

Monitoring Alewife Runs in the South Shore Estuary Reserve

Report on the 2007 Volunteer Survey

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An aggregation of alewives spawning in the lower Swan River

Summary

- The alewife is a socially and ecologically important species of fish that lives at sea and spawns in freshwater, including small coastal streams like those found across Long Island.
- Environmental Defense and the South Shore Estuary Reserve (SSER) repeated a volunteer survey that began in 2006 to document existing spawning runs to guide habitat protection and restoration projects.
- A total of 26 volunteers from the community, along with numerous high school and college students, participated in a series of workshops to learn about alewives and the survey.
- Data sheets were returned by 30 individuals, although total participation in the survey was even greater as many volunteers worked in teams.
- An important lesson from the 2006 survey was to allocate effort to fewer tributaries to increase coverage of each. That strategy was implemented in 2007, but with limited success.
- On all tributaries, volunteer effort was greatest in April and less in May, although the difference in effort between months was not as great as in 2006, so more even temporal coverage was achieved.
- There were confirmed sightings of alewives in the Swan River and Howells Creek, and of a significant spawning run in the tidal section of the Carmans River.
- Sighting in the Carmans River and Swan River began in early April and continued through mid-May. Alewives were seen in Howells Creek in May.
- Alewives were present in the Carmans River during all stages of the tidal cycle.
- Increased volunteer participation should be encouraged.
- An assessment of observer effort should be made while the survey is ongoing in order to guide consistent volunteer effort on all rivers in both months.
- Visual observations should be supplemented with more active and non-destructive observation methods such as trapping. Photographs and video of alewife spawning activity should also be captured if possible to confirm sightings and aid in future training.

About alewives

The alewife (*Alosa pseudoharengus*) is a member of the herring family that spends most of its life at sea and migrates up freshwater rivers to spawn. This anadromous life history is seen in other species of herring as well, including the blueback herring (which, together with alewives, are commonly collectively known as ‘river herring’), American shad and hickory shad. However, on Long Island, most if not all anadromous herrings are likely to be alewives. American shad prefer rivers larger than the coastal streams that cover Long Island, and blueback herring prefer warmer and faster moving waters. However, hickory shad are reportedly becoming more common on Long Island.

Alewives range from the Canadian Maritime Provinces to North Carolina. At sea, they spend most of their time north of Long Island and Cape Cod, mixing with other small, pelagic fish over the continental shelf. They return to spawn between the ages of 3 and 5, presumably to the river in which they were born or one nearby, and can live 8 to 10 years. Spawning runs occur in the spring, and fish can make multiple spawning runs over their lifetime. Offspring remain in freshwater for the summer and into early fall of their first year before migrating downstream to overwinter in the estuary.

A small fish (around 12 inches maximum length) of humble appearance, alewives are incredibly important ecologically. They are perhaps most important as a forage fish, serving as prey for numerous predators while at sea (e.g., tuna, cod, dolphins, billfish), in estuaries (e.g., striped bass, bluefish, weakfish, harbor seals), and in rivers (e.g., ospreys, white perch, herons, river otters). Also, alewives help deliver carbon and energy upstream against river flow to freshwater habitats, thereby replenishing what is lost as water moves matter out to sea.

In addition to their ecological importance, these small fish have tremendous social value. Alewives support both commercial and recreational fisheries. In the South, alewives are a regional delicacy. Further north they are popular bait for lobster traps, and along the coast they are popular bait among striped bass anglers. Many of the predators that eat alewives support sport fishing or passive recreation such as bird watching and wildlife viewing. Therefore, alewives also help to sustain those activities. Also, an alewife run itself is a unique natural phenomenon enjoyed by local communities from North Carolina to Maine.

Sadly, this aspect of our natural heritage has been largely lost or forgotten on Long Island. But it can be regained. Efforts are underway to restore alewives by providing access to historical spawning grounds that has been lost due to barriers to migration. Plans are underway and proposal are being developed to modify impassable culverts, remove obsolete dams, or install fish ladders and other passage structures to help fish reach valuable spawning habitat. Complementing this fish passage work are efforts to restore habitat, improve water quality, and manage fisheries in a sustainable way, both in rivers and at sea. This report describes the second annual volunteer survey of alewife runs that was started in 2006 in order to improve our knowledge of these fish on Long Island and to help guide restoration efforts

Overview of the survey

Environmental Defense and the South Shore Estuary Reserve (SSER) organized a volunteer survey to locate alewife runs during the spring of 2007. This was the second consecutive year of the monitoring survey (see “Monitoring Alewife Runs in the South Shore Estuary Reserve: Report on the 2006 Volunteer Survey”). Prior to 2006, the last formal survey of alewife runs was conducted as part of the 1938 State survey of biological resources on Long Island, which documented at least 14 tributaries

with an alewife run in the SSER. Anecdotal reports suggest that some tributaries still teemed with alewives as recently as the 1960s and 1970s, and that a few runs linger today.

The survey was organized to support to a major multi-stakeholder effort to restore diadromous fish populations to the south shore, and to implement recommendations in the SSER Comprehensive Management Plan. The survey was also conducted to help evaluate the success of forthcoming fish passage projects by providing baseline information on the location and size of spawning runs, and to prioritize sites for future barrier mitigation projects. The survey aimed primarily to document presence or absence of alewife runs in select tributaries, and secondarily to document the timing of any spawning runs located. Estimating numbers of fish was also a goal, although a much lower priority, in part due to the limitations of visual observation in producing abundance estimates.

Survey tributaries were initially selected in consultation with the SSER Diadromous Fish Work Group based on the location of planned and potential fish passage projects. Selection of survey tributaries was modified for the 2007 survey to concentrate volunteer efforts on a smaller subset of target tributaries in an attempt to achieve greater total observer time on each tributary, therefore increasing the likelihood of documenting a run. Observation sites were also modified from the 2006 survey sites to accommodate access and visibility issues. Other selection factors are listed below:

Carlls River – The Carlls River is the third longest river in the SSER, and has a well-protected watershed providing potential spawning habitat for alewives once passage projects allow access to upstream areas.

Connetquot River – Connetquot River is a unique, highly managed system, but it has extensive upstream habitat inside a well-protected watershed. Connetquot River State Park staff have not observed alewives in quite some time, but there have been anecdotal reports from others.

Brown's River – An alewife run has been documented in Brown's River historically, and recent anecdotal reports suggest that a run might still persist. The Browns River watershed is somewhat protected by several Suffolk County Parks, which enhance the river's ability to serve as spawning grounds. Inclusion of the Brown's River in the 2007 survey supports recommendations from the Town of Islip's "Green's Creek and Brown's River Watershed Management Plan" to monitor living resources in the watershed.

Swan River – The Swan River has a known population of native brook trout, and anecdotal reports suggest an alewife run exists there as well. A fish ladder will be installed at the Swan Lake dam with support from an award to the Town of Brookhaven from New York State's 1996 Clean Air/Clean Water Bond Act allowing access to Swan Lake and the upper reaches of the river.

Carmans River – The Carmans River is the longest river on the South Shore, second longest on Long Island overall, and has one of the best protected watersheds with four Suffolk County parks and the Wertheim National Wildlife Refuge along its length. A fish ladder will be installed at the Hards Lake dam in South Haven County Park in fall 2007, and additional fish passage projects are planned for the C-gate dam, Lower Lake dam, and Upper Lake dam through awards to Suffolk County and the Town of Brookhaven from New York State's 1996 Clean Air/Clean Water Bond Act. DEC staff also monitor an eel weir in the river.

Beaverdam Creek - The Students for Environmental Quality at Bellport High School expressed interest in monitoring at this site nearby the high school.

Participants were encouraged to survey on additional tributaries of interest, either due to logistical convenience or personal affinity. This included Howells Creek (Bellport Golf Course Canal), where volunteers reported alewife sightings in 2006, and has a historically documented alewife run. Due to access issues, Howells Creek was not formally included in this years survey, although alewives were seen spawning there on at least one occasion in 2007.

The monitoring protocol was based on the Massachusetts Division of Marine Fisheries Volunteer River Herring Counting of 2005, and was developed in consultation with the Diadromous Fish Work Group. Volunteers were provided with maps of the selected observation site on each tributary and copies of the data sheet appended to this report. Volunteers were encouraged to begin observing in April 2007 based on when alewives were observed in 2006, and in an attempt to avoid the surge of effort before alewives were present in the rivers, as experienced in March 2006. Observations continued through the end of May. Volunteers were asked to scan the water and stream bank for alewives or evidence of alewives (e.g., surface disturbance due to spawning activity, carcasses left by raccoons or other predators). Volunteers were also asked to report alewife sightings immediately rather than at the end of the survey so the sighting could be confirmed by an experienced biologist.

Fifteen minutes was defined as the minimum duration that would qualify as a valid observation period, and longer observation periods were encouraged to increase the chances of observing alewives. In 2006, volunteers were encouraged to observe during the period from mid tide rising to mid tide falling. Results from the 2006 survey suggest that there was not a strong correlation between tides and when alewives were observed; therefore, volunteers were not provided with tide charts in 2007 and were encouraged to observe during all stages of the tidal cycle.

Participation in the survey

Volunteers included private citizens, members of environmental and fishing organizations (e.g., The Nature Conservancy and Trout Unlimited), local municipality staff, and high school and university students. Volunteers were encouraged to attend training sessions where a presentation was given providing background information on alewife ecology and conservation, and instruction on where, when and how to visually survey for migrating and/or spawning fish. Survey materials were also distributed at these training sessions.

Training sessions were held on March 28 and March 31, 2007, at Dowling College in Oakdale, NY. The March 28 session had nine attendees, and 17 people attended on March 31. Additional volunteers who had been to training sessions in 2006 and did not attend a session in 2007 also participated in the survey. Training sessions for students were also held at Suffolk County Community College and Bellport High School. Instructions and materials were provided via email

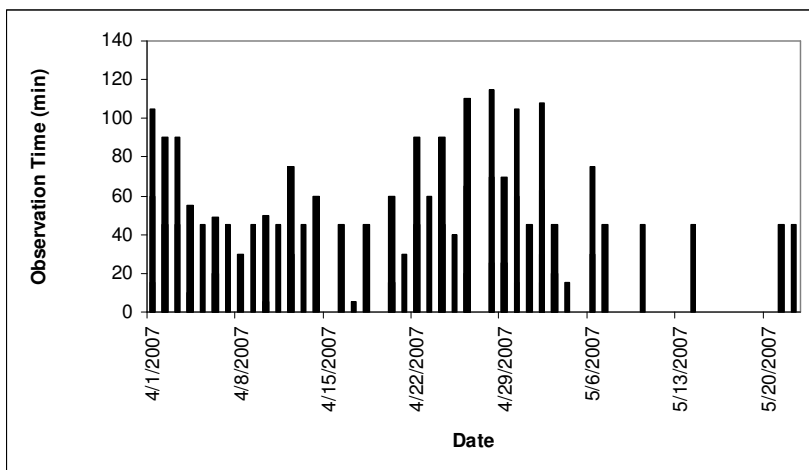


Figure 1. Observation on the Browns River by day.

or telephone for those who were unable to attend the training sessions. Survey materials and instructions were also made available via a webpage on the South Shore Estuary Reserve Council's website (http://www.estuary.cog.ny.us/council-priorities/living-resources/alewife_survey/alewife_survey.htm).

Data were submitted via completed data sheets, and verbal and written correspondence by 30 volunteers, including 13 Suffolk County Community College students. The actual number of participants was greater than 30 because many observations involved two or more people working together and sharing a single data sheet.

The total observation time, number of observers, number of observer days, and average observation time per day at each river in each month and for the season are provided in Table 1. Data were submitted for seven tributaries. For all of these, the total observation time was greater in April than in May. The Brown's River, which was not surveyed in 2006, had the greatest amount of volunteer effort, with more than 37 total hours of observations (see Figure 1). Nearly 29 of those hours were accumulated over 27 days in April as effort dropped drastically in May with just over eight hours of observation time logged over ten days. Beyond Brown's River, the rivers with the greatest volunteer monitoring effort were the Swan River and the Carmans River.

Fish sightings

As in 2006, alewife sightings took place in the Carmans River, Swan River, and Howells Creek during the spring of 2007. The number of sightings and estimated number of fish sighted was greater for all 3 rivers in 2007 compared to 2006. Effort increased significantly on Swan River and Howells Creek compared to last year, no doubt contributing to the increase in sightings on those two rivers. While observations from the mouth of Howells Creek were done informally this year due to access issues, the number of fish seen there by a trained and experienced biologist for the second year in a row suggests that fish regularly use this small tributary.

Swan River

The presence of alewives in the Swan River in 2007 far exceeded the single sighting that occurred in 2006. Alewives were seen spawning in the Swan River north of the Sweezy Street Bridge eight times on seven different days from late April to mid-May. The estimated number of fish present during each confirmed sighting ranged anywhere from one to about fifty fish (see Figure 2). The largest aggregations of fish were seen in the very beginning of May when their presence was most consistent. An estimated 195 fish were seen overall. It is unknown whether fish seen on different dates were the same fish making repeat movements between the bay and river.

In addition, because observations were only taken from one point along the river, it is difficult to estimate the actual size of the run

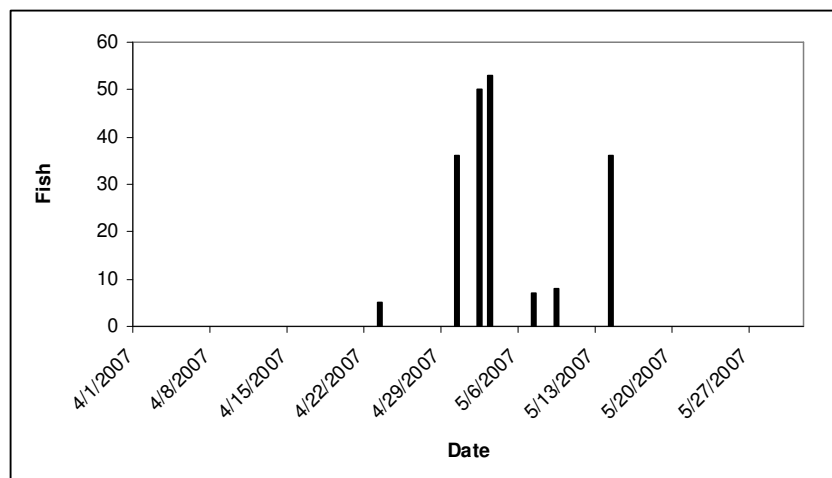


Figure 2. Estimated number of alewives observed by day in the Swan River.

on the Swan River. While the data suggest that the size of the run increased dramatically from 2006 to 2007, observation time and effort on the Swan River in 2006 was well below half of what it was in 2007. 17 observations were made over 16 days in 2006 compared to 61 observations over 33 days in 2007. The increase in and consistency of observations is a positive development that must continue, but better quantitative methods will be needed to accurately estimate population size.

Tidal Stage	Number of Fish	Observations where Fish Present	Total Observations	Total Hours (hrs:min)
Low Tide	8	1	3	0:40
Low Flood	0	0	11	2:50
Flood	0	0	5	1:10
High Flood	6	2	11	2:28
High Tide	0	0	4	1:15
High Ebb	6	1	11	3:05
Ebb	86	2	8	2:15
Low Ebb	89	3	8	2:03
TOTAL	195	9	61	15:46

Table 2. Sightings of alewives in the Swan River during different tide stages. High and low tides are defined as the time of the peak or minimum tide height ± 45 minutes. The stages of flood tide begin 45 minutes after minimum low tide and last 1.5 hours each ending 45 minutes before peak high tide. The stages of ebb tide begin 45 minutes after peak high tide and last 1.5 hours each ending 45 minutes before minimum low tide.

In contrast to reports from other locations, no alewives were observed in the Swan River at the peak high tide (see Table 2). Conversely, fish were seen most often just before low tide when the tide was still ebbing during Low Ebb and Ebb. In fact, all but one of the nine observations that yielded fish occurred while the tide was moving during periods of ebb and flood. However, the great majority of the total observations (54 of 61) also occurred during those periods.

Carmans River

As in 2006, the Carmans River produced the greatest number of alewife sightings during 2007. Over 30 days in April and May, volunteers made more than 50 observations on the Carmans River. On 17 of those days and during 25 separate observations, alewives were seen spawning. There were several instances where the number of alewives sighted from the Victory Avenue Bridge was estimated at 200. The greatest aggregations of alewives reportedly occurred during the very end of April, but fish were observed on the river from April 10 to May 14.

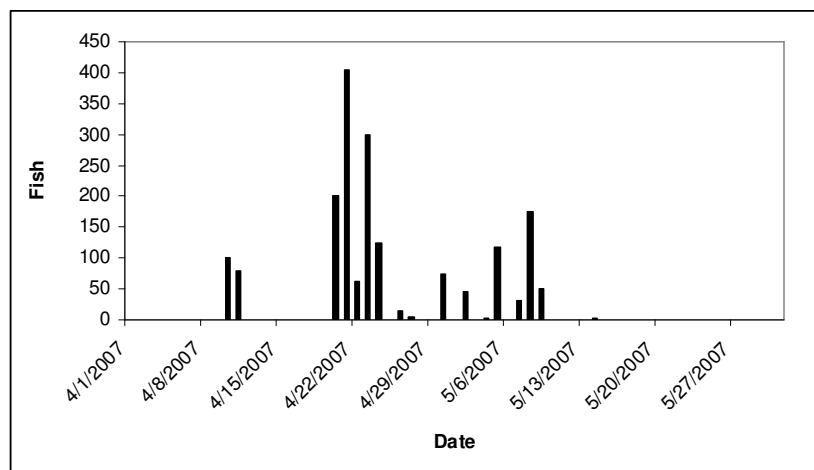


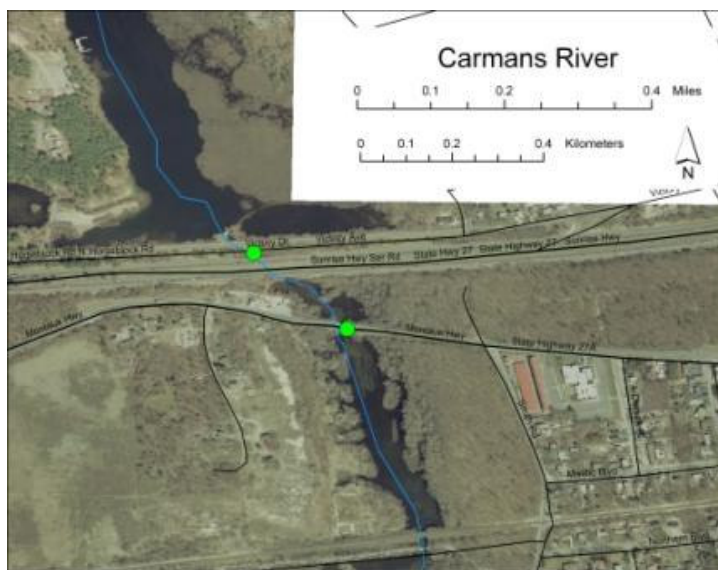
Figure 3. Estimated number of alewives observed by day in the Carmans River.

It is important to remember that the number of fish seen is a crude estimate made by an observer some distance above the river's surface is less reliable data than presence/absence. This is particularly true along the Carmans River because there was a sizable population of white perch inhabiting the river and mixed in with alewives during the 2007 alewife spawning season, particularly closer to the Hards Lake dam (see photograph). It is possible that at least some perch were accidentally incorporated into alewife abundance estimates and may bias those results. However, photographic evidence from the Montauk Highway bridge show what are clearly predominantly alewives at that location, and the presence of white perch does not change the conclusion that the Carmans River has a significant alewife run.



Alewives and white perch in the Carmans River. The fish in the foreground is a white perch. Alewives are shown in the background. Courtesy of Anthony Graves.

Observations on the Carmans River were taken primarily from the Montauk Highway Bridge. Several observations were taken from the Victory Avenue Bridge, and one was taken from atop the Hards Lake Dam spillway. The photograph of white perch and alewives was captured by an underwater camera stationed between the two bridges. While there are more observation points along the Carmans River compared to the Swan, the two bridges are quite close to one another on the Carmans River and observers often times collected data from both places during a single observation period (see Carmans River map). It is therefore difficult to estimate the entire size of the run on the Carmans River from its mouth to Hards Lake Dam.



Map of the Carmans River. Observation sites are marked by green dots. The Victory Avenue site is the northern dot and the Montauk Highway site is the southern one. Hards Lake Dam is just North of Victory Avenue.

Tidal data from the Carmans River in 2007 also does not support evidence that fish are most likely present at peak tides. As with the Swan River this year, fish were present most often when the tide was either ebbing or flooding. In fact, more observations with fish were present took place during the Low Ebb stage, followed by the High Flood stage on both the Swan and Carmans River in 2007. While this

would suggest that fish are most often present just before the tide goes slack, it is important to realize that observer effort on the Carmans River was far greater during the periods right before High and Low Tide, enhancing the chance of seeing fish in the first place. Not surprisingly, the three tidal stages when fish were most often observed made up more than half of fish sightings (14 of 25), more than half of total observation time (7:32 of 14:51), and half of total observations (26 of 52). A more consistent number of observations per tidal stage across the entire tide cycle would clarify any relationship between tidal stage and fish presence that might exist.

Tidal Stage	Number of Fish	Observations where Fish Present	Total Observations	Total Hours (hrs:min)
Low Tide	154	3	4	1:40
Low Flood	92	2	6	1:35
Flood	300	2	7	1:45
High Flood	305	4	9	2:12
High Tide	246	2	5	1:10
High Ebb	150	2	5	1:15
Ebb	242	4	6	1:39
Low Ebb	300	6	10	3:35
TOTAL	1789	25	52	14:51

Table 3. Sightings of alewives in Carmans River during different tide stages.

The nature of presence/absence data is such that sighting fish is evidence that they use the habitat in question, but failing to sight them could simply mean that the observer was at the location at the wrong time, viewing from the wrong spot, confronted with low visibility conditions, or otherwise did not encounter fish that might otherwise be present. Therefore, implications of failing to see significant spawning runs or even any alewives at all on most of the rivers are ambiguous and could reflect possible absence of alewives or the need for more observation time throughout the alewife spawning season. The lowest average daily observation time was greater than the recommended 15 minutes per observation and, on average, rivers were observed over more days in 2007 than in 2006. This concentrated effort on a focused set of tributaries may have contributed to the increase in fish sightings in 2007.

Comparison of 2006 and 2007 results

Alewife sightings

The 2007 alewife run on the Carmans River exceeded that of 2006 in terms of total observations where fish were present, number of days fish were sighted, and estimated number of fish seen (see Figure 4). Observer effort data for each year helps strengthen the argument that the 2007 alewife run on the Carmans River was

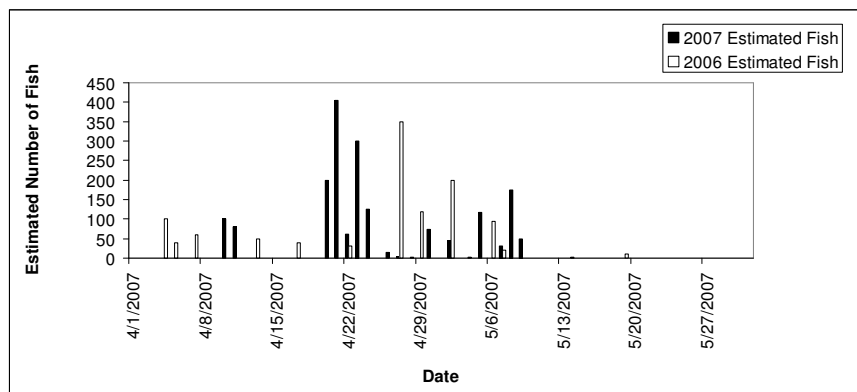


Figure 4. Estimated number of alewives observed by day in the Carmans River in 2006 and 2007.

stronger than the previous year. Total hours observed, total observer days, and total number of observers for each month in April and May of 2006 exceeded the same monthly totals for 2007. Yet fish were sighted 7 more times in 10 less total observations in 2007 than in 2006.

A significant difference in the breakdown of data between 2006 and 2007 concerns the definition of tidal stages. In 2006, four distinct tidal stages of three hours each were defined as low, ebb, high, and flood. High and low tides were defined as ± 1.5 hours of peak high and low, respectively. Ebb tide was defined as three hours in between high and low tide, and flood tide was defined as three hours in between Low and High tide. When the 2007 Carmans data is examined based on the 2006 tidal breakdown, no real trends in fish presence at particular tidal stages emerge (see Table 4). The only similarity of note is that Ebb tide produced the most observations with fish present in each of the last two years. Effort was also relatively high during that stage each year. A surprising statistic is the number of fish observed in 2007 within an hour and a half either side of low tide. The most likely explanation is that many of the approximately 300 alewives observed during Low Ebb as defined in Table 3 were observed within an hour and a half of low tide. It may be due to observer bias as well. In each year the second highest total observation time occurred during that period as well.

Tidal Stage	Number of Fish	Number of Observations with Fish	Total Observations	Total Hours (hrs:min)
Low	521 (160)	7 (2)	10 (15)	3:50 (6:45)
Flood	605 (340)	6 (7)	14 (21)	3:45 (6:55)
High	346 (155)	3 (2)	12 (11)	2:47 (3:12)
Ebb	317 (429)	9 (7)	16 (15)	4:29 (4:50)

Table 4. Sightings of alewives in the Carmans River during different tide stages in 2007. 2006 data is in parentheses. As in the 2006 survey, high and low tides are defined as the time of the peak or minimum tide height ± 1.5 hours. Flood and ebb are defined as all time in between these periods when the tide is rising or falling. Each stage is approximately 3 hours in duration.

Volunteer effort

With the exception of Brown's River which was not observed in 2006, overall volunteer participation was decreased significantly in 2007. The six rivers in common between 2006 and 2007 were observed by 32 volunteers for 72 hours and 25 minutes in 2006 and 30 volunteers for 58 hours and 8 minutes in 2007. The average total observation time per river in May favored 2007, but by less than an hour. Although overall observation time was down this year, effort was spread slightly more evenly over each river in 2007 as the average amount of observation days per river was greater by almost a day. Although this is most likely due to the drastic drop off in effort experienced during May 2006, it is still an encouraging sign.

Effort was also spread slightly more evenly between April and May in 2007 than in 2006. Although there was still a drop both in observation time as well as observation days on most rivers from April to May in 2007, the difference in volunteer effort between months was less than in 2006. Average observation time per river decreased by nearly 8 hours between April and May in 2006 compared to 4

hours in 2007. Average observation days per river decreased by 10 days from April to May in 2006 and by 8 days in 2007.

There were three rivers that were observed with greater frequency and duration throughout both months of the 2007 alewife spawning season. Beaverdam Creek, Howells Creek and the Swan River were observed for more total and average time, by more observers, and for more days in April as well as May in 2007 than in 2006. The presence of fish in Howells Creek and the Swan River in 2006 played a role in increasing the effort on those two tributaries in 2007.

Lessons from 2007 for future surveys

1. Observations began later in 2007 than in 2006, but the attempt to spread effort more evenly in terms of volunteer days and average time was not fully achieved.
2. Data should be reported in a consistent format to aid in its interpretation.
3. If possible, photographs and video of alewife spawning activity should be captured to validate observations, aid in future training sessions, and for use as general outreach via the SSER website.
4. Decreasing the number of tributaries included in the survey had limited success in concentrating volunteer effort. Future surveys should either focus on a smaller number of tributaries or encourage increased volunteer participation.
5. Although the temporal spread of effort was more even than in 2006, 2007 results suggest that effort needs to be spread more evenly across the alewife spawning season in an effort to have observation times in May equal to those in April.
6. Decreased observation time on the Carmans in 2007 may have been due to increased observation time on other rivers, which may have contributed to increased alewife sightings on the Swans River.
7. More frequent assessment of volunteer effort in terms of observation time and days should occur over the course of the survey period in order to guide consistent volunteer effort on all rivers.
8. Greater effort should be made to determine if there is a strong correlation between tidal stage and alewife presence in tributaries. This may be achieved by instructing volunteers to make observations during dedicated tidal stages on rivers with historic alewife runs.
9. Future efforts should consider supplementing visual observations with more active sampling using non-destructive methods such as fish traps or weirs to intercept migrating fish and more definitely establish presence or absence.

Table 1. Summary of observation effort on each tributary included in the 2007 alewife survey. 2006 data is in parentheses. The Browns River was not observed in 2006.

River	April (2006 April Totals)				May (2006 May Totals)				Season (2006 April and May totals)			
	Monthly Total (hrs:min)	Number Of Observers	Observer Days	Average Observation Time per Observer day (min:sec)	Monthly Total (h:m)	Obs	Obs Days	Avg Time per Obs Day (m:s)	Season Total (h:m)	Obs	Obs Days	Avg Time per Obs Day (m:s)
Carlls River	2:13 (10:14)	1 (5)	4 (18)	33:15 (20:25)	1:00 (0:16)	1 (1)	1 (1)	60:00 (0:16)	3:13 (10:30)	1 (6)	5 (19)	38:36 (10:10)
Connetquot River	3:40 (13:07)	3 (11)	9 (18)	24:26 (43:43)	3:13 (2:55)	2 (4)	6 (4)	32:10 (43:45)	6:53 (16:02)	4 (11)	15 (22)	27:32 (43:44)
Browns River	28:59	5	27	60:25	8:33	6	10	51:18	37:32	7	37	60:52
Swan River	11:04 (1:48)	6 (4)	23 (7)	28:52 (15:26)	4:42 (1:50)	4 (4)	10 (6)	28:12 (18:20)	15:46 (3:38)	7 (6)	33 (11)	28:30 (19:49)
Howells Creek	5:27 (0:31)	2 (1)	5 (2)	65:24 (15:30)	0:50 (1:11)	2 (1)	2 (4)	25:00 (17:45)	6:17 (1:42)	3 (1)	7 (6)	53:52 (17:00)
Beaverdam Creek	8:08 (6:27)	6 (5)	26 (19)	18:46 (20:22)	2:55 (2:05)	5 (4)	15 (9)	11:40 (13:53)	11:03 (8:32)	6 (5)	41 (28)	16:10 (18:17)
Carmans River	11:31 (27:51)	5 (11)	22 (30)	31:25 (55:42)	3:20 (4:10)	3 (6)	8 (10)	25:00 (25:00)	14:51 (32:01)	5 (10)	30 (40)	29:42 (48:02)

