

Owner Outreach and (Mitigation) Design of Priority Hudson River Estuary Biologically Important Barriers

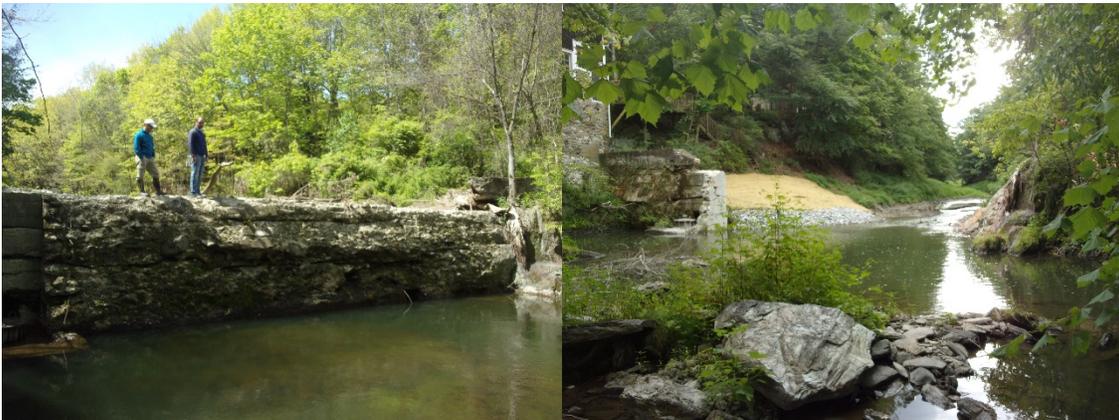


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December 21, 2016



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Owner Outreach and (Mitigation) Design of Priority Hudson River Estuary Biologically Important Barriers

December 21, 2016



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EXECUTIVE SUMMARY

The New England Interstate Water Pollution Control Commission (NEIWPCC) and New York State Department of Environmental Conservation's (NYS DEC) Hudson River Estuary Program (HREP) retained The Chazen Companies (Chazen) and Dr. Stuart Findlay at the Cary Institute of Ecosystem Studies to implement an outreach and education effort about impacts of artificial stream barriers (culverts and dams) on stream ecology and resiliency, as well as to provide preliminary designs on the replacement and removal of those barriers. Over six months, the team contacted approximately 250 owners of pre-identified priority dams and perched culverts or bridges, used print and radio media to educate and reach additional barrier owners, and conducted three public informational meetings.

The outreach work identified a number of dam and culvert owners interested in preliminary barrier removal design assistance. Interest varied as owners considered potential loss of in-stream ponds or considered alternative uses for their dams. The owners of seven dams and eight culverts submitted Letters of Interest from which eight biologically-prioritized dams and culverts were selected by NYSDEC for pre-mitigation assistance, based on criteria such as biological importance and landowner interests.

The selected dams were Browns Pond dam on the Moodna Creek, Bingham Mills dam on the Roeliff Jansen Kill, and the Annandale and Mill Road dams on the Sawkill Creek. The selected culverts were on the Valatie Kill and on Tackawasick Creek in Rensselaer County, one on the Fishkill Creek in Dutchess County, and one on Green Brook in Columbia County. The Chazen team, HREP, and NEIWPCC worked over an additional six months to develop representative barrier mitigation plans for these four dams and four culverts as demonstration projects.

Costs to remove these four dams and redesign the culverts/bridges include permitting expenses ranging between approximately \$25,000 and \$75,000 with an assumption of streamlined permitting and determinations that SHPO and full FEMA evaluations are not needed. Site surveys and biddable design drawings would average an additional \$15,000 to \$30,000 per site if required. Estimated budgets to remove the four dams range between \$150,000 and \$235,000 presuming accumulated sediments do not need additional characterization and can mostly be stabilized in place. Similarly, best-case budgets to correct perched culverts range between \$115,000 and \$315,000 depending on the road service and stream size at individual locations. Worst-case budgets were also examined recognizing the potential for more complicated permitting reviews, large budget requirements for management of sediment behind and upstream of dams, or extensive SEQRA, SHPO, or expanded FEMA evaluations. Sediment accumulation behind the dams was identified as the most-significant potential additional cost along with FEMA and SHPO exposure.

Up to approximately 125 stream miles would be interconnected as a result of design improvements at these eight locations. American eel would be a primary beneficiary, as well as benefits to fish and amphibian environments.

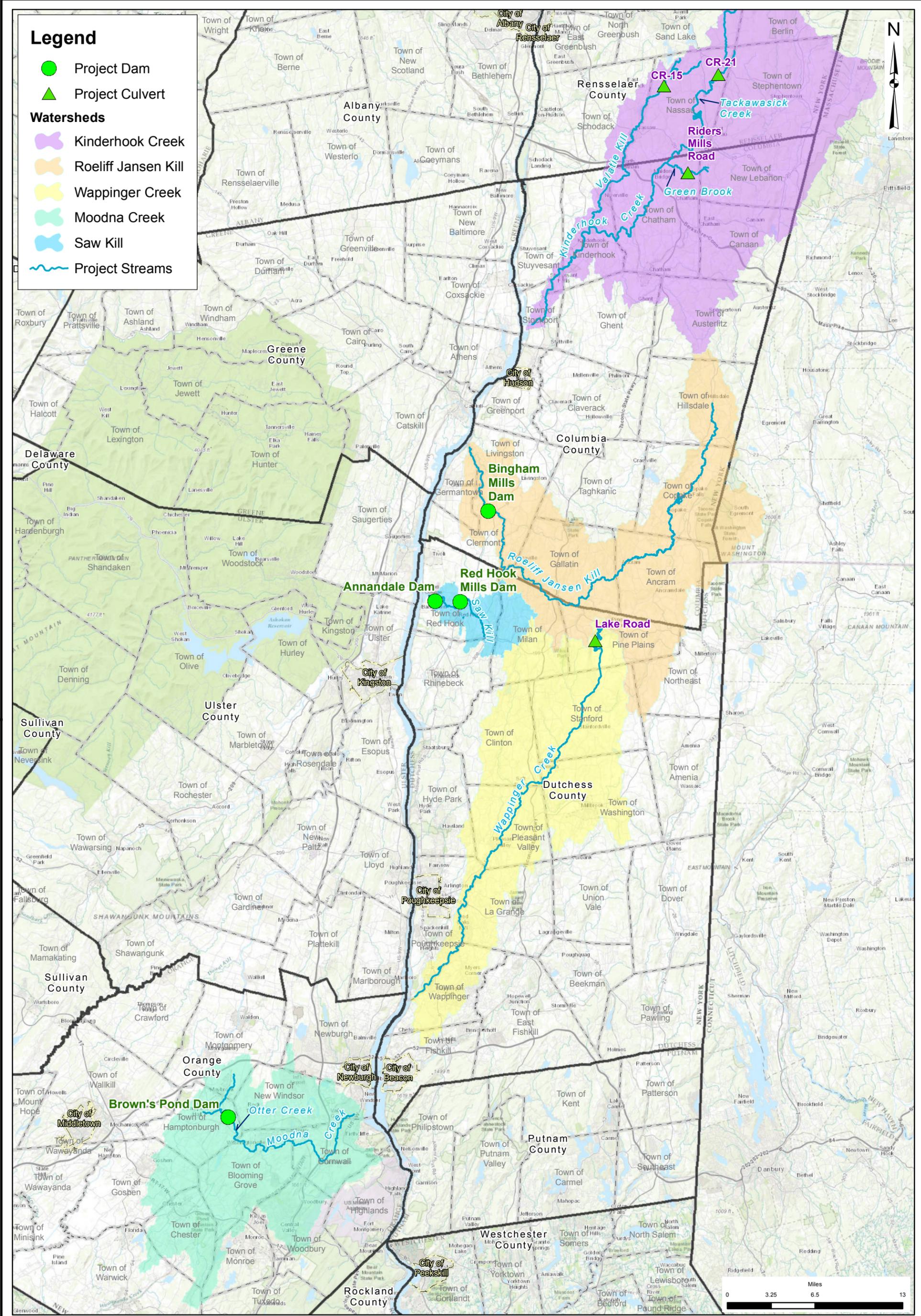
This project was advanced to contribute to greater public understanding of the impacts of stream barriers on ecosystem health including New York State Species of Greatest Conservation Need and resiliency, and to advance pilot design work on a limited number of priority barrier dams and culverts. A majority of barrier owners have signed Letters of Commitment to continue to advance the concept of mitigating or removing their barriers, if funding and support were to become available. The next pages provide a table with additional information about the eight studied barriers and a location map.

**Table 1 - Executive Summary
Summary of Barrier Indicies
December 21, 2016**

Barrier Name/ Watershed (tributary)	Distance Upstream Opened with Barrier Removal		Mainstem Distance Downstream		NYSDEC Stream Classification	NYSDEC Wetlands (Y/N) In Vicinity	USACE Regulated Aquatic Resources (Y/N)	Historical Resources	Endangered Species	Opinion of Probable Cost	
	Opened for Migration with Barrier Removal (Miles) Based on "Absolute Gain Obtained by Removing Barrier**"	Next Mainstem Upstream Artificial Barrier**	Next Downstream Artificial Mainstem Barrier (Miles) (ID #) Remaining Barriers to Hudson River (ID #)	To Hudson River (miles)						High	Low
Brown's Pond Dam/ Moodna Creek (Otter Kill)	4.2 miles for Diadromous fishes, American Eel in particular	Goshen Reservoir (12.6 miles)	Mendelson Pond Dam (1.9 miles)(195-1089) Salisbury Mills Dam (195-0492) Orrs Pond Dam (195-0494) Firthcliffe Dam (195-0501) Possibly Interstate Container Dam (195-1206)	17.2	C	Y MB-18, Class 1	Y	SHPO Consultation 14PR04275. SHPO CRIS identifies dam as "open review." Stantec Report states dam determined not National Register Eligible. Area upstream of dam within an archeologically sensitive area.	FED: In range of Northern long-eared bat (NLEB), Indiana bat, dwarf wedgemussel, and small whorled pogonia. STATE: No occurrence records.	\$2,330,000	\$236,000
Bingham Mill Dam/ Roeliff Jansen Kill (Roeliff Jansen Kill)	52.2 miles American Eel and Brook Trout	Ancram Dam (22.3 miles)	None (6.1 miles to Hudson River)	6.1	C(T)	N	Y	Dam not listed as a National Register or Eligible site. Mill Road Bridge is National Register Listed. Site within an archaeologically sensitive area.	FED: In range of Northern long-eared bat (NLEB), Indiana bat. STATE: Roeliff Jansen Kill is NYS Significant Coastal Fish and Wildlife Habitat and Anadromous fish concentration area of statewide significance (downstream of dam).	\$1,949,000	\$246,000
Mill Road Dam/ Saw Kill (Saw Kill)	1.37 miles of stream with suitable habitat for American Eel	Red Hook Golf Club (4.9 miles)	Annandale Dam (3.6 miles)(210-0898) Bard College Dam(GLK163)	4.5	B(T)	Y CM-9, Class 2	Y	Dam not listed on the National Register of Historic Places. Location not within an archaeologically sensitive area.	FED: In range of Northern long-eared bat (NLEB), Indiana bat, and dwarf wedgemussel. STATE: No occurrence records.	\$1,481,000	\$258,000
Annandale Dam/ Saw Kill (Saw Kill)	0.49 miles for American Eel (which should be able to reach toe of Annandale dam)	Mill Road Dam (3.6 miles)	Bard College Dam (0.7 miles)(GLK163)	0.9	B(T)	N	Y	Dam listed on the National Register of Historic Places (02715.000686) and within Hudson River Historic [Building] District 92NR00302). Site in archeological sensitive area.	FED: In range of Northern long-eared bat (NLEB), Indiana bat, and dwarf wedgemussel. STATE: Project in vicinity of Hemlock-Northern Hardwood Forest. Downstream are the North and South Tivoli Bays Significant Coastal Fish & Wildlife Habitat, an Anadromous Fish Concentration Area (EOID 8512), and the Tivoli Bay Wildlife Management Area (1.7 miles downstream).	\$732,000	\$385,000
CR15 Culvert/ Kinderhook Creek (Valatie Kill)	0.7 miles for amphibians	Silvko Road /pond at top of stream (0.76 miles)	Nassau Lake Dam (3.7 miles) (226-1264) N. Drahos Wildlife Marsh Dam (227-2805) Kinderhook Lake Dam (227-1204) Mill #3 Concrete Dam (227-1196) Stuyvesant Falls Dam (227-1147) Stuyvesant Falls Dam (227-1147A) Chittenden Falls Dam (227-1128)	28.3	C	N	Y	No cultural resources in vicinity	FED: In range of Northern long-eared bat (NLEB). STATE: No occurrence records.	\$538,000	\$419,000
CR21 Culvert/ Kinderhook Creek (Tackawasick Creek)	2.70 miles for fish including potentially eel and amphibians	Road to gravel mine (0.05 miles) Three headwater fingers, with 1.13 miles on one stem	Harder Mills Dam (22.5)(227-0855) Beaver Mill Pond Dam (25.4 miles) Stuyvesant Falls Dam (227-1147) Stuyvesant Falls Dam (227-1147A) Chittenden Falls Dam (227-1128)	37.2	C(T)	N	Y	No cultural resources in vicinity	FED: In range of Northern long-eared bat (NLEB). STATE: No occurrence records.	\$496,000	\$369,000
Riders Mill Road Culvert/ Kinderhook Creek (Green Brook)	0.70 miles for trout, potentially eel, and amphibious species	Route 13 (0.7 miles)	Harder Mills Dam (14.9)(227-0855) Beaver Mill Pond Dam (227-1194) Stuyvesant Falls Dam (227-1147) Stuyvesant Falls Dam (227-1147A) Chittenden Falls Dam (227-1128)	27	C(TS)	N	Y	Within an archaeologically sensitive area	FED: In range of Northern long-eared bat (NLEB). STATE: No occurrence records.	\$503,000	\$387,000
Lake Road Culvert/ Wappinger Creek (Wappinger Creek)	1.4 miles for fish including potentially eel and amphibious species	Route 199 (1.4 miles)	Borden Milk Co Dam (8.9 miles)(229-0808) Yazoo Dam (212-0176) Red Oaks Mill Dam (212-0651) Wappingers Falls Dam (221-0613)	38.3	B	Y PP8, Class 1	Y	No cultural resources in vicinity	FED: In range of northern long-eared bat (NLEB), Indiana Bat, dwarf wedgemussel and bog turtle. STATE: In proximity to Golden Eagle, Least Bittern and Bald Eagle	\$309,000	\$205,000

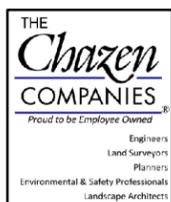
* Brown, Michelle and Cheeseman, Craig. 2013. Final Report – Identification of Biologically Important Barriers in the Hudson River Estuary. The Nature Conservancy, with contributions by New York Natural Heritage Program and Andrew Peck and Alicia Raeburn of The Nature Conservancy. https://wri.cals.cornell.edu/sites/.../TNC_HRE_Barriers_FinalReport_April2013.pdf. See batAbs "Absolute gain obtained by removing barrier."

** Based on Candidate Barrier Mapping provided by the NYSDEC. For dams, based on distance upstream to next known dam. For culverts, based on distance to head of stream or to next known road crossing where culvert connectivity status is unknown.



Legend

- Project Dam
- ▲ Project Culvert
- Watersheds**
- Kinderhook Creek
- Roeliff Jansen Kill
- Wappinger Creek
- Moodna Creek
- Saw Kill
- ~ Project Streams



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Owner Outreach and Mitigation design of Priority Hudson River Estuary Biologically Important Barriers

Project Locations

Hudson Valley New York

Drawn:	RL-B
Date:	12/19/2016
Scale:	1 inch = 6.5 miles
Project:	41544.00
Figure:	X

1. INTRODUCTION

1.1 Purpose

The New England Interstate Water Pollution Control Commission (NEIWPCC) and New York State Department of Environmental Conservation's (NYS DEC) Hudson River Estuary Program (HREP) retained The Chazen Companies (Chazen) to 1) design and implement an outreach and education effort to inform communities and individuals who own or manage stream barriers (dams or culverts) about the impacts of barriers on stream ecology and resiliency and introduce them to existing opportunities to support culvert replacement or dam removal 2) identify candidate stream barrier mitigation and removal sites in tributaries to the Hudson River Estuary through use of existing data, new data collected during this project and outreach to individual dam and culvert owners, 3) develop preliminary barrier removal or mitigation design plans for a set of priority candidate sites, and 4) obtain letters of concurrence from barrier owners to move forward with the mitigation and removal process.

This project was proposed by NEIWPCC and HREP to contribute to greater public understanding of the impacts of stream barriers on ecosystem health and resiliency, and to advance a limited number of preliminary mitigation plans at specific priority barrier dams and culverts. The project's overarching purpose contributes to HREP's objective to restore stream connectivity in watershed tributaries to enhance migratory fisheries and riverine ecosystem resilience.

1.2 Outline/Organization/Content of Report

This report is organized around the various deliverables provided by The Chazen Companies and our collaborating ecological scientist Dr. Stuart Findlay at the Cary Institute of Ecosystem Studies.

- Section 1 of this report provides these introductory sections.
- Section 2 outlines the project outreach methods and efforts.
- Section 3 reviews selection of particular priority barriers for preliminary design exploration.
- Section 4 provides an overview of the preliminary design process and references eight appendix reports describing specific sites and containing associated letters of interest and letters of concurrence as applicable.

1.3 QAPP

A project Quality Assurance Program Plan (QAPP) was prepared by Chazen in November of 2015 and accepted thereafter as complete by NEIWPCC and HREP. The document describes the project organizational tasks and responsible team partner roles, measurement quality objectives and criteria, documentation and records methods including field data recording sheets, report presentation formats, and other project management protocols.

The QAPP is referenced by extension but not reprinted as part of this document.

2. OUTREACH AND BARRIER IDENTIFICATION

2.1 Background Information Available to Chazen

HREP provided Chazen with two lists of priority barriers. One list identified approximately 130 priority culverts and box-style bridges. The second list identified an additional approximately 120 priority dams. The selection of these prioritized dams and culverts was established by HREP assisted by prior HREP consultants.

Most of the priority dams were presented to Chazen by NYSDEC dam ID numbers, HREP priority dam coding, and GIS-based reference locations. Chazen georeferenced these dams to identify ownership addresses to allow use of direct mail outreach and improved understanding of owner profiles. The exercise indicated that 18 dams were owned by New York State/New York City or Federal owners, 20 were owned by various Village, Towns and Counties, 4 were owned by Central Hudson Gas & Electric, and the balance were owned by a collection of private landowners and associations.

Since most culverts were keyed only to road locations, Chazen georeferenced these culverts to identify their ownership by Town, County whether they were owned by New York State. The effort identified that 24 passed under New York State Highways, 31 passed under County roads in Rensselaer, Columbia, Ulster, Greene, Dutchess and Orange Counties, and most of the balance crossed under more than 30 Town and Village roads. Chazen identified the name and address of the elected municipal executive (Mayor, Supervisor, County Executive) and highway manager (DPW, Highway Superintendent) for each priority culvert or prioritized boxed bridge.

These enhanced priority barrier lists were used for public outreach efforts and provided to HREP upon conclusion of the project public outreach work effort.

2.2 Public Outreach, Educational Mailings, Website Portal

Public outreach was both broadly generated as well as targeted on the approximately 250 identified owners of priority dams and culvert/bridges. Representative outreach materials, brochures, and Letters of Interest are found in Appendix 1. The following methods were used.

- Chazen and Stuart Findlay wrote and co-signed two rounds of individual mailings to each priority barrier owners. These were delivered by US Postal mail or via email where individuals were personally known by Chazen or Findlay. The mailings provided personalized letters, an educational information brochure, identified the information portal (next bullet), announced upcoming information meetings, and included information interest and field forms.
- Chazen established a website portal where barrier owners could submit information about their barriers, identify interest in attending a meeting, or signify interest in barrier mitigation.
- Chazen and Stuart Findlay wrote text for an Earthwise® radio and print newscast for WAMC Radio and regional papers including the Poughkeepsie Journal.
- Reporter John Ferro at The Poughkeepsie Journal published a full-length article about the project.

Field forms were circulated and/or referenced through all outreach efforts. The forms, adapted for culverts or dams, allowed barrier owners to provide more detailed information about their specific

culverts or dams, and to submit their barrier for preliminary mitigation design assistance. Assistance, for selected sites, would consist of preliminary site condition and records evaluations and with preparation of a conceptual mitigation plan and budget, as discussed further in Section 4.0 of this report.

2.3 Workshop Outreach Meetings

Three public meetings were scheduled to discuss the project.

- Chazen and Stuart Findlay presented the project to an audience of more than 35 citizens, public officials, and NYSDEC personnel at the December 9, 2016 monthly breakfast meeting of the Hudson River Watershed Alliance. The meeting notice was distributed the HRWA breakfast meeting email list of more than 400 interested citizens, municipal officials, and other individuals and organizations.
- Chazen conducted a public meeting in Stephentown, Rensselaer County, co-hosted with the Rensselaer Plateau Alliance and another meeting in Newburgh, Orange County, co-hosted with SUNY Orange and Orange County Cornell Cooperative Extension and HREP. Attendees at both meetings had been informed of the meetings by direct mailings to the approximately 250 owners of priority dams and culverts, as well as direct phone calls and emails to additional barrier owners responding to the news articles, radio notice, and website portal. At each meeting, Chazen and Stuart Findlay outlined benefits of connectivity and solicited interested in barrier removal technical support. HREP personnel also attended these meetings and assisted with responses to questions about barrier removal funding and connectivity objectives. Invitations were extended at the Stephentown and Newburgh meetings for barrier owners to submit Letters of Interest.

3. DATA MANAGEMENT AND PRELIMINARY MITIGATION DESIGN SITE SELECTIONS

3.1 Data Management

The public outreach efforts yielded phone calls, emails, and face-to-face contact with multiple barrier owners. Most interest was expressed by priority barrier owners but some was from additionally-identified sites. Resulting information, address corrections, and conditions information were added to the data sets initially received from HREP (Section 2.1).

These expanded and annotated data sets were provided to HREP upon conclusion of the project public outreach work effort.

3.2 Design Site Selection

Chazen received site information forms from more than 20 sites. Through dialogue with owners and other factors, several representative sites removed themselves from consideration, as follows:

- Shapp Pond Dam: received separate funding during the project period.
- Foundry Brook Dam: owned by Scenic Hudson. Removed from consideration by owner due to historic value and public appreciation of the dam.
- Teatown Lake Dam: dam owners withdrew interest as site personnel changes occurred.
- Oscawana Dam: owners found other funding to pursue dam removal.
- Furnace Pond dam: owned by the Town. Town Board decided not to pursue removal due in part to public appreciation of the pond.
- Glencoma dam in Putnam County. County DPW withdrew interest due to concern that public opposition would occur.

These cases are reviewed here to document learning experiences gained as outreach was advanced.

Near the end of the outreach period, Chazen requested confirmed “Letters of Interest” from site owners extending continued program interest. These letters provided a signal of commitment suggesting a willingness to consider barrier removal if preliminary design and eventual project funding support could be provided. Fifteen Letters of Interest were secured.

Chazen and Dr. Findlay met with HREP/NEIWPC to conduct a team meeting at which eight sites were selected for preliminary design services. Of the 15 “willing owner” sites, eight were culverts of which four were previously identified as biologically important and seven were dams of which six were previously identified as biologically important. From these, the team selected eight sites for preliminary design services.

After consideration of each site not previously identified as a priority barrier, the team ruled out these sites by confirming them to be less biologically important than other sites on the basis of barrier proximity to the Hudson River and other factors, and ruled out one dam where owner interest was limited to installation of a fish ladder rather than more comprehensive barrier mitigation.

The resulting eight sites were selected for preliminary mitigation design support as model sites:

Culverts:

- County Route 21 in Rensselaer County. Owned by Rensselaer County.

- County Route 15 in Rensselaer County. Owned by Rensselaer County.
- Lake Road in Town of Pine Plains. Owned by Town of Pine Plains, in Dutchess County.
- Riders Mill Road in Town of Chatham. Owned by Town of Chatham in Columbia County.

Dams:

- Bingham Mills Dam, Germantown, Columbia County
- Annandale Dam, Red Hook, Dutchess County
- Mill Road Dam, Red Hook, Dutchess County
- Brown's Pond Dam, Hamptonburgh, Orange County

4. PRELIMINARY DESIGNS

Preliminary mitigation design approaches used by Chazen and Dr. Findlay are reviewed below. Eight project packages are provided in Appendices 2 through 9 presenting the finalized preliminary design packages.

4.1 Information Collected and Developed for Each Site

Chazen evaluated the eight sites with a focus on collecting critical design control factors including a review of the habitat value of the stream segment that would be re-connected for fisheries migration value, riparian corridor and in-channel habitat benefit, and water quality improvement.

A field team consisting variably of a design engineer, environmental permitting expert and landscape architect and Dr. Findlay from the Cary Institute visited all eight sites to collect initial site observation data and discuss mitigation preferences of site owners. The team conducted non-invasive structural observations of the existing culvert or dam barrier to determine general conditions of the barriers, conducted visual reviews of potential and immediate upstream and downstream impacts to the barrier location, noted potential wetland and ETR habitat factors. Conferences with the property owner including specific inquiries to identify specific concerns or design preferences which might enhance owner tendency to proceed at a later time to full barrier mitigation; for example, some owners expressed wishes for mitigation designs to include the retention of dam abutments as historic artifacts, so that the site's historic context could be retained, or to consider other partial removal options which would retain some of the existing dam benefits.

As an additional task contributed above Chazen's contracted scope, a field team later returned to the Annandale and Mill Road dams to collect sediment samples for grainsize and limited chemical characterization, and to complete preliminary bathymetric assessments. Findings from these visits helped inform sediment management and mitigation design concepts described in the individual reports prepared for these dams. Similar site visits were not conducted at Brown's Pond Dam because substantial sediment data had been previously collected by a prior consultant or at the Bingham Mills dam because scientists from Clarkson University were conducting similar evaluations with an initial expectation that findings would be available within the time period of this project.

Chazen also conducted the following:

- A. Hydrological Analysis: Chazen calculated flows for critical design storm events using StreamStat data software
- B. Preliminary Aquatic and Ecological Assessment: Chazen prepared site specific letters to NY Natural Heritage Program regarding ETR occurrences and downloaded, formatted and evaluated US Fish and Wildlife Service lists from the IPACs system.
- C. Preliminary Aquatic Resource Assessment and Regulatory Review: Chazen completed mapping review of aquatic resources in the vicinity of the barrier including reviews of the NYSDEC Wetland and Stream Mapper, NWI maps, and review of aerial photography. Applicability of ACOE Nationwide Permit #3 and #27 requirements was reviewed.

On the basis of all of the above, Chazen then conducted sketch mitigation designs for each site, providing first one draft dam and one draft culvert design to HREP staff for initial comment, and then

completing eight mitigation sketch designs which address the general intent of a barrier mitigation approach at each site.

Chazen also summarized wetland permitting/mitigation requirements, sediment sampling and management plans, and other pre-implementation regulatory requirements needed to advance barrier mitigation at the individual sites.

Implementation Strategies were then developed for each site, including project milestones and steps for project completion, along with draft budgets expressed as Opinions of Probable Cost (low and high ranges) for all identified line item costs and/or action items. Attachments 2 through 9 provide individual reports to the NYSDEC and Landowners summarizing this information for each site.

4.2 Design Refinement

As the Task 4.1 projects were being completed, Chazen circulated the preliminary design drawings to the individual landowners for comments, and provided the full preliminary design report to NYSDEC/HREP for feedback on the likely design steps and review anticipated permitting requirements. A NYSDEC review meeting was conducted in part of an informal pre-permitting conference to confirm the steps individual site owners would need to advance to convert preliminary designs to final buildable designs. Letters of Commitment included in Appendix A were secured from each property owner, signifying their receipt of the project reports and suggesting their readiness to proceed through barrier mitigation if funding allows.

Chazen finalized the conceptual designs based on comments obtained from NYSDEC/HREP and property owners and assembled this final report with separable appendices for the eight preliminary design locations

4.3 Project Close-Out

Chazen provided quarterly reports throughout the contract period and communicated frequently with HREP and NEIWPC contract contacts as warranted. Priority barrier data sets initially provided to Chazen and Dr. Findlay were returned to HREP personnel with annotated additions and this report constituted the final project delivery under NEIWPC job code: 0100-143-005, project code 2015-024. The Chazen Companies and Dr. Findlay at the Cary Institute of Ecosystem Studies hope the owner outreach efforts conducted has enhanced regional awareness of stream connectivity benefits and that the eight sites receiving preliminary design assistance proceed through barrier removal at some time.

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APPENDIX 1

Handouts/Mailers/Presentations

Russell Urban-Mead

From: Russell Urban-Mead
Sent: Monday, November 30, 2015 4:05 PM
Subject: December 10, 2015 HRWA breakfast - Dam Removal/Mitigation & Culvert Corrections
- Let the fish swim!

Hudson River Watershed Alliance (HRWA) Mid-Hudson Watershed Breakfast Series, 2015 - 2016

Thursday, **December 10**, 2015, 8:00 - 9:30 am

Topic: **Dam Removal/Mitigation & Culvert Corrections – Let the fish swim!**

Featured Speakers: Russell Urban-Mead and colleagues, The Chazen Companies, and
Stuart Findlay, PhD, Cary Institute of Ecosystem Studies

Dams and culverts on Hudson River tributaries can limit pathways that fish and other organisms use to move between feeding, nursery and breeding locations. The Chazen Companies and Stuart Findlay from the Cary Institute of Ecosystem Studies were recently contracted by the New England Interstate Water Pollution Control Commission (NEIWPCC) and NYSDEC's Hudson River Estuary Program (HREP) to identify property owners willing to restore free-flowing water past critical stream barriers. Russell and Stuart will describe how landowners can volunteer sites to be considered for dam removal/mitigation and culvert corrections, and outline the benefits of these improvements. They hope attendees will help spread the word about this unique effort. Andrew Meyer, a HREP barrier specialist, is likely to assist with the presentation.

Please **RSVP** (attendance only) to Russell Urban-Mead, rum@chazencompanies.com. There is a \$4 minimum food/beverage purchase. Location: Plaza Diner (Stop & Shop Plaza), New Paltz.

WINTER BAD WEATHER POLICY: HRWA breakfasts are cancelled only if the New Paltz Central School District (the nearest school district to the diner) has either a weather delay or cancellation. Please listen to the radio, call the school district, or visit <http://www.newpaltz.k12.ny.us/Page/1> to learn of delays or cancellations. You are also always welcome to call Russell Urban-Mead at [914 456-1095](tel:9144561095) (cell).

Russell Urban-Mead, Principal, PG, CPG, LEED AP, VP Environmental Services

Hydrogeology - Remediation - Water Supply - Due Diligence/Phase I,II – Resilience

Safety Services & Training - Facility Compliance/EHS – Wetlands & Natural Resources

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December XX, 2015

Greetings,

The Chazen Companies and Ecologist Dr. Stuart Findlay from the Cary Institute of Ecosystem Studies are seeking property owners willing to consider potential lowering or removal of small, unused dams. We are writing because public records indicate you may have a dam on your property. Our work is being funded by the New England Interstate Water Pollution Control Commission and New York State Department of Environmental Conservation's Hudson River Estuary Program (HREP).

Many older dams no longer serve their original purposes as mill dams or other uses. Most are in disrepair and are unmaintained. More than 2,000 such barriers in the Hudson River estuary watershed impede fish passage, create warm-water and low-oxygen pools, and trap sediments.

Dam mitigation benefits property owners by eliminating periodic costs for repairs and permitting, eliminating dam hazard liability, ending any existing New York State dam permitting obligations, potentially increasing paddling and shoreline fishing recreation, and restoring dry land acreage.

We are currently assembling a list of property owners willing to be considered for free preliminary mitigation design assistance. This will help owners apply for future full dam mitigation grant funding. To learn more please return the attached worksheet about your dam to the Chazen address above, or enter the same information on line at <http://www.chazencompanies.com/sbmi/>.

We have a short project schedule so would appreciate hearing from you by January 15. As we gather a list of interested dam owners, we will be hosting information meetings, confirming a short list of owners willing to be considered for dam lowering or removal, and then picking approximately five for preliminary mitigation design and permitting. Mitigation choices will include either full or partial removal, or perhaps fish bypass structures.

We are excited about this project and hope you are interested in learning more. Again, please just return the enclosed form to Chazen or enter the same information at Chazen's website. Participation requires no financial commitment thanks to a grant supporting this work. We will notify you of information meetings in early 2016. Please contact us with questions at:

At Chazen: Project Manager Russell Urban-Mead, (845) 486-1551, rum@chazencompanies.com

At HREP: Conservation Specialist Andrew Meyer, (845) 256-3135, andrew.meyer@dec.ny.gov

Thanks very much,

Sincerely,

Russell Urban-Mead
Sr. Hydrogeologist, Chazen

Dr. Stuart Finlay, PhD
Senior Ecologist, Cary Institute

Cc: Dan Miller, HREP/NEIWPC
Mike Jennings, NEIWPC
Scott Cuppett, Cornell/HREP
Andrew Meyer, Cornell/HREP



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Hudson Valley Office- Headquarters
 21 Fox St., Poughkeepsie, NY 12601
 P: (845) 454-3980 F: (845) 454-4026
www.chazencompanies.com

Capital District Office (518) 273-0055
 North Country Office (518) 812-0513

January 6, 2016

ADDRESS
 ADDRESS.
 ADDRESS

Dear XXXX/Greetings,

The New York State Department of Environmental Conservation’s Hudson River Estuary Program in partnership with the New England Interstate Water Pollution Control Commission, the Chazen Companies and ecologist Dr. Stuart Findlay from the Cary Institute of Ecosystem Studies are seeking municipalities and property owners willing to improve stream habitat by replacing priority culverts and bridges with better designed and constructed road/stream crossings.

Fish cannot swim through culverts with big drops at either end, so free technical assistance and funding are being made available to correct culverts/bridges in the most biologically-critical areas of the Hudson River watershed. Culvert/bridge improvements that allow fish and terrestrial animal passage can also benefit owners and neighbors by correctly sizing culverts to reduce stream blockages and minimize the risk of road overtopping and washout. So, correctly designed and sized culverts and bridges are a win-win for aquatic life and for owners, and improvements can sometimes be done as part of scheduled culvert maintenance. Highway Superintendents, environmental committees and others may be familiar with additional "problem" culverts in your municipality.



Although many culverts function very well, those that are ‘perched’ (with drops at the downstream end), or those which are undersized, are most likely to impede fish passage. Many biologically-important culvert barriers have already been identified by the Estuary Program. Those high priority culverts in your municipality can be viewed at: <http://arcg.is/1mpBgki>



We are currently assembling a list of culvert/bridge owners (both private and public) willing to be considered for free preliminary redesign services. The free services will position owners for grants to help fund the culvert or bridge improvements. If you are willing to consider this opportunity, or report other culverts/bridges that you believe may also be barriers to fish and wildlife, please return the attached worksheet or note your interest on line at <http://www.chazencompanies.com/sbmi/>.

Please use the forms to provide us further information about culverts/bridges we have already identified. You may also wish to bring new barriers to our attention. Please use one form per culvert or bridge.

We have a short project schedule so would appreciate hearing from you by January 25. Based on the responses we receive, we will select locations for future public informational meetings, confirm a short list of interested owners, and then pick at least five biological-important culverts/bridges for free preliminary mitigation design and analysis of permitting needs.



We are excited about this project and hope you are interested in learning more. Again, please just return the enclosed form or enter the same information at Chazen's website by January 25, 2016. Although participation requires no financial commitment thanks to the grant supporting this work, we respectfully request that if you are reporting culverts/bridges that you own, you do so only if you are reasonably committed to advancing improvements responsive to

this inquiry. We will notify you of information meetings in early 2016.

You are welcome to contact us with questions:

At Chazen: Project Manager Russell Urban-Mead, (845) 486-1551, rum@chazencompanies.com

At HREP: Conservation Specialist Andrew Meyer, (845) 256-3135, andrew.meyer@dec.ny.gov

Sincerely,

Handwritten signature of Russell Urban-Mead.

Russell Urban-Mead
Sr. Hydrogeologist, Chazen

Handwritten signature of Dr. Stuart Finlay.

Dr. Stuart Finlay, PhD
Senior Ecologist, Cary Institute

Cc: Dan Miller, HREP/NEIWPC
Mike Jennings, NEIWPC
Scott Cuppett, Cornell/HREP
Andrew Meyer, Cornell/HREP

Dam Field Sheet

Date: _____ Name of Owner: _____

Address: _____ Email: _____

Would you be interested in a meeting to discuss barrier mitigation or removal? _____

Might you be willing to consider having your dam removed or otherwise mitigated to allow free-flowing water? _____ Yes _____ No _____ Maybe

General Information, confirming location and barrier ID (if known) of your dam:

Watershed Name: _____ Stream Name: _____

Nearest Road Name: _____ NYSDEC Dam ID No.? _____

Accessibility: _____ Comments: _____

1 = inaccessible 2 = difficult to access 3 = moderately difficult to access 4 = easy to access 5 = no access issues

Dam Characteristics, helping us better understand the condition and size of your dam:

Dam Type: _____ (earthen, concrete, mill pond, weir, etc.)

Height (m): _____ Length (m): _____ ~ size of impoundment (sq ft): _____

Is there an existing fish passage structure?: _____

Dam Condition: _____ Does debris get stuck in Spillway: _____

1 = severely breached or collapsed 2 = slightly breached 3 = moderately impaired 4 = slightly impaired 5 = Excellent

We'd appreciate receiving some photos! Digital pictures can be uploaded at <http://www.chazencompanies.com/sbmi/> or emailed care of: rum@chazencompanies.com

Miscellaneous

Evidence of Wildlife: _____ Wildlife: _____

Evidence of Recreational Use of the Impoundment: _____

Evidence of Recreational Use of the Stream: _____

Do you own the whole dam? If NO, please explain: _____

Comments / Notes: _____

Please email, fax, or mail to Russell Urban-Mead at Chazen as follows: fax 845 454-4025; email rum@chazencompanies.com; Address: Chazen Companies, 21 Fox Street, Poughkeepsie, NY 12601. Please email photos.

Culvert & Bridge Field Sheet

Date: _____ Name of Owner: _____

Address of owner: _____ Email: _____

Would you be interested in attending a meeting about improved culvert & bridge connectivity? _____

Might you be willing to consider replacing or fixing your culvert/bridge to improve free-flowing water? Yes ___ No ___ Maybe ___ Do you own this culvert or bridge? Yes ___ No ___

General Information (please use separate sheets for separate culverts)

Culvert location: _____ (road, nearest intersection)

Please email us some photos (details below)– pictures are worth 1,000 words!

Construction (concrete, plastic, metal, other). _____ Shape (arch, round, box, other) _____

Approximate dimensions of opening (diameter or L x W): _____ (in _ feet or _ inches?)

Length of culvert or bridge (2 lane road, 4 lane road, other) _____

Inlet (upstream side)

Is the bottom in line with the bottom of the stream? _____ (yes, no)

Describe any erosion or scouring around the inlet: _____

Is the culvert/bridge opening clogged or submerged? _____

Typically, how deep is the water that flows into the culvert/bridge? _____ (inches)

Does sediment in the stream continue into the bottom of the culvert/bridge? ye ___ No ___

During storms, does this culvert or bridge flood the road, or cause upstream flooding? _____

Outlet (downstream side)

Is the bottom of culvert or bridge in line with the bottom of the stream? yes ___ No ___

(If the Outlet is above the stream, how much of a drop is it? _____ (inches)

Please describe any erosion, scouring or plunge pool around the outlet: _____

Is the outlet clogged or submerged? _____

Miscellaneous

If you were a fish, could you easily swim upstream through this culvert or bridge? _____

Are you aware of any wildlife that benefit from (or are harmed by) this bridge/culvert? _____

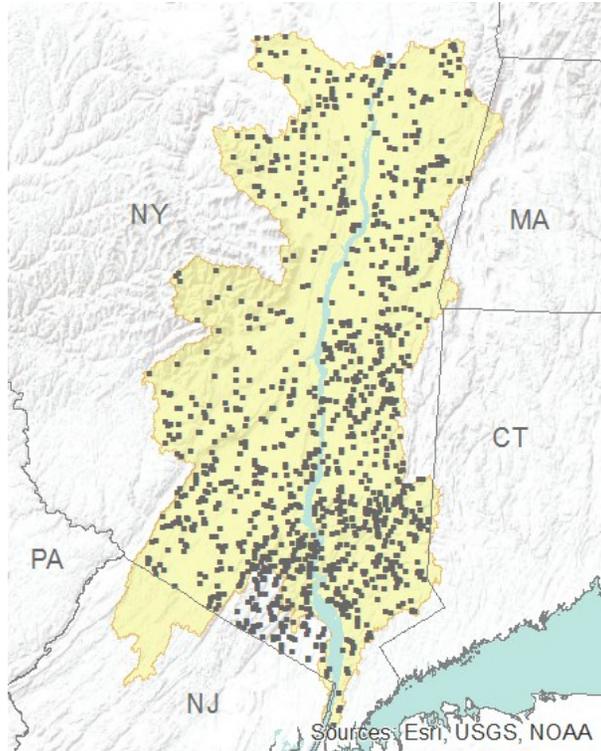
Comments / Notes : _____ (use back)

Please email, fax, or mail to Russell Urban-Mead at Chazen as follows: fax 845 454-4025; email rum@chazencompanies.com; Address: Chazen Companies, 21 Fox Street, Poughkeepsie, NY 12601.

Please email us some photos – pictures are worth 1,000 words!

Free Flowing Streams

New York's Hudson Valley has over 16,000 miles of streams. These streams are tributaries to the Hudson River and play an important role in its health. Free flowing streams move in predictable patterns, transporting water, nutrients and sediment to the river.



Dams in the Hudson River Estuary Watershed

Stream flow is disrupted by dams, altering the movement of water and sediment which can cause a number of problems including:

- Stagnant, murky water behind the dam
- The need for dredging sediment that builds up behind the dam
- Instability of the stream bank and bed

Why Reconnect?

Ownership Burden - Relief from maintenance costs and liability for damages

Public Safety - Removes the risk of flooding from dam failure or overflowing.

Stream Stability - Free flowing streams are most stable limiting erosion and flooding

Recreation - Fishermen, boaters and nature lovers gain access to restored stream habitat and renewed fisheries

Conservation - Enhanced habitat for stream dwelling wildlife



- More Information -

Dam Removal

NYS DEC Hudson River Estuary Program
845-256-3016 | hrep@dec.ny.gov

Dam Safety

NYS DEC Dam Safety Program
518-402-8185 | DOWinformation@dec.ny.gov

&

www.HudsonEstuaryResilience.net



Hudson River Estuary Program

A Program of the New York State Department of Environmental Conservation

The Benefits of Reconnecting Hudson Valley Waterways



Building Resilient Watersheds through Dam Removal and Stream Restoration

Hudson Estuary Watershed Resiliency Project
www.hudsonestuaryresilience.net



Cornell University Cooperative Extension

Dams in New York

New York State is home to over 5,700 active dams. Most of these dams are over 65 years old and require ongoing maintenance to keep them functioning properly. Many dams no longer serve their intended purpose and have fallen into disrepair. Dam failure may cause flooding that could threaten people, property and wildlife.



Dams are regulated by the NYS Department of Environmental Conservation, which requires anyone with a dam on their property to keep it in safe condition. Many dam owners are finding it difficult to meet the requirements to maintain their dams.



When a dam fails, the property owner is liable for any damages resulting from the failure.

The costs of dam maintenance and the risk of dam failure make dam removal an attractive option to some damowners. Adding to its popularity, are the many other benefits of returning waterways to their free-flowing state.

Benefits for Wildlife

Streams, rivers and lakes are connected to each other, forming a network as they flow over the land. This network is very important for the survival of aquatic species. Fish must be able to move to the various habitats available throughout the stream network making them very sensitive to barriers.



Dams block the stream and harm the ability of aquatic life to travel freely in search of food, breeding grounds and seasonal refuges. In order to support plentiful amounts of healthy fish, waterways need to be well connected to each other.



Many of the species that people love to fish for, including herring and trout, have declined because dams prevent their free movement.

Options for Reconnecting

Complete dam removal restores the flow of water, sediment, and the movement of aquatic species, providing the greatest benefits.



Partial dam removal can be used to reconnect streams where polluted sediment should not be disturbed or when a community values and wants to preserve the historic character of a dam.



Wildlife passage structures like fish ladders can provide a way for fish and aquatic life to travel past a dam in some cases.

Eelways are specifically designed to help eels on their fascinating journey up into Hudson Estuary waterways to live and back out to the ocean to breed.

A LOOK AT OUR
CHANGING
ENVIRONMENT

earthWISE



Helping fish go with the flow

Have you ever wondered what happens when a fish encounters a dam or a culvert? Too often, these structures are barriers to breeding and nursery sites, feeding grounds, and vital genetic mixing. In a warming world, barriers also prevent fish from seeking refuge as stream temperatures change.

In New York's Hudson Valley, hundreds of dams also threaten fish that spend part of their lives in the ocean and part of their lives in our freshwater tributaries. While these dams once served useful purposes, they remain obstacles to fish that need access to our streams to feed and breed.

Old culverts and box bridges can also break up the connectivity of our freshwaters. They allow streams to pass under our roads, but they can impede fish movement.

With all this in mind, the New York State Department of Environmental Conservation's Hudson River Estuary Program is funding restoration projects. For example, several hundred thousand dollars in grants were awarded in January to restore flow connectivity in local streams.

The Chazen Companies and the Cary Institute of Ecosystem Studies are now seeking more dams and culverts blocking fish migration where barrier removal, engineering repairs, or fish ladders might offer the greatest environmental benefit.

So if you are either the owner of or an observer of a dam or culvert that is blocking fish passage, provide barrier information on Chazen's Stream Barrier Mitigation Inventory at www.chazencompanies.com. Selected sites will be eligible for more grant assistance.



U.S. FISH AND WILDLIFE SERVICE/COURTESY VIA FLICKRR CC
[HTTP //POJNEWS.CO/CCLIC](http://POJNEWS.CO/CCLIC)

The Flock Process Dam Removal project in Norwalk, Connecticut removes the first dam on the Norwalk River, eliminating dam failure risk, allowing fish to move freely between salt and freshwater, facilitating sediment transport and more.



(Photo: Gannet News Service file)

f 43 | | | | |

In the Oscar-nominated film "The Revenant," actor Leonardo DiCaprio plays real-life mountain man Hugh Glass.

In 1823, Glass was mauled by a bear in the Dakotas and left for dead by his partners. Despite his injuries, Glass managed to crawl more than 300 miles to a fur-trading post along the Missouri River in South Dakota.

His tale has been retold, and embellished, numerous times over the past 200 years.

In "The Revenant," DiCaprio's character frequently encounters can't-get-there-from-here scenarios. Battered and bloody, he claws his way up impossible heights, tosses himself from dizzying precipices and thrashes down freezing streams.



THE POUGHKEEPSIE JOURNAL

Proof of success: Lake Champlain fishing booming again

That's what it's like to be a fish in Dutchess County — and just about everywhere else that isn't open water.

The difference? When fish encounter impossibly high dams, or culverts with big drop-offs, they don't make it home. And they never get a gold statue for trying.



Got dams or culverts? Speak up and help save fish



John Ferro, Poughkeepsie Journal 6:23 p.m. EST January 27, 2016

This photo, provided by courtesy of Twentieth Century Fox, shows Leonardo DiCaprio as Hugh Glass, in a scene from the film, "The Revenant." (Photo: Associated Press)

That is why a public-private partnership is hoping to make travel a bit easier for Hudson Valley fish by figuring out all the places where fish can't get there from here, and then fixing as many of them as possible.

It is estimated more than 2,000 barriers within the Hudson River watershed impede fish passage between feeding, breeding and nursery waters.

Behind the blockages form unhealthy pools of water. Like the Long Island Expressway in summer, these pools frequently are too warm, have too much unwanted debris and too little oxygen for whatever gets trapped there.

The project is being led by Russell Urban-Mead, a senior hydrogeologist with [The Chazen Companies](#) in Poughkeepsie, and [Stuart Findlay](#), a senior ecologist at [The Cary Institute of Ecosystem Studies](#) in Millbrook.

Partners include the state Department of Environmental Conservation's [Hudson River Estuary Program](#) and the [New England Interstate Water Pollution Control Commission](#).

And hopefully, you.

The groups are [assembling a list of property owners](#) with dams or culverts who are willing to be considered for free preliminary redesign services.

"We want them to look for those little waterfalls on the downstream side of a culvert that fish just can't get up," Urban-Mead said.

The redesign would position property owners for grants to fund fish-friendly projects, such as removal or redesign of dams or culverts, or even the installation of fish ladders.

Just this week, the DEC announced it was awarding the Village of New Paltz and the Dutchess County Soil & Water Conservation District nearly \$350,000 toward culvert and dam replacement projects.

New Paltz is getting \$246,365 to replace a culvert system along the Wallkill Valley Rail Trail near Water Street and the Wallkill River.

And Dutchess is receiving \$96,408 remove the 12-foot Shapp Pond Dam on a tributary of the Wappinger Creek, the East Branch Wappinger Creek.



In this 2006 file photo, Bard College juniors and biology majors Mer Mletzfeld from Unadilla, N.Y., top, and Andras Hufli from Budapest, Hungary, work on an eel ladder in the Sawkill Creek at Bard College in Annandale-on-Hudson in the Town of Red Hook. The ladder traps eels below a waterfall over a concrete dam in the creek. The eels are measured, tagged and later released above the dam. (Photo: Karl Rabe/Journal file)

Many of the high priority culverts have already been identified by the estuary program. But in true crowdsourcing fashion, the scientists need your help to understand the whole picture.

You can provide your information online at <http://www.chazencompanies.com/sbmi/> or by calling Russell Urban-Mead at 845-486-1551.

"Out There" appears every other week in *My Valley*. Reach John Ferro at 845-437-4816; jferro@poughkeepsiejournal.com; Twitter: [@PoJoEnviro](https://twitter.com/PoJoEnviro)



Home

Presented By



chazencompanies.com

888.539.9073



Stream Barrier Mitigation Inventory

> Enter Info
on a Dam

> Enter Info on
a Culvert

Dams and culverts can limit pathways that fish and other organisms use to move between feeding, nursery and breeding grounds. Aquatic habitat can be segmented into "upstream" and "downstream" sections, making streams less resilient to changes in climate and land use.

The Hudson River Estuary Program (HREP) and partners are working towards restoring free flowing tributaries to the Hudson River. From time-to-time grant money is available to support these improvements. For instance, \$625,000 was made available for such projects in late 2015.

The Chazen Companies and Stuart Findlay from the Cary Institute of Ecosystem Studies were recently contracted by the the New England Interstate Water Pollution Control Commission (NEIWPCC) and New York State Department of Environmental Conservation's Hudson River Estuary Program (HREP) to help identify property owners willing to restore free flowing water past their dams or culverts.

- Corrections to culverts are needed where there are drops in elevation at either end that fish cannot navigate.
- Corrections to dams are needed where fish passage is blocked: Improvements might include lowering or removing portions of the dam or by installing bypass options.

You can help support stream flow improvements if you...

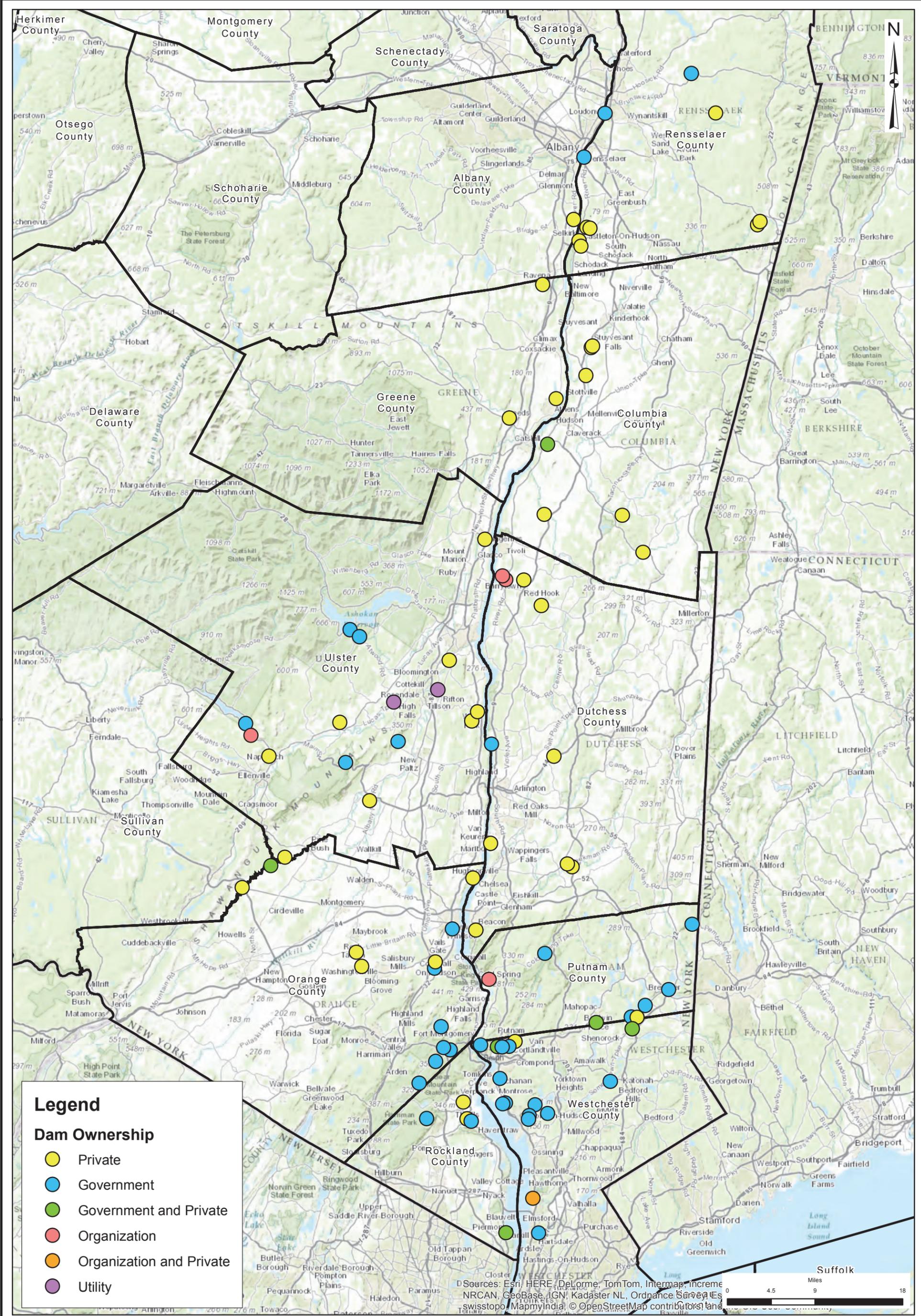
- Own a dam or culvert on a stream or tributary to the Hudson River, and...
- Are willing to consider having your dam or culvert evaluated by Chazen and Stuart Findlay at no cost, and if...
- you would be willing to consider funded corrections to your dam or culvert...

Even if you don't own a barrier, but you have observed an unused dam that you would like to recommend for mitigation, please use the same links above.

If you want to discuss a situation or site with us, please email project manager Russell Urban-Mead at rum@chazencompanies.com or call Mr. Urban-Mead at 845 486-1551.

The New York State Department of Environmental Conservation has more information about barrier removal benefits at <http://www.dec.ny.gov/lands/99489.html>

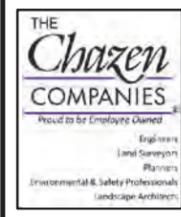
Screen clip of landing page maintained by Chazen during project period, providing project information and allowing owner registration of information about a volunteered dam or culvert.



Legend

Dam Ownership

- Private
- Government
- Government and Private
- Organization
- Organization and Private
- Utility



CHAZEN ENGINEERING, LAND SURVEYING & LANDSCAPE ARCHITECTURE CO., D.P.C.

Dutchess County Office:
21 Fox Street
Poughkeepsie, NY, 12601
Phone: (845) 454-3980

Capital District Office:
547 River Street
Troy, NY, 12180
Phone: (518) 273-0055

North County Office:
375 Bay Road
Queensbury, NY, 12804
Phone: (518) 812-0513

This map is a product of The Chazen Companies. It should be used for reference purposes only. Reasonable efforts have been made to ensure the accuracy of this map. The Chazen Companies expressly disclaims any responsibilities or liabilities from the use of this map for any purpose other than its intended use.

Owner Outreach and (Mitigation) design of Priority Hudson River Estuary Biologically Important Barriers

Priority Dam Ownership Summary

Hudson Valley New York

Drawn:	RL-B
Date:	11/30/2015
Scale:	1 inch = 9 miles
Project:	41544.00
Figure:	X

February XX, 2016

Address
Address
Address

RE: *Barrier Culverts and Bridges*

* *Information meetings in Newburgh and Stephentown*

* *Call for additional submissions*

Greetings,

We wrote to you in January about grant assistance to correct culverts/bridges and dams which are barriers to fish migration. This letter announces two information meetings and urges you to submit more potential mitigation sites. Your participation will help position you for future mitigation funding.

A flyer describing the two meetings is enclosed. Please consider attending. The meetings are as follows. Details are on the flyer.

Rensselaer County, Stephentown Fire Hall, March 15, 7-8:30 PM

Orange County, Kaplan Hall, Newburgh, March 31, 2016 1-3 PM



We continue to assemble a roster of owners of dams and culvert/bridges (both private and public) willing to be considered for free preliminary design service. In the past year, more than \$1M has been awarded in local grants through NYSDEC to improve stream connectivity. Further grant funding is likely. This preliminary review service will position owners for future grants to fund the culvert/bridge improvements or dam removals.

As indicated previously, to report a culvert/bridge or dam that you believe is a barrier to fish and wildlife, please register the location online at <http://www.chazencompanies.com/sbmi/>. You may also still also submit information using the attached worksheets. Maps of currently-recognized biologically-critical culverts are available here: <http://arcg.is/1mpBgki> and priority dams can be viewed here: <http://arcg.is/1VRUSJk>



For those who have already submitted culvert, bridge and dam candidates - Thank you; your responses helped us select locations for the two public meetings and we are very pleased to have your submittals.

We would appreciate receiving additional submittals by early April, 2016. From these, we will confirm a list of interested owners, and then meet with the Hudson River Estuary Program project team to select a number of the most biological-important culverts/bridges for

the free preliminary mitigation design assistance.

As a reminder, this project is being funded by New York State Department of Environmental Conservation's Hudson River Estuary Program in partnership with the New England Interstate Water Pollution Control Commission. The Chazen Companies and ecologist Dr. Stuart Findlay from the Cary Institute of Ecosystem Studies were contracted to advance this project. We are excited about this opportunity to help connect barrier owners with grant funds.



In closing, please join us at these meetings, or simply return the enclosed forms or enter information about barriers at Chazen's website. Thank you also for submissions already made. Participation requires no financial commitment thanks to the grant supporting this work, but we once again respectfully request that if you are reporting culverts/bridges that you own, please do so only if you are reasonably committed to advancing improvements.

You are welcome to contact us with questions:

At Chazen: Project Manager Russell Urban-Mead, (845) 486-1551, rum@chazencompanies.com

At HREP: Conservation Specialist Andrew Meyer, (845) 256-3135, andrew.meyer@dec.ny.gov

Thanks very much,

Sincerely,

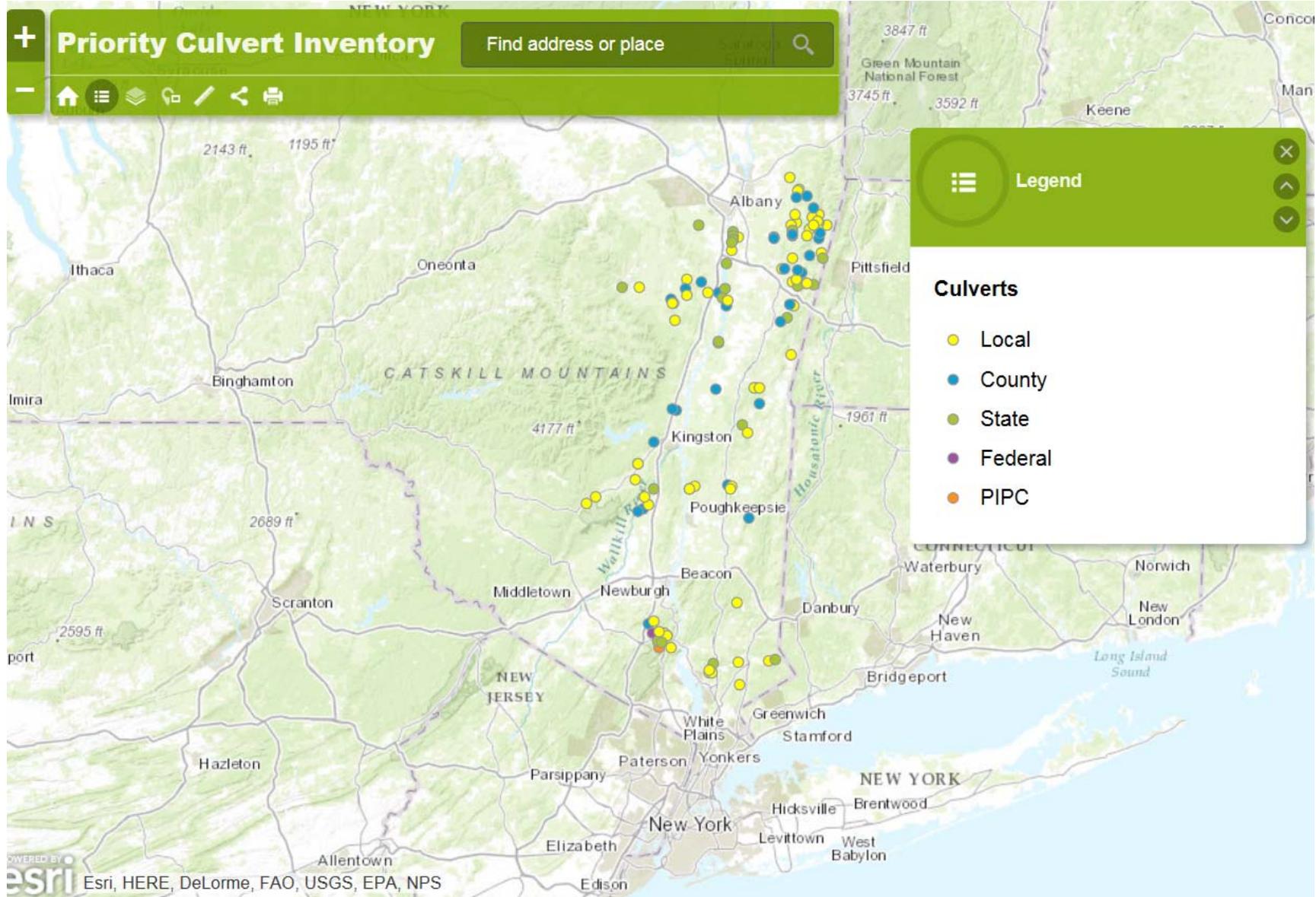
Handwritten signature of Russell Urban-Mead.

Russell Urban-Mead
Sr. Hydrogeologist, Chazen

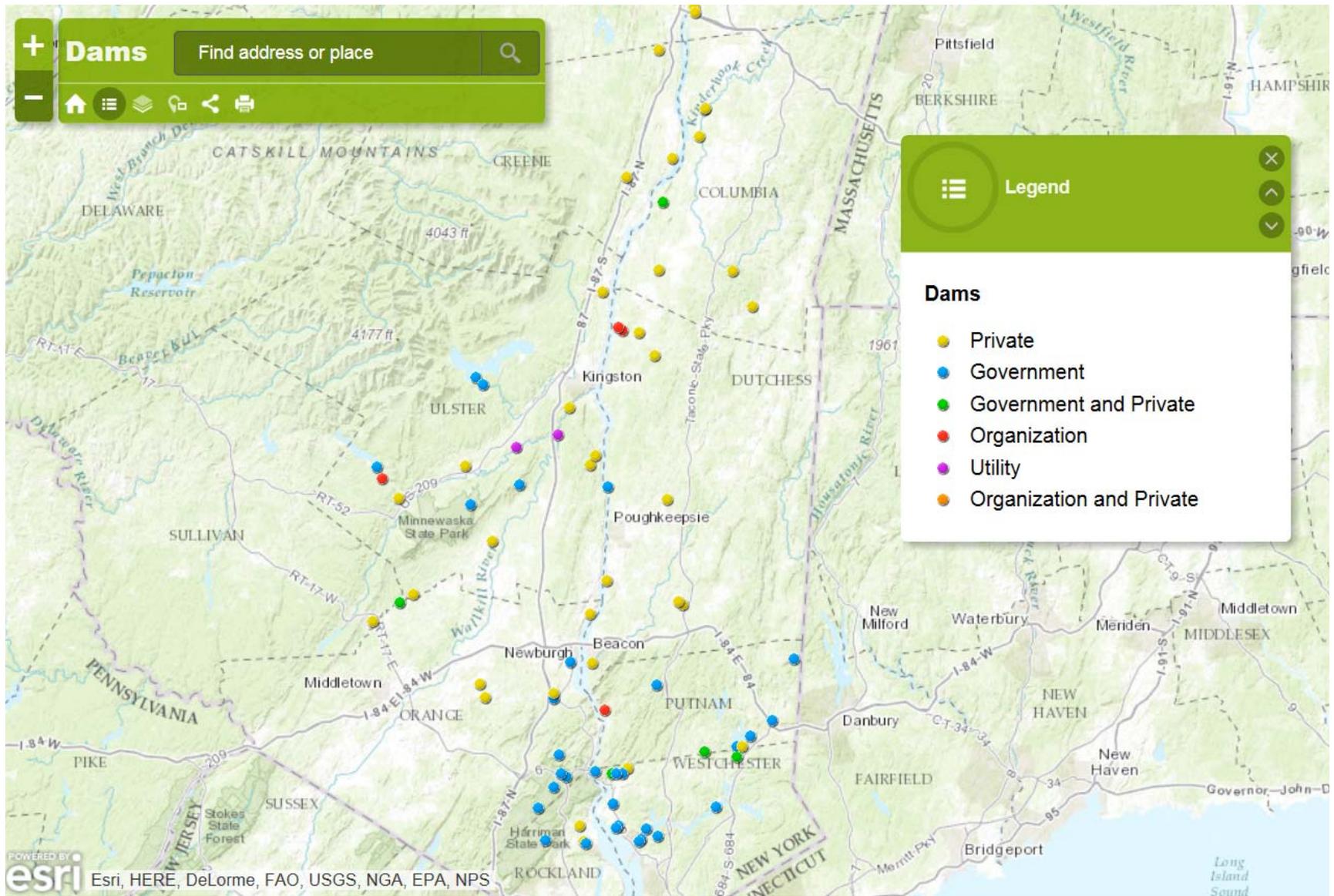
Handwritten signature of Dr. Stuart Findlay.

Dr. Stuart Findlay, PhD
Senior Ecologist, Cary Institute

Cc: Dan Miller, HREP/NEIWPC
Mike Jennings, NEIWPC
Scott Cuppett, Cornell/HREP
Andrew Meyer, Cornell/HREP



Screen clip of interactive link showing priority culverts to their owners. Established by Chazen during project duration at: <http://arcg.is/1mpBgki>



Screen clip of interactive link showing priority dams to dam owner. Established by Chazen during project duration at: <http://arcg.is/1VRUSJK>

Reconnecting Streams Through Dam Removal and Culvert Mitigation

Two meetings to learn about grants & free pre-grant assistance for land owners & municipalities

Rensselaer County

March 15, 2016

7:00 – 8:30 PM

Stephentown Fire Hall

35 Grange Hall Road, Stephentown, NY

Orange County

March 31, 2016

1:00 - 3:00 PM

SUNY Orange, Kaplan Hall

1 Washington Center, Newburgh, NY

The Hudson River Estuary Program and partners are working towards restoring free flowing tributaries to the Hudson River. From time-to-time grant money is available to remove old dams and re-install culverts for size and fish travel. For instance, \$625,000 was made available for such projects in late 2015, followed by another \$355,000 last month.

The Chazen Companies and Stuart Findlay from the Cary Institute of Ecosystem Studies have been contracted to help “prequalify” owners of dams and culverts for future grant finds. These free services include conceptual mitigation plans, budget development, and environmental permitting/ecological benefit analysis.

You can receive pre-application assistance if you...

- Own a dam or culvert/bridge on a stream or tributary to the Hudson River which you are willing to address to improve connectivity, and,
- Are willing to consider having your dam or culvert evaluated by Chazen and Stuart Findlay at no cost



Two information meetings are planned. You are also welcome to submit dams and culverts for consideration directly at <http://www.chazencompanies.com/sbmi/>

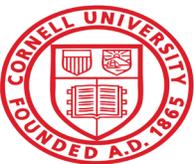
If you don't own a barrier, but you have observed an unused dam that you would like to recommend for mitigation, you may nominate such locations for consideration.

This project is paid for by the Hudson River Estuary Program and the New England Interstate Water Pollution Control Commission (NEIWPCC)

Meeting Co-Sponsors include Rensselaer Plateau Alliance, SUNY Orange, and Cornell Cooperative Extension of Orange County

Rensselaer Plateau Alliance

Conservation Through Community



Cornell University
Cooperative Extension
Orange County

THE
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SUNY ORANGE

Cary Institute
of Ecosystem Studies
[the science behind environmental solutions]

To register for either meeting or for questions, please contact Russell Urban-Mead rum@chazencompanies.com or 845 486-1551



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Engineers
Land Surveyors
Planners
Environmental & Safety Professionals
Landscape Architects

ADDRESS

ADDRESS

ADDRESS

April XX, 2016

RE: *Stream Connectivity – XX Dam XX culvert*

Hello XX,

The Chazen Companies along with our partners, the Hudson River Estuary Program (HREP), and the New England Interstate Water Pollution Control Commission (NEIWPCC), are excited that you and many others have responded with interest in re-establishing stream connectivity on your property.

We thank you for submitting information regarding your culvert/dam. We are now considering which sites to select for pre-mitigation assistance. We will be reviewing that information and other resources, and meeting with HREP to select those sites offering the best or most immediate biological benefit, with priority paid also to owners who have expressed 'good faith' interest in supporting the design phase and potential implementation.

Selected barriers will then be further evaluated as part of the conceptual design process. The work to be completed by The Chazen Companies and/or Dr. Findlay will include but is not limited to the following, and is free of charge to the property owner:

- Review the watershed associated with your barrier to examine storm event flow criteria.
- Conduct a biological assessment to identify species benefiting from re-established connectivity.
- Conduct a site visit to gather some non-invasive structural observations:
 - dimensions and condition of the existing dam,
 - upstream and downstream site conditions including wetlands and access conditions,
 - estimated volumes of any sediment accumulated behind the barrier.

During the site visit, there will be ample opportunity to discuss the variety of ways to re-establish connectivity that best suits your interests and needs.

- Use the assembled materials and your thoughts to develop a least-cost barrier mitigation conceptual plan (design and budget). For dams, mitigation may will likely focus on full removal, with fish ladders also being an option in some circumstances. Conceptual designs and budgets would be shared with you and HREP/NEIWPCC for concurrence before finalization.
- The finalized connectivity plan and budgets would be provided to you, so that the next time a grant source is identified, you should be poised to successfully apply for grant funding to implement mitigation. The Hudson River Estuary Program and NEIWPCC will keep copies of the Chazen barrier conceptual mitigation designs as well.

With these thoughts in mind, we do require your good faith commitment to proceed to the conceptual design phase of this project. By submitting the attached letter, you are expressing your non-binding

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interest in implementing the dam mitigation design produced by this project. If you do not submit this letter, your project will likely not score well enough to be selected for the free design phase services. However, completing and signing the attached does not obligate you to allow implementation of a project on your property.

Please feel free to contact me if you have questions. Once again, we are excited that you submitted a stream barrier for grant assistance consideration. Please keep in touch, and return two separately signed copies of the attached form soon (one for each dam) if you find the terms acceptable. Thanks very much XXX.

Sincerely,

A handwritten signature in cursive script, appearing to read "Russell Urban-Mead".

Russell Urban-Mead, CPG
Senior Hydrogeologist, Chazen

Cc: Stuart Findlay, Cary Institute
file

Dam Mitigation Letter of Interest

Russell Urban-Mead
Chazen Companies
21 Fox Street
Poughkeepsie, NY 12601
fax: 845 454-4026
email: rum@chazencompanies.com

Dear Mr. Urban-Mead,

I, _____ (name), am the owner of the dam at the following address:

_____, on the _____ (stream/river name).

To restore stream habitat and free-flowing river conditions, I request that conceptual designs be completed to remove the dam on my property. In requesting these designs, I agree to the following two conditions:

1. I will allow representatives from the project to access my property to complete all field related activities necessary to prepare the conceptual dam removal design. This will entail at least one site visit at an agreed-upon time and date to view the site and agree upon a mitigation approach with you.
2. While signing this letter does not obligate me to remove my dam, it does indicate me acting in good faith toward that goal, including pursuing future funding opportunities with partners.

Signed

Date

Printed name

APPENDIX 2

Brown's Pond Dam Town of Hamptonburgh, Orange County

Owner Outreach
and (Mitigation) Design of
Priority Hudson River Estuary
Biologically Important Barriers

Brown's Pond Dam

December 21, 2016



Prepared for:

Mr. Michael Jennings, Senior Program Manager
New England Interstate Water Pollution Control Commission
650 Suffolk Street, Suite 410
Lowell, MA 01854

Mr. Andrew Meyer
Hudson River Estuary Program
NYSDEC
21 South Putt Corners Road
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Owner Outreach
and (Mitigation) Design of
Priority Hudson River Estuary
Biologically Important Barriers
Brown's Pond Dam

December 21, 2016



Engineers
Land Surveyors
Planners
Environmental Professionals
Landscape Architects

Prepared by:

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INTRODUCTION

THE SITE

Attachment A to this report provides Figures illustrating the site. The site is located at the intersection of NY Route 207 and 208 in the Town of Hamptonburgh, and is identified as Tax ID 7-1-45.21. Figure 1 illustrates this property on tax maps for Orange County. Figure 2 illustrates this site generally on a Google Earth aerial photograph. Figure 3 shows the topography of the surrounding land on the Maybrook USGS Topographic Quadrangle. Figures 4 and 5 show a “bird’s eye view” of the area

REVIEW OF ON-LINE RESOURCES

Topography and Aerial Photos: Figure 3 illustrates the site on the Maybrook USGS Quadrangle. The site is located just upstream of the intersection of NY Route 207 and 208, with the dam flowing into a slightly sloped stream corridor. Upstream of the dam, the pond is located in a relatively flat valley. Figure 2 illustrates the site on the Google Earth aerial, and shows the meandering stream that feeds directly into two wider pond/wetland areas. Immediately downstream of the dam, the stream narrows once more. Figures 4 and 5 show this area in more detail.

NYSDEC Wetlands and Waters: The wetland maps of the New York State Department of Environmental Conservation (NYSDEC) indicated the site is within the Otter Kill, a Class C stream. The maps also indicate the project area is on the border of wetland MB-18, a 176.3-acre Class 1 wetland. See Attachment A, Figure 6, “NYS ERM, Streams and Wetlands.” This is a regulatory map.

USFWS National Wetland Inventory Map: According to the USFWS National Wetland Inventory Mapper (NWI), the area near the dam falls between a lacustrine system and riverine system. The lacustrine system is classified as limnetic, with an unconsolidated bottom, and permanently flooded (L1UBHh). This area was created/modified by the dam. The riverine system is defined as lower perennial, with an unconsolidated bottom, and permanently flooded (R2UBH). See Attachment 1, Figure 8. This is not a regulatory map, it is a map documenting status and trends of wetlands and waters in the United States.

Soil Mapping: Soil mapping for this site is provided in Attachment 1, Figures 9 and 10. This includes a general soil map and a hydric soil map for the property. Soils near the dam are generally mapped as Water (W) and Mardin gravelly silt loam, 8 to 15 percent slopes (MdC). Table 1 summarizes information on the hydric rating of these soils and water table position.

Table 1 – Summary of Soils Mapped within Area of Review

Map Unit Symbol	Map Unit Name	Hydric Soil Rating	Depth to High Water (duration)	Depth to Bedrock Bedrock Hardness
W	Water	0	-	-
MdC	Mardin channery silt loam, 8 to 15% slopes	0	1.0 to 1.6 feet (Perched winter to early spring)	> 60 inches

NYSDEC Endangered Species: The NYSDEC Environmental Resource Mapper (ERM) (Attachment 1, Figure 7) indicates that the site is within an occurrence record circle for rare plants and animals. Attachment B, Ecological Resources, contains the request made to the New York Natural Heritage Program on June 22, 2016 for records of endangered species for this location. The NYSDEC report resulting from this request indicates no records of rare or state-listed animals or plants, or significant natural communities at the site or in its immediate vicinity, however there is a documented maternity colony of Indiana Bat within 1.3 miles of the site. The bats may travel 2.5 miles or more from documented locations.

USFWS Endangered Species: Attachment B, Ecological Resources also contains the USFWS IPAC report that provides the unofficial list of Federal endangered and threatened species for this area obtained through the US Fish and Wildlife Service (USFWS) internet site. That list indicates that the site is in the range of four species, the Northern long-eared Bat (NLEB), which recently was added to the federal and state lists of threatened species, the Indiana Bat, the Small Whorled Pogonia, and the dwarf wedgemussel. The habitat of concern for the NLEB and the Indiana Bat are trees used for daytime roosting by females and their young. Suitable trees are generally 3 inches dbh or greater, with features that can shelter the bats, such as exfoliating bark, cracks, crevices, or cavities. A number of trees fitting this size were observed on site along the water's edge surrounding the site.

The other species, the dwarf wedgemussel, is generally limited to the Delaware River and tributaries. In New York, dwarf wedgemussels live embedded in fine sediments that have accumulated between cobbles in slow to moderate current and relatively shallow water (40 cm or 15 inches) in small cool water rivers and similar habitat in larger rivers (Stayer and Jirka 1997). Generally these are identified as "confined river," which is defined as the aquatic community of relatively large, fast flowing sections of streams with a moderate to gentle gradient. The only known populations in New York State occur in the upper Delaware River in Sullivan and Delaware Counties and one of its downstream tributaries, the lower Neversink River in Orange County, along with the Webatuck Creek in Dutchess County. No streams are located on site thus do not meet the habitat requirements of this species. Additionally, although in Orange County, the Otter Kill Creek is not a tributary of the Neversink River or Delaware River.

Cultural Resources: A historical resource assessment and subsequent report was conducted by Simon Gruber in association with the Stantec evaluation of the site. This report, dated December 7, 2014, states that the NY State Office of Parks, Recreation and Historic Preservation (NYSOPRHP) recommends that the dam itself, as an architectural feature, is not eligible for listing on the State or National Registers of Historic Places. However, a map from the NYSOPRHP's Cultural Resource Information System (included in Attachment A, Figure 11) indicates the dam is a part of an open consultation project, USN Number 14PR04275. This means that the dam is being reviewed as a historical resource, and this resource should be taken into consideration during state and federal permitting of the project. This is discussed in further detail below under Next Steps, Permitting.

HYDROLOGICAL ASSESSMENT

Hydrologic statistics were developed to provide information on peak flows of the Otter Kill in the vicinity of the Brown's Pond Dam. Sources of information for the development of the peak flow statistic included data provided through the U.S. Geological Survey (USGS) New York StreamStats3 online software program (StreamStats). Attachment E, Hydrological Assessments, contains summary reports of the HydroCAD models prepared for both existing and proposed conditions, as well as StreamStats data.

StreamStats provides streamflow statistics and basin characterization. Streamflow includes statistics including 100-year flood, 10-year flow and other flows. Basin characteristics include drainage area, stream slopes, forested areas, etc. StreamStats uses existing stream gages, rain gages, rain events, etc. to calculate the streamflow statistics at each station and subsequent point of interest. Detailed calculation procedures can be reviewed at the USGS Office of Surface Water. Most points of interest are not located at gaging stations and require a process known as regionalization to develop equations to estimate flows.

The Brown's Pond Dam, point of interest, includes a 51 square mile tributary drainage area as seen in Report Figure 1, Tributary Area. The tributary area includes a lag factor of 1.45 with a 5.27 storage percentage.

Hydraulic information was developed using HydroCAD. HydroCAD is a computer software program that assists with developing stormwater modeling. For this project, HydroCAD was used to analyze flow conditions upon completion of the proposed site improvements. The hydraulic calculations provided are intended to understand the stream flow depth(s) and potential impacts to the stream banks after the removal of the dam.

Report Figure 1: Tributary Area

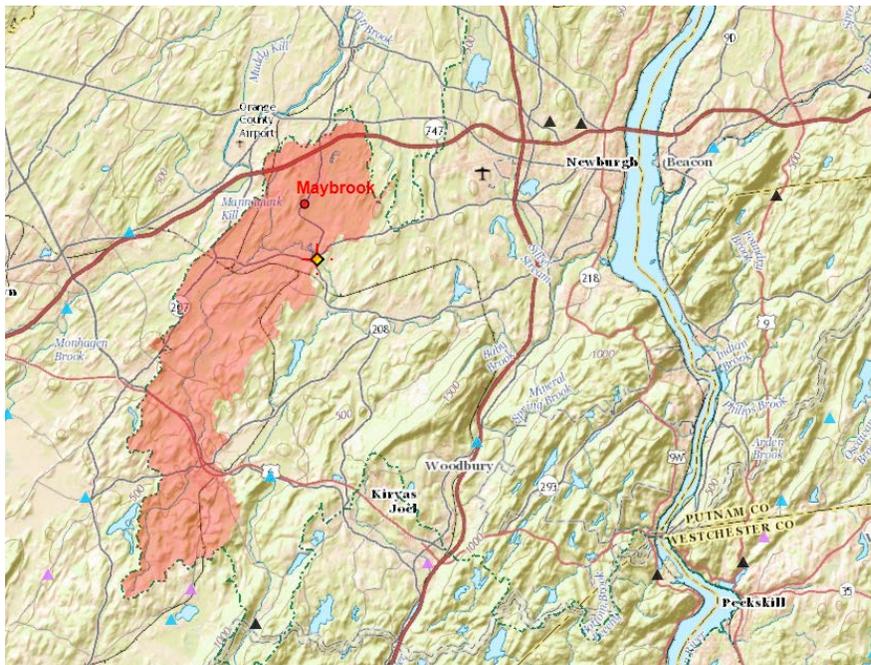


Table 2 reflects the hydrologic and hydraulic information derived from the StreamStats program as well as HydroCAD. Included within Table 1 is the stream channel water depth as well as the average stream velocity. The calculated values are based upon the general site information gathered during site visits as well as site survey information.

Table 2: Peak Flows, Otter Kill located at Brown's Pond Dam

Drainage Area (sq mi)	24-hour Duration Storm Event				
	1 – Year (100%)	2 – Year (50%)	10-Year (10%)	50-Year (2%)	100-Year (1%)
51 sq mi - Peak Flow (cfs)	292.01	494.89	1,221.84	2,607.75	3,507.04
Stream Channel Flow Depth (ft)	3.37	3.90	4.66	5.25	5.88
Stream Channel Flow Velocity (fps)	4.06	3.57	4.12	4.55	5.02

The Brown's Pond Dam site includes a channel that is approximately 60 feet in width with a varying upstream impoundment depths of about four feet. Included are the StreamStat and HydroCAD reports. Stantec has also conducted an extensive study of the site hydrologic and hydraulic site conditions.

SITE VISIT

On July 25, 2016, George Cronk of the Chazen Companies and Stuart Findlay of the Cary Institute visited the site.

Summary of Observed Conditions: The Otter Kill flows over this dam. The dam is classified as a Class A – low hazard structure. The current concrete structure is in fair condition. Observed water quality during the summer site visit was almost stagnant. The dam was historically used for the manufacturing of ice and thus the concrete retaining dam structure was constructed to withstand the expansive pressures of ice. The dam includes a concrete spillway that is in poor condition and is breached in several locations. The upstream water level varies in depth from a few inches to about 8 feet in depth. Downstream of the spillway bedrock is exposed in the stream channel with a transition to a boulder and cobble stream corridor further downstream. Approximately 50 feet downstream, the stream corridor is bisected by the NYSDOT Route 207/208 bridge. The bridge and abutments appear to need maintenance.

Summary of Landowner Comments: The land and dam owner stated that he inherited the structure. He would prefer having the structure removed and is not interested in continuing any needed maintenance. The Owner stated that he and the Town have already expended some efforts to study the dam with the intention of removal. The Owner stated that several agencies have also looked at the structure. The NYSDEC has reportedly been monitoring the upstream area for unidentified species. The land owner mentioned that two neighbors adjacent to the shallow pond are attentive to all activities occurring in the vicinity of the pond and dam. The landowner is interested in funding opportunities that would fully fund the removal of the structure and provide any and all mitigation needed.

SEDIMENT SAMPLING

A report dated December 10, 2014 of the Brown's Pond Dam was conducted by Stantec and includes analysis of sediments found behind the dam, as well as from sediments upstream and downstream of Brown's Pond Dam.

Bathymetric studies reported in the Stantec report indicate estimated potentially-mobile sediment thicknesses ranging from 0.1 to 4.53 feet with an average thickness of 1.32 feet. Of the locations measured, only two locations identified sediments more than 4 feet thick; one area was approximately 375 feet upstream of the dam and the other was 1600 feet upstream where the stream turns away from NY Route 208. On the basis of their sediment bathymetry estimates, Stantec suggested that approximately 32,000 cubic yards of sediment has been retained behind the Brown's Pond Dam. Using sediment sieve evaluations and channel flow analysis, Stantec estimated that of this, some 14,000 cubic yards of this sediment is likely to be remobilized within two years following removal of the dam and implies but does not state that therefore 14,000 cubic yards of sediment should be removed rather than being stabilized in place.

Stantec collected sediment samples for analysis per NYSDEC's 2004 Technical & Operational Guidance Series 5.1.9. Analyses included standard sieve analysis (for soil texture), total organic carbon estimation, metals, PCBs, pesticides, volatiles, polycyclic aromatic hydrocarbons (PAHs), volatiles and Dioxins. Four sediment samples were collected from slow-moving areas within the impoundment where finer sediments were likely to accumulate, along with one upstream and one downstream sediment sample.

Review of TOGS 5.1.9 sediment rating thresholds identifies that the impoundment sediments generally consist of Class A sediments. VOCs, pesticides and PCBs were undetected aside from acetone which was flagged for potential laboratory contamination. Some PAHs, dioxin and arsenic were detected but concentrations were within Class A criteria limits. Cadmium, copper, lead, and mercury were present in one impoundment sample in concentrations equal to or slightly more than Class A threshold but at the low end of the Class B sediment range and these metals did not exceed the Class A threshold in the other three impoundment samples. Considered comprehensively, and applying TOGS 5.1.9 as a guidance document, Chazen believes NYSDEC would likely to agree that the overall sediment quality is most consistent with a Class A sediment.

The upstream and downstream samples both identified Pb (lead) over Class A thresholds, suggesting some degree of lead mobility in the local watershed, and the downstream sample also contained both copper and dioxins over the Class A standard. The copper concentration was consistent with the highest copper detection in the impoundment while the dioxin concentration was an order of magnitude higher than any impoundment sample, suggesting that impoundment sediments are not significantly contributing to downstream sediment quality and that specific compounds are already present in both locations.

In conclusion, the Stantec report concludes, "it appears unlikely that sediment mobilization following potential dam failure or removal would introduce contaminants to the stream below the dam that have not already been introduced." A submission of these data will need to be presented to NYSDEC to seek their determination of Class A or B sediment status. If NYSDEC accepts these sediments as Class A, they can be relocated anywhere on the property and stabilized without permitting beyond development of a sediment erosion control plan; however, if NYSDEC categorizes these sediments as Class B soils, a

Beneficial Use Determination (BUD) would be necessary to reuse the sediments on site or the sediments would need to be removed for off-site disposal.

SPECIES CONNECTIVITY

The list of candidate dam sites was selected from a priority list developed by The Nature Conservancy¹. Their analysis began with a full list including 1004 dams derived from the New York State Department of Environmental Conservation (DEC) Inventory of Dams. To obtain a manageable list of sites for more detailed consideration TNC used a two-part evaluation: species suitability and habitat quality criteria and a length of habitat “gained” criterion. The species criterion (described in the report) uses models to judge whether or not a stream segment would be suitable for a range of species focusing on diadromous fishes and Brook trout. General habitat quality was gauged by metrics such as impervious surface and presence of intact floodplain. The “Gain” criterion required that a removal of a candidate barrier would increase habitat by at least 750 m in a network of at least 2 km.

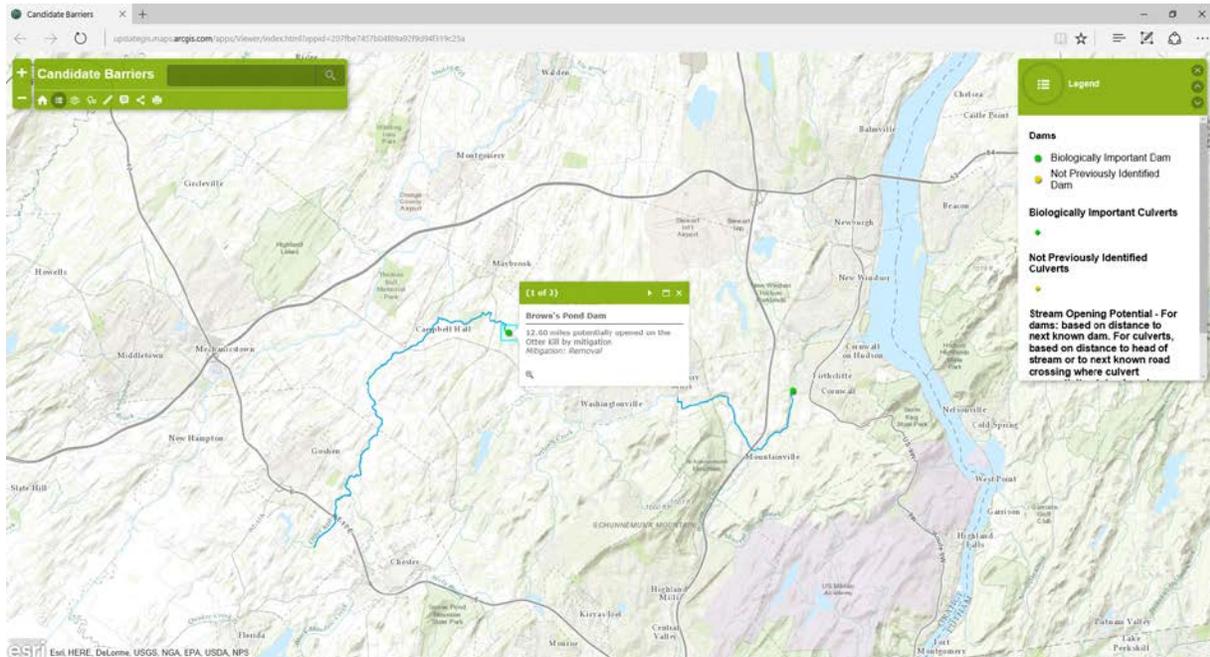
Following this screening procedure there was a list of 80 dams that met the criteria and were considered further by Chazen. Following an assessment of landowner interest, this candidate dam site was visited by Chazen et al. in summer of 2016.

The Brown’s Pond Dam (NY Dam ID 195-0519) on the Otter Kill in Orange County is in a large watershed, the Moodna Creek. Upstream reaches are judged as potential habitat for Diadromous fishes, American eel in particular. According to The Nature Conservancy Study of Biologically Important Barriers in the Hudson River Estuary² removal of this dam would make an additional 4.2 miles of stream available. The next downstream barrier is Mendelson Pond Dam, approximately 1.9 miles downstream. There are fringing wetlands around the impoundment covered primarily by shrubby and herbaceous species and these would probably become less wet as water levels drop following dam removal but these wetlands do not appear unique. As shown in the Report Figure 2 below, the next mapped upstream barrier is the Goshen Reservoir, located 12.6 miles upstream on the Otter Kill at a spot south of Route 17. Crossings of Otter Creek between the Brown’s Pond Dam and Route 17 include the Norfolk Southern Railroad, Otter Road, Route 207, the Norfolk Southern Railroad, Route 77/Egbertson Road, Route 8 Sarah Wells Trail, Route 66 Craigville Road, Old Chester Road, Route 17M, and Route 6/Route17W/E.

¹ Brown, Michelle and Cheeseman, Craig. 2013. Final Report – Identification of Biologically Important Barriers in the Hudson River Estuary. The Nature Conservancy, with contributions by New York Natural Heritage Program and Andrew Peck and Alicia Raeburn of The Nature Conservancy. https://wri.cals.cornell.edu/sites/.../TNC_HRE_Barriers_FinalReport_April2013.pdf. See batAbs “Absolute gain obtained by removing barrier.

² Ibid.

Report Figure 2: Candidate Barriers



CONCEPTUAL DESIGN AND SUMMARY DESCRIPTION

The purpose of this project is to restore the connectivity of the Otter Kill by removing this barrier. Removal of this barrier will create 12.60 miles of Otter Kill without a dam.

The NYSDEC's intent is to consider full dam removal. The design intent is also to confer with NYSDEC on the volumes of sediment which must be removed or relocated behind the dam. The Stantec report suggests up to 14,000 cubic yards of sediment would be mobilized within two years following dam removal while Chazen's observation is that removal of the dam to the current stream bed level might reduce the need for soil removal to perhaps 1,500 cubic yards collected from within 150 feet of the dam, with the potential for some sequenced natural stream bed migration and sediment migration thereafter. Dam mitigation costs rise sharply if the higher volume is addressed immediately. Under both scenarios, the project approach attempts to avoid direct impacts to the shrub/forested wetlands along the shoreline and to allow riparian zones to return to their pre-dam condition following dam removal.

Attachment F provides a conservative conceptual design plan addressing 14,000 cubic yards. Sheet BP-01 shows the project site location. Sheet BP-02 provides the conceptual design broken into two sections, Sections A and B. Section A includes the immediate area surrounding the dam which would be removed in its entirety. A low flow channel would be installed, as well as stream bank protection measures such as boulders and vegetation. Section B is upstream of the dam. This area would be stabilized using stipulated methods. It is unclear where 14,000 cubic yards could be placed on site but lesser quantities can be graded into non-wetland abutting areas.

OPINION OF PROBABLE COSTS

Low to high Opinions of Probable Cost are provided in Attachment G.

NEXT STEPS

The NYSDEC report *Dam Removal and Barrier Mitigation In New York State: Final Draft Guidance for Dam Owners and Project Applicants* provides information and outlines steps for applicants with an interest in removing a dam or implementing an aquatic barrier mitigation project (to access this report please see: http://www.dec.ny.gov/docs/remediation_hudson_pdf/damremoval.pdf). The report pages 35 through 38 of 51 of the pdf recommends a feasibility assessment/report and then discusses permitting. Chazen and others have completed a number of tasks as described in the feasibility assessment limited to those necessary for preliminary designs. However, there are remaining tasks needed to complete a full a feasibility study as well as prepare a complete permit application. A summary of completed tasks and remaining actions to be taken are provided below.

Additional Tasks Required to Complete a Feasibility Study

Task 1. Site Reconnaissance: Chazen has completed site visits, obtained reference photos and other pertinent information, and conducted meetings. The following tasks need to be completed:

- *Utility research* to determine if there are any utilities in the vicinity of the dam to be protected during construction.
- *Adjoining property deed search* to determine that all of the work proposed is within the limits of the property boundaries.
- *Easements search*, to ensure that there are no restrictions on the dam removal, or other easements that would not allow placement of materials or work associated with this project.

Tasks 2 and 3. Access Route Survey, Project Site Survey, River Cross-Sections, Dam Survey, and Bathymetric Survey: Chazen has identified potential access routes however limited surveying has been completed. The following tasks may need to be completed:

- *Bathymetric surveys*. Because bathymetric surveying has been completed at Brown's Pond, it is likely (and assumed) that additional effort is not needed.
- *Existing Site Conditions Survey*, which involves integrating topographic, easement, property boundaries, access routes, affected structures, and utilities survey onto a single plan sheet, typically in CAD format. Because of the existing work completed at Brown's Pond Dam, it is assumed that additional effort is not needed.

Task 4. Hydraulics and Hydrological Analysis: Chazen has conducted preliminary analysis necessary for the preliminary design. USGS StreamStats data was obtained for the surrounding area. This data was inputted into HydroCAD. Models for existing and proposed conditions were created. The following tasks need to be complete:

- NYSDEC to review of adequacy of hydraulic analysis/determination if additional analysis is required. Stantec has previously suggested that dam removal would result in few to no changes to downstream flow.

Task 5. Sediment Accumulation Determination: Stantec has measured the depth of water and sediments at this location. Depth of water, silt/clay sediment thickness maps were developed by Stantec. The following tasks need to be completed:

- NYSDEC to review and determine adequacy of sediment sampling.

Task 6. Soil Cores: Stantec has collected sediment samples as provided in their report and summarized here. In conclusion, the Stantec report concludes, “it appears unlikely that sediment mobilization following potential dam failure or removal would introduce contaminants to the stream below the dam that have not already been introduced.” A submission of these data will need to be presented to NYSDEC to seek their determination of Class A or B sediment status. The following tasks need to be completed:

- NYSDEC review and determine adequacy of sampling, and consideration whether 14,000 cubic yards of sediment or lesser volumes must be removed as part of the dam removal project.

Additional Engineering Studies Required to Submit the Permit Applications

Based on the findings of the feasibility study and discussion with stakeholders a final engineering design and specifications would be selected for implementation. The following studies and assessments will be required to be completed to submit the permit applications:

- Final engineering design documents and project specifications.
- Stormwater Pollution Prevention Plan (SWPPP) for Soil and Erosion Control.
- Construction documents.

Permit Applications and Permitting

NYSDEC

- *State Environmental Quality Review Act (SEQRA) Determination.* We recommend that the NYSDEC and the Town of Hamptonburgh coordinate on the appropriate Lead Agency for this review. The project needs to obtain a NYSDEC dam removal permit. However, the project also has the potential to affect six or so parcels fronting this mill pond, and therefore potentially characterized as “waterfront” properties. Changing the character of these properties could be of concern to local landowners and therefore the municipality. Given that the removal of this dam also has the potential to affect more than 10 acres of land associated with the potential changes in the hydroperiod of NYSDEC Wetland MB-18, a 176-acre Class I NYSDEC wetland (and a Corps regulated wetland), a project with the potential to impact more than 10-acres of land is a Type 1 action under SEQRA, and so a coordinated review is required. Alternatively, the SEQRA may be avoided by the NYSDEC Dam Safety Division identifying this as a hazard and issuing approval under an Emergency Authorization.

To initiate SEQRA, the Applicant for the project, or their consultant would need to prepare a Full Environmental Assessment Form (FEAF) and submit that to the NYSDEC, along with the Joint Permit Application for the Dam Removal Permit. Under a Coordinated Review, the Lead Agency would circulate the FEAF to the involved and interested parties, and obtain comments on the Lead Agency designation and potential environmental impacts. Following a Lead Agency coordination period, the NYSDEC would determine whether a negative declaration could be issued for this project.

- *NYSDEC Dam Removal Permit.* The Applicant’s consultant would prepare and submit a NYSDEC Dam Removal Permit as part of a Joint Permit Application (JPA) to the Corps of Engineers and NYSDEC. The Dam Removal Permit would contain the materials identified in Tasks 1 through 6

above, along with the engineering documents identified above, and the materials described here for the NYSDEC, Corps and Associated Environmental Permits.

- *NYSDEC Stream Disturbance Permit.* The Otter Kill in this location is a Class C Stream, and so no NYSDEC Stream Disturbance Permit is required to remove the dam under Article 15 Protection of Waters Permit. The NYSDEC's Google Earth mapping of Impaired Waterbodies does not show any impairment on this system.
- *NYSDEC Wetland Permit.* The open water upstream of the dam is identified as NYSDEC Wetland BM-18, a Class 1 regulated wetland by the NYSDEC under Article 24, Freshwater Wetlands Act. The removal of the dam has the potential to change the character of this wetland from an open water /emergent wetland to a drier wetland type (emergent marsh/wet meadow/shrub) or even forested wetland or upland. The Joint Permit Application would need to discuss compliance with the NYSDEC Article 24 Freshwater Wetlands Act Permit Issuance Standards and Procedures found at 6 NYCRR 663.4 and 6 NYCRR 663.5.
- *NYSDEC Section 401 Water Quality Certificate.* The NYSDEC would need to issue a Section 401 Water Quality Certificate for any Corps of Engineers permit for the project. The Permit Issuance Standards and Procedures under the Article 15 Stream Disturbance Permit would apply to this application as well.

Corps of Engineers

- *Corps of Engineers Nationwide Permit 27 or Individual Permit.* As described above, there are aquatic resources on the Project Site that meet the Federal definition for Waters of the United States, including open waters and wetlands. An important characteristic of wetlands that are subject to federal jurisdiction (i.e., U.S. Army Corps of Engineers) is that they have a definite connection ("significant nexus") to surface waters that are considered to be Traditionally Navigable Waters (TNWs). These wetlands appear to have such a connection, as they are directly adjacent to the Otter Kill, which is a tributary to the Moodna Creek which eventually flows to the Hudson, a TNW. Therefore, all of the waters and wetlands found on the Project Site exhibit a significant nexus to a TNW. Under Section 404 of the Clean Water Act, the Corps regulates the discharge of dredged or fill material into waters of the United States, and based on the type of work proposed at this location, there would likely be the need to obtain a permit from the Corps for this work. The Corps has a Nationwide Permit 27 for Stream Restoration, which includes removal of dams. If the Corps finds that the project meets the terms and conditions for this nationwide permit, including regional conditions, a nationwide permit may be available for this work. If not, a Corps of Engineers individual permit could be required to complete the work described above. The permit application to the Corps would be submitted concurrently (and typically within the same permit application package) as the application to the NYSDEC.

Associated Environmental Reviews for Corps and NYSDEC

The need for permits from the Corps and NYSDEC trigger the involvement of other regulations. Compliance with these other regulations is typically discussed in the Joint Permit Application to the Corps and NYSDEC, with detailed information provided as attachments. These are summarized below.

- *SHPO/Cultural Resources.* According to the NYS Office of Parks, Recreation and Historic Preservation Website (also known as NYS Historic Preservation Office (SHPO)), the dam on this site is under an open review to determine its status as cultural resource. There is also an area of archeological sensitivity in the vicinity of the site. Under the Corps' review, the SHPO would need to provide an opinion of the effect of the project on the dam and any other cultural resources. This review would be under Section 106 of the National Historic Preservation Act, which would also demonstrate compliance under Section 14.59 of the State Historic Preservation Act. Consultation with SHPO requires a determination of whether the dam is eligible for listing on the National Register, or if any other areas to be disturbed by the project contain cultural resources, and if so, mitigation for impacts to those resources adequate to offset the complete removal of this historic resource. This could include documentation using photography of the dam and its construction, photography of the dam prior to its removal, and reporting and public information displays. If the dam is determined eligible for listing, there is the potential that the Advisory Council on Historic Preservation would be involved in this review. The review would be led by the Corps of Engineers as part of their permit review, and could require development of a Memorandum of Understanding between the Corps, NYSDEC, SHPO and landowner. The SHPO and Corps may also require cultural resource investigations or reviews of any other areas of ground disturbance or permanent placement of fill outside of wetlands.
- *Endangered Species.* The USFWS identifies that the project site is within the range of the northern long-eared bat (NLEB), Indiana bat, dwarf wedgemussel, and small whorled pogonia. The site does not represent suitable habitat for the dwarf wedgemussel. The NYSDEC NYNHP indicated a documented maternity colony of Indiana Bat within 1.3 miles of the site. The bats may travel 2.5 miles or more from documented locations. Based on current data available to Chazen, the closest known hibernaculum is approximately 6 miles to the south. With regard to the northern long-eared bat and Indiana bat, these species that utilizes trees greater than 3" dbh for summer roosting. A small number of suitable trees exist in the vicinity of the dam. Removing these trees during the winter months (November 1 to March 31) should provide adequate avoidance mitigation for the species.

For endangered species, the Applicant, or their consultant will need to prepare an assessment of potential affect for the identified species, along with mitigation measures and include that in the Joint Permit Application. During processing, the Corps will coordinate with the USFWS about the project, potential impacts and mitigation measures that might be incorporated as conditions into the permit.

- *Coastal Zone.* The project site is outside the NYS Coastal Zone Boundary.

- *Wetland Delineation Report.* The Corps may or may not require a wetland delineation report for this project, and/or an assessment of potential impacts on the adjoining wetland resources upstream of the dam on the Otter Kill.

Local Review

Each municipality reviews this type of work at their understanding of the applicable regulations. The following would most likely be applicable to the proposed dam removal project in the Town of Hamptonburgh.

- **Local Planning Board:** As construction plans are developed, they should be reviewed against the Town of Hamptonburgh code to determine if any additional permits or reviews are required from the Town for various aspects of the design or sediment removal.
- **FEMA/Application/Study** (If the municipality requires update of flood mapping resulting from the removal of the dam). It is Chazen's opinion that removal of the dam will likely reduce flooding impact limits. The municipality could require either a Conditional Letter of Map Revision (CLOMR) or a Letter of Map Change (LOMC). Alternatively, the municipality may ask that FEMA assist with the completion of such a study. The Corps of Engineer's Nationwide Permit Program General Condition states "The activity must comply with applicable FEMA-approved state or local floodplain management requirements."

Pre/Post Ecological Monitoring

We anticipate that any Pre/Post Ecological or Water Quality monitoring would be performed by the NYSDEC.