NEVERSINK SHAD STUDY

Final Report

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Introduction

The Cuddebackville Dam, built in the early 1900's, was located about 15 km upstream of the mouth of the Neversink River. It consisted of two sections, each blocking a channel on either side of an island. In 2004, the right section of the dam was removed. There had been plans to build a rock ramp on the left channel. However, after removal, large floods deposited large amounts of sediment in the channel upstream of the left channel, so that almost all flow went through the newly-opened channel along the right bank.. In 2004-20006, The Academy of Natural Sciences (ANS) studied effects of the dam removal on assemblages of fish in the immediate vicinity of the dam site. One of the main purposes of the dam removal was to allow upstream passage of migratory fishes, especially American shad. In 2006 and 2007, ANS investigated occurrence and spawning of American shad and other anadromous fish in the Neversink river upstream of the former Cuddebackville dam site.

The 2006 study primarily used daytime and nighttime visual and auditory observations and ichthyoplankton sampling to determine occurrence of American shad and other fishes. These studies were conducted at one station 1.3 km downstream of the dam site and several stations upstream of the dam. Based on the results of the 2006 study, the 2007 study design was modified in several ways. Daytime and nighttime observation were used as in 2006. However, more emphasis was placed on capture of fish to allow better identification of fishes, specifically to separate different species of clupeids. Ichthyoplankton sampling was not done in 2007, because abundances of shad were anticipated to be small, so that ichthyoplankton sampling would have a relatively small likelihood of capturing eggs or larval shad. In 2007, sampling was done in the lower river as well, to determine occurrence and upstream movement of American shad in the river.

Study sites

The Neversink River rises in the Catskill Mountains. Its upper reaches are impounded in the Neversink Reservoir, with the dam about 69 km upstream of the mouth of the river. The river flows approximately south, gaining a number of tributaries, many draining lakes and impoundments. From the dam to Bridgeville (I17 bridge), the river has an average gradient of about 3.3 m/km. Downstream of Bridgeville , the river flows into the Neversink Gorge, where it flows in a canyon about 200 m deep. This reach has relatively high gradient (average of 10.1 m/per km from I17 bridge in Bridgeville to the Oakland Valley bridge) and has several steep drops. The lowermost of these is High Falls (about 28 km above the mouth of the river), which is about several meters high and is likely to provide a barrier to upstream movement of American shad. Downstream of High Falls, the river consists largely of runs and riffles, with several deep pools. The river leaves the gorge at about km 21, but the gradient is relatively high (7.1 m/km from Oakland Valley to the mouth of the Basha Kill) and the channel is largely runs and riffles with a few pools for another 9 km. The Cuddebackville Dam was located at the lower end of this section, at river-km 15. At river-km 12m, the Basha Kill flows into the Neversink River, and the river turns to flow approximately southwest down to its mouth at Port Jervis. This lower part of

the river (about 12 km) has a lower gradient (about 1.1 m/km from the mouth of the Basha Kill to the mouth of the Neversink River) and contains longer pools and runs than the upper section.

Because of its lower gradient and channel form the lower part of the river is expected to be relatively unobstructed for passage of American shad. Upstream of this, spawning and resting habitat for shad would be largely in the deep pools. At low flows (including typical non-storm spring flows), riffles in this section are shallow and likely to be unpassable for American shad. Thus, migration of shad into the section upstream of the Basha Kill may occur mainly during higher flows, with shad able to remain in pools between high flow events.

In both 2006 and 2007, sampling for shad was focused on the deep pools in the reach between Cuddebackville and High Falls (Table 1), with most observation at the large pool at the Paradise Road Bridge (river-km 20), and additional sampling at the Cuddebackville Pool and pools in the Neversink Gorge. In 2007, observation and sampling was also done in the lower river, in order to document timing of occurrence in the river. Sampling and observation in the lower reach was done mainly near Port Jervis (stations PJ1 and PJ2, river-km 3-4.4), with observation at the Guymard Road Bridge (river-km 11), as well (see Figure 1 for a map of the study area and sampling locations).

Design

Sampling in 2006

The 2006 sampling program (Tables 2 and 3) used three primary techniques for identifying the occurrence of shad and shad spawning in the Neversink River:

1) Ichthyoplankton samples were taken at stations in the Neversink River at eight periods (each period including sampling on 1-2 days) between May 5 through June 20, 2006, designed to sample through the potential period of spawning of American shad in the Neversink river. The sampling period was based on reports of shad occurrence in the Delaware River. Samples were taken at Cuddebackville (station CB, at the pool at the bridge abutments) and at the pool at the Paradise Road Bridge in Oakland Valley (station OV; Paradise Road intersects NY Route 49 about 0.9 km south of the Route 49 crossing of the Neversink River). Some samples were also taken at the former dam site (station DS) near the start of the study. The Oakland Valley station is upstream of the dam site. The CB site is at the head of the first pool downstream of the dam site. While some ichthyoplankton encountered may have come from the area between the dam site and the CB sampling site, all shad, which spawn in pools, are likely to have come from upstream of the dam site. Samples were taken during the evening (after dusk) and in the morning (before 1000). Thus, in addition to sampling larvae, the study could potentially sample both recently spawned eggs from near the sampling stations and eggs spawned the previous night farther upstream. Identification of ichthyoplankton focused on anadromous species, but other species were identified as well.

2) Daytime visual observations were taken at the ichthyoplankton sampling stations and in appropriate pool habitat in the Neversink Gorge between High Falls and Oakland Valley.

Observation was done using binoculars from shore and by snorkeling. It had been anticipated that vehicular access to the area of High Falls would be possible, enabling observation within the gorge during eight sampling events. However, permission for vehicular access to that area through private lands could not be obtained. Permission was obtained to take vehicles to the southern edge of the Neversink Gorge Natural Area, approximately 6 km from High Falls. Two visits were made to the gorge from this access site, one observing pools upstream to the mouth of Eden Brook and the other observing from the mouth of Eden Brook upstream to High Falls. The change in scope was described to The Nature Conservancy (TNC) in a memorandum sent on 17 May, 2006.

3) Nighttime observations were taken concurrently with nighttime ichthyoplankton samples. These observations could potentially document shad spawning by hearing spawning splashes and/or by visual observation of fish.

In addition, limited sampling was done using dip nets, gill nets and angling to document fish presence.

Sampling in 2007

In 2007, daytime and nighttime visual and aural observation was done using similar techniques as those described above (Tables 2 and 4). Most observation was done at the OV station, which is likely to be the first large holding pool for shad upstream of the dam. Observations were also done near the mouth of the river, at the Guymard Bridge, at a pool upstream of the mouth of the Basha Kill. In addition to bankside observation, limited snorkeling observations were made in pools in the Neversink Gorge.

Several techniques were used to capture fish for specific identification:

1) Boat electrofishing was done near the mouth of the Neversink River.
2) Gill netting was done in the Oakland Valley pool.
3) Limited angling was also done.

Methods

Ichthyoplankton sampling

Samples were taken using single, round, 0.75-m diameter, 250-micron mesh ichthyoplankton nets. Nets were mounted on a round gimbel and had a General Oceanics flowmeter affixed in the approximate center of the net. In relatively deep water (e.g., at the OV station), a weight was tied to the bottom of the net, and the net was lowered until it was just completely submerged. In shallow water, the net was held on the bottom with a weight and held upright with a rope from the top. In a few cases, the top of the net was out of the water; in these cases, the net cross-section was adjusted to the amount of submerged area. Samples were taken for a variety of durations, depending on amount of debris. Most durations were 10-20 minutes.

The net had a removable collecting jar in the end. At the end of sampling, sample material on the nets was washed into the collecting jar, the jar was drained, and the sample poured into a sample jar, where 10% buffered formalin (about 50% volume of the jar) and rose Bengal stain was added, resulting in a sample preserved in about 5% formalin.

Flowmeter readings were taken at the start and end of sampling. The linear distance of water flowing through the net was calculated from the difference between these readings (number of counts), using a factor relating counts to distance. The volume sampled was estimated as the product of cross-sectional area of the net and distance of each sample. In some cases, the flowmeter readings were unreasonable (e.g., distance sampled much greater or less than the other samples of similar duration taken at the same time and date). In some cases, these could be resolved by simple corrections of start or stop readings based on the structure of the counter. However, no flowmeter readings could be used for four samples (taken on three different station-date events), one because of air in the meter, and the other three for unknown reasons. In these cases, volumes were estimated from the durations of the samples, using duration to volume ratios for the other sample(s) taken at the same station on the same date.

Ichthyoplankton samples were sorted in the laboratory. Coarse debris was removed from samples, the sample remainder was sorted under a dissecting microscope, with all fish, fish eggs, reptiles and amphibians removed. Representative macroinvertebrates were removed from some samples but were not tabulated. Fish and fish eggs were identified to the lowest-practical taxonomic level, and were enumerated by taxon and stage (larval stages, juvenile and adult). QA checks were done on 10% of the samples by adding all picked material and debris to the sample remainder to reconstruct the original sample, and resorting the sample.

Visual observation

Visual observation was done for fixed periods of time (usually 15-min or more). Observations were taken from bridges (Guymard Road Bridge and Paradise Road bridge in Oakland Valley), from elevated spots along the bank (at Paradise, High Falls Pool), or from bankside (most stations). Attempts were made to identify all fishes observed, with special attention to clupeids. Polarized glasses were worn during daytime sampling. Nighttime observation was done using bright lights. Auditory surveys for spawning splashes were done simultaneously with the nighttime visual observation.

Boat electrofishing

Boat electrofishing was done, using a 14-ft custom electrofishing boat with Smith-Root electronics. Sampling was done from the Port Jervis launch upstream as far as navigable by the boat (near a left bank tributary in a sharp bend about 2 km upstream of the launch). Sampling was done mainly in pool habitats, where numbers of clupeids were observed. A small number of American shad were netted and measured, but most fish were observed without netting, to reduce stress on the fish.

Gill netting

Gill nets were 60-ft long, consisting of the 20-ft panels, of 2, 3, and 4- in (5.1, 7.6 and 10.2 cm) stretched mesh. Gill nets were used at the OV station. Gill nets were usually set with one end attached to the Paradise Road bridge and the other end pulled and held with a weight on the lead line. One set was done from a canoe. Gill nets were set in late afternoon or dusk and left in place for 2 - 12 hours. These relatively short soak times were used to minimize mortality of captured fish.

Snorkeling

Snorkeling was done at the Oakland Valley station and the stations in the Neversink Gorge (IP, EB, and HF). Sampling was done over the area of potential pool habitat, with attempts made to identify all fishes observed. Snorkeling generally allowed close approach and identification of many smaller fishes, but was generally unproductive for larger, mobile fish (including clupeids), which could not approached closely enough for observation or identification when observed.

Other

Some sampling was done using dip nets, to sample juvenile fishes in shallow water. Angling was done in a few cases, using standard lures for shad fishing (shad darts and flutter spoons).

Results

A total of 23 species were observed or captured in the two years of study (Tables 5 -7).

2006 Results

1) Ichthyoplankton samples. A total of 92 ichthyoplankton samples were taken. While no quantitative estimate of net efficiency is possible, the results suggest that the nets worked effectively. Fish eggs and larvae were caught in a number of samples (Tables 8 and 9). A maximum of 172 larvae were caught in one sample. A variety of life stages, including eggs, larvae, postlarvae and small juveniles were caught. Catch rates were higher in nighttime samples. This is typical and is often due to either net avoidance during daytime or greater drift during nighttime. However, the same pattern was seen for fish eggs, which might reflect timing of egg-laying (since eggs could have drifted for a distance, greater nighttime occurrence could reflect either local nighttime egg-laying or more distant daytime egg-laying).

No clupeids (herring, American shad and/or gizzard shad) were found in any ichthyoplankton samples. Taxa encountered included white sucker (abundant), sea lamprey (common on 19 June, the last sampling date), tesselated darter (fairly common in mid- and late spring), shield darter (uncommon), yellow perch (fairly common), rock bass (rare), smallmouth bass (rare), and minnows (generally common). The spottail shiner appeared to be the most common species of minnow found, but common shiner and cutlip minnow were also identified. One juvenile or adult margined madtom, a juvenile white sucker, several juvenile or adult shield darters, and

amphibians (tadpoles and a newt) were caught. A number of fish eggs were caught. None of these were clupeid eggs. Some were tentatively identified as minnow or centrarchid (sunfish or bass) eggs.

2) Daytime visual observations. It is likely that appropriate spawning habitat for American shad or other anadromous herrings (alewife and blueback herring) would occur only in deep pools in the river. Such pools were noted at Oakland Valley (at the Paradise Road bridge) and at several sites in the Neversink Gorge (Barbers Eddy, two pools near the mouth of Eden Brook, and at the base of High Falls). Clupeids were observed at the Oakland Valley pool and at the High Falls pool. Positive identification to species was not possible, but it is likely that most or all were gizzard shad. One dead gizzard shad was noted on shore at the Oakland Valley site on 20 June, 2006. In September, the head of a clupeid, tentatively identified as a gizzard shad, was found on a gravel bar upstream of the dam site.

3) Nighttime observations. Adult fish identified as clupeids were observed at the Oakland Valley Pool. At least one fish was tentatively identified as an American shad, but definitive identification was not possible. Splashes were heard at the Oakland Valley Pool on at least two occasions, but these could not be verified as shad spawning splashes. Splashes were heard at Guymard Bridge on 9 May, 2007. However, no American shad were observed, and these could not be confirmed as shad spawning splashes.

4) Other techniques. Larval white suckers were collected in dip nets samples taken near shore. Small fish seen in observation samples were likely also larval or postlarval white suckers. Postlarval blacknose dace were also collected in dip net samples at the edge of the river but weren't found in ichthyoplankton samples. Several short-term gill net samples were taken at the OV site. Only one fish (a redbreast sunfish) was caught. An angler at the CB site reported seeing two dead American shad at the OV site and reported that a friend caught an American shad. Another angler reported a shad caught at OV; this fish was identified as a gizzard shad by a conservation officer.

2007 Results

No clupeids were observed in 2007 (Tables 11) at any of the sites upstream of the dam site (Oakland Valley and Neversink Gorge sites). A large number of American shad were observed and captured by electrofishing in Port Jervis, about 3-4 km upstream of the mouth, on May 9. Gizzard shad were collected in the same areas on that date. Smaller numbers of American shad were observed at the same site on May 18. Two American shad were observed from the Guymard Road Bridge on 30 May.

In sites upstream of the dam, the white sucker was the most common and widely documented species, with both adults and schools of young-of-year fish noted. Smallmouth bass and brown trout were also documented at a number of sites, with several other species (rock bass, tesselated darter, rainbow trout, sea lamprey, blacknose dace and fallfish) noted. Adult sea lamprey were observed at the dam site and at Oakland Valley.

Discussion

One adult American shad was observed at OV during a nighttime visual observation period in 2006. Although the observer was confident of the identification, it might have been a gizzard shad. American shad were reported by an angler in 2006. Both observations were at the OV site. However, gizzard shad were also present at this site, based on observation of a dead individual and report of a gizzard shad caught by an angler and identified by a conservation officer. There was no evidence of American shad spawning at the OV station. No large schools of clupeids were noted. The estimated sizes of the observed shad at OV were about 45 cm, which is typical of buck American shad or large gizzard shad of either species. However, accurate estimation of observed fish is difficult.

In contrast to the 2006 observations of American, gizzard, and unidentified adult clupeids at the Oakland Valley pool and the High Falls pool, no large clupeids were observed upstream of Guymard Bridge in 2007. The difference may reflect differences in flow conditions (Figure 2). In 2006, there were several periods of moderate flow in May and early June. In contrast, there was one very high flow event in late April, 2007, with no subsequent high flow events. On 24 April, 2006, there was a small peak flow of 815 cfs in the Neversink River at Bridgeville (2006 discharges from USGS online water quality data). Discharge decreased to 137 cfs on 1 May, 2006, and remained between 109 and 130 cfs until 12 May, 2006. Flow was between 158 and 944 cfs from 12 May through 16 June, 2006, with 19 days of flow greater than 300 cfs. In 2007, there were high flows in late April. In the Neversink River at Bridgeville, flows were above 1000 cfs from 15 to 22 April, with a peak of 9290 cfs on 16 April (2007 discharges are provisional data from USGS). After this, flow dropped steadily to 135 cfs on 9 May, and there were no high discharge events for the remainder of the spring and summer. From 9 May through 16 June, there were discharges greater than 150 cfs on 6 days, with the remaining days with average daily discharges of 130-150 cfs. The late April high flow event occurred before shad had reached the upper Delaware River and may have delayed upstream movement.

As a result of the flow patterns, there were no high flow events in 2007 during the period when American shad were in the Neversink area. In contrast, there were several such events in 2006, with a number of days with higher flow than in the spring of 2007. This difference would affect the ability of clupeids to ascend the Neversink much upstream of its mouth. Upstream movement may be particularly flow-dependent in the relatively steep reaches upstream of the Basha Kill, where there a few deep pools between runs and shallow riffles.

The Neversink River is regulated by flows from the Neversink Reservoir, and small flood peaks may be reduced, with relatively large flows necessary to generate large spring releases or spills. As a result, upstream movement of shad may occur only in wet springs, unless special releases can be made to allow upstream movement.

In 2007, large numbers of American shad and gizzard shad were documented in the lower part of the Neversink River, near Port Jervis. Only a few shad were observed at Guymard Bridge, about 7 km upstream of the uppermost part of Station PJ2, where they were observed circling in a small pool under the bridge. Thus, while the small number at Guymard may partly reflect differences in sampling, it is likely that many of the American shad observed near the mouth of the Neversink do not travel upstream to Guymard and upstream reaches.

The sea lamprey is an anadromous species. Larval sea lampreys (ammocoetes) were found in the ichthyoplankton samples, and adult sea lampreys (dead or moribund) were observed upstream of the dam site as well. Sea lamprey ammocoetes were caught upstream of the dam site in the 2004-2006 ANS Cuddebackville dam fish assemblage study, as well, including records from the two upstream stations in 2004. These predate the dam removal, so that lampreys had not been fully blocked by the Cuddebackville Dam. However, the dam removal may have increased upstream migration and spawning of sea lampreys. Unusually high numbers of adult sea lamprey were noted in the Neversink River upstream of the Neversink Gorge in 2007 (C. Apse, pers. comm.), suggesting increased upstream movement.

Most species found in ichthyoplankton samples are resident species known from the vicinity of the sampling stations. Gizzard shad and yellow perch are known to make spawning migrations, and these species may have moved upstream above the dam site to spawn. Both species are known from the Delaware River, and gizzard shad was found near the mouth of the Neversink River in 2007, and it occurs in the Basha Kill as well (Smith 1985, G. Schuler, pers. comm.). Yellow perch commonly occurs in lakes and reservoirs and is known from the Neversink drainage upstream of the gorge (Smith 1985). Yellow perch larvae might have come downstream from impoundments on tributaries of the Neversink River (e.g., Crane Pond on Bush Kill, Wolf Lake on an unnamed tributary; Yankee Lake, Lake Louise Marie, Treasure Lake, Wanaksink Lake and Davies Lake on the Katrina Falls stream, and Pleasure Lake on Sheldrake Stream), tributaries of Kiamesha Creek (tributary to Sheldrake Stream), or Neversink Reservoir. The closest of these are Crane Pond (about 5.5 km upstream of the mouth of the Bush Kill, which is about 1 km upstream of the OV sampling site) and Wolf Lake (about 3.5 km upstream of the tributary mouth, which is about 8 km upstream of the OV sampling site). It is possible that the gizzard shad observed were also derived from upstream sources; however, no upstream records of gizzard shad are known.

Most of the species found in the ichthyoplankton samples were found in the ANS backpack electrofishing samples in the vicinity of the Cuddebackville dam site in 2004-2006 and/or in the adult fish sampling done as part of this study. The tesselated darter, white sucker, common shiner, blacknose dace, cutlip minnow and shield darter were among the most common species found in these electrofishing samples. The American eel, longnose dace, fallfish, brown trout and margined madtom were common or fairly common in the electrofishing samples, but early life

stages of these species were not identified in the ichthyoplankton samples. Early life stages of the American eel are typically not found in inland freshwaters. The fallfish and longnose dace may have been present, but not distinguished in the ichthyoplankton samples. Early life stages of trout and the margined madtom may not occur in the drift as much as other species.

Literature Cited

Smith, CL. 1985. The inland fishes of New York State. New York State Department of Environmental Conservation. Albany. 522 pp.

Table 1. Stations sampled in Neversink River as part of 2006-2007 ANS Neversink shad study.

Station	Station Name	Location	Distance above mouth (km)	Relation to Dam	Region
PJ1	Port Jervis launch	Port Jervis fire training facility boat launch	3.0	Downstream	Port Jervis
PJ2	Port Jervis upstream	Upstream of PJ1	3.0-5.0	Downstream	Port Jervis
GB	Guymard Bridge	Guymard Road Bridge	11.2	Downstream	Downstream of Basha Kill
DP	Deerpark	Pool at abutments of old canal in Deerpark, downstream of Rt. 209	12.4	Downstream	Downstream of Basha Kill
CB	Cuddebackville	Pool by abutments upstream of Rt. 209	13.7	Downstream	Upstream of Basha Kill
1,2	1,2	Pool immediately downstream of dam site	15.1	Downstream	Upstream of Basha Kill
DS	Dam site	Former Cuddebackville dam site	15.1	At dam site	Upstream of Basha Kill
2	2	Upstream of Cuddebackville Dam; approximate reach of former impoundment	15.1-15.5	Upstream	Upstream of Basha Kill
OV	Oakland Valley	Pool by Paradise Road bridge at Oakland Valley, about 0.9 km south of Route 49 crossing of Neversink River	19.9	Upstream	Upstream of Basha Kill
BE	Barbers Eddy	Pool in gorge in bend upstream of Route 49 crossing of Neversink River.	23.25	Upstream	Neversink Gorge
EB	Ledge Pool	Pool downstream of Eden Brook and upstream of L Eden Brook	26.2	Upstream	Neversink Gorge
IP	Island Pool	Pool upstream of island at mouth of Eden Brook	27.1	Upstream	Neversink Gorge
HF	High Falls Pool	Pool below High Falls	27.6	Upstream	Neversink Gorge

Table 2. Techniques used at each station and sampling date in the 2006 and 2007 ANS Neversink shad study (A=angling, B=boat shocker, D=dip net, G=Gill net, I=ichthyoplankton net, O=observation, S=snorkeling). Station locations are shown in Table 1.

Sation	1,2	2	CB	DP	DS	EB	GB	HF	IP	OV	PJ1	PJ2
5/5/2006	-	-	I,O	-	I,O	-	-	-	-	I,O	-	-
5/9/2006	-	-	I,O	-	-	-	-	-	-	I,O	-	-
5/10/2006	-	I,O	I,O	-	-	-	-	-	-	I,O	-	-
5/22/2006	-	-	I,O	-	-	-	-	-	-	I,O	-	-
5/23/2006	-	-	I,O	-	-	-	-	-	-	I,O	-	-
5/31/2006	-	-	I,O	-	-	-	-	-	-	I,O	-	-
6/5/2006	-	-	I,O	-	-	-	-	-	-	I,O	-	-
6/7/2006	-	-	I,O	-	-	-	-	-	-	I,O	-	-
6/8/2006	-	-	I,O,H	-	-	-	-	-	-	I,O,H	-	-
6/12/2006	-	-	I,O	-	-	-	-	-	-	I,O	-	-
6/13/2006	-	-	I,O	-	-	-	-	-	-	I,O	-	-
6/19/2006	-	-	I,O	-	-	-	-	-	-	I,O	-	-
6/20/2006	-	-	I,O	-	-	S	-	S	O	G,I,O	-	-
5/9/2007	-	-	-	-	-	-	O	-	-	G	B	B
5/17/2007	-	-	-	-	-	-	O	-	-	G	-	-
5/18/2007	-	-	-	-	-	-	O	-	-	-	A,O	-
5/30/2007	-	-	-	-	-	-	O	-	-	A,O	-	-
5/31/2007	-	-	-	-	-	-	-	-	-	G	-	-
6/6/2007	O	-	-	O	-	-	O	-	-	A,G,O	-	-
6/19/2007	-	-	-	O	-	-	O	-	-	O,S	O	-
7/3/2007	-	-	-	-	-	O,S	-	A,O	A,S	O	-	-
Totals	O	I,O	I,O,H	O	I,O	O,S	O	A,O,S	A,O,S	A,G,I,O,S	A,B,O	B

Table 3. Numbers and types of samples taken in 2006-2007 ANS Neversink shad study.					
Date Taken	Station	Technique	Serial Number	Serial Number(s)	Number of Samples
			Prefix	Suffix	
5/5/2006	CB	Ichthyoplankton net	NVI06	CBI1 - CBI3	3
5/5/2006	CB	Observation	NVI06	CBO1	1
5/5/2006	DS	Ichthyoplankton net	NVI06	DSI1 - DSI2	2
5/5/2006	DS	Observation	NVI06	DSO1 - DSO2	2
5/5/2006	OV	Ichthyoplankton net	NVI06	OVI1 - OVI3	3
5/5/2006	OV	Observation	NVI06	OVO1 - OVO2	2
5/9/2006	CB	Ichthyoplankton net	NVI06	CBI4	1
5/9/2006	OV	Ichthyoplankton net	NVI06	OVI4 - OVI6	3
5/9/2006	OV	Observation	NVI06	OVO3	1
5/10/2006	2	Ichthyoplankton net	NVI06	2I1 - 2I3	3
5/10/2006	2	Observation	NVI06	2O1	1
5/10/2006	CB	Ichthyoplankton net	NVI06	CBI5 - CBI6	2
5/10/2006	CB	Observation	NVI06	CBO2	1
5/10/2006	OV	Ichthyoplankton net	NVI06	OVI7 - OVI9	3
5/10/2006	OV	Observation	NVI06	OVO4	1
5/22/2006	CB	Ichthyoplankton net	NVI06	CBI7 - CBI9	3
5/22/2006	CB	Observation	NVI06	CBO3	1
5/22/2006	OV	Ichthyoplankton net	NVI06	OVI10 - OVI12	3
5/22/2006	OV	Observation	NVI06	OVO5	1
5/23/2006	CB	Ichthyoplankton net	NVI06	CBI10 - CBI12	3
5/23/2006	CB	Observation	NVI06	CBO4	1
5/23/2006	OV	Ichthyoplankton net	NVI06	OVI13 - OVI15	3
5/23/2006	OV	Observation	NVI06	OVO6	1
5/31/2006	CB	Ichthyoplankton net	NVI06	CBI13 - CBI18	6
5/31/2006	CB	Observation	NVI06	CBO5 - CBO6	2
5/31/2006	OV	Ichthyoplankton net	NVI06	OVI16 - OVI21	6
5/31/2006	OV	Observation	NVI06	OVO7 - OVO8	2
6/5/2006	CB	Ichthyoplankton net	NVI06	CBI19 - CBI21	3
6/5/2006	CB	Observation	NVI06	CBO7	1
6/5/2006	OV	Ichthyoplankton net	NVI06	OVI22 - OVI24	3
6/5/2006	OV	Observation	NVI06	OVO9	1
6/7/2006	CB	Ichthyoplankton net	NVI06	CBI22 - CBI27	6
6/7/2006	CB	Observation	NVI06	CBO8 CBO9	2
6/7/2006	OV	Ichthyoplankton net	NVI06	OVI25 - OVI30	6
6/7/2006	OV	Observation	NVI06	OVO10 - OVO11	2
6/8/2006	CB	Dip net	NVI06	CBH1	1
6/8/2006	CB	Ichthyoplankton net	NVI06	CBI28 - CBI30	3
6/8/2006	CB	Observation	NVI06	CBO10	1
6/8/2006	OV	Dip net	NVI06	OVH1	1
6/8/2006	OV	Ichthyoplankton net	NVI06	OVI31 - OVI33	3
6/8/2006	OV	Observation	NVI06	OVO12	1
6/12/2006	CB	Ichthyoplankton net	NVI06	CBI31 - CBI33	3
6/12/2006	CB	Observation	NVI06	CBO11	1
6/12/2006	OV	Ichthyoplankton net	NVI06	OVI34 - OVI36	3
6/12/2006	OV	Observation	NVI06	OVO13	1
6/13/2006	CB	Ichthyoplankton net	NVI06	CBI34 - CBI35	3
6/13/2006	CB	Observation	NVI06	CBO12	1
6/13/2006	OV	Ichthyoplankton net	NVI06	OVI37 - OVI39	3
6/13/2006	OV	Observation	NVI06	OVO14	1
6/19/2006	CB	Ichthyoplankton net	NVI06	CBI36-1 - CBI38	3
6/19/2006	CB	Observation	NVI06	CBO12-1	1
6/19/2006	OV	Ichthyoplankton net	NVI06	OVI40 - OVI42	3
6/19/2006	OV	Observation	NVI06	OVO15	1
6/20/2006	CB	Ichthyoplankton net	NVI06	CBI39 - CBI41	3
6/20/2006	CB	Observation	NVI06	CBO13	1
6/20/2006	EB	Snorkeling	NVI06	EBO1	1
6/20/2006	HF	Snorkeling	NVI06	HFO1	1
6/20/2006	IP	Observation	NVI06	IPO1	1
6/20/2006	OV	Gill net	NVI06	OVGN1 - OVGN3	3
6/20/2006	OV	Ichthyoplankton net	NVI06	OVI43 - OVI45	3
6/20/2006	OV	Observation	NVI06	OVO16	1

Table 4. Numbers and types of samples taken in 2006-2007 ANS Neversink shad study.

Date Taken	Station	Technique	Serial Number	Serial Number(s)	Number of Samples
			Prefix	Suffix	
5/9/2007	GB	Observation	NVI07	GBO1	1
5/9/2007	OV	Gill net	NVI07	OVGN1 - OVGN3	3
5/9/2007	PJ1	Boat shock	NVI07	PJ1BS1	1
5/9/2007	PJ2	Boat shock	NVI07	PJ2BS1	1
5/17/2007	GB	Observation	NVI07	GBO2	1
5/17/2007	OV	Gill net	NVI07	OVGN4 - OVGN6	3
5/18/2007	GB	Observation	NVI07	GBO3	1
5/18/2007	PJ1	Angling	NVI07	PJ1A1 - PJIA2	2
5/18/2007	PJ1	Observation	NVI07	PJ1O1	1
5/30/2007	GB	Observation	NVI07	GBO4 - GBO5	2
5/30/2007	OV	Angling	NVI07	OVA1	1
5/30/2007	OV	Observation	NVI07	OVO1 - OVO2	2
5/31/2007	OV	Gill net	NVI07	OVGN7 - OVGN8	2
6/6/2007	1,2	Observation	NVI07	1,2O1	1
6/6/2007	DP	Observation	NVI07	DPO1	1
6/6/2007	GB	Observation	NVI07	GBO6	1
6/6/2007	OV	Angling	NVI07	OVA2	1
6/6/2007	OV	Gill net	NVI07	OVGN9 - OVGN10	2
6/6/2007	OV	Observation	NVI07	OVO3 - OVO4	2
6/19/2007	DP	Observation	NVI07	DPO2	1
6/19/2007	GB	Observation	NVI07	GBO7	1
6/19/2007	OV	Observation	NVI07	OVO5	1
6/19/2007	OV	Snorkeling	NVI07	OVSN1	1
6/19/2007	PJ1	Observation	NVI07	PJ1O2	1
7/3/2007	EB	Observation	NVI07	EBO1	1
7/3/2007	EB	Snorkeling	NVI07	EBSN1	1
7/3/2007	HF	Angling	NVI07	HFA1	1
7/3/2007	HF	Observation	NVI07	HFO1	1
7/3/2007	IP	Angling	NVI07	IPA1	1
7/3/2007	IP	Snorkeling	NVI07	IPSN1	1
7/3/2007	OV	Observation	NVI07	OVO6	1

Table 5. Common and scientific names of species collected in the ANS Neversink River shad survey. Numbers of all fish and young-of-year (YoY) captured and observed are shown.

Family	Common name	Scientific name	Number of YoY	Total Number of fish
Petromyzontidae				
	sea lamprey	*Petromyzon marinus*	100	157
Clupeidae				
	American shad	*Alosa sapidissima*	0	112
	gizzard shad	*Dorosoma cepedianum*	0	101
	herring species	*Clupeidae Species*	0	20
Cyprinidae				
	common carp	*Cyprinus carpio*	0	70
	cutlip minnow	*Exoglossum maxillingua*	6	6
	common shiner	*Luxilus cornutus*	1	1
	golden shiner	*Notemigonus crysoleucas*	0	1
	spottail shiner	*Notropis hudsonius*	433	433
	blacknose dace	*Rhinichthys atratulus*	9	14
	fallfish	*Semotilus corporalis*	0	15
	minnow species	*Cyprinidae species*	359	362
Catostomidae				
	white sucker	*Catostomus commersoni*	1289	1474
Ictaluridae				
	brown bullhead	*Ameiurus nebulosus*	0	1
	channel catfish	*Ictalurus punctatus*	0	1
	margined madtom	*Noturus insignis*	0	2
	catfish species	*Ictaluridae species*	0	1
Anguillidae				
	American eel	*Anguilla rostrata*	0	26
Salmonidae				
	brown trout	*Salmo trutta*	0	11
	rainbow trout	*Oncorhynchus mykiss*	0	2
Centrarchidae				
	rock bass	*Ambloplites rupestris*	14	18
	redbreast sunfish	*Lepomis auritus*	0	6
	smallmouth bass	*Micropterus dolomieu*	46	66
	sunfish	*Centrarchidae species*	1	3
	sunfish species	*Lepomis species*	0	3
Percidae				
	tesselated darter	*Etheostoma olmstedi*	143	164
	yellow perch	*Perca flavescens*	230	234
	shield darter	*Percina peltata*	5	29
	darter species	*Percidae species*	1	1
		Total	2637	3334

Table 6. Total number of fish caught by various techniques in 2006 and 2007 Neversink River collections as part of the ANS Neversink River shad survey.

		Technique							
Common Name	Scientific name	Angling	Boat shock	Dip net	Gill net	Ichthyoplankton net	Observation	Snorkeling	Total
American shad	*Alosa sapidissima*	-	108	-	-	-	4	-	112
brown bullhead	*Ameiurus nebulosus*	-	-	-	-	-	1	-	1
rock bass	*Ambloplites rupestris*	1	2	-	-	14	1	-	18
American eel	*Anguilla rostrata*	-	25	-	-	-	-	1	26
white sucker	*Catostomus commersoni*	-	76	2	1	821	147	427	1474
sunfish	*Centrarchidae species*	-	-	-	-	1	2	-	3
herring species	*Clupeidae Species*	-	-	-	-	-	12	8	20
common carp	*Cyprinus carpio*	-	70	-	-	-	-	-	70
minnow	*Cyprinidae species*	-	-	11	-	344	-	7	362
gizzard shad	*Dorosoma cepedianum*	-	100	-	-	-	1	-	101
tesselated darter	*Etheostoma olmstedi*	-	-	-	-	143	1	20	164
cutlip minnow	*Exoglossum maxillingua*	-	-	-	-	6	-	-	6
channel catfish	*Ictalurus punctatus*	-	1	-	-	-	-	-	1
catfish	*Ictaluridae species*	-	-	-	-	-	1	-	1
redbreast sunfish	*Lepomis auritus*	-	5	-	1	-	-	-	6
sunfish species	*Lepomis species*	-	-	-	-	-	3	-	3
common shiner	*Luxilus cornutus*	-	-	-	-	1	-	-	1
smallmouth bass	*Micropterus dolomieu*	1	2	-	-	1	11	51	66
golden shiner	*Notemigonus crysoleucas*	-	-	-	-	1	-	-	1
spottail shiner	*Notropis hudsonius*	-	-	-	-	433	-	-	433
margined madtom	*Noturus insignis*	-	-	-	-	1	-	1	2
rainbow trout	*Oncorhynchus mykiss*	1	-	-	-	-	1	-	2
yellow perch	*Perca flavescens*	-	-	-	-	234	-	-	234
sea lamprey	*Petromyzon marinus*	-	35	-	-	100	12	10	157
shield darter	*Percina peltata*	-	-	-	-	18	-	11	29
darter species	*Percidae species*	-	-	-	-	1	-	-	1
blacknose dace	*Rhinichthys atratulus*	-	-	4	-	-	-	10	14
brown trout	*Salmo trutta*	1	-	-	6	-	-	5	12
fallfish	*Semotilus corporalis*	-	-	-	-	-	15	-	15
Unidentified fish		-	-	-	-	4	21	-	25
Fish eggs		-	-	-	-	90	-	-	90
	Total fish	4	424	17	8	2213	233	551	3450
Eastern American Toad	*Bufo americanus*	-	-	-	-	-	2	-	2
Unidentified tadpole	Anura	-	-	-	-	129	500	-	629
Two-lined salamander	*Eurycea bislineata*	-	-	-	-	1	1	-	2
Northern water snake	*Nerodia sipedon*	-	-	-	-	-	1	-	1
Red-spotted newt	*Notopthalmus viridescens*	-	-	-	-	1	-	-	1
Salamander spp.		-	-	-	-	1	-	-	1
	Total other species	0	0	0	0	132	504	0	636

Table 7. Total numbers of each fish species collected in 2006 and 2007 at each station by ANS scientists as part of the Neversink River shad survey. Unidentifiable fish eggs and larvae are not included.

	Station and location	2 (above old dam site)	Cuddebackville	Dam site & 1-2	Ledge pool	High falls pool	Oakland Valley	Deerpark	Guymard bridge	Island pool	Port Jervis (at fire facility)	Port Jervis (upstream of fire facility)	Total
Common name	Scientific name	2	CB	DS	EB	HF	OV	DP	GB	IP	PJ1	PJ2	ALL
Sea lamprey	*Petromyzon marinus*	-	95	1	-	-	19	-	7	-	-	35	157
American shad	*Alosa sapidissima*	-	-	-	-	-	1	-	2	-	9	100	112
brown bullhead	*Ameiurus nebulosus*	-	-	-	-	-	1	-	-	-	-	-	1
rock bass	*Ambloplites rupestris*	-	14	-	-	-	-	-	-	2	-	2	18
American eel	*Anguilla rostrata*	-	-	-	-	1	-	-	-	-	-	25	26
white sucker	*Catostomus commersoni*	7	663	18	202	105	199	-	2	200	3	75	1474
sunfish	*Centrarchidae species*	-	-	-	-	-	3	-	3	-	-	-	6
herring species	*Clupeidae Species*	-	-	-	-	8	1	-	-	-	11	-	20
common carp	*Cyprinus carpio*	-	-	-	-	-	-	-	-	-	-	70	70
minnow species	Cyrpinidae	-	308	-	5	2	47	-	-	-	-	-	362
gizzard shad	*Dorosoma cepedianum*	-	-	-	-	-	1	-	-	-	-	100	101
tesselated darter	*Etheostoma olmstedi*	1	60	-	20	-	83	-	-	-	-	-	164
cutlip minnow	*Exoglossum maxillingua*	-	4	-	-	-	2	-	-	-	-	-	6
channel catfish	*Ictalurus punctatus*	-	-	-	-	-	-	-	-	-	-	1	1
catfish species	Ictaluridae	-	-	-	-	-	1	-	-	-	-	-	1
redbreast sunfish	*Lepomis auritus*	-	-	-	-	-	1	-	-	-	-	5	6
common shiner	*Luxilus cornutus*	-	1	-	-	-	-	-	-	-	-	-	1
smallmouth bass	*Micropterus dolomieu*	-	1	-	31	-	10	-	6	16	-	2	66
golden shiner	*Notemigonus crysoleucas*	-	1	-	-	-	-	-	-	-	-	-	1
spottail shiner	*Notropis hudsonius*	-	329	-	-	-	104	-	-	-	-	-	433
margined madtom	*Noturus insignis*	-	-	-	-	1	1	-	-	-	-	-	2
rainbow trout	*Oncorhynchus mykiss*	-	-	-	-	-	-	-	-	2	-	-	2
yellow perch	*Perca flavescens*	1	92	4	-	-	137	-	-	-	-	-	234
shield darter	*Percina peltata*	-	4	-	-	11	14	-	-	-	-	-	29
percid species	Percidae	-	-	-	-	-	1	-	-	-	-	-	1
blacknose dace	*Rhinichthys atratulus*	-	4	-	-	5	-	-	-	5	-	-	14
brown trout	*Salmo trutta*	-	-	-	1	-	11	-	-	-	-	-	12
fallfish	*Semotilus corporalis*	-	-	-	17	-	-	-	-	-	-	-	17
	Total	9	1576	23	276	133	637	0	20	225	23	415	3337

Table 8. Average densities (number per 100 m^3, calculated as total number/volume) of young of year fish collected in 2006 during night sampling at four different stations as part of the ANS Neversink River shad survey. The row "corr" shows sample groups where flowmeter readings were wrong for one or two samples; volumes for these samples were estimated from sample duration and volumes collected in the other samples on the same date and station.

	5/5/2006		5/9/2006		5/10/2006	5/22/2006		5/31/2006		6/5/2006		6/7/2006		6/12/2006		6/19/2006	
Station	Cuddebackville	Oakland Valley	Cuddebackville	Oakland Valley	Cuddebackville	Cuddebackville	Oakland Valley	Cuddebackville	Oakland Valley	Cuddebackville	Oakland Valley	Cuddebackville	Oakland Valley	Cuddebackville	Oakland Valley	Cuddebackville	Oakland Valley
	CB	OV	CB	OV	CB	CB	OV	CB	OV	CB	OV	CB	OV	CB	OV	CB	OV
corr:		corr															
rockbass	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.52	-
white sucker	6.87	1.82	125.26	4.57	42.64	2.16	1.63	5.06	0.38	1.62	1.38	1.12	0.04	2.37	0.52	0.74	0.42
cyprinidae sp.	-	-	-	-	0.24	0.12	-	5.21	0.57	0.04	0.27	1.63	0.85	6.76	0.04	2.43	0.28
tesselated darter	-	-	-	0.22	0.95	0.09	0.45	1.28	1.77	0.33	0.58	0.33	0.67	0.20	0.19	0.33	0.48
cutlip minnow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.07	0.04	-
common shiner	-	-	-	-	-	0.03	-	-	-	-	-	-	-	-	-	-	-
smallmouth bass	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.04	-
spottail shiner	-	-	-	0.11	0.24	-	-	-	0.13	5.79	0.32	3.00	0.58	-	0.93	2.69	1.47
yellow perch	0.81	54.09	-	1.78	-	0.12	0.09	2.14	0.63	0.96	0.48	0.54	0.09	0.14	0.19	0.11	0.03
sea lamprey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.49	0.14
shield darter	-	-	-	-	-	-	-	-	-	-	0.05	-	-	0.14	0.04	-	0.03
percidae sp.	-	-	-	-	-	-	-	-	-	-	-	-	0.04	-	-	-	-
fish eggs	4.4	9.1	3.6	0.33	2.6	-	0.18	0.14	0.063	0.12	0.053	0.36	0.0	0.20	0.22	0.037	0.028
unidentified fish	-	-	-	-	-	-	-	-	0.06	-	-	-	-	-	-	-	0.11

Table 9. Average densities (number per 100 m^3, calculated as total number/volume) of young of year fish collected in 2006 during morning sampling at four different stations as part of the ANS Neversink River shad survey. The row "corr" shows sample groups where flowmeter readings were wrong for one or two samples; volumes for these samples were estimated from sample duration and volumes collected in the other samples on the same date and station.

	5/5/2006		5/10/2006		5/23/2006		5/31/2006		6/7/2006		6/8/2006		6/13/2006		6/20/2006	
Station	Cuddebackville	Dam site	Above dam	Oakland Valley	Cuddebackville	Oakland Valley	Cuddebackville	Oakland Valley	Cuddebackville	Oakland Valley	Cuddebackville	Oakland Valley	Cuddebackville	Oakland Valley	Cuddebackville	Oakland Valley
	CB	DS	2	OV	CB	OV	CB	OV	CB	OV	CB	OV	CB	OV	CB	OV
corr:					corr			corr								
white sucker	8.31	0.44	1.45	1.37	0.40	0.31	-	0.44	0.07	-	-	0.14	0.15	0.12	-	-
centrarchidae sp.	-	-	-	-	-	-	-	-	-	-	-	0.07	-	-	-	-
cyprinidae sp.	-	-	-	-	0.13	-	-	-	0.15	-	0.29	0.07	-	-	-	0.41
tesselated darter	0.59	-	0.21	-	-	-	0.17	-	-	-	-	-	0.10	-	0.28	-
cutlip minnow	-	-	-	-	-	-	-	-	-	-	-	-	0.15	-	-	-
spottail shiner	-	-	-	-	-	-	0.17	-	0.59	0.20	-	0.07	0.25	0.24	5.32	0.21
yellow perch	-	0.10	0.21	0.27	0.13	0.16	-	-	0.37	0.20	0.29	-	0.15	0.12	-	-
fish eggs	4.2	-	-	-	-	-	0.17	-	0.15	-	-	0.20	0.050	-	-	-
unidentified fish	-	-	-	0.27	-	-	-	-	-	-	-	-	-	-	-	-
tadpole	-	-	-	-	-	-	-	-	0.22	-	2.25	-	-	0.12	-	0.21

Table 10. Numbers of adult or juvenile fish observed or captured in the 2006 ANS Neversink shad study.

Common Name	Scientific Name	CB	DS	HF	IP	OV	Total	Technique	Notes
American eel	*Anguilla rostrata*	-	-	1	-	-	1	SN	
American shad	*Alosa sapidissima*	-	-	-	-	1	1	O,B	
blacknose dace	*Rhinichthys atratulus*	-	-	5	-	-	5	SN	
gizzard shad	*Dorosoma cepedianum*	-	-	-	-	1	1	O,B	Dead on bank
golden shiner	*Notemigonus crysoleucas*	1	-	-	-	-	1	I	Age 1+ or 2+
herring Species	*Clupeidae* species	-	-	8	-	1	9	O,SN	about 41-46 cm TL
margined madtom	*Noturus insignis*	-	-	1	-	1	2	SN,I	
minnow*	*Cyprinidae* species	-	-	2	-	-	2	SN	
redbreast sunfish	*Lepomis auritus*	-	-	-	-	1	1	GN	
rock bass	*Ambloplites rupestris*	-	-	-	1	-	1	O	
shield darter	*Percina peltata*	2	-	11	-	11	24	SN,I	
smallmouth bass	*Micropterus dolomieu*	-	-	-	-	1	1	O	
tesselated darter	*Etheostoma olmstedi*	1	-	-	-	-	1	O	
white sucker	*Catostomus commersoni*	2	0	-	-	10	12	O,I	Most adults; 1 juvenile in 1 sample
	Total	6	0	28	1	27	62	O,SN,I,B,GN	

* Likely *Semotilus corporalis* or *Luxilus cornutus*

Table 11. Numbers of fish of different species caught or observed at different stations in the Neversink River in the 2007 ANS Neversink shad study. The Tech column shows techniques by which different species were documented, in decreasing order of number of fish.

	PJ1		PJ2		GB		1,2		OV		EB		IP		HF	
Scientific name	#	Tech	#	Tech	#	Tech	#	Tech	#	Tech	#	Tech	#	Tech	#	Tech
Alosa sapidissima	9	BS A O	100	BS	2	O	-	-	-	-	-	-	-	-	-	-
Ambloplites rupestris	-	-	2	BS	-	-	-	-	-	-	-	-	1	A	-	-
Ameiurus nebulosus	-	-	-	-	-	-	-	-	1	O	-	-	-	-	-	-
Anguilla rostrata	-	-	25	BS	-	-	-	-	-	-	-	-	-	-	-	-
Catostomus commersoni	3	O BS	75	BS	2	O	-	-	53	GN O SN	202	SN	200	SN	105	O
Centrarchidae species	-	-	-	-	-	-	-	-	2	O	-	-	-	-	-	-
Clupeidae Species	11	O	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyprinidae species	-	-	-	-	-	-	-	-	-	-	5	SN	-	-	-	-
Cyprinus carpio	-	-	70	BS	-	-	-	-	-	-	-	-	-	-	-	-
Dorosoma cepedianum	-	-	100	BS	-	-	-	-	-	-	-	-	-	-	-	-
Etheostoma olmstedi	-	-	-	-	-	-	-	-	-	-	20	SN	-	-	-	-
Ictaluridae species	-	-	-	-	-	-	-	-	1	O	-	-	-	-	-	-
Ictalurus punctatus	-	-	1	BS	-	-	-	-	-	-	-	-	-	-	-	-
Lepomis auritus	-	-	5	BS	-	-	-	-	-	-	-	-	-	-	-	-
Lepomis species	-	-	-	-	3	O	-	-	-	-	-	-	-	-	-	-
Micropterus dolomieu	-	-	2	BS	6	O	-	-	9	O SN	31	SN	16	A SN	-	-
Oncorhynchus mykiss	-	-	-	-	-	-	-	-	-	-	-	-	2	A	-	-
Petromyzon marinus *	-	-	35	BS	7	O	1	O	14	O SN	-	-	-	-	-	-
Rhinichthys atratulus	-	-	-	-	-	-	-	-	-	-	-	-	5	SN	-	-
Salmo trutta	-	-	-	-	-	-	-	-	11	GN SN	1	A	[1]**	A	-	-
Semotilus corporalis	-	-	-	-	-	-	-	-	-	-	17	A O	-	-	-	-
unidentified fish	-	-	-	-	1	O	-	-	20	O	-	-	-	-	-	-
Total	23	BS O A	415	BS	21	O	1	O	111	SN O GN	276	SN O A	224	SN A	105	O A

* includes dead and dieing fish ** dead individual observed

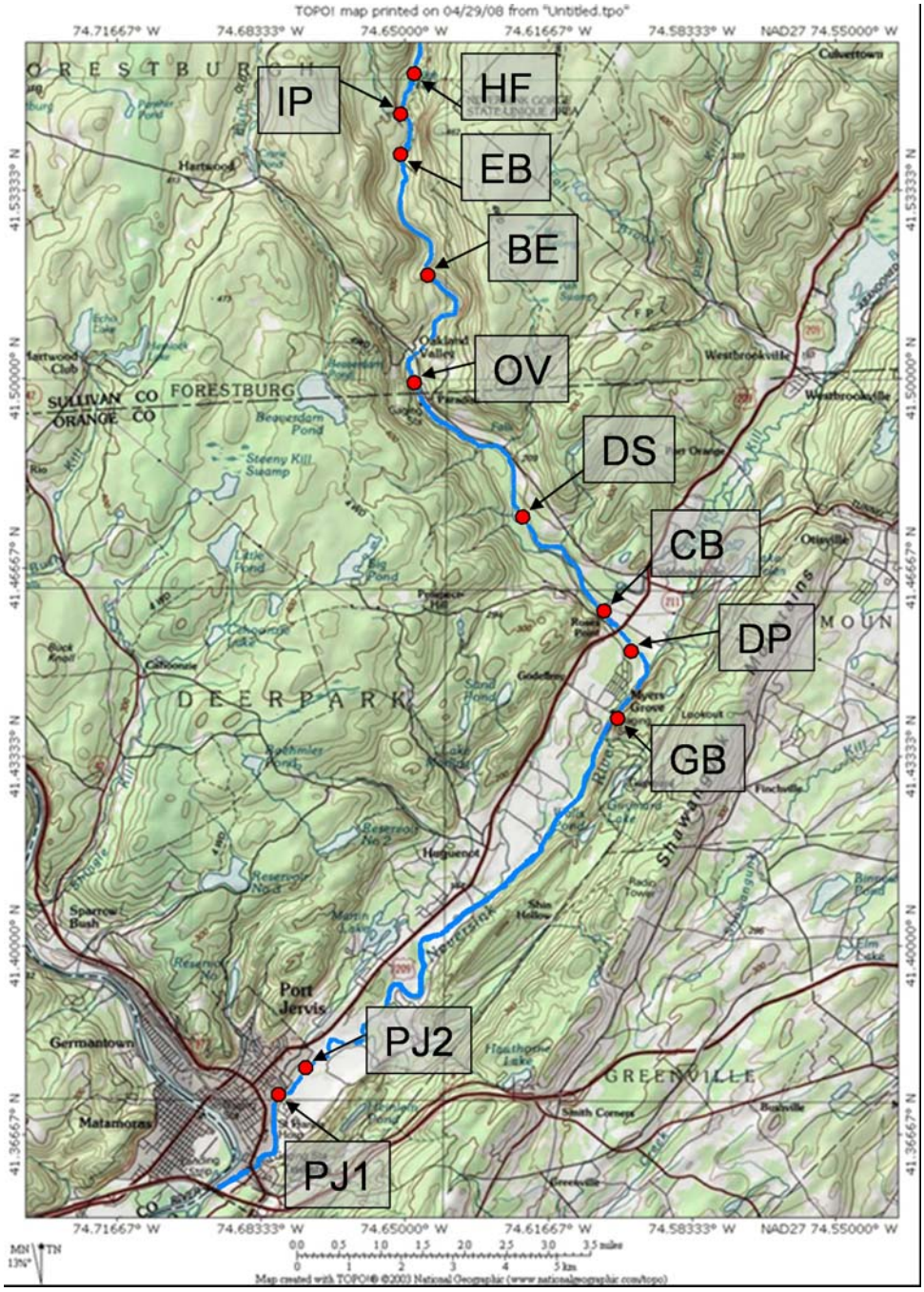

Figure 1. Map indicating sampling stations for 2006-2007 ANS Neversink River shad study. Circles indicate stations. Boxes indicate station abbreviations. PJ1=Port Jervis, near boat launch at fire training facility, PJ2=Port Jervis, upstream of high school, GB=Guymard Rd. bridge, DP=Deerpark downstream of Rt. 209 at public fishing access, CB=Cuddebackville upstream of Rt. 209 off Hoag Rd., DS=former Cuddebackville dam site (removed in 2004), OV=Oakland Valley at Paradise Rd. bridge, BE=Barbers Eddy, EB=pool downstream of Eden Brook, IP=pool upstream of island at mouth of Eden Brook, and HF=pool downstream of High Falls.

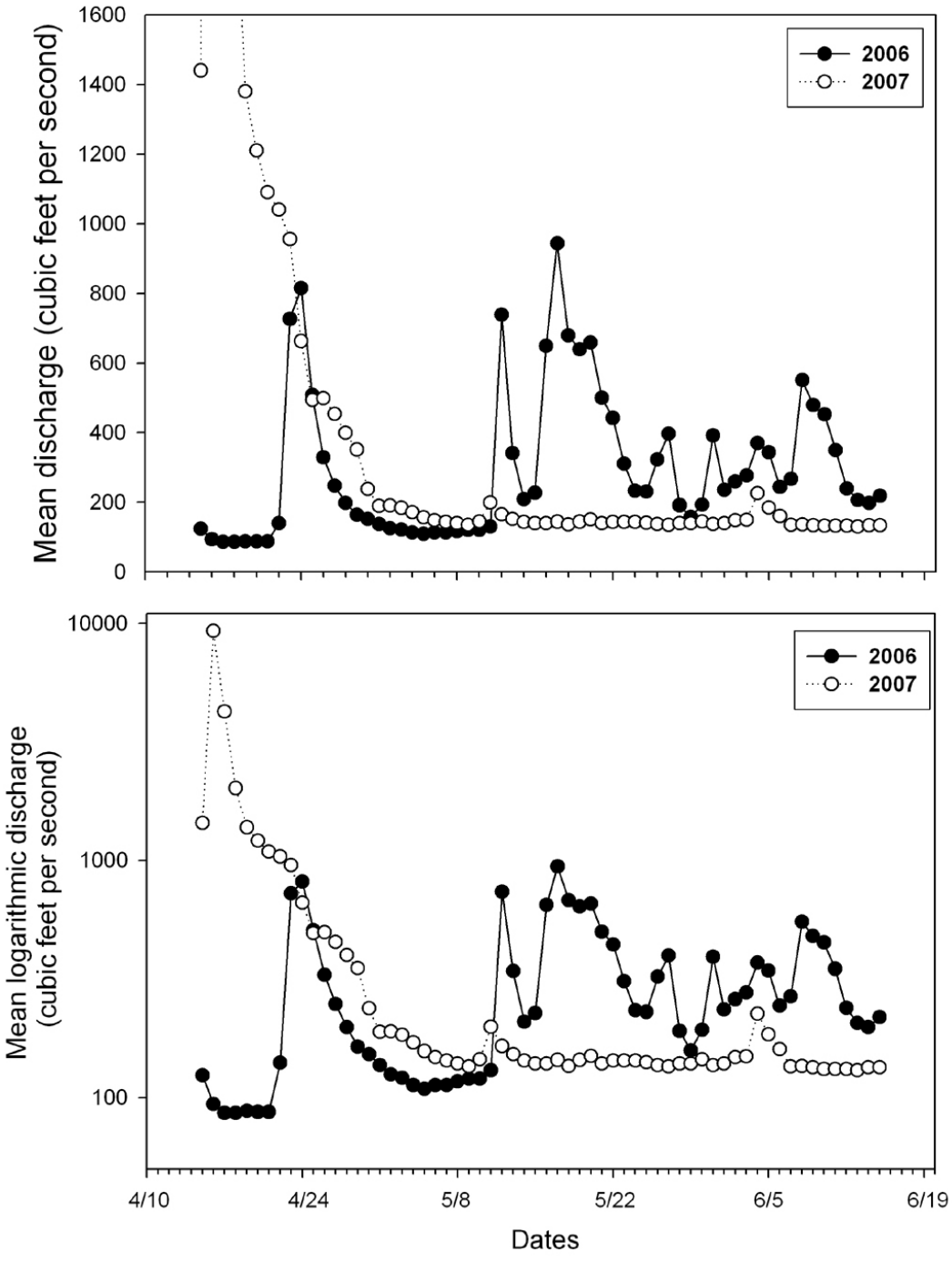

Figure 2. Mean discharge with linear (top) and logarithmic scales (bottom) of water from 15 April 15 through 15 June of 2006 and 2007 in the Neversink River in Bridgeville, NY. Note that some April, 2007, data are out-of-range in the top figure. 2007 data are provisional data.