

Exeter Great Dam Removal: A Blueprint for Successful Fish Passage Restoration on the Exeter River Maine Sustainability and Water Conference 2019 || Migratory Fish Passage

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The Dam Removal Process

- Identify project
- Feasibility Study
- Design and Engineering
- Dam Removal
- Channel Restoration

Post-Construction Monitoring



Headworks

Founders Par

High Street

108

Je In

27 High St

111

Water St

Great Dam

-

Fish Ladder

8

Fish Weir

Kimball Island

1

108

Exeter Library

FEOUNDERS Parke

27

Water St

111

digt.

String Bridge

Project Goals: Post-Removal Riverbed Design

- Fish Passage Channel Geometry
 - Channel Slope and Slope Length
 - Jump Height
 - Boulder Features, Overflow Channel
- Stabilize channel and banks
- Maintain water intake functionality
- Prevent channel head cutting (High Street bridge scour)



Post-Removal Riverbed Design - Plan



Post-Removal Riverbed Design - Profile











Post-Construction Monitoring

- Funding/Permit requirement
- Annual Report 5 years (3 if conditions met)
 - Photo Documentation
 - Cross-Section Surveys- Channel Depth & Slope
 - Vegetation recovery 75% in 3 years
 - Fish Counts Alewife Presence (NHFGD)
 - Spring Migration Survey
 - (If needed) Channel micro-revisions







Monitoring – Photos



Monitoring – Cross-Section Surveys



Monitoring – **Cross-Section Surveys**



Monitoring – Fish Counts. This should be easy!

2016: No data (too late in season)



Post-Construction Monitoring: Tracking Success Criteria

							As-Built survey indicates constructed project is consistent with design.
Streambank Stability & Vegetation Cover	n/a	2017	75% Vegetative Cover	0%	> 75% Vegetative Cover	> 75% Vegetative Cover	Criterion Met. Restored temporary impact areas have at least 75% vegetative cover (excluding invasive species) and stream banks are stable (no slumping) based on visual inspection.
Site Passability: Channel Width	Dam in Place	2017	4 feet (min)	5.9 feet	11.7 feet	35 feet	Criterion Met. Minimum channel width observed at monumented Cross- Section 2: As-built observation on 10/14/2016, Year 1 monitoring observation on 10/9/2017, Year 2 monitoring survey on 8/27/2018. Flows at these dates are 1 cfs, 6 cfs, and 30 cfs respectively (measured at USGS Stream Gage 01073587, Exeter River at Haigh Rd, Brentwood, NH). These flows scaled to the monitoring location are approximately 2 cfs, 10 cfs, and 51 cfs, respectively. 2016 and 2017 flows were below the 95% exceedance probability flow (19 cfs at the USGS gage 32 cfs at the monitoring location). Normalizing the 95% exceedance probability flow rate to the surveyed data, we'd expect the channel width to be approximately 29-feet.
Site Passability: Channel Depth	Dam in Place	2017	6-9 inches (min)	6 inches	10 inches	15 inches	Criterion Met. Minimum channel depth observed at monumented Cross- Section 2: As-built observation on 10/14/2016, Year 1 monitoring observation on 10/9/2017, Year 2 monitoring survey on 8/27/2018. Flows at these dates are 1 cfs, 6 cfs, and 30 cfs respectively (measured at USGS Stream Gage 01073587, Exeter River at Haigh Rd, Brentwood, NH). These flows scaled to the monitoring location are approximately 2 cfs, 10 cfs, and 51 cfs, respectively. 2016 and 2017 flows were below the 95% exceedance probability flow (19 cfs at the USGS gage 32 cfs at the monitoring location). Normalizing the 95% exceedance probability flow rate to the surveyed data, we'd expect the channel depth to be approximately 13.6-inches.
Site Passability: Average Channel Slope – Lower Riffle (Main Channel)	Dam in Place	2017	3.0% (max)	2.78%	~2.8%	~2.8%	Criterion Met. Design targets 2.8% average slope. Success criterion: Average channel slope through lower riffle reach (Sta. 1+75 to 2+35) remains less than 3%. Channel is carved into bedrock; no post-construction deterioration anticipated.
Site Passability: Average Channel Slope – Upper Riffle (Main Channel)	Dam in Place	2017	3.0% (max)	2.23%	2.11%	2.05%	Criterion Met. Design targets 2.5% average slope. Success criterion: Average channel slope remains less than 3.0% through upper riffle reach. Average slope measured between monumented Cross-Sections 2 and 3 (Sta. 2+85 to 3+50).
Site Passability: Max Jump Height	Dam in Place	2017	9 inches (max)	< 6 inches	< 6 inches	< 6 inches	Criterion Met. Maximum observed jump height estimated by visual inspection: As-built observation on 10/14/2016, Year 1 monitoring observation on 10/9/2017, Year 2 monitoring observation on August 29, 2018.
Alewife Presence/ Absence (Adult)	Absent	2018	Present	n/a	Present	Present	Criterion Met. Alewife presence at project site and at Pickpocket Dam observed by representatives of NHFGD, NOAA, and NHDES in 2018. Target is documented presence of adult alewives at the Pickpocket Dam.

Monitoring – Lessons Learned

- Success Standards:
 - Quantifiable
 - Multiple data sources
- Timing:
 - Survey low-flow
 - Field visit fish passage
- Consistency:
 - Monitoring Photos
 - Field Survey
- Budget for monitoring BEFORE construction



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