. Cox); PIN (D. McCaw); NMFS (M. Buhyoff; J. Murphy)

Notes: This was the second Ad Hoc Committee meeting. During the meeting, the Committee continued to identify reasonable contingency measures to ensure safe passage of Atlantic salmon and other anadromous species at the above mentioned projects while considering the health and safety of fish passage staff. The Committee developed three mitigation options for each project within an Excel Spreadsheet. The three mitigation options were designed to address Covid 19 limitations if either Brookfield (BF) or MDMR staff are not available to operate the trapping and sorting facilities at each project.

Brunswick Project

At the Brunswick Project, BF operates and maintains the fishway. MDMR is responsible for trapping, trucking, and culling invasive species. Atlantic salmon hatchery broodstock are not collected at the project. MDMR expressed concerns for invasive species in the Androscoggin River if the fishway is opened without invasive culling. MDMR also did not expect any significant reproduction of alosines unless fish are able to be trucked upstream to spawning habitat. NMFS expressed concern for Atlantic salmon if the fishway does not operate.

Three options were identified for addressing fish passage at the project if operations become impaired due to Covid 19 (see below). The Committee was not able to identify a preferred option at this time.

Lockwood Project

At the Lockwood Project, BF operates and maintains the fishway. MDMR is responsible for trapping and trucking anadromous species to spawning habitat. Atlantic salmon hatchery broodstock are not collected at the project. Three options were identified for addressing fish passage at the project if operations become impaired due to Covid 19 (see separate attachment). The Committee agreed Option 1 could be the preferred mitigation measure for the Lockwood Project.

Orono Project

At the Orono Project, BF operates and maintains the fishway. BF is also responsible for trapping and trucking anadromous species upstream of the project. Typically, alosines are trucked to the Milford Project headpond. Atlantic salmon are either released into the Milford Project headpond or transported to the Milford fishlift for broodstock purposes. Three options were identified for addressing fish passage at the project if operations become impaired due to Covid 19 (see separate attachment). The Committee agreed Option 3 could be the preferred mitigation measure for the Orono Project.

Milford Project

At the Milford Project, BF operates and maintains the fishway. The project passes most alosines voluntarily. However, MDMR also traps and transports alosine to upstream spawning habitat in the watershed. MDMR also collects Atlantic salmon hatchery broodstock at the project. Broodstock collected at the Milford Project are the primary source of broodstock for the Penobscot River. Broodstock collected at Milford are transported to the USFWS hatchery for spawning.

Three options were identified for addressing fish passage at the project if operations become impaired due to Covid 19 (see separate attachment). The Committee agreed Option 3 could be the preferred mitigation measure for the Milford Project.

Ellsworth Project

At the Ellsworth Project, BF operates and maintains the fishway. BF is also responsible for trapping and trucking anadromous species upstream of the project. Atlantic salmon are not collected for broodstock purposes. Three options were identified for addressing fish passage at the project if operations become impaired due to Covid 19 (see separate attachment). The Committee agreed Option 1 could be the preferred mitigation measure for the Ellsworth Project.

Next Steps

The Committee schedule a conference call with Brookfield to seek their input on the various mitigation options including a preferred alternative. The call will take place on April 10, 2020.

Final Report of the Emergency Fish Passage Ad Hoc Committee Prepared for the Atlantic Salmon Implementation Team

April 24, 2020

Background

In response to COVID-19 pandemic, the Atlantic salmon Implementation Team (IP) formed an Ad Hoc Committee (Committee) pursuant to the Collaborative Management Strategy (CMS). The Committee was established in early April 2020 to undertake emergency scenario planning to facilitate the continuation of fish passage facility operation at hydroelectric projects in the Gulf of Maine DPS of Atlantic salmon. The committee's focus was on fishways that rely, at least in part, on trap and truck operation for Atlantic salmon fish passage and/or broodstock collection including the Ellsworth, Milford, Orono, Brunswick, and Lockwood Projects.

Specifically, the Committee was charged with the following;

- Identify the potential operational changes and consequences of operational changes that are necessary to comply with federal, state, local and industry level policies and recommendations necessary to protect human health and safety in light of the COVID-19 pandemic.
- Identify a range of contingency measures that could be implemented to minimize disruption to fish passage operations at hydroelectric projects to protect endangered Atlantic salmon and maximize compliance with requirements in FERC licenses, ESA Section 7 biological opinions, and other regulatory or legal requirements.
- Identify a range of contingency measures that could be implemented to protect other diadromous species at fish passage facilities within the GOM DPS of Atlantic salmon.
- Identify a range of contingency measures for broodstock collection at Milford. o This should include a scenario where the transport of sea-run broodstock from Milford to Craig Brook is not possible. Please identify at least three options for this scenario (e.g., open fishway/fishways to allow free swim; trap and truck upstream; don't allow passage). Please include the costs and benefits associated with each scenario, as well as the committee's preferred option and the rationale supporting this option.
- Coordinate with licensees, Maine Department of Environmental Protection, FERC staff, and others as necessary to gather information and make informed decisions regarding contingency measures.

Implementation

The Committee consisted of representatives from MDMR (S. Ledwin, Mike Brown), USFWS (A. Harris, O. Cox), NMFS (J. Murphy, M. Buhyoff), and the Penobscot Indian Nation (D. McCaw). J. Murphy served as chair.

The Committee met expeditiously over several weeks to provide the IP with a draft report by April 14, 2020. Three meetings have been conducted to date with meeting notes provided below. The Committee sought significant input from the Licensee of the Ellsworth, Milford, Orono, Brunswick, and Lockwood Projects (Brookfield) to identify measures that could be implemented to minimize disruption to fish passage operations at each project. The Committee and Brookfield considered compliance with FERC licenses, ESA Section 7 biological opinions, other regulatory or legal requirements in addition to the health and welfare of staff associated with fish passage operations at each project.

Recommendations

The Committee's preliminary recommendations and response to the IP's charge were presented on March 13, 2020. The Committee's recommendations are presented in a separate Excel spreadsheet. Notes from the meeting are being prepared for the IP. During the meeting, we were not able to identify a mitigation alternative for fish passage at the Brunswick Project. The Committee was able to present preferred mitigation alternatives for the Milford, Orono, Lockwood, and Ellsworth Projects.

March 31, 2020 Meeting Notes

Participants: Oliver Cox, Anna Harris, Jim Pellerin, Gale Wippelhauser, Sean Ledwin, Mitch Simpson, Casey Clark, Paul Christman, Mike Brown, Sean McDermott, Jeff Murphy, Don Dow, Matt Buhyoff, Dan Tierney, Kelly Maloney, Richard Dill, Adam Brown, Matt Leblanc, Dan McCaw.

Jeff M: Opened the meeting and addressed the excel sheet as a document to help guide discussion.

Kelly M: Summarized an update on where we are today as they influence how we move forward.

- She stated that it would be good to have a follow up call in a week or so to resolve any conflicts between parties. This call would be a much smaller working group and would include one individual from each agency/entity to help clarify priorities¹.
 - o Need to setup a meeting and have agencies/entities identify their point of contact
-

Agency Updates on staff state of affairs:

- NOAA is under work from home requirements.
- Brookfield is under work from home requirements for their compliance team through the month of April and will reevaluate by the end of the month.
 - o Three distinct fish passage teams have been formed with a lead and 5 team members (Richard-Penobscot and Union, Jay-Kennebec, Matt L-Andro and Saco).
 - o The fisheries leads will be maintaining the 'normal course of action' for the fishway season. They are hiring their fishway crews for each river/project for the 2020 season. They are eliminating congregating of these crews to limit exposure between members of these teams.
 - o The operations crews are asked to report in teams of 2 at a single site and their workspace (I.e. the powerhouse) is off limits to other workers. This will prevent cross exposure at sites where it is feasible. At sites where this is not possible, the operations teams will be taking on fish operations responsibilities at specific sites (Mattaceunk).
- DMR is under directive to maintain social distancing at worksites. DMR personnel cannot share a vehicle for transportation for any work-related activities. Most DMR staff are working from home. DMR intends to complete the tasks that are usually carried out by DMR when feasible. DMR will prioritize some activities, such as stocking, to ensure that key objectives are met given the added difficulty to work in this environment.
- The Tribal community is very concerned about this epidemic and has made strong recommendations to limit exposure of the tribal community to the epidemic. No PIN staff can return to Indian Island currently to limit exposure to the community

¹ Note: Resource Agency participation in the Ad Hoc Committee will consist of 2 staff from DMR, USFWS, NMFS and 1 staff from PIN

- USFWS. Most regulatory staff are working at home to limit exposure, especially at Craig Brook. With the exception of mission critical fieldwork, they are not able to carry out fieldwork. Hatchery staff are isolating each hatchery to the extent possible, which is a challenge because of tourists. Craig Brook has two teams, which are isolated from each other. Green lake is at a skeleton crew and is stocking smolts now. Once smolts are off station, they will make teams to limit exposure of staff. These are in place until the end of April.

Project by Project walk through
Brunswick:

- Kelly M. The operations team is separate from the fishway at this facility. So BF does not believe that DMR access to the site will be limited at this site.
- Kelly M. Under scenario 1 on the excel sheet, even if fishway operations staff are not able to be at the site, operations will be able to operate the fishway. The fishway should not have to be closed and it is BF priority to ensure that their project continues to provide fish passage. They would make sure the fishway is “open, functional, operational”. The fishway would be open and clear of debris.
- Sean L. Scenario 2 is the limited DMR staff scenario. DMR is always limited on staff to truck fish from ‘terminal fishways’ such as Lockwood. DMR is trying to limit the projects that they undertake this year and spreading staff too thin. Even under a limited staffing scenario, DMR would prefer to delay opening the fishway or to not open the fishway. At terminal fishways, DMR’s opinion is that allowing fish to pass puts those fish at higher risk than keeping them below the project. This is the case at Brunswick. There is no spawning habitat above Brunswick to which alewives have access to. Passing alewives upstream will increase mortality for alewives while not producing juveniles for the 2020 season. Also, opening the fishway and not sorting fish would allow white catfish upstream, which would have long term consequences. DMR AND IFW are concerned that passing catfish at Brunswick may pose a greater risk than the potential benefits of passing herring and salmon.
- Jim P. Operating the fishway with sorting is preferred for as long as possible. If sorting is not possible the fishway should not be open. Volitional passage is not an option for IF&W.
- Kelly M. Asked to clarify should we (DMR?) be planning to close the fishway now or should we be planning to operate the fishway with limited staff.
- Sean L. DMR would prioritize trucking fish at Lockwood over Brunswick. So would like to plan for not operating the Brunswick fishway.
 - o Gail W. Clarified, DMR would still likely do some stocking of Sabattus Lake run to ensure the Androscoggin River alewife run continues.
- Matt Buhyoff. Repercussions exist if project operators do not pass fish in normal times. We are lucky at Brunswick that we can operate in a volitional manner and be able to pass salmon that way. Also, culling of invasive species should not require a lot of staff effort. NMFS believes that the fishway can operate while reducing the threats of invasive species.

- Jeff M. There is precedent for dealing with emergency consultations if there are significant changes to operations that may impact endangered species in emergency situations. An after-the-fact consultation is one way this could be accomplished. An emergency consultation would potentially be needed if we shutdown the fishways.
- Kelly M. The agencies need to decide what operations the agencies prefer BF to follow. This should be brought to the meeting next week.
- Mike B. If DMR is stocking fish, DMR has 4 people working. If just operating the sorting facility, one person could staff the site. Therefore, only one person would be needed to cull out white catfish.
- Don Dow. Another solution would be to put a fish jump in the lower fishway. This would limit most fish from entering the fishway, but would allow ATS to enter the fishway.
- Matt L. Does not remember the specifics of if a fish jump would prevent white catfish, but was concerned it would not limit them.
- Jim P. Based on 2019 observations of various jump barrier settings, a jump would more likely create a velocity barrier and not a suitable vertical jump barrier. Volitional passage with a jump barrier is too risky and based on the information we have not suitable for adequately preventing invasives. Focus was on white catfish, but carp are also a concern and are likely stronger swimmers/jumpers than white catfish.
- Mike Brown. Because the lower pools are tidally influenced, a jump in the lower part of the fishway could be limited in efficacy by the tides. DMR typically sees white catfish when the water starts to warm in late July, early August. DMR does think that if the fishway is closed, there would be some injury to shad, likely very little impact to alewives.
 - o In regards to fishway timing. Brunswick alewives start to show up the first week of May and stop by the first-second week of June. At Lockwood, the season is longer because the blueback herring run comes in later than the alewives. Mike indicated that white cats would start moving at the beginning of June when water temps increase.
- Jeff M. The resource agencies should have a follow up to iron out differences and we should move on to other projects for the sake of time.
- Matt L. There is a concern that if fish are collected from the fishway and then the fishway is closed, BF would still need to shutdown the fishway. A fishway full of fish is an issue to empty.

Lockwood:

- Jeff M. Exclusively trap and truck. There is no volitional passage at the project. BF operates the lift and conducts sorting activities. DMR trucks salmon, shad, and river herring.
- Gail W. DMR stocks some tier 1 ponds (E.g. Wesserunsett) with alewife, some headponds with blueback herring, and some out of basin ponds.
- Kelly M. BF can keep operations separate from fishway crews. Separate gates and facilities are available for the separate crews. If BF lost its seasonal staff, operations will

not be able to take over fishway operations because it is too much effort at this site. BF recognizes its goal to pass fish and that is their primary goal. They may be able to shift resources from a lower priority project, such as Orono, to this project to maintain fishway operations. BF does not have trucks to move fish from this project.

- Sean L. DMR is able to truck fish at this site with additional physical distancing measures in place. Again, we will likely prioritize our operations because trucking will not be as efficient with social distancing measures in place. Salmon trucking can be accomplished with one staff member. If there were a shelter in place order, DMR would likely not be allowed to truck fish.
- Craig K. DMR can accomplish the alewife stocking and have developed contingency plans for stocking operations. Stocking fish will require 2 staff, but they can drive in separate vehicles from the project to the stocking site.
- Jeff M. Summarizing: absent a shelter in place order, DMR should be able to carry out stocking at this location, correct?
- Sean L: Yes, that is correct. It is also important to recognize that some of our staff, those with kids, will likely be working part time to work with family obligations.
- Kelly M. Operations staff will be able to maintain the downstream fishway at this site if fishway crews cannot.

Hydro Kennebec:

- Kelly M. At high flows salmon can ascend past the Lockwood project and enter the fishway at HK.
 - o No fish passed in 2019, 2 salmon passed in 2017, she thinks.
 - o BF cannot maintain social distancing at this site and would like to recommend not running the fishway at this site.
- Matt Buhyoff. Not running the fishway at HK should be fine, given circumstances.
- Don Dow. Agree, but if circumstances change for the better it would be good to operate the project. Kelly M stated the lift could be operated on occasion to make sure it's ready to go.
- Paul C. DMR would also support not operating the fishway at HK.

Milford:

- Two fishways: Fishlift that can be operated in an automatic or manual mode. There is also a denil that is not typically used.
- Richard D. There is trap for the denil being fabricated and can be installed in July. This will take some construction effort (4 weeks) and low flows.
- Kelly M. The primary lift and the sorting facility are sufficiently distanced from the power house to allow separation of the operations staff from the fishway staff. There are also separate gates to access the site for each crew. Fishway crews will not be able to access powerhouse. If conditions get worse and DMR is not able to staff fishway, the BF operations staff will still be on site and they could pass fish volitionally at this site.
- Mitch S said that white catfish occur in the reach of river upstream of Milford and that the Milford fishway is not operated to prevent catfish passage. Mitch S. If DMR is able

to access the site, 2-3 staff can operate the sorting facility with 2 or so people on the roof sorting fish and one person at the counting window. If DMR is not available to operate the fishway, DMR would prefer to open the fishway to ensure that ATS are able to pass the project. If the lift breaks, free swim of fish through the denil would be ok with DMR. The denil should be open anyway, to allow more fish to move upstream. DMR is not prioritizing trucking alewives at Milford because they do have upstream access to spawning habitat.

- Oliver C. USFWS would like to continue to collect broodstock if they have the staff to do so. If they do get to a point where they do not have staff to collect broodstock, USFWS supports the decision for allowing fish to swim upstream. They would like to see the denil opened and, if possible, putting in cameras to monitor passage in the fishways.
- Richard D. As far as the hopper cam goes, BF has used a camera in the past but reviewing the camera data would add a significant amount of effort. Of note, if the denil is opened it would prevent us from getting a count of fish, as the fish going through the denil would not be able to be counted.
- Sean L. DMR has also suggested that allowing more fish to pass during May could limit effort and meet agency goals.
- Kelly M. Is USFWS planning to collect broodstock.
- Oliver C. At this time USFWS plans to be able to collect broodstock, but they will likely not be able to do as much of it. Either as less times per day, less days per week, or limiting the timeframes which they collect.
- Jeff M. If conditions stay as they are today, the fishway will be operated, DMR will sort fish, and USFWS will collect Broodstock. If USFWS is not available for broodstock collection, fish will be passed into the headpond. If DMR is not able to sort fish, fish will be passes into the headpond.

Orono:

- Jeff M. Trap and truck facility only. No volitional passage. Herring are trucked upstream of Milford facility. Salmon are taken to DMR staff at Milford to be processed. The resource agencies that signed the Penobscot Multiparty Agreement are responsible for long distance transport of herring.
- Kelly M. Operations and fishway crews do share a gate and some facilities, but BF believes they can maintain social distancing at the site. They plan to operate as normal. If conditions get worse, operations cannot truck fish at this site. So the Orono fishway would need to be shutdown in that scenario. Operations staff will maintain the downstream fishway no matter what. BF believes that shutting down this fishway will not have a significant impact on passage of ATS because ATS that approach Orono go to Milford without much delay.
- Kelly M. BF does intend to carry out all fishway studies as planned this season. They do think they can carry out all fishway studies under the current circumstances.
- Mitch S. DMR thinks BF's strategy should be fine. DMR staff do not usually go to this site under normal operations.

- Kelly M. This is one site that, if staffing at another facility has a staffing need, staff from this site could go to a higher priority site. They would only do this in consultation with the agencies.
- Oliver C. If BF is operating the site, what will BF do if they get a salmon at this site?
- Richard D. BF could release the fish upriver or transport the fish to DMR at Milford if conditions allow.
- Kelly M. If the fishway was shutdown, would it require consultation?
- Jeff M. yes, we would need to an after the fact, but I do not know if it would be formal or informal right now. If we can devise ways to protect salmon, we are doing the right thing.

Ellsworth:

- Terminal fishway. BF contracts to transport river herring into Graham lake during river herring harvest. BF staff take over river herring staffing after harvest has concluded. Trapping operated by BF and BF is always on site.
- Kelly M. Plan at this site is status quo. BF plans to hire the same contractor to truck alewife. Operations can enter from a separate area to separate themselves from the harvester. There can be a bit of crowding during the alewife harvest with lobstermen and other public at the site.
 - o If conditions get worse and fishway staff are no longer on site, operations staff will not be able to pass fish on their own and BF would need to shutdown the fishway.
 - o Agencies need to give BF guidance on priorities for fishway operations if we are faced with staffing shortage issues. Which fishways should be staffed for sure? Which terminal fishway should be closed first.
- Mitch. DMR does not see a problem with BF's plan. DMR only plays a guidance role at this site for suspected AQC fish or other salmon issues.

COVID-19 Pandemic Contingency Plan

Stocking Emergency Ad Hoc Committee

Denise Buckley, U.S. Fish and Wildlife Service, Chair
Oliver Cox, U.S. Fish and Wildlife Service
Keith McGilvary, U.S. Fish and Wildlife Service
Peter Ruksznis, Maine Department of Marine Resources
Colby Bruchs, Maine Department of Marine Resources
Jennifer Noll, Maine Department of Marine Resources
Zach Sheller, Downeast Salmon Federation
Dan Kircheis, National Marine Fisheries Service
Dan McCaw, Penobscot Indian Nation

April 2020

Committee Charge

The Stocking Emergency Ad Hoc Committee (Committee) was formed in April 2020 by the Atlantic salmon Implementation Team (IP) to undertake cross agency contingency planning for the release of endangered juvenile Atlantic salmon during the COVID-19 pandemic. The Terms of Reference were finalized on April 3, 2020 and are attached as Appendix A.

The primary goal of the Committee is to ensure the health and safety of staff while ensuring juvenile Atlantic salmon released in Maine are released in a manner that promotes survival, facilitates the recapture of family groups during age 1+ parr collections, and mitigates potential deleterious effects to the captive broodstock lines held at Craig Brook National Fish Hatchery (CBNFH).

The Committee was charged to implement a range of [stocking] contingency measures to include:

- Identify the stocking strategy of smolts from Green Lake NFH, including differences in timing and methods necessary to ensure the safety of staff. Identify any other contingency measures needed if the scenario should get worse.
 - Identify the potential program impacts of the stocking strategy and any other scenario
 - Identify potential means, if any, to mitigate these impacts

- Identify possible scenarios, including best and worst case, for stocking of fry from Craig Brook NFH, including any differences in timing and methods necessary to ensure the safety of staff.
 - Identify the potential program impacts under each scenario
 - Identify potential means, if any, to mitigate these impacts

The charges set out in the Terms of Reference focused specifically on juvenile releases from Green Lake National Fish Hatchery (GLNFH) and CBNFH. The Chair extended these charges to include juvenile releases into Kennebec River by Nashua National Fish Hatchery (NNFH) and Downeast Salmon Federation (DSF) operations releasing juveniles into the East Machias and Pleasant rivers.

Smolt Releases from GLNFH and NNFH

Prior to the formation of the Committee GLNFH and NNFH initiated the release of smolts into the Penobscot and Kennebec rivers, respectively. This action was deemed necessary due to the rapidly unfolding pandemic situation and uncertainty related to future personnel restrictions or illness that may have impacted hatchery operations.

NNFH completed the release of approximately 88,753 smolts into the mainstem Kennebec River, below the Lockwood dam on April 6th. This represents the first release of Penobscot origin smolts, transferred from GLNFH in the fall of 2019 to NNFH. The release below Lockwood deviates from original stocking plans which included several release sites in the Sandy River, a tributary to the Kennebec. The mainstem Kennebec River was only to be considered in the event either a passage study was required or as a last resort. Release timing also deviated from original stocking plans; smolts were to be released when temperatures were appropriate (7°C – 10°C) between late April and mid-May. Given that stocking occurred several weeks earlier than the normal migratory period for wild smolts, it is anticipated there could be some survival effects on this smolt cohort. Returns from the 2020 smolt cohort will be recaptured at Lockwood as grilse in 2021 and multi-sea winter adults in 2022; assessments of the cohort can be made at that time. No mitigation strategies were identified.

GLNFH will complete the release of approximately 650,000 smolts into the Penobscot River, below the Milford dam during the week of April 13th. The release of Penobscot smolts in 2020 occurred approximately three weeks early; the final releases will occur at the same time initial releases occur in a status quo year. . Given that stocking occurred several weeks earlier than the normal migratory period for wild smolts, it is anticipated that there could be some survival effects on this cohort of smolts. Returns from the 2020 smolt cohort will be recaptured at Milford as grilse in 2021 and multi-sea winter adults in 2022; assessments of the cohort can be made at that time. No mitigation strategies were identified.

Fry Releases from CBNFH and DSF

CBNFH

Under normal operations unfed fry from CBNFH are released between 85% and 100% developed. This permits CBNFH to combine as many families as possible for each scheduled

release, ensuring the broadest distribution of genetic material in to high quality rearing habitat. Releasing fry below 85% is not recommended as the fry are too weak to transport long distances or survive well in river conditions. Releasing unfed fry above 100% development is not recommended as the fry will have passed the point of accepting feed at the hatchery and the risk of starvation is heightened. CBNFH is unable to facilitate the feeding of fry under current operations.

The Committee opted to release CBNFH fry at the earliest development feasible in 2020, limiting the range to 85% - 90%, and in larger groups to condense the number of trips necessary. CBNFH load out protocols are included as Appendix C. These actions will move fry releases to early May and ensure adequate mixing of fry occurs.

CBNFH will provide standard frystocking equipment including:

- 1 F250 4X4, Yeti coolers (4), oxygen, aeration, canoe rack – 100K fry capacity
- 1 F250 4X4, blue tank (1), oxygen, aeration – 100K fry capacity
- 1 F250 4X4, blue tank (1), oxygen, aeration – 100K+ fry capacity (up to 112K without cubes)
- 2 single cooler set-ups for Sheepscot fry
- Miscellaneous equipment, buckets, dipnets, etc.

DSF

Under normal operations DMR would assist DSF with releasing fed and unfed into the East Machias and Pleasant rivers. For 2020 DSF will solely conduct fry stocking operations. DSF is self-sufficient in terms of equipment and personnel needs.

2020 Stocking Scenarios

The Committee developed a matrix [Table 1] that will guide fry stocking operations under three possible scenarios based on personnel availability. The DMR Atlantic Salmon Stocking Plan, which includes detailed regional stocking plans under each of the three scenarios and State of Maine personal protective measures, is attached as Appendix B.

Each scenario addresses shifting personnel availability, stocking protocols, identifies potential consequences and mitigation strategies. Stocking is a fluid activity that often requires changes of strategies and personnel based on environmental conditions, equipment failures and other issues. All personnel involved with stocking on an annual basis are familiar with the need for close communication and flexibility. While these scenarios address steps that will be taken under varying conditions, field and hatchery personnel will maintain the ability to make daily decisions based upon current conditions and guidance as related to COVID-19.

Table 4.1. 2020 Fry stocking contingencies in response to the Covid-19 pandemic.

	Scenario 1: Current Operations	Scenario 2: Reduced Operations	Scenario 3: No Operations
Description	Core USFWS/DMR/DSF personnel (no interns/volunteers) on split schedules to minimize contact. Staff from all agencies are available to conduct stocking activities.	A. USFWS/DMR/DSF available to conduct stocking activities B. DMR available to conduct stocking activities	A. USFWS/DSF Caretaker only, DMR available to conduct stocking activities B. USFWS/DSF available to conduct stocking activities, DMR unavailable
CBNFH Staff	Full staff (5), 2 dedicated to transport/stocking	A. minimum of 2 staff B. no staff available	A. No available staff B. Minimum of 2 staff
DMR Staff	1+/SHRU	1+/SHRU	A. 1+/SHRU B. no staff
DSF Staff	Full staff (3)	A. minimum of 2 staff B. no staff available	A. No available staff B. Minimum of 2 staff
Approach	<u>Status quo</u> : Mixed groups of fry will be released in high quality habitat to maximize survival and increase likelihood of recapture as parr broodstock. Fry releases to the East Machias and Pleasant rivers will be conducted solely by DSF personnel.	<u>Status quo</u> and in addition, fry densities may be increased to compress the number of individual release locations. <i>Daily assessment of current staff availability, safety and current COVID guidance will occur to maintain flexibility.</i>	<u>Scenario 3A</u> : In the absence of sufficient USFWS/DSF staff, unmixed groups of fry will be available for release to a reduced number of locations. DMR personnel will use USFWS vehicles to release fry. <u>Scenario 3B</u> : In the absence of sufficient DMR staff, mixed, or unmixed, groups of fry will be released in pre-selected vacant habitat near direct road access by USFWS/DSF personnel

Table 1 continued:

	Scenario 1: Current Operations	Scenario 2: Reduced Operations	Scenario 3: No Operations
Program Consequences	None anticipated	For the Penobscot population stocking activities will shift from fully seeding habitat via canoe to point stocking; habitat will not be fully seeded under this scenario	Quality habitat will not be fully seeded. The reduction of release locations, releasing fry in less optimal habitat and/or the inability to adequately mix family groups may result in poor recapture of families during parr collections in 2021. Poor family recapture may negatively impact the genetic diversity and viability of affected populations.
Mitigation	For the Dennys population, with a wide spread of development, multiple trips will be taken to locations to ensure adequate in-river mixing of families for future recovery.	Possible mitigation measures, including additional trips [on other rivers in addition to the Dennys], will be discussed if Scenario 2 is achieved.	<u>Scenario 3A</u> : Individual release locations should be visited multiple times to ensure adequate family representation at each site. <u>Scenario 3B</u> : This scenario represents the most risk to fry survival and broodstock viability. To mitigate the effects of this scenario parr broodstock collections from affected populations will be increased by 50 in 2020. Further mitigation may be available for affected populations by retaining spent age 3 broodstock in 2021.

COVID-19 Preparedness

Guidelines from the Center for Disease Control (CDC), state and federal agency will be followed to ensure the health and safety of all personnel. The COVID-19 pandemic is a dynamic situation with new information and guidelines published nearly daily. It is imperative personnel from all agencies remain in close contact in the event of new protocols or incidents affect our ability to maintain stocking activities. Personnel health and safety is of paramount concern.

COVID-19 Preparedness during fry loading, transport and release will include, but is not limited to, the following:

- Field vehicles will have supplies of hand sanitizer and either sanitizing wipes or spray bottles of isopropyl alcohol (>70%), paper towels, nitrile gloves, disposable face masks and first aid kits
 - Interiors surfaces of vehicles will be disinfected after each use; if feasible, leave vehicle windows down overnight to allow vehicle to air out
- Field personnel will limit their interaction with the public; use recommended PPE including face masks (disposable or freshly laundered cloth), safety glasses, latex/nitrile gloves will be used if public interaction is required
- Maintain physical distancing of >6'
 - Personnel will be assigned vehicles; no more than 1 person per vehicle
 - Agency personnel will work in groups no larger than 2
- If physical distancing of >6' cannot be maintained
 - Use recommended PPE including disposable face masks, safety glasses, latex/nitrile gloves
- Agency personnel will self-monitor their health, contact their supervisor in the event they develop symptoms consistent with COVID-19, receive either a positive or presumptive positive diagnosis of COVID-19
- Hatchery staff will wear nitrile gloves when weighing, loading, and off-loading fry
- Hatchery equipment will be disinfected per standard biosecurity protocols
- Hatchery equipment handled by non-FWS personnel in the field will be disinfected on site

STOCKING EMERGENCY AD HOC COMMITTEE

Terms of Reference

April 3, 2020

Issue Statement:

In response to COVID-19 pandemic, the Atlantic salmon Implementation Team (IP) has formed an Ad Hoc Committee pursuant to the Collaborative Management Strategy (CMS) to conduct contingency planning for the 2020 stocking season that may be necessary to ensure the safety of all staff and comply with social distancing and other orders. The committee will focus on smolt stocking at Green Lake and fry stocking at Craig Brook. Other projects may be considered by the committee if deemed appropriate by the chair.

Charge:

Identify a range of contingency measures that may be necessary to ensure the safety of personnel during the Coronavirus pandemic. This includes:

- Identify the stocking strategy of smolts from Green Lake NFH, including differences in timing and methods necessary to ensure the safety of staff. Identify any other contingency measures needed if the scenario should get worse.
 - Identify the potential program impacts of the stocking strategy and any other scenario
 - Identify potential means, if any, to mitigate these impacts
- Identify possible scenarios, including best and worst case, for stocking of fry from Craig Brook NFH, including any differences in timing and methods necessary to ensure the safety of staff.
 - Identify the potential program impacts under each scenario
 - Identify potential means, if any, to mitigate these impacts

Membership:

Denise Buckley, FWS, Chair
Oliver Cox
Keith McGilvray
Peter Ruksznis
Colby Bruchs
Jen Noll
Zach Sheller
Dan Kircheis
Dan McCaw

Deliverables: Initial report reflecting consideration of the charge to the Implementation Team by April 14, 2020



MAINE DMR – SEA RUN FISHERIES AND HABITAT

ATLANTIC SALMON FRY STOCKING PLAN --- Spring 2020 ---

The following stocking plan was developed by DMR in response to the Atlantic salmon Implementation Team (IP) request pursuant to the Collaborative Management Strategy (CMS) to conduct contingency planning for the 2020 fry stocking season amid the COVID-19 pandemic. The stocking plan provides alternatives for release in each drainage that minimize risk to Endangered Atlantic salmon populations and ensures the safety of all State, Federal, and NGO staff conducting essential stocking activities during the current public health emergency.

As directed by the DMR Commissioner (per agency staff meeting held 4/1/2020), DMR field staff are currently available for 2020 stocking activities while following existing Agency fieldwork and CDC guidelines to reduce risk of exposure to, and slow the spread of, the COVID-19 virus. Mitigation measures include, single user gear, limiting vehicle occupancy to the driver only, prohibiting direct contact of personnel and/or members of the public (no handshakes), maintaining 6 feet of distance from other individuals including the public at all times, disinfection of surfaces, use of hand sanitizer, and limiting the total number of personnel working together to pairs. Stocking activities in the Downeast region are typically accomplished by one regional DMR scientist and one USFWS employee traveling in separate vehicles. However, stocking could be accomplished by an individual staff member from either agency if necessary. Given the dynamic situation and changes in policies, further restrictions may be made at any time.

Contingency Plans:

The rapidly changing response to the COVID-19 pandemic may necessitate changes to staff availability should core stocking personnel from DMR or the USFWS become quarantined and/or ill thus unable to perform essential program functions. The following stocking contingency plans address three scenarios: (1) DMR and USFWS staff are both available to conduct stocking activities; (2) Only DMR staff are available to conduct stocking activities; (3) Only USFWS staff are available to conduct stocking activities. Trip level plans/logistics are provided for all scenarios (see Appendices A-C). Trip level plans include: fry numbers for each release location, UTM's of all stocking points, UTM's for access locations, and a travel itinerary to maximize stocking efficiency.

Scenario 1: DMR and USFWS staff are both available to conduct stocking activities

Under this scenario, stocking activities would occur under status quo; fry are to be released in the highest quality vacant habitat to maximize survival, increasing the likelihood of recapture of genetic family groups during broodstock collection, and maximizing freshwater production. Releases will occur throughout watersheds in broad geographic distribution to expose juvenile salmon to diverse environmental selection pressures.

Scenario 2: Only DMR staff are available to conduct stocking activities

Under this scenario, stocking activities would occur under status quo; fry are to be released in the highest quality vacant habitat to maximize survival, increasing the likelihood of recapture of genetic family groups during broodstock collection, and maximizing freshwater production. Releases will occur throughout watersheds in broad geographic distribution to expose juvenile salmon to diverse environmental selection pressures. *Note: This approach may require more daily trips to each river of origin as stocking activities will take more time to accomplish.*

Scenario 3: Only USFWS staff are available to conduct stocking activities

Under this scenario, stocking activities would be limited to a minimal number of locations; due to geographic unfamiliarity and lack of off-truck transport equipment, USFWS personnel are limited to stocking fry in locations in close proximity to road access. Where feasible, fry are to be released in vacant habitat near direct road access. ***Note: This approach is not recommended.*** However, in the event DMR scientists are unavailable to direct stocking due to COVID-19 related quarantine and/or illness, this stocking contingency plan provides USFWS personnel a limited number of locations with direct access where feasible to ensure all fry are released into their river of origin.

Program Impacts:

Scenarios 1 and 2 are status quo activities wherein the highest quality vacant habitat is stocked to maximize freshwater production as well as provide the greatest likelihood of recapture for the broodstock program at current resource levels.

Scenario 3 is a reduction in stocking activities that seeks to minimize impacts to freshwater production and broodstock program, while recognizing geographic unfamiliarity of staff and equipment limitations. Vacant habitat in proximity to road access is limited in both quality and quantity. Fry will be stocked in at least two productive locations where broodstock can likely be collected the following fall.

Broodstock collection efforts may take considerably more time and targets may not be met under this scenario. Remaining fry will be stocked in one or more high quantity mainstem habitat locations likely resulting in low survival and limited potential for recapture.

Personal protective measures:

Annual juvenile stocking is a critical program activity aimed at preservation of Downeast Coastal SHRU Atlantic salmon populations. As much as possible, fry stocking activities should be focused on distribution into quality rearing habitat that will provide the highest chance of survival. As stated above precautions will be in place to minimize exposure risk of both DMR staff and USFWS staff. DMR is committed to directing stocking activities as long as core staff avoid COVID-19 related exposure, quarantine and/or illness. Coordination between agency staff will be necessary to lay out basic logistics during off-loading to reduce exposure risk. Adequate disinfection of vehicles provides a safe space for personnel during travel. Additionally, requiring individual use of gear and vehicles will reduce exposure risk. Once fish are transported from CBNFH to river of origin for release, risk of exposure and/or transmission associated with stocking activities is reduced due to the remote setting and rare possibility of public interaction. Interaction among DMR and USFWS personnel can be extremely limited in the field using common sense precautions. Other precautions such as requiring a 'one-out policy' wherein only one staff person is allowed outside a vehicle at any time is feasible to further reduce exposure risk. The aforementioned steps, in combination with following CDC guidelines, will ensure the safety of all State, Federal, and NGO staff while allowing critical stocking activities to be completed during the current COVID-19 public health emergency.

2020 Fry Stocking Plan: Downeast Coastal Rivers SHRU Narraguagus, Pleasant, Machias, and Dennys

Trip level stocking plan/daily itinerary employed under;

Scenario 1: DMR and USFWS staff are both available to conduct stocking activities

NARRAGUAGUS RIVER

NG	20-Nov	5/13/2020	5/29/2020	73,255	176,782
NG	22-Nov	5/14/2020	5/30/2020	54,398	
NG	25-Nov	5/15/2020	5/31/2020	24,047	
NG	27-Nov	5/17/2020	6/1/2020	17,745	
NG	2-Dec	5/19/2020	6/2/2020	7,337	

Day 1: 87,423 fry

Mainstem: Hemlock Dam (57,488), 30-35-0 Landing (9,095), 28 Pond Outlet (12,790), Above Bracey (2,500)

Tribs: 35 Brook (5,550)

Day 2: 89,359 fry

Mainstem: Beddington Braids (55,884)

Tribs: Shorey Brook (5,189), Rocky Brook (2,070), Baker Brook (10,425), Little Narraguagus (5,424)

MACHIAS RIVER

MC	20-Nov	5/13/2020	5/29/2020	11,771	189,147
MC	22-Nov	5/14/2020	5/30/2020	21,294	
MC	25-Nov	5/15/2020	5/31/2020	97,094	
MC	27-Nov	5/17/2020	6/1/2020	43,995	
MC	2-Dec	5/19/2020	6/2/2020	14,993	

Day 1: 94,586 fry

Mainstem: WigWams (29,406)

Tribs: Libby Brook (8,620), Mopang → Eagle Rock (13,600), Horse Rips (18,900), 2nd Lake Outlet (24,060)

Day 2: 94,561 fry

Tribs: Chain Lakes Stream (34,340), Dead Stream (14,200), Holmes Brook (6,540), West Branch → 50-29-0 Landing (9,103), Rolford (5,428), 39-00-0 (11,200), Fletcher Brook (6,900), Dunning Brook (1,250), OFFLOAD New Stream (7,900)

DENNYS RIVER

DN	4-Nov	4/27/2020	5/13/2020	51,084	+
DN	7-Nov	5/2/2020	5/18/2020	39,579	
DN	12-Nov	5/8/2020	5/24/2020	24,417	
DN	14-Nov	5/9/2020	5/26/2020	21,448	
DN	19-Nov	5/12/2020	5/28/2020	17,472	
					154,000

Day 1: 91,000 fry

Mainstem: Robinson's Pit (30,469)

Tribs: Cathance – Flume (8,768), Marion Falls (3,776), Nowhere Rips (44,582) and Dead Stream (3,405)

Day 2: 63,000 fry

Mainstem: Stoddard Rips (34,335), Clark Rips (10,780)

Tribs: Cathance – Nowhere Rips (14,785) and Venture Brook (3,100)

Scenario 2: Only DMR staff are available to conduct stocking activities

Same trip logistics as Scenario 1. *Stocking densities will be increased at in large sub-reaches to reduce number of stocking locations.* USFWS loads truck, DMR scientist conducts all transport from hatchery to stocking location.

Scenario 3: Only USFWS staff are available to conduct stocking activities

Reduced stocking activities. 2 – 3 stocking locations per day. Off-truck stocking equipment provided to USFWS where necessary. Trip logistics by river below:

NARRAGUAGUS RIVER

NG	20-Nov	5/13/2020	5/29/2020	73,255	+
NG	22-Nov	5/14/2020	5/30/2020	54,398	
NG	25-Nov	5/15/2020	5/31/2020	24,047	
NG	27-Nov	5/17/2020	6/1/2020	17,745	
NG	2-Dec	5/19/2020	6/2/2020	7,337	
					176,782

Day 1: 88,391 fry

Mainstem:

Hemlock Dam (42,156)

- Stocking point: UTM 573117; 4967786
- Access → From 30-00-0/CCC Road: UTM 572840; 4967611

Beddington Braids (41,046)

- Stocking point: UTM 573745; 4964981
- Access → From E. Beddington Lake Road: UTM 573745; 4964981

Tribs:

Shorey Brook (5,189)

- Stocking point: UTM 575112; 4965251
- Access → From E. Beddington Lake Road: UTM 575192; 4964382

Day 2: 88,391 fry

Mainstem: → Hemlock Dam (42,156), Beddington Braids (41,046)

Tribs: → Shorey Brook (5,189)

MACHIAS RIVER

MC	20-Nov	5/13/2020	5/29/2020	11,771	189,147
MC	22-Nov	5/14/2020	5/30/2020	21,294	
MC	25-Nov	5/15/2020	5/31/2020	97,094	
MC	27-Nov	5/17/2020	6/1/2020	43,995	
MC	2-Dec	5/19/2020	6/2/2020	14,993	

Day 1: 92,861 fry

Mainstem:

Route 9 (41,351)

- Airline Rips Campsite below Route 9
- Stocking point: UTM 591817; 4973085

Tribs:

Chain Lakes Stream (51,510)

- Below Route 9
- Stocking point: UTM 600846; 4977014

Day 2: 96,286 fry

Mainstem:

Crooked River Confluence (68,086)

- @ confluence
- Stocking point: UTM 590565; 4975857
- Access → Off 52-00-0 Road to end of Crooked River Road

Tribs:

Dead Stream (21,300)

- 58-00-0 Road Culvert
- Stocking point: UTM 594937; 4980698
- Access → from Route 9: UTM 599059; 4976281

Fletcher Brook (6,900)

- 42-00-0 Road Culvert
- Stocking point: UTM 585251; 4990164

DENNYS RIVER

DN	4-Nov	4/27/2020	5/13/2020	51,084	+
DN	7-Nov	5/2/2020	5/18/2020	39,579	
DN	12-Nov	5/8/2020	5/24/2020	24,417	
DN	14-Nov	5/9/2020	5/26/2020	21,448	
DN	19-Nov	5/12/2020	5/28/2020	17,472	
					154,000

Day 1: 90,663 fry

Mainstem:

Robinson's Pit (40,304)

- Stocking point: UTM 638855; 4973510
- Access → from Route 86: UTM 638825; 4973320

Tribs:

Cathance – Nowhere Rips (44,159)

- Stocking point: UTM 631087; 4973831
- Access → landing/trailhead: UTM 630874; 4973518
- Access → from Route 86: UTM 630149; 4970258

Venture Brook (6,200)

- Stocking point: UTM 635201; 4973702
- Access → from Route 86: UTM 636333; 4972234

Day 2: 63,337 fry

Mainstem: Robinson's Pit (26,196)

Tribs:

Cathance – Nowhere Rips (30,041)

Dead Stream (7,100)

- Stocking point: UTM 625524; 4984513
- Access → from Route 191: UTM 625249; 4984942

Note: The Pleasant River is stocked by DSF staff under the direction of DMR. See reach level stocking plan below.

2020 DSF Fry Stocking Request per DMR allocation - Pleasant River Drainage

Stream	Subreach	2019 Redds	Habitat Units	Lifestage	Estimated Stocking Density	Estimated Number of Fry
Eastern Little River	All	0	82	UnFed Fry	250	20500
Pleasant River	Pleasant River Lake - Beech Hill	0	49	Eyed-Egg Planting	0	0
	Beech Hill - Ravine	0	124	Eyed-Egg Planting		0
	Ravine - Crebo	0	162	Eyed-Egg Planting		0
	Crebo - Farren	16	62	Eyed-Egg Planting		0
	Saco Falls - Artie's Bridge	13	372	UnFed Fry	0	0
	Clubhouse Rips	0	81	UnFed Fry	250	20250
	Newcomer's Rips	1	83	UnFed Fry	250	20750
	Ben Allen Rips	0	97	UnFed Fry	250	24250
	Downtown Columbia Falls	0	63	UnFed Fry	175	11025
Western Little River	All	0	57	UnFed Fry	250	14250
Total		30	1232		Total	111025

2020 Fry Stocking Plan: Penobscot Bay SHRU

Trip level stocking plan/daily itinerary employed under;

Scenario 1: CURRENT OPERATIONS

Description: Core USFWS/DMR personnel (no interns/volunteers) on split schedules to minimize contact. Staff from both agencies are available to conduct stocking activities.

Figure 1.

Priorities	East	North	Site Name	River	Assigned # fry	Max Fry	Take 638,847	total #
Highest #1	457334	5009702	Barrows Falls 97.90	Piscataquis	107,293	na	11-NOV, 15-NOV (107,293)	638,847
Highest #1	455235	4998994	foot stock #1 BRIDGE	Kingsbury str.	24,657	na	8-NOV, 13-NOV (98,627)	
Highest #1	457324	5002058	foot stock #2 RD SIDE	Kingsbury str.	24,657	na	SAME	
Highest #1	460517	4999912	foot stock #3 Telephone pole	Kingsbury str.	24,657	na	SAME	
Highest #1	461065	4999299	foot stock #4 coles corner	Kingsbury str.	24,657	na	SAME	
Highest #1	565182	5099570	Red Bridge 32.24	East Branch Matta	100,814	na	1/2 of 18-NOV (100,814)	
Highest #1	515949	5108827	Matagamon 76.80 camp site	East Branch Penob	100,815	na	1/2 of 18-NOV (100,815)	
Highest #1	515949	5108827	Matagamon 76.80 camp site	East Branch Penob	101,854	na	1/2 of 21-NOV (101,854)	
Highest #1	522185	5086624	Katahdin Brook 10.02	Wassataquoik	101,855	na	1/2 of 21-NOV (101,855)	
Highest #1			SAME	Wassataquoik	27,589	na	21-NOV (27,589)	
Highest #2	457334	5009702	Barrows Falls 97.90	Piscataquis	107,293	na	11-NOV, 15-NOV (107,293)	638,847
Highest #2	458634	5002100	Bingham Rd Thorn Brk 0.00	Kingsbury str.	98,627	na	8-NOV, 13-NOV (98,627)	
Highest #2	569597	5093467	Sno Mo 11.59	East Branch Matta	107,711	na	1/2 of 18-NOV (100,814) 25-NOV (6,897)	
Highest #2	515949	5108827	Matagamon 76.80 camp site	East Branch Penob	107,711	na	1/2 of 18-NOV (100,815) 25-NOV (6,897)	
Highest #2	528299	5110008	Matagamon rd X.XX	Seboeis	108,752	na	1/2 of 21-NOV (101,854) 25-NOV (6,897)	
Highest #2	522185	5086624	Katahdin Brook 10.02	Wassataquoik	108,753	na	1/2 of 21-NOV (101,855) 25-NOV (6,898)	
Highest #3	457334	5009702	Barrows Falls 97.90	Piscataquis	107,293	na	11-NOV, 15-NOV (107,293)	638,847
Highest #3	458634	5002100	Bingham Rd Thorn Brk 0.00	Kingsbury str.	98,627	na	8-NOV, 13-NOV (98,627)	
Highest #3	528299	5110008	Matagamon rd X.XX	Seboeis	215,423	na	18-NOV (201,629) 1/2 OF 25-NOV (13,794)	
Highest #3	515949	5108827	Matagamon 76.80 camp site	East Branch Penob	217,504	na	21-NOV (203,709) 1/2 OF 25-NOV (13,795)	

REDUCED - Normal Stocking Activity

APPROACH: Status quo: Mixed groups of fry will be CANOE STOCKED in high quality habitat to maximize survival. Fry densities have been increased to compress the number of individual release locations.

STAFF: CBNFH = 2 dedicated to transport/stocking

DMR STAFF = 1+ Biologists/SHRU

Status Quo, Limit Personnel Contact, Reduced USFWS Staff)

Stocking locations: DMR staff will CANOE stock locations as listed in Figure 1. when fry are at 85% development or more.

Scenario 3: No Operations

Description: A. USFWS Caretaker only, DMR available to conduct stocking activities
B. USFWS available to conduct stocking activities

Reduced Stocking Activities: NO CANOE STOCKING; SITES REDUCED 4 POINT STOCK SITES

APPROACH: Scenario 3A: In the absence of sufficient USFWS staff, unmixed groups of fry will be available for release to a reduced number of locations

Scenario 3B: In the absence of sufficient DMR staff, mixed, or unmixed, groups of fry will be released in vacant habitat near direct road access by USFWS personnel

*STAFF: CBNFH A. No available staff members
B. Minimum of 2 staff members*

*DMR A. 1+ Biologists/SHRU
B. no staff available*

Stocking locations: DMR or USFWS staff will POINT stock locations as listed in Figure 1. when fry are at 85% development or more.

4 large point stocking (ease of locations, point stock large sections of habitat)

USFWS caretaker will load fry for DMR and/or FWS staff at of hatchery.

2020 Fry Stocking Plan: Merrymeeting Bay Sheepscot River

Trip level stocking plan/daily itinerary employed under;

Scenario 1: DMR and USFWS staff are both available to conduct stocking activities

Priorities	Easting	Northing	Site Name	River	Assigned Fry #	Reduced stocking	Take	
Highest	473995	4922697	Burnham Hill Rd.	Mainstem	2,850	5,400	14-Nov	27,750
Highest	452594	4896693	Rt. 126	Mainstem	7,620	17,000	4-Nov	
Highest	461088	4906299	Somerville	Mainstem	4,834	5,400	11-Nov	
High	476124	4924900	Herb Jackson	Mainstem	6,058	n/a	7-Nov	
High	455755	4906371	Windsor Station	West Branch	4,388	n/a	7-Nov	
Medium	441460	4897547	Togus Discgolf*	Togus Stream	2,000	n/a	4-Nov	
Alternative	442131	4898115	Barber Rd.*	Togus Stream	2,000	n/a	4-Nov	

*If time is limited, Togus- Barber Rd. can be stocked instead.

** All sites, with the exception of Rt. 126, should be stocked upstream of road crossing.

Normal Stocking Operations

(Scenarios Covered: Status Quo, Limit Personnel Contact, Reduced USFWS Staff)

5/5/2020 (based on USFWS calculations, subject to change) - One DMR staff will pick up fry from Craig Brook hatchery. DMR will stock Herb Jackson, Burnham Hill, Rt 126, and Togus- Disc Golf Course. Fry takes should be kept separate if possible.

5/11/2020 (based on USFWS calculations, subject to change) - One DMR staff will pick up fry from Craig Brook hatchery. DMR will stock Somerville and Windsor Station. Fry takes should be kept separate if possible. Fry takes should be kept separate if possible.

Reduced Stocking Operations

(Scenarios Covered: State and Federal Shutdown, Federal Shutdown, Limited Fieldwork)

Highest level priority sites should be the minimum number of sites to be stocked. As many sites should be attempted to be stocked as possible. Fry takes can be mixed if needed.

Scenario 2: Only DMR staff are available to conduct stocking activities

See Scenario 1.

DMR staff will need a minimum of one USFWS staff available to deliver fry to DMR staff outside of hatchery.

Scenario 3: Only USFWS staff are available to conduct stocking activities

Normal Stocking Operations

(Scenarios Covered: State Shutdown, COVID+ cases in both DMR staff)

USFWS staff is advised to stock locations as listed in Scenario 1-*Normal Stocking Operations* when fry are at 85% development or higher. Alternative Togus stocking site (Barber Rd.) should be used instead of Togus- Disc Golf Course site. If possible, keep fry takes separate.

Reduced Stocking Activities

(Scenario Covered: If State had been previously shut down, and notification of federal government shut down occurs)

USFWS staff is advised to stock locations as listed in Scenario 1-*Reduced Stocking Activities* when fry are at 85% development or higher. Alternative Togus stocking site (Barber Rd.) should be used instead of Togus- Disc Golf Course site. Fry takes can be mixed if needed.

Craig Brook National Fish Hatchery Load-out, Transport, and Release Protocols

Section 1. General protocols

Section 1a. General load-out protocols

Stocking vehicles are prepped prior to load-out of fry. Each vehicle carries either a single tank [with 15 cubes] or four 178 quart coolers [three cubes each] with a maximum capacity of 48 pounds of fry. Vehicle tank(s) are watered, cubes (if using) are examined for damage, oxygen tank and fuel levels checked and aerator function confirmed. Oxygen levels are set to between 0.5 and 1.0 lpm per stone; one stone per cooler and three stones per tank. Prior to adding fry to cubes even oxygen dispersal is confirmed. Any deficit or fault is corrected immediately. If deficit or fault cannot be corrected another vehicle is used. Once a vehicle is ready to receive fry load-out begins.

CBNFH track fry inventory from the eyed-egg stage through load-out by counting individual mortalities from each incubation tray; each tray starts with 6,500 eyed-eggs, with one 'short' tray holding the remainder of the group. Difference load-out scenarios are used depending on the trip logistics. A sample count for each group is obtained by weighing a known number of fry; example, one tray with 6,200 fry weighing 3.1 pounds equates to 2,000 fry/pound. The total number of fry, and the associated weight is recorded on a field sheet. Fry are weighed on a large 250 pound capacity scale. Up to four five-gallon buckets with water are place on the scale and tared. Fry from four trays are poured into each of the buckets, taring between each bucket. If additional fry are required for the trip fry from another group will be added in equal proportion to the four buckets to equal the desired total. The fry are then loaded into the cubes.

CBNFH personnel work with DMR biologists to determine the number of fry required for each stocking location. To ensure a broad distribution of fry throughout stocked habitats, fry from all spawn groups are combined if their individual development levels fall between 85% and 100%. For 2020 the targeted development levels are 85% and 90%; this will allow fry to be released at the earliest date possible but still permit some mixing of groups to occur. CBNFH personnel uses trip level fry requirements as a guide for mixing and loading fry into the cubes. No more than four pounds of fry are placed in a single cube. The size of the fry, water and air temperature, transport time and length of stocking trip are considered when loading fry; densities may be reduced if deemed necessary.

Once fry are loaded cube lids are secured, oxygen dispersal and levels are confirmed, using a calibrated YSI ProODO or YSI Pro20; effort is made to ensure

oxygen levels do neither drop below 100% saturation nor go above 150% saturation. Tanks or coolers are secured with ratcheting tie-downs.

Section 1b. General transport protocols

CBNFH personnel will carry a cellphone and have the number of the DMR representative they are to rendezvous with. Personnel transporting fry will procedure to either the stocking location or designated meeting location by the most expeditious route; attention will be given regularly to the amp meter, or other visible indicator in the cab of the vehicle that indicates the aerators are functioning. One stop each hour is required to check the temperature, oxygen, aerators, and status of the fry. Fry should be low in the cubes, with only a few individuals swimming up in the cube. Large numbers of fry in the water column, fry on their sides, or the fry appear grayish in color are signs of distress. Adjustments to oxygen settings can be made, but are generally not recommended unless the levels have dipped below 100% saturation. If significant signs of distress are noted CBNFH personnel will advise the DMR biologist and alternate stocking locations may be used.

Aerators are turned off during fry removal; care must be taken to ensure they are turned back on if another release location is being visited. At each stocking location fry are poured from each cube into watered five-gallon buckets; additional water is poured over and through the cube to facilitate fry removal. Fry may also be dipped from cubes into buckets.

Once all the cubes have been emptied they are set aside to allow personnel to capture any fry that may be loose in the tank/cooler. These fry are placed in a bucket at released. At this time the aerators are turned off, the oxygen valve is closed and the tanks are drained. Tanks or coolers are secured before leaving the site.

Section 1c. General Release protocols

CBNFH personnel will adhere to DMR release protocols, whether assisting DMR personnel or conducting stocking on their own to specified locations. CBNFH personnel may participate in either foot stocking or point stocking; CBNFH personnel will not participate in canoe stocking in 2020.

Section 2. Current Operations

Under our current operations the following modifications to general protocols have been made:

- CBNFH personnel will be split into two crews: one stocking crew (two people) and one hatchery operations (three people)
 - No interns or volunteers are anticipated at this time

- CBNFH will maintain >6' distance whenever feasible during load out and release; PPE will be worn at all times
- CBNFH personnel will be assigned a stocking vehicle; interior surfaces of the vehicle will be disinfected after each use
- CBNFH will not participate in canoe stocking

Section 3. Reduced Operations

Under a reduced operations scenario further modifications to general protocols and those in Section 2 will be made:

- A minimum of two CBNFH personnel are required to load fry
- Fry handling at the hatchery may be minimized
 - Weights may not be collected
- One CBNFH person will transport fry
- DMR personnel may be asked to assist with loading and/or transporting of fry

Section 4. No operations

Under this scenario there may be either no CBNFH or DMR personnel available to conduct stocking activities. This will cause even further restrictions in activities as those presented under general protocols and Sections 2 and 3.

- Fry handling will be minimized; no weights and minimal data recording
- DMR will conduct transport
- If no DMR personnel are available CBNFH will conduct all stocking activities, releasing fry into pre-arranged and easily accessible locations.

BROODSTOCK COLLECTION EMERGENCY AD HOC COMMITTEE

Terms of Reference

May 26, 2020

Issue Statement:

In response to COVID-19 pandemic, the Atlantic Salmon Implementation Team (IP) formed an Ad Hoc Committee pursuant to the Collaborative Management Strategy (CMS) to conduct contingency planning for the 2020 broodstock collection season to ensure the safety of all staff and comply with social distancing and other orders. The committee will focus on adult salmon broodstock from the Penobscot River and parr broodstock collection for the captive lines housed at Craig Brook NFH (CBNFH). Other projects may be considered by the committee if deemed appropriate by the chair.

Charge:

Identify contingency measures for the collection of broodstock that are necessary to ensure the safety of personnel during the COVID-19 pandemic. This includes:

Sea-Run Broodstock

- Identify protocols for the collection, handling, transport and processing of adult broodstock at the trap at the Milford Dam and CBNFH.
 - Identify collection, sampling, and transfer protocols of fish at the Milford Dam trapping facility that safeguards the health and safety of individuals involved.
 - Identify transfer, transport, fish health screening, and handling protocols of fish at CBNFH that safeguards the health and safety of individuals involved.
 - Identify potential impacts and mitigations of either not receiving any adult broodstock or receiving a reduced numbers of adult broodstock.

Parr Broodstock

- Identify protocols for the collection, transport, handling, and processing of parr broodstock in the field and at CBNFH.
 - Identify collection and transport protocols for parr broodstock that safeguards the health and safety of individuals involved.
 - Identify protocols for the transfer of fish to the receiving buildings at CBNFH that safeguards the health and safety of individuals involved.
 - Identify potential impacts and mitigations to either not receiving any parr brood or receiving a reduced numbers of parr broodstock.

Membership:

Oliver Cox, FWS (Chair)
Denise Buckley, FWS
Jason Duryea, FWS
Meredith Bartron, FWS

Ernie Atkinson, DMR
Mitch Simpson, DMR
Paul Christman, DMR
Colby Bruchs, DMR

Jason Valliere, DMR
Jen Noll, DMR
Dan McCaw, PIN
Zach Sheller, DSF

Deliverables:

Report reflecting consideration of the charge to the Implementation Team.

BROODSTOCK COLLECTION EMERGENCY AD HOC COMMITTEE REPORT

Sea-Run Broodstock

The Ad Hoc Team discussed several scenarios related to the 2020 sea-run brood collection and ways to mitigate safety and brood quantity issues (Table 1). On June 1, 2020, the FWS notified the CMS that they could accept brood safely under the current COVID-19 guidance beginning on June 15, 2020. The protocols developed for the transport and handling of sea-run brood from Milford to CBNFH were vetted internally by the FWS and adopted as Scenario 1 (Table 1). Scenario 1 was presented to the Ad Hoc team and discussed with the Milford trap crew to address the logistical details of safely collecting brood. The other scenarios discussed were the release of Atlantic Salmon (ATS) to the river (Scenario 2) and the potential to stock pile brood at CBNFH for gravid release (Scenario 3). Scenario 3 was determined too risky for fish health reasons because of the number of ATS that could be at risk should a fish health issue arise at CBNFH. It was determined that if the ATS cannot be screened for diseases, they are better off in the river.

For each scenario, the risks and mitigating factors were established for personnel safety, fish health, genetic implications, future brood implications, and spawning considerations (Table 1). Bear in mind that we are not choosing between Scenario 1 and 2 but rather we are on a continuum. Currently CBNFH has over 200 ATS on station and Maine DMR has released over 1,400 ATS. There may be COVID-19 related issues or water temperatures may be too high at any time during the collection that prevent us from collecting brood. If that is the case, fish will be released to the river until brood collections can resume.

Brood Collection

The broodstock goal of 200 multi-sea-winter (MSW) females, 170 MSW males, and 30 grilse was established based on four factors; 1) minimize the handling of fish to also limit the interactions of staff during the fish screening process, 2) logistical considerations related to the timing and shipping of the fish health samples to Lamar, PA., 3) collect enough eggs to meet the Penobscot River smolt production goal (650,000 smolts) while also minimizing the number ATS that need to be spawned and 4) to maintain the same female to male representation as previous brood targets.

The brood collection scheme allows for FWS to manage health risks to people and fish. Up to 30 fish will be transported daily on Mondays, Tuesdays, Wednesday, and Thursday. The last transport truck will depart Milford by 1:00 pm to allow the CBNFH staff to conduct their fish health screening. It was also determined that Maine DMR would not conduct their normal sampling protocol, but that would be done at CBNFH. This decision was made to minimize the handling of ATS. Maine DMR will decide which fish to pass and which fish to sort out for brood with the goal of meeting a 1:1 ratio of females to males. All fish not collected for brood will be released to the river.

Northeast Fisheries Center

The Genetics Lab is operational and there should be no COVID-19 impacts since samples are preserved and can be processed at a later date. If there is no genetic information prior to spawning, matings will be done randomly to minimize inbreeding.

The Lamar Fish Health Center (FHC) is operational. Under normal operating procedures, the FHC

processes the brood fish blood samples upon receiving the overnight shipments from CBNFH. CBNFH staff will be notified in the event the FHC is not able to process samples. Broodstock can still be transported to CBNFH and blood samples can still be collected as fish arrive. The blood samples can be fixed using RNAlater, a stabilization solution, and frozen right away; the sample can then be processed via PCR at a later date. This alternative method is not ideal since the live virus can be lost during freezing and thawing the sample and you lose the ability to conduct blood/HBSS cell culture test that is done to confirm a diagnoses. Fish will not be collected if the CBNFH screen building tank space reaches capacity. Brood collections can resume once tank space is available again.

Spawning

Spawning is currently considered an essential activity by the FWS. However, it is recognized that guidance may change or other circumstances may arise that could prevent the FWS from spawning. If that happens, the gravid brood will be released into spawning habitat. If it is known ahead of time, the brood will be released in October; otherwise, they will be released as soon as possible.

Eyed-egg Allocations

Egg allocations will proceed as normal. For any given year, the number of sea-run eggs can fall short of our goal and require the use of domestic eggs.

If the full complement of brood is collected and the number of eyed eggs is nearing 950,000 or more, no domestic eggs will be needed for smolt production. A full complement of sea-run eggs will be transferred to GLNFH for smolt production and the remaining eggs will be available for fry production. If there is a shortage of sea-run eggs, eggs will be transferred to GLNFH and the age 4 domestic brood eggs will be allocated to smolt production in a manner that captures the genetic variability of that cohort to produce a full complement of Penobscot River smolts. In this case, there will be no sea-run fry production at CBNFH. Any and all remaining domestic eggs will be available to Maine DMR for egg planting. The FWS will determine if age 4 domestic eggs can be transferred to CBNFH for fry production for the Penobscot.

Age 3 domestic eggs will be available to Maine DMR for egg planting.

Table 1. Atlantic Salmon (ATS) Sea-run broodstock collection scenarios for the Penobscot River program.

Alternative	Scenario 1 Reduced Collection	Scenario 2 No Collection	Scenario 3 Collection for Gravid Release
General Description	<ul style="list-style-type: none"> • Up to 200 MSW female, 170 2SW males and 30 grilse will be accepted by CBNFH for broodstock • Daily maximum accepted will be 30 ATS • Favor 2SW fish for broodstock if truck space is limited • Disease sampling, tagging, tissue and metric data collection of broodstock will occur at CBNFH • No ATS will be accepted Friday through Sunday, on holidays, or the day before a holiday • Increased escapement to the river due to fewer brood being collected • There are water temperature constraints on handling ATS that may necessitate the need to let fish pass upstream and not be collected 	<ul style="list-style-type: none"> • CBNFH is not able to safely accept broodstock, ATS will free-swim • All ATS are allowed to pass Milford (100% escapement to the river) 	<ul style="list-style-type: none"> • CBNFH is only able to transport SR ATS and not able screen the brood. • ATS would be held until October and then released into spawning habitat. • This alternative is not feasible due to fish health considerations at CBNFH
Personnel Health and Safety Considerations	<ul style="list-style-type: none"> • DMR personnel are able to social distance and complete the sampling of ATS • CBNFH personnel are able adhere to FWS, DMR, and Brookfield safety, biosecurity protocols and Covid-19 prevention procedures to safely accessing the Milford site, transport ATS, conducting sampling and tagging activities at CBNFH • Northeast Fish Center (fish health genetics) is able to safely process samples • If the Center was closed, samples could be stored and processed later. This is not ideal for blood samples but doable to allow for Infectious Salmon Anemia virus (ISAv) detection. • All sampling and tagging activities will occur immediately upon receipt of SR ATS and be conducted in a manner to 	<ul style="list-style-type: none"> • DMR is able to work-up ATS on their sample days (M, W, F) as long as water temperatures are < 24.0 °C. • DMR is able to perform hopper or window counts of SR ATS. • No Covid-19 related health risks to CBNFH personnel exist under this scenario 	

	<p>alleviate potential heat-related stress from wearing both required biosecurity gear and Covid-19 PPE</p> <ul style="list-style-type: none"> • Workstations will be designed to maximize physical distancing during sampling and tagging activities • Only FWS personnel, including volunteers and interns, will be permitted on FWS vehicles 		
Fish Health Considerations	<ul style="list-style-type: none"> • Status quo procedures for the handling of pathogenic and non-pathogenic individuals will be followed. • Samples will be shipped to the Lamar Fish Health Unit by 5pm Monday-Thursday. • Limiting the number of samples submitted daily may assist with the timing of sample analysis and results reporting 	<ul style="list-style-type: none"> • No screening for ISA v • No impact to the Penobscot River population 	
Genetic Considerations	<ul style="list-style-type: none"> • Approximately 200 hatchery family groups will be created. This is a slight reduction from 2019. • With more ATS in the river there is potential to increase the diversity of wild family groups and to allow for precocious parr to participate in spawning. • ATS cohorts are multi-generational thus mitigating against genetic loss to the broodstock population; additionally, age 4 domestic Penobscot broodstock reared at Green Lake National Fish Hatchery (GLNFH) are the same cohort as 2020 two-sea-winter ATS • Domestic broodstock could be used to supplement smolt production and increase the genetic diversity of the 2022 smolt cohort 	<ul style="list-style-type: none"> • Natural spawning allows for mate selection, supports local adaptation, and will produce future generations of genetically diverse adults for the Penobscot population and as use for broodstock • Most hatchery origin ATS are imprinted to the lower river and not to productive habitat. Some of these fish may not successfully reproduce. • ATS cohorts are comprised of adults from many smolt cohorts, Thus, the hatchery brood line did recapture some of these genes in 2019 and will be able to collect some of the “missed” genetic in 2021 • Age 4 domestic Penobscot broodstock reared at GLNFH are the same cohort as 2020 two-sea-winter ATS 	

		<ul style="list-style-type: none"> Genetic samples from SR ATS would be collected by DMR only on sample days 	
Estimated production	<ul style="list-style-type: none"> Up to 950,000 sea-run eyed eggs to GLNFH yielding: <ul style="list-style-type: none"> Up to 650K smolts Up to 100K 0+ parr to Nashua NFH Up to 100K 0+ parr stocked into PN Up to 310K sea-run fry for the PN No impact to domestic production allocation 	<ul style="list-style-type: none"> No sea-run ATS hatchery production All hatchery production will be from GLNFH domestic line Age 4 domestic broodstock at GLNFH will be used to produce the 2022 smolt cohort The smolt cohort may be less than 650,000 Additional age 4 domestic eggs are available for egg stocking and possibly fry for the PN Age 3 domestic eggs are available for egg stocking in the KN 	
Future Broodstock considerations	<ul style="list-style-type: none"> Natural spawning may result in future generations of genetically diverse and locally adapted adults for use as broodstock 	<ul style="list-style-type: none"> The absence of ATS in 2020 will create a gap in the development of domestic broodstock at GLNFH Mitigation strategies could include retaining age 4 and/or age 3 broodstock an additional year, collecting Penobscot parr or smolts This action will require infrastructure changes to ensure biosecurity Returns of the 2022 smolt cohort may be lessened which will prompt the use of domestic broodstock during these years. Retain domestic brood (TBD) 	
Spawning considerations	<ul style="list-style-type: none"> Spawning is considered an essential fish task and permitted under current guidelines. If spawning is not permitted due to changes in FWS guidance, gravid brood will be released into spawning habitat 	<ul style="list-style-type: none"> None 	

Parr Broodstock

The Ad Hoc Team discussed two scenarios related to the 2020 parr brood collection and ways to mitigate safety and brood quantity issues (Table 2). Scenario 1 considered that the full complement of parr are collected and Scenario 2 was that no parr are collected. For each scenario, the risks and mitigating factors were reviewed for personnel safety, genetic implications, brood implications, fish health and spawning considerations (Table 2). Just as with the sea-run brood collections, we are not choosing between Scenario 1 and 2 but rather we are on a continuum.

Parr Brood Collection and Future Spawning

Under current COVID-19 guidance both the USFWS and DMR are able to provide crews to collect parr brood. Several COVID-19 mitigation measures such as social distancing, wearing PPE, and limiting vehicle occupants will be implemented. Electrofishing crews will be limited to 2 or 3 people. Standard operating procedures for electrofishing and agency specific job hazard analyses (JHAs) for COVID-19 field work and vehicle use will be followed.

The rivers/strains have been prioritized for collection (Appendix 1) so that the direct collections occur first assuming river conditions are favorable. In the event that there is a COVID-19 positive case or exposure that affects one or both crews, collections of the highest ranking rivers will remain the priority after appropriate safety measures (e.g. quarantining and disinfecting equipment) have been taken per agency guidance.

The broodstock goal for each captive strain is 215 (200 parr plus 15 extra to offset non-feeders). If broodstock collection goals are met, then the future spawning cohorts in 2022 – 2024 will proceed as expected and no additional mitigation actions are needed. If parr brood collections are anything less than 200 parr, spawning in 2022 – 2024 will be impacted; the genetic diversity will be reduced as well as production levels. The reduction in diversity and production will be mitigated

To mitigate the loss of genetic diversity, any barren captive brood from the 2016 cohort will be retained for spawning in 2021. Individuals in the 2016 brood cohort did contribute to the parr cohort being targeted in 2020 (Appendix 1, Table 1). By spawning the remaining brood from the 2016 captive line we can compensate for some of the genetic material that would have been “recaptured” in the 2020 parr collections.

There are two options that can be implemented to help CBNFH meet production goals. First, captive brood from the 2018 and 2019 cohorts can be retained and spawned in 2022, 2023, and 2024 (Appendix 1, Table 2). Second, the parr collection goals can be increasing in 2021 to bolster the number of maiden spawners in 2023 and 2024 and therefore offset the lack of 2020 parr.

The Downeast Salmon Federation noted that the effects of not meeting production goals and having eggs to transfer to the Peter Gray rearing station would negatively impact their mission and staff.

Parr Brood Field Transfers

Both the DMR and USFWS crews will coordinate parr collection so that they are working at the same time, in the same river, and at nearby sites. This will allow for the parr to be directly transferred to the USFWS transport tank reducing parr handling and decreasing the interactions between crews and offices. In the event that parr do need to be transferred from a DMR or DSF holding tank, it will be done in the field by one crew. The outside of the holding tank and lid will be disinfected and the crew

will use their own equipment. The other crew will remain in the vehicle or at safe distance away.

Northeast Fishery Center

Parr that could be collected for future broodstock in 2020 would be PIT tagged and fin clipped in summer/fall 2021. Genetic analysis of those tissues by the Northeast Fishery Center Conservation Genetics Lab would be conducted in winter/spring 2022 and are not expected to be impacted by the current Covid-19 pandemic.

The Lamar Fish Health Center is considered essential and should be operational. Under normal operating procedures, the FHC processes the ovarian fluid and milt samples upon receiving the overnight shipments from CBNFH. CBNFH staff will be notified in the event the FHC is not able to process sample. Ovarian and milt samples will not be collected if the FHC is not able to accept the samples at the time of spawning. Along with testing on all broodstock mortalities, additional fish health screenings can be done on resultant fry to mitigate for the lack of fish disease testing at the time of spawning. If this is the case, egg planting would not be permissible.

2020 Captive Brood Spawning

Spawning is currently considered an essential activity by the FWS. However, it is recognized that guidance may change or other circumstance may arise that could prevent the FWS from spawning. That said, the health and wellbeing of the staff are the first priority. It is anticipated that no external help will be permitted to assist the hatchery with spawning. If spawning is not possible or truncated, gravid brood will be released into spawning habitat with any mitigation measure related to the 2020 parr brood collection effort implemented. If it is known ahead of time that spawning will not occur, the brood will be released in October; otherwise, they will be released as soon as possible.

Table 2. Atlantic Salmon (ATS) Parr broodstock collections scenarios for the Captive Brood Program.

Alternative	Scenario 1 Parr Collection	Scenario 2 No Parr Collection
General Description	<ul style="list-style-type: none"> • A maximum of 215 1+ parr ATS will be collected for each captive strain in a prioritized manner 	<ul style="list-style-type: none"> • No 1+ parr ATS are collected • USFWS and DMR are not able to collect broodstock. • Post spawn releases will be altered to retain brood that represent the parents of the 1+ parr
Personnel Health and Safety Considerations	<ul style="list-style-type: none"> • DMR and FWS personnel are able to social distance and collect parr brood • Each crew will adhere to their agency specific guidance • Agency staff will not share vehicles with other agencies • DMR and FWS will each have a collection crew that will work nearby each other but independent from each other. • Field transfers of parr from DMR to USFWS will be done utilizing social distancing measures and disinfecting equipment as needed • Crews will wear appropriate PPE • FWS will disinfect equipment as needed 	<ul style="list-style-type: none"> • All Covid-19 related health risks to field personnel are mitigated for under this scenario
Fish Health Considerations	<ul style="list-style-type: none"> • All sampling and tagging activities will occur at a later date (i.e. summer of 2021) and be done in a manner that reflect our current Covid-19 protocols and PPE requirements • Northeast Fishery Center (fish health and genetics) is able to safely process samples • If the Center was closed, samples could be stored and processed later. • Status quo procedures for the handling of pathogenic and non-pathogenic individuals will be followed. 	<ul style="list-style-type: none"> • N/A
Genetic Considerations	<ul style="list-style-type: none"> • Collections of each strain are prioritized within each SHRU based on heterozygosity and effective population size • Broodstock will be available for spawning 2022, 2023, and 2024 as customary 	<ul style="list-style-type: none"> • Broodstock won't be collected in 2020 to represent the diversity from broodstock spawned predominantly in 2018. • Due to limited use of repeat spawning and little contribution to other year classes in the parr collection, the genetic diversity from the adults spawned in 2018 would not be captured
Spawning Considerations	<ul style="list-style-type: none"> • No impact on future captive brood 	<ul style="list-style-type: none"> • The absence of 2020 parr brood result in the loss of a spawning year class • Genetic mitigation strategy is to retaining barren brood from the 2016 captive cohort currently held at CBNFH for spawning in 2021 • Production mitigation strategies are to increase parr collection targets in 2021 to offset loss of 2020 collection year for future production and retain captive brood to bolster the egg take in 2022, 2023, and 2024.

Appendix 1

Prioritization of drainages for Atlantic salmon parr broodstock collection based on genetic diversity parameters

Meredith Bartron, USFWS Northeast Fishery Center, Lamar, PA
July 31, 2020

Due to Covid-19, parr broodstock collection efforts may be impacted. For some of the six rivers where parr are obtained for broodstock purposes, the number able to be collected may be less than the target ($n=200$ for each river), or collection may not be possible from some rivers entirely. Therefore, it may be necessary to prioritize rivers for broodstock collection efforts. One method to prioritize parr broodstock collection is based solely on estimates of genetic diversity. Populations or broodstocks with the lowest estimates of genetic diversity are likely more susceptible to further losses of genetic diversity. Broodstocks with slightly higher estimates of genetic diversity are likely more able to maintain genetic diversity if broodstock collection for 2020 resulted in limited or no parr broodstock collection.

For each metric, individual broodstocks were ranked based on their relative mean number of alleles per locus, observed heterozygosity, and effective population size, and the average of those ranks were calculated (Table 1). Given that the Dennys has on average the lowest estimates of genetic diversity, it would be considered the top priority, followed by the Pleasant River (Table 1). When considering all four metrics, the East Machias and Sheepscot have equal prioritization scores, followed by the Machias and then the Narraguagus (Table 1). Historically, both the Machias and Narraguagus have had higher broodstock numbers, the current target of 200 reflects a recent reduction for those broodstocks.

However, when ranking within SHRU, given that the Sheepscot is the only broodstock for the Merrymeeting Bay Salmon Habitat Recovery Unit (SHRU), it could be considered independently and the other populations ranked collectively since the remaining broodstocks are all within the Downeast SHRU. Therefore the Sheepscot broodstock would have a priority rank of 1 in the Merrymeeting Bay SHRU, and the Dennys would have a priority rank of 1 in the Downeast SHRU. No parr-based broodstocks are maintained for the Penobscot SHRU.

This genetic-metric based ranking does not incorporate accessibility, temperature at time of collection, or logistics of sampling, which are all parameters that could also be factored into prioritization of collection.

Implications of not collecting (or limited collection of) parr broodstock:

- Fewer adults will be available to spawn in 2022 and 2023 (when fish would be 3 and 4 year old broodstock, Table 2)
 - To address a potential shortfall if 2020 parr collections are limited, a portion of the 2018 and 2019 collection year could be retained for spawning again in 2022, 2023, and 2024 (Table 2), which would result in repeat spawning of some of those broodstock (Table 2). Repeat spawning is a deviation from normal spawning protocol. Efforts to not repeat the same crosses made in previous years would be important.
 - Target numbers for parr collections in 2021 could be increased to help offset the absence or limited number of the 2020 collection. This would be particularly important to provide sufficient broodstock for production targets in the 2023 spawn, as the only available broodstock for that spawn year would be from the 2019 and 2021 collection years (Table 2).

If spawning is not possible in 2020 due to Covid-19, then:

- Broodstock (except the 2018 and 2019 collection years) could be released pre-spawn for spawning in the rivers. Broodstock from the 2018 and 2019 collection years would be retained for spawning in 2021, 2022, and 2023 (only the 2019 collection year would be available to spawn in 2023).

Table 1. Estimates of genetic diversity including the mean number of alleles per locus), expected and observed heterozygosity (H_e and H_o respectively, and effective population size (N_e) (N_a based on microsatellite data obtained from the 2008 to 2017 parr collection years. The average priority rank represent the average rank across each metric for each broodstock, with the lowest value ranked greatest priority. Ranks are provided within the SHRUs represented.

Broodstock	SHRU	N_a	H_e	H_o	N_e	Average priority rank by SHRU
Dennys	Downeast Coastal	11.7	0.673	0.690	71.59	1
East Machias	Downeast Coastal	11.7	0.670	0.693	84.22	3
Machias	Downeast Coastal	12.2	0.678	0.674	105.95	4
Narraguagus	Downeast Coastal	12.8	0.683	0.703	144.21	5
Pleasant	Downeast Coastal	10.7	0.674	0.696	79.50	2
Sheepscot	Merrymeeting Bay	11.5	0.685	0.706	72.28	1

Table 2. Projected spawning years based on individual parr broodstock collection year.

Parr collection year	Spawn Year		
	3 year old (first potential spawn)	4 year old (second potential spawn)	5 year old (third potential spawn)
2016	2018	2019	2020
2017	2019	2020	2021
2018	2020	2021	2022
2019	2021	2022	2023
2020	2022	2023	2024
2021	2023	2024	2025
2022	2024	2025	2026