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Massachusetts Division of Marine Fisheries

Annual Report

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Abstract:

Anadromous fish species such as the Rainbow smelt, American shad and river herring play an important role in the sport and commercial fisheries of Massachusetts. River herring are actually two closely-related migratory species the alewife or Branch herring (*Alosa pseudoharengus*) and the blueback or Glut herring (*Alosa aestivalis*). The alewife is the most abundant anadromous fish in the Commonwealth. The blueback herring is often confused with alewives by the untrained observer. Because their life cycles are very similar and their spawning migrations into coastal systems overlap the alewife and blueback have traditionally been managed as a single fishery.

During this reporting period, a total of 727 river herring were recorded entering Lower Shawme Lake, via the Dexter Mill fishway on Mill Creek, Sandwich, MA. Fifty percent of the run had passed the counting station by the 8th of May. An additional 5,000 gravid alewife were stocked into the system by the Division of Marine Fisheries (DMF).

The 1997 adult river herring population of the Monument River system was estimated to be 398,929 ($\pm 46,850$) fish of which 86.5% were alewife and 13.5% were blueback herring. Fifty percent of the combined alosid run had passed the counting station by the 4th of May. The adult return was the third largest total recorded since monitoring commenced in 1980.

This spring's DMF propagation program transported 59,000 river herring from five Commonwealth donor streams into fifteen different

coastal systems. Stocking densities ranged from 7 to 101 fish per hectare, with a program average of 105 adults per hectare for the 437 surface ha. stocked.

During this reporting period technical assistance was provided to interested parties on 239 occasions. Issues concerning fish passage, run occurrence, fish behavior and fishery related problems for the 100+ anadromous runs of the Commonwealth were addressed.

Job No. 1.

Characterization of River Herring populations, alewife
and blueback herring in two coastal streams.

Work objectives for this segment were to: continue and expand the temporal data base for alewife (*Alosa pseudoharengus*) and blueback herring (*Alosa aestivalis*) in the Bournedale (Monument River) of Bourne and the Mill Creek run in Sandwich, MA.

Study areas.

I.

The Monument River begins in Little Herring (30.4 ha.) and Great Herring Pond (153 ha.) in Plymouth and Bourne, Massachusetts. The river flows 1.6 km. and drops 10.4 m in elevation before emptying into the north shore of the Cape Cod Canal via a 0.61 m X 1.52 m culvert.

Three fishways enable river herring to reach the upper spawning grounds. The first fishway is 213 m long and passes spawning fish to the town catching pool. The second ladder is 18.3 m long and provides passage from the catching pool to Foundry Pond. The last fishway allows fish to pass through a town conservation area (Carter-Beal) into a small impoundment approximately 0.8 km. upstream. Once past the conservation area, fish have unimpeded access to the headwater ponds (Map A).

II.

Sandwich (Mill) Creek flows 3.22 km from Upper and Lower Shawme Lakes (17.8 ha) through the town of Sandwich emptying into Cape Cod Bay through Town Beach at Old Harbor. A dam at Lower Shawme Lake is bypassed by a 23 m concrete weir-pool fishway. A second dam, 2.4 m high and in poor condition, separates the Lower and Upper lakes. Outflow is maintained via a serpentine bypass channel which connects the two water bodies but blocks fish passage into the upper lake. A dysfunctional ladder is present but fish passage is not possible at this time.

In conjunction with the DMF ladder restoration work, stocking efforts were initiated in 1991 with the goal of restoring this scenic run. Five thousand gravid alewife were stocked into this system during the spring of 1997. Fish were released into Upper Shawme Lake, the upper most impoundment. Access for stocking was just above the old wooden dam off Grove Street on the northern shore of the upper pond (Map B).



Mill Creek System, Sandwich MA.



Produced August 13, 1997



Methods:

I. Adult Assessment, Spring.

A Smith-Root model SR-1100 fish counter was used from 4/10-6/18 to record the number of adult herring as they migrated upstream in Bournedale. A Smith-Root model SR-903-D counter was used from 4/21-6/16 at Mill Creek. Due to an error by a Grist mill worker, the power was turned off for the Mill Creek counter over the Memorial Day weekend and four days of data were not recorded. Electronic counts were compared at least once a day, Monday through Friday, to a visual count conducted at the distal end of the counting tube. The visual counts were conducted for either one or two five-minute intervals and compared to the electronic tabulations for that interval to assess accuracy of the counters. Smith-Root Inc. reports a counting accuracy typically better than 95% for their fish counters.

Counter accuracy varied with the number of fish ascending the ladder, being higher when the run was "light" and lower when the run was "heavy". The counter could undercount total passage due to fish position in the counting tube and/or the number of fish passing through the tube simultaneously. To address this undercount or bias, a stratified mean bias rate of the daily machine counts was estimated using the ratio of daily visual counts to the machine count.

A mean count bias rate was determined for each week of the ten weeks of run. Stratum were weighted by the weekly electronic count.

$$\bar{B}_{st} = (\sum_{i=1}^L W_i \bar{B}_i) / \sum_{i=1}^L W_i$$

The stratum variance of the mean is $S^2_i/n = S^2_{Bi}$

From this a stratified standard error (S.S.E.) was derived.

$$S_{Bst} = SSE. = \sqrt{\sum_{i=1}^L W_i^2 S_{Bi}^2 / (\sum_{i=1}^L W_i)^2}$$

Where:

W_i is the weight in stratum i

L is the number of strata (10 weeks)

$\bar{B}_i$ is the mean daily bias rate for stratum i

S^2_i is the stratum variance

S^2_{Bi} is the variance of the mean for stratum i

S^2_{Bst} is the stratified variance of the mean

$\bar{B}_{st}$ is the stratified mean

The population escapement count (C1) was then calculated as the electronic count for the entire run times the mean bias rate.

$$C1 = Ct * (\bar{B}_{st} \pm 2 \text{ S.S.E.})$$

Ct = electronic count for 1997

$\bar{B}_{st}$ = mean daily bias rate

S.S.E. = stratified standard error

Plus or minus 2 S.S.E. of the mean bias rate was used to approximate the 95% confidence interval for the run.

Future work will attempt to refine and improve this estimate calculation.

An estimate of the entire 1997 Bournedale run (P) is achieved from the addition of the adjusted Smith-Root counts $\pm 2(\text{S.S.E.})$ for the 95 % confidence interval, the catch harvested by the town of Bourne, the number of fish removed from the run by DMF for stocking, the number collected for scientific evaluations, and the number supplied to the town of Pembroke.

$$\text{Total population } P = Ct * (\bar{B}_{st} \pm 2 \text{ S.S.E.}) + C2 + C3 + C4 + C5$$

Ct = electronic count

C2 = Fish harvested by the Town of Bourne

C3 = DMF stocking collections

C4 = Collections for study

C5 = fish supplied to Pembroke

All captures and removals occurred down stream of the counting station.

For species specific information, samples of adult fish were collected from the Bournedale system on thirteen occasions during the course of the spring run. The Mill Creek system remained under a town management closure, and no adult fish were removed. A total of 595 spawning run fish from Monument River was collected via hand-held dip net and returned to the field station where species, sex, total length, and live weight grams were determined.

Water quality parameters, such as dissolved oxygen, per cent oxygen saturation, pH, as well as stream velocity were monitored weekly (3/19-6/25). Air temperature, water temperature and weather conditions were collected daily at the Bournedale fishway in Bourne (4/10-6/18) and at the Dexter Mill fish ladder on Lower Shawme lake-Mill Creek (4/21-6/16). Weather and water chemistry data were recorded at all sampling sites. Water quality parameters: temperature ($\pm 0.3^{\circ}\text{C}$) and pH ($\pm 0.05\text{pH}$) were determined with a Horiba

U-10 Water Quality Checker. Air temperature was measured with a BCR standard stem thermometer ($\pm 0.5^{\circ}\text{C}$). Dissolved oxygen was determined by a YSI model 51B D.O. meter ($\pm 0.2\text{mg/l}$). Percent oxygen saturation was taken from a Rawson's saturation nomogram. Prior to each sampling the U-10 was calibrated automatically with Calitechtm Auto-Cal Solution standard for pH. The D.O. meter was calibrated with ambient oxygen. Water velocity was taken by a model 2030R General Dynamics flow meter and calculated as meters per second. Velocities were determined at the Lower Shawme Lake exit just above

the fishway off Route 130 in Sandwich. In Bourne measurements were taken at the Herring Run Motel catching pool exit above the first fishway in the system. Weather was recorded numerically corresponding to descriptions presented in the Weather Index (Appendix A). Values from the weekly weather and water chemistry sampling for the two study sites are given in Table 5 and 6.

I. Mill Creek, Sandwich, MA.

Results and Discussion:

A. Spring 1997

The Mill Creek system was monitored at the Dexter Mill fishway off Route 130 in the Town of Sandwich. The spring of 1997 was the sixth since repair and modification of the Dexter Mill fish-way, and the seventh since restorative alewife stocking efforts commenced. This was the fifth spawning migration monitored in Mill Creek.

The DMF propagation program released 5,000 gravid alewife taken from the nearby Monument River run, into Upper Shawme Lake this year. This spring visual observation of the fishway area commenced on March 19 (Julian day 78). No herring were observed in the system by DMF personnel until April 22 (Julian 112). Following adjustments and reinforcement to the counting tube mounting box the counter was deployed on April 21 (Julian 111). The first up runners were recorded on April 23 (Julian 113).

During the 52 days the fish counter operated, 727 river herring were recorded entering Lower Shawme Lake. A total of ten visual checks were performed on the Mill Creek counter with an overall accuracy of 100% for the periods counted. This 100% value represents no bias between the visual and electronic totals and is felt to reflect the small number of fish passing through the counter at any one time. So few fish passing through the tube allowed the machine to record each one. Due to a loss of power,

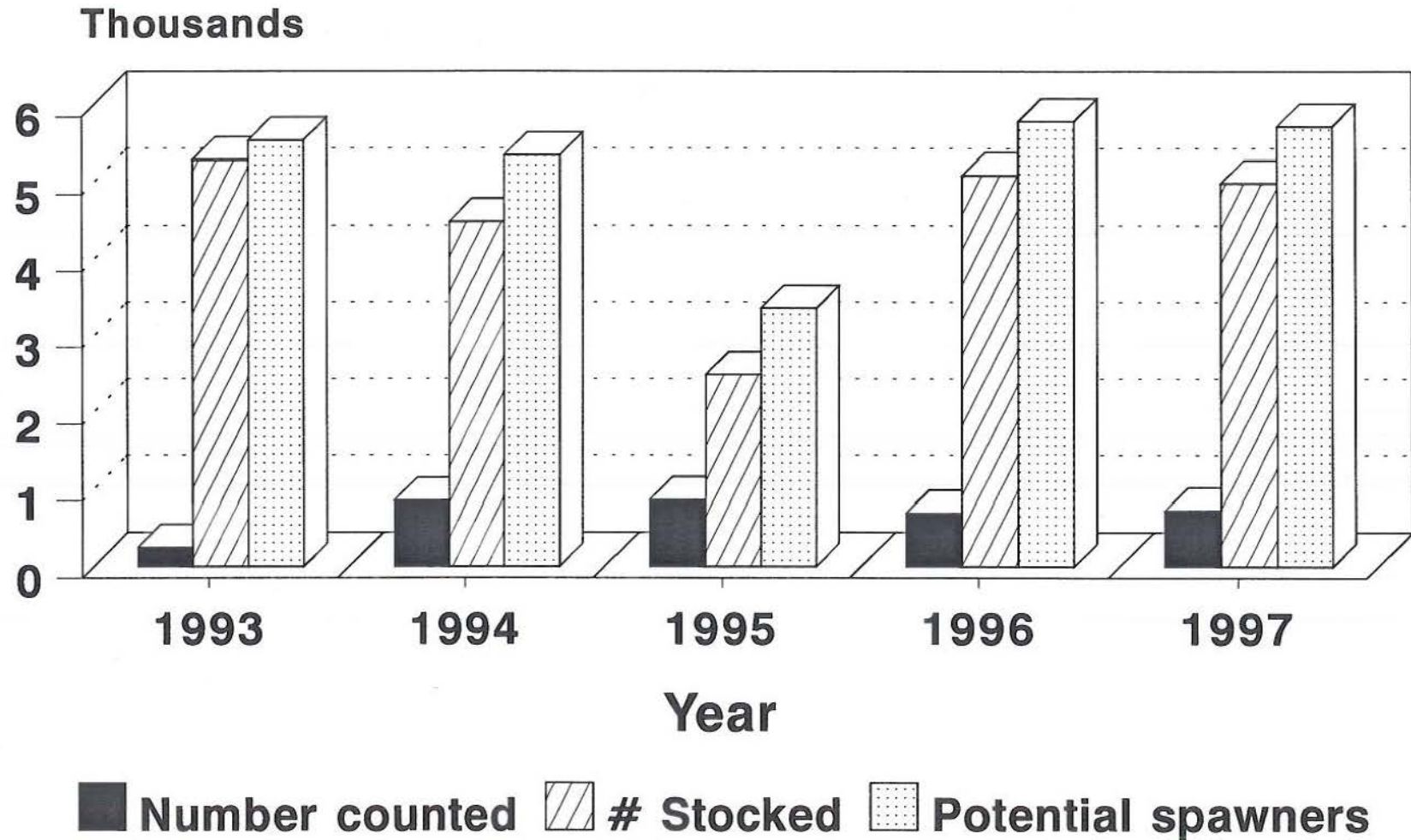
count information went unrecorded over the Memorial Day holiday in May (24-27). Passage numbers for the four day period prior to the holiday was 42 fish while the number during the same period following the holiday was 35 fish. Due to the patchy distribution of herring schools and large differences in daily passage levels (0 to 59 fish) no correction value was added to the counter total to account for the lost days. Therefore, the total count of natal fish is believed to be smaller than if the power had not been interrupted.

The number of returning fish counted plus the number introduced via stocking and their combined total for each of the past five years are presented in Figure 1. The total number of river herring in Upper and Lower Shawme Lakes in 1997 was at least 5,727 fish. Since 1993 the combined total number of spawning adult herring in the lakes has ranged from 3,367 to 5,797. Natal returns (herring not stocked) have represented from 4.5% to 25.7% of the total spawning population. (Table 1).

Table 1.

<u>Year</u>	<u># Stocked</u>	<u>#Natal Count</u>	<u>Total#</u>	<u>% Natal</u>
1993	5,300	252	5,552	4.5
1994	4,500	857	5,357	16.0
1995	2,500	867	3,367	25.7
1996	5,100	697	5,797	12.0
1997	5,000	727	5,727	12.7

Mill Creek, Sandwich River Herring Run



SR 903D Fish Counter
Stocked by DMF
Total= counted + stocked

Figure 1.

The daily count at the fishway and the cumulative total over the 1997 run are displayed in Figure 2. The largest single day count occurred on May 2 (Julian 122) when 59 fish were tallied. Weather conditions were 100 percent overcast with a water temperature of 14.4°C. The second largest passage number (38 fish) occurred a week earlier on April 24 (Julian 114) which was also completely overcast with a water temperature of 11.1°C. Fifty percent of the natal run had passed through the counter by May 8 (Julian 128) and 75% had passed upstream by May 17 (Julian 137). Proportioned by month, 72% of the run occurred in May, 19% in April and June accounted for the remaining 9%.

Table 2, presents the average monthly climate and water chemistry data during the spring run. Water velocities at the fishway do not appear to reflect rainfall totals. This may be a result of the Towns use of the Dexter Grist Mill sluiceway to dump water under the Mill and control water levels in the Lake during heavy rain events.

Mill Creek, Sandwich MA

Herring Run
Spring 1997

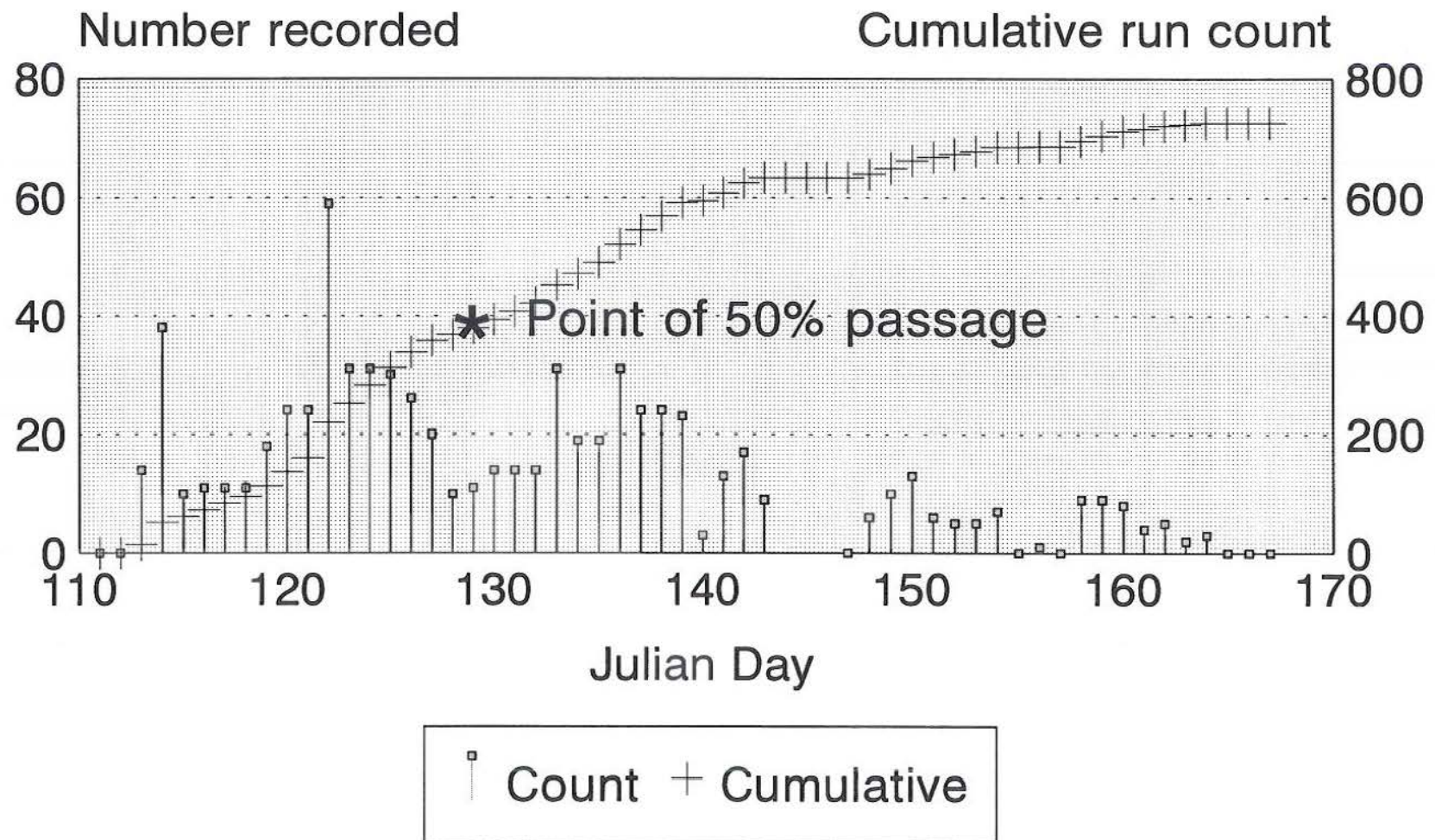


Table 2. Climate and Water Chemistry: Counting

Station Lower Shawme Lake, Sandwich, MA

	Air T Onsite °C	NOAA Air T ° C	NOAA Rain- fall	Water T on site ° C	D.O. mg/l	% D.O. Satura- -tion	PH	Velocity m/s
March	6.9	3.2	4.86"	6.6	11	91	7.0	0.82
April	10.3	8.4	4.69"	10.2	11	100	6.7	1.36
May	12.2	13.0	2.69"	14.2	8.9	90	6.9	1.22
June	16.6	20.0	2.24"	18.1	6.7	77.8	6.6	1.33

All data are averages, except rainfall is total inches.

NOAA Temperature and Rainfall from Providence station 1997
approximately 38 miles due west.

Water temperature over the 97 day observational period averaged 14.5°C and ranged between 6.1° and 24.8°C. Dissolved oxygen levels averaged 9.1 mg/l with a low of 5.2 mg/l and a high of 11.8 mg/l. Percent oxygen saturation averaged 89.4% and ranged between 59% and 107%. The pH reading was 6.8 on average with a range of 6.0 to 7.5 pH units. Water velocity averaged 1.2 m/sec. with a high of 1.7 m/sec and a low of 0.7 m/sec over the course of the observational period (Figures 3,4,5,and 6,). The run will be followed again next spring.

Habitat Parameters

Lower Shawme Lake

Sandwich, MA

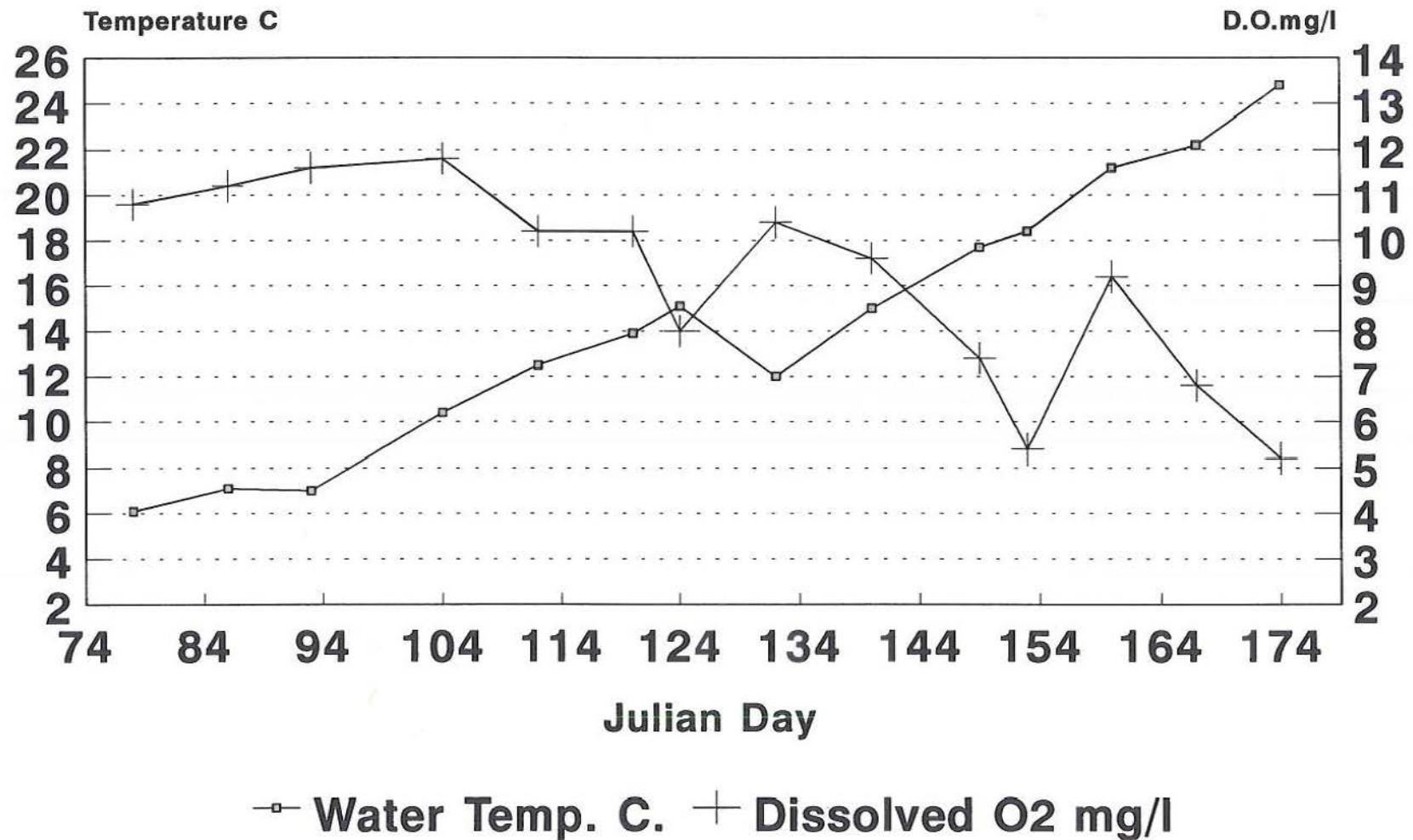
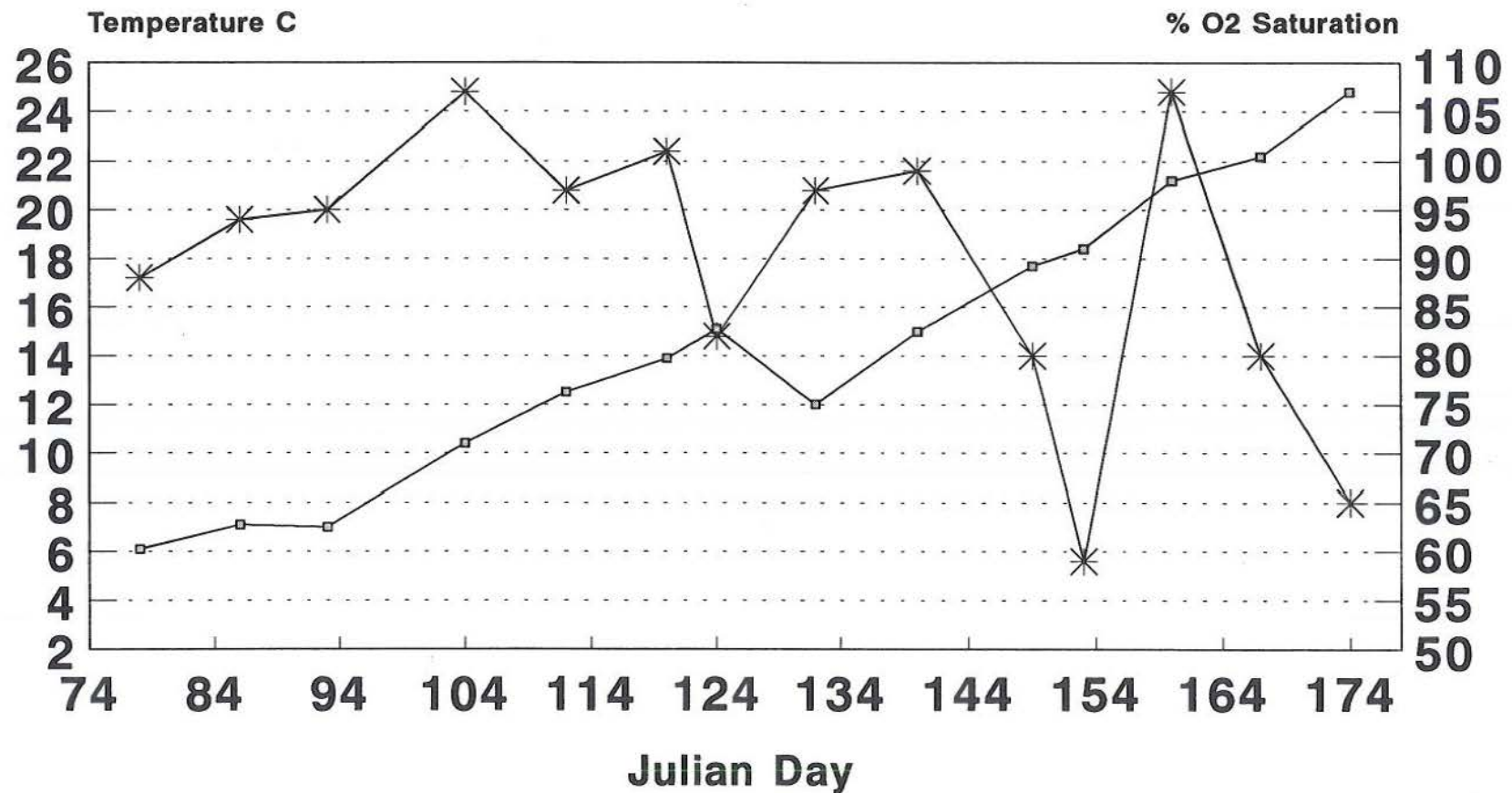


Figure 3.

Habitat Parameters

Lower Shawme Lake

Sandwich, MA



□ Water Temp. C. * %Saturation O2

Habitat Parameters

Lower Shawme Lake

Sandwich, MA

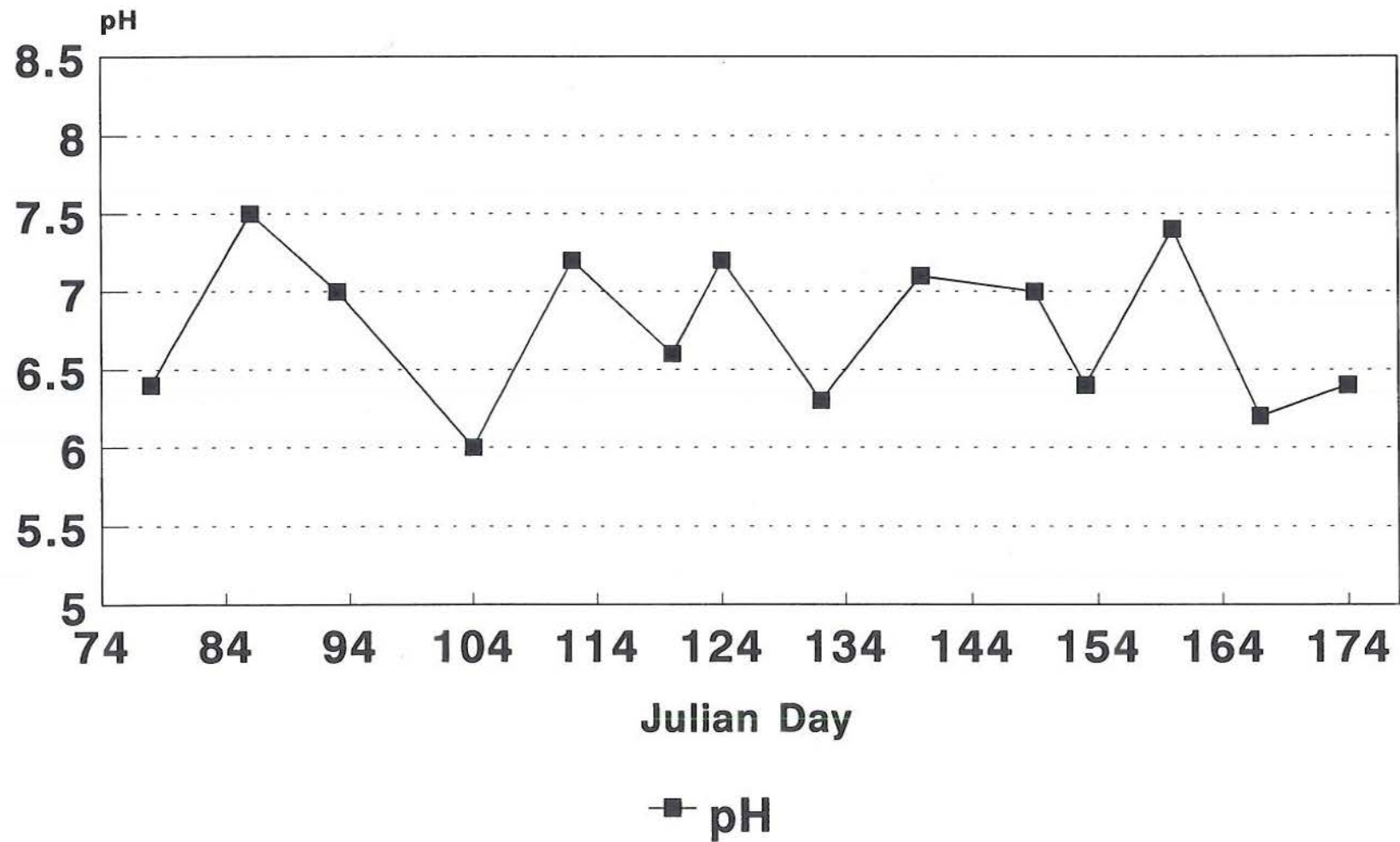


Figure 5.

Habitat Parameters

Lower Shawme Lake

Sandwich, MA

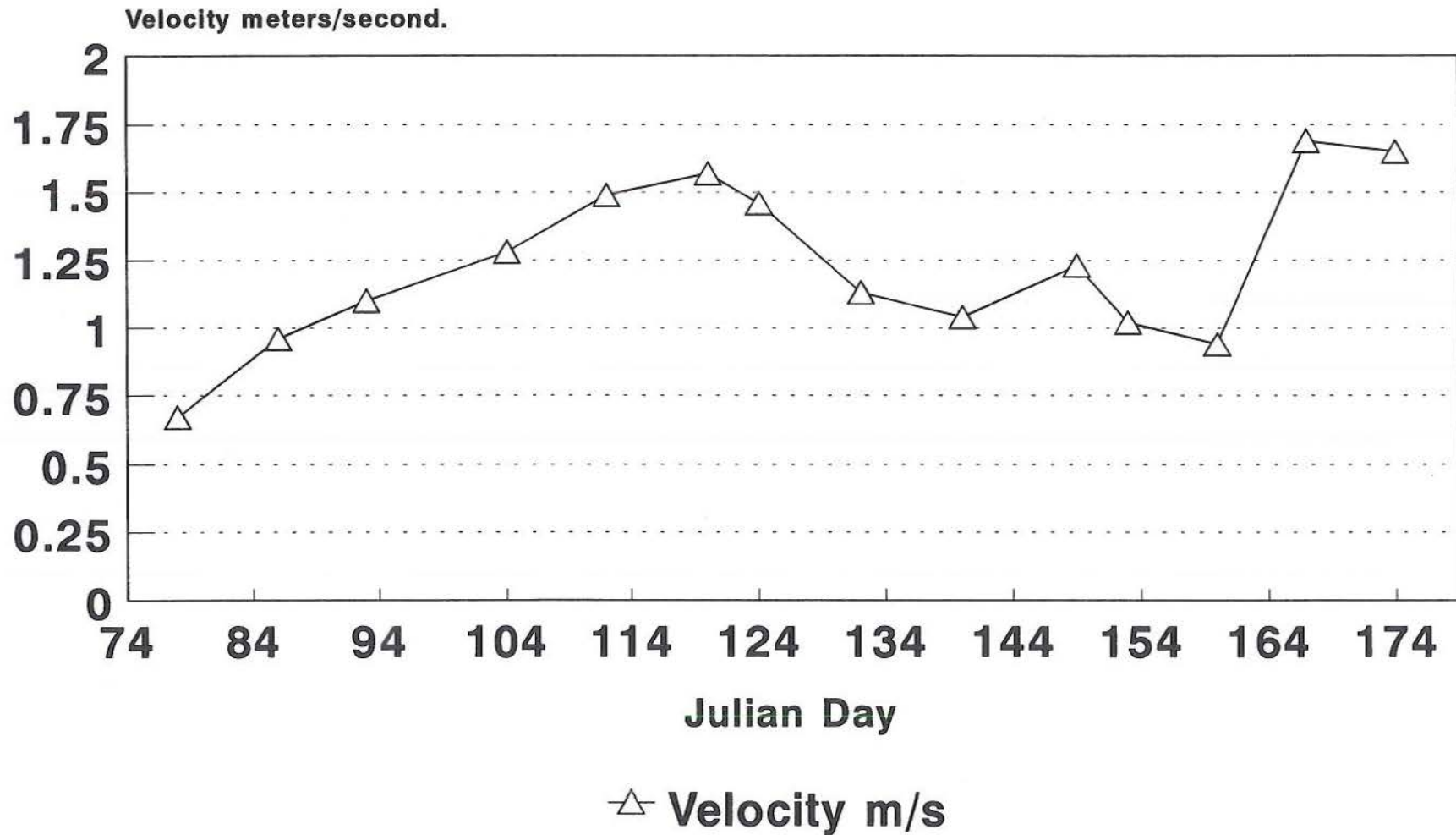


Figure 6.

II. Monument River, Bournedale, MA.

A. Adult River Herring Spring 1997.

The 1997 Monument River herring run (alewives and bluebacks) was estimated at 398,929 ($\pm$ 46,850) fish over a ten week period. A total of 57 visual checks were performed for the Bournedale counter over the counting period. Calculations produced a stratified mean bias rate of 1.57154 with a weighted standard error of (S.S.E.) 0.11654. A count of 315,884 ($\pm$ 46,850) adult herring was determined for fish passing above the counting site on their way to the headwater spawning ponds. This level of escapement resulted in a system fish density of 1,723 spawners per surface hectare of spawning area. This spring the breakdown was 86.5 % alewives and 13.5% blueback herring. A total of 83,045 fish, 21% of the combined runs, was harvested for either bait, local consumption, scientific studies, and alosid restoration and propagation (Table 3).

Table 3. Total River Herring for
Monument River, Bourne 1997.

SR-1100 Count Monument River	Bourne Herring Catch. C2	DMF Stocking Collections C3	Collections for Scientific Study C4	Pembroke Collections C5
315,884 $\pm$ 46,850	54,000	25,675	2,170	1,200

Total = 398,929 $\pm$ 46,850

Conservation measures by the Town of Bourne continued in 1997. The catching season ran from April 21 until May 31. A town herring permit which had to be displayed at all times was required to receive fish. The herring catch was distributed by the official town catcher only to permit holders. Permit holders were entitled to 14 herring per catching day subject to availability. The permit was marked by the herring catcher each time herring were provided. Fish could only be obtained from the herring catcher at the designated catching area. The catching service was provided by the town on Sunday, Monday, Wednesday, Friday and Saturday during the catching season, and on Tuesday May 20 and Thursday May 22, between the hours of 5:00 a.m. to 11:00 a.m. and 6:00 p.m. to 10:00 p.m. The Carter Beal Conservation area, a traditional catching area for local harvesters, remained closed. The protective buffer zone around the river entrance along the north shore of the Cape Cod Canal remained in effect. No harassment or snagging of fish was allowed in this area. Demand for live herring as sportfish bait has intensified in recent years as the numbers of striped bass fishermen working the Cape Cod Canal has increased. Over 1,000 herring permits were issued this spring. A seasonal harvest quota of 50,000 fish was continued. When final catch figures were received from the town the target cap had been exceeded by 8%, or 4,000 fish. Town harvest represented $\approx$ 13.5% of the total run.

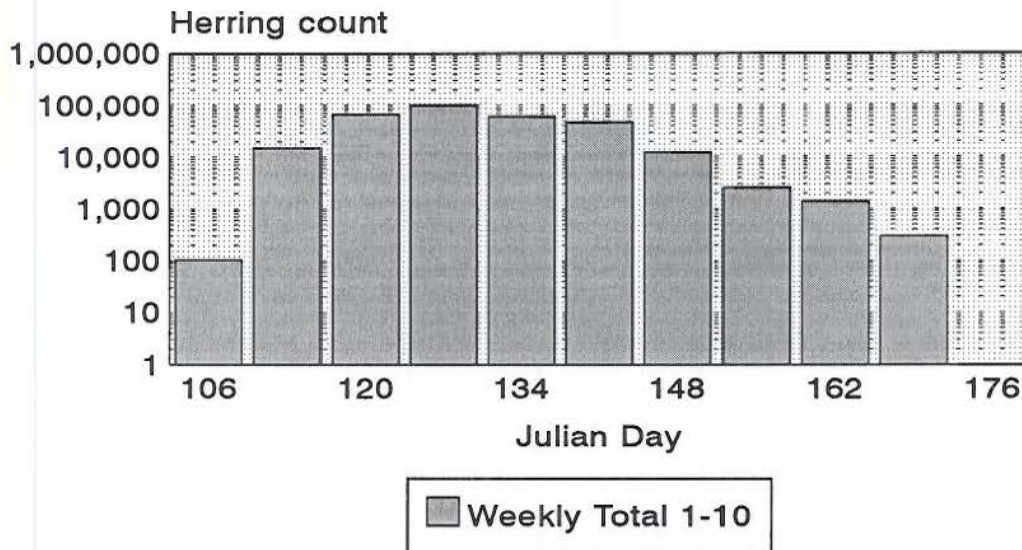
The run began with the first scouts entering the river on April 15 (Julian 105). Water temperature was 8.5°C. Large numbers of fish did not arrive until the third week of April when water

temperatures reached 9°C-11°C. Peak migration occurred during week four when 32.8% of the alosids passed through the counter area. Approximately seventy-four percent of the run occurred in a three week period during the 3rd, 4th and 5th weeks (Figure 7). The daily count at the fishway and the cumulative total over the run are displayed in Figure 8. The largest single day for passage occurred on April 29 (Julian 119) when 32,480 fish passed through the fishway. Weather conditions were sunny and water temperature was 11° C. The second largest passage occurred 3 days later when an additional 32,391 fish moved upstream. Weather conditions were partly sunny and water temperatures had increased 1°C to 12°C. Fifty percent of the run had passed through the counter by May 4 (Julian 124) and 75% had passed upstream by May 13 (Julian 133). During the 1997 immigration, river herring were recorded from April 15 (Julian 105) through June 18 (Julian 169). Total run duration covered 65 days.

Each year alewife account for the largest segment of the combined herring runs. In 1997 they continued to be the dominant anadromous species utilizing this system. Since 1980 the percentages of alewife have ranged from a low of 55.4% to a high 93.3%, averaging 76.8% (s.e. 3.6). This year they represented 86.5% of the combined run. Conversely, blueback herring composed the smallest contingent of the Bournedale run and varied from 6.7% to 44.6%, averaging 23.2% (s.e. 3.6). However, the 13.5% bluebacks this year, represents a population of 53,800 fish. This number is similar to the average run of 52,952 ($\pm$ 15,772) blueback herring

Monument River

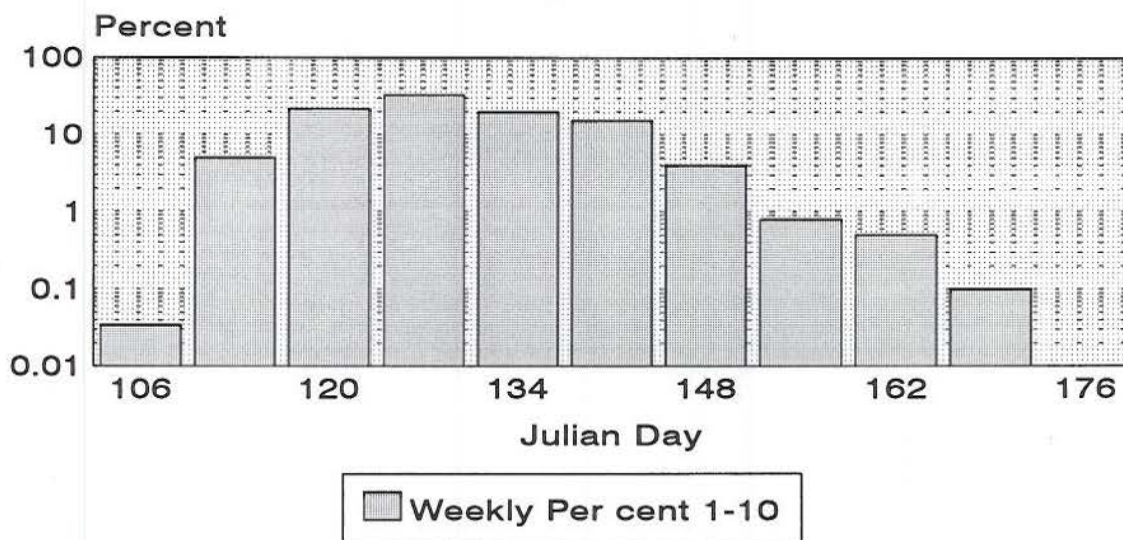
Weekly Total Count



Weekly Total
1997

Monument River

Weekly portion of run

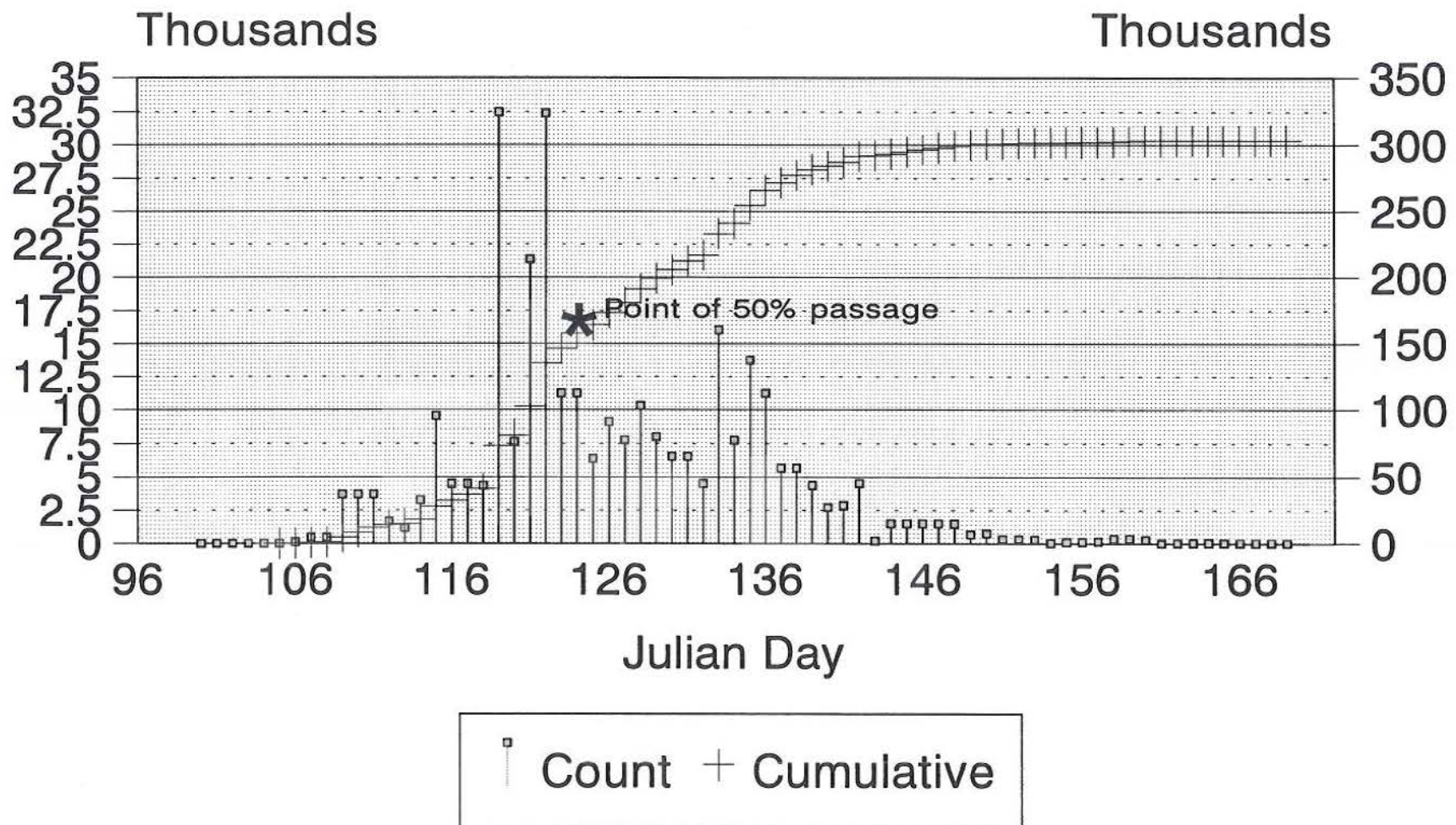


Weekly Total
1997

Figure 7.

Monument River

Herring Run
Spring 1997



recorded in this system since 1980.

In the course of this springs migration the runs of the two species overlap from early May until the last week of May. Alewife ran from April 15 (Julian 105) until May 29 (Julian 149), while Blueback herring were present from May 5 (Julian 125) until June 18 (Julian 169) (Figure 9).

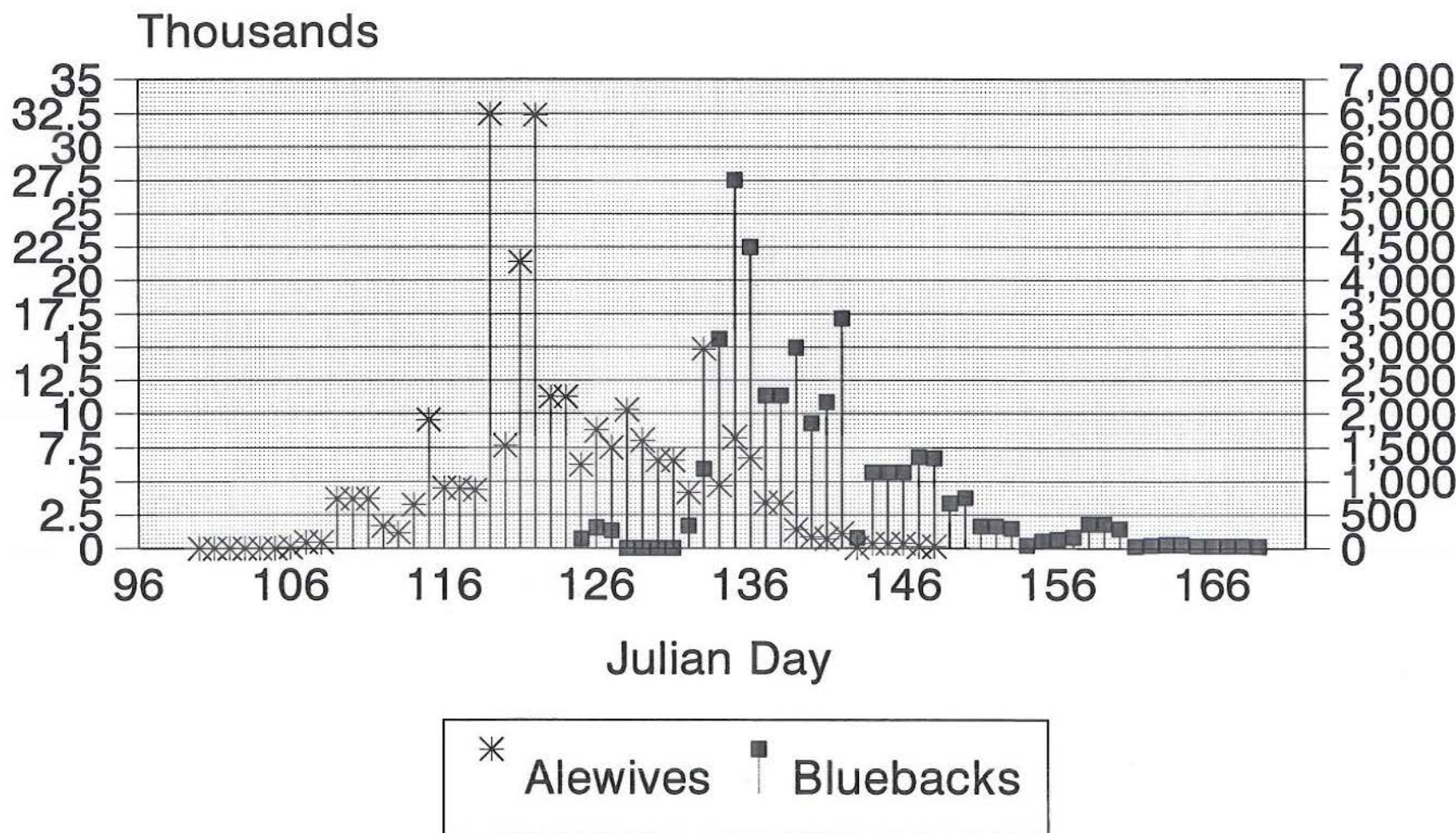
Collected alewives ranged in size from 225 mm TL (102 g) to 305 mm TL (294 g). Males averaged 262 mm.(164 g) and females averaged 274 mm.(194 g). Blueback herring, the smaller of the two species, ranged from 212 mm TL (84 g) to 282 mm (222 g) with a mean size of 234 mm (118 g) for males and 252 mm (150 g) for females . Length frequency to the nearest 5mm for collected samples are presented in Figures 10 and 11.

Sex composition of up running samples indicated more males than females 53% males vs. females 47% for alewives and 55% vs. 45% for bluebacks ascended to the spawning areas this spring. Male to female sex ratios were 1.13:1.00 for alewife and 1.24:1.00 for bluebacks.

The first down-runners moving off the run were seen on May 12. Down-runners can usually be visually differentiated from up runners by their poorer physical appearance. They often appear much thinner than the fish fresh from the canal. Down runners also can evidence an external white fungus (ich) in large patches on their bodies. The fungus has the opportunity to establish itself while the fish are on the spawning grounds but is lost or cured when they return to the salt water.

Monument River

Herring Run
Spring 1997

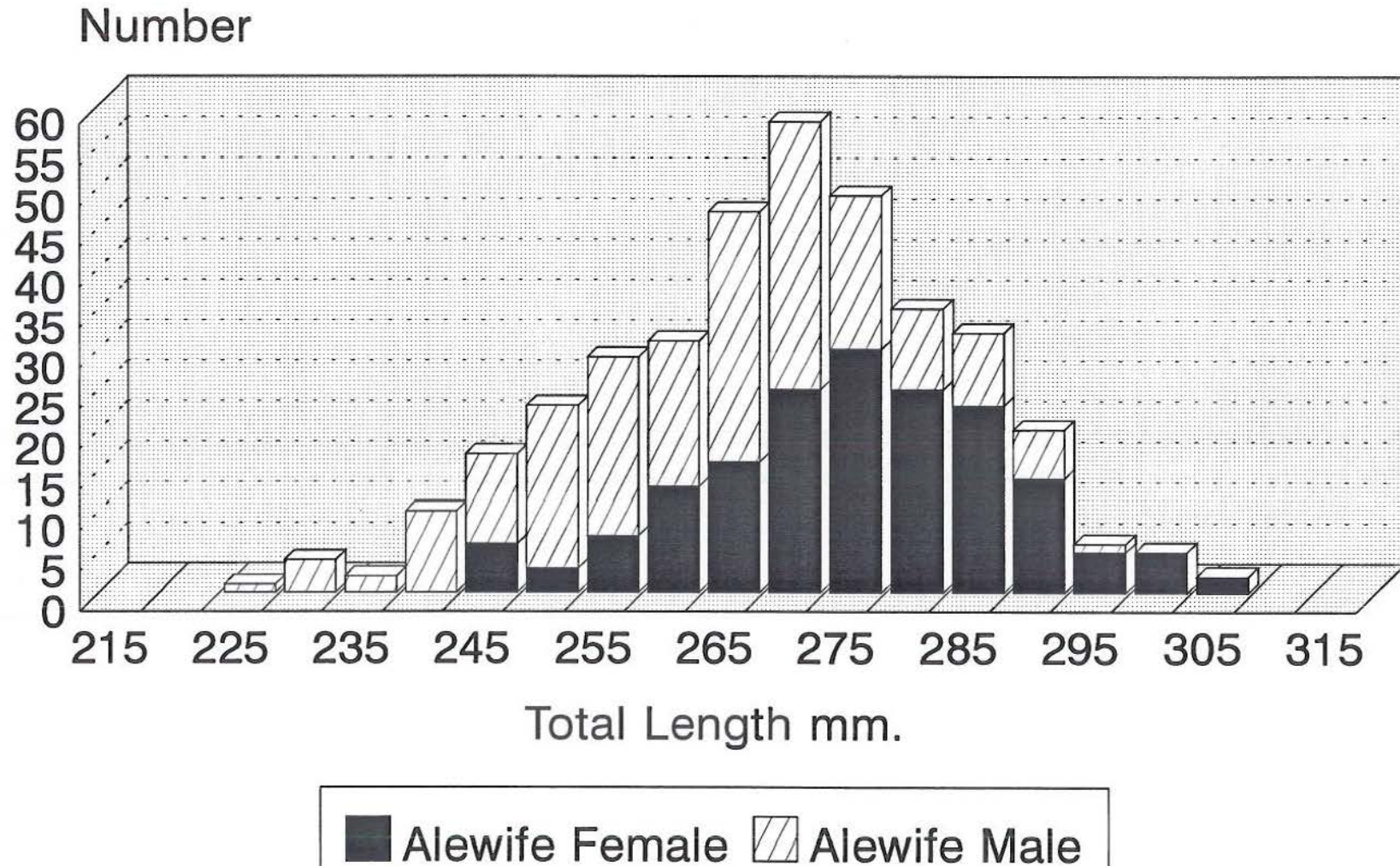


SR-1100 Electronic counter

Figure 9.

River Herring Length Frequency

Monument River, Bourne

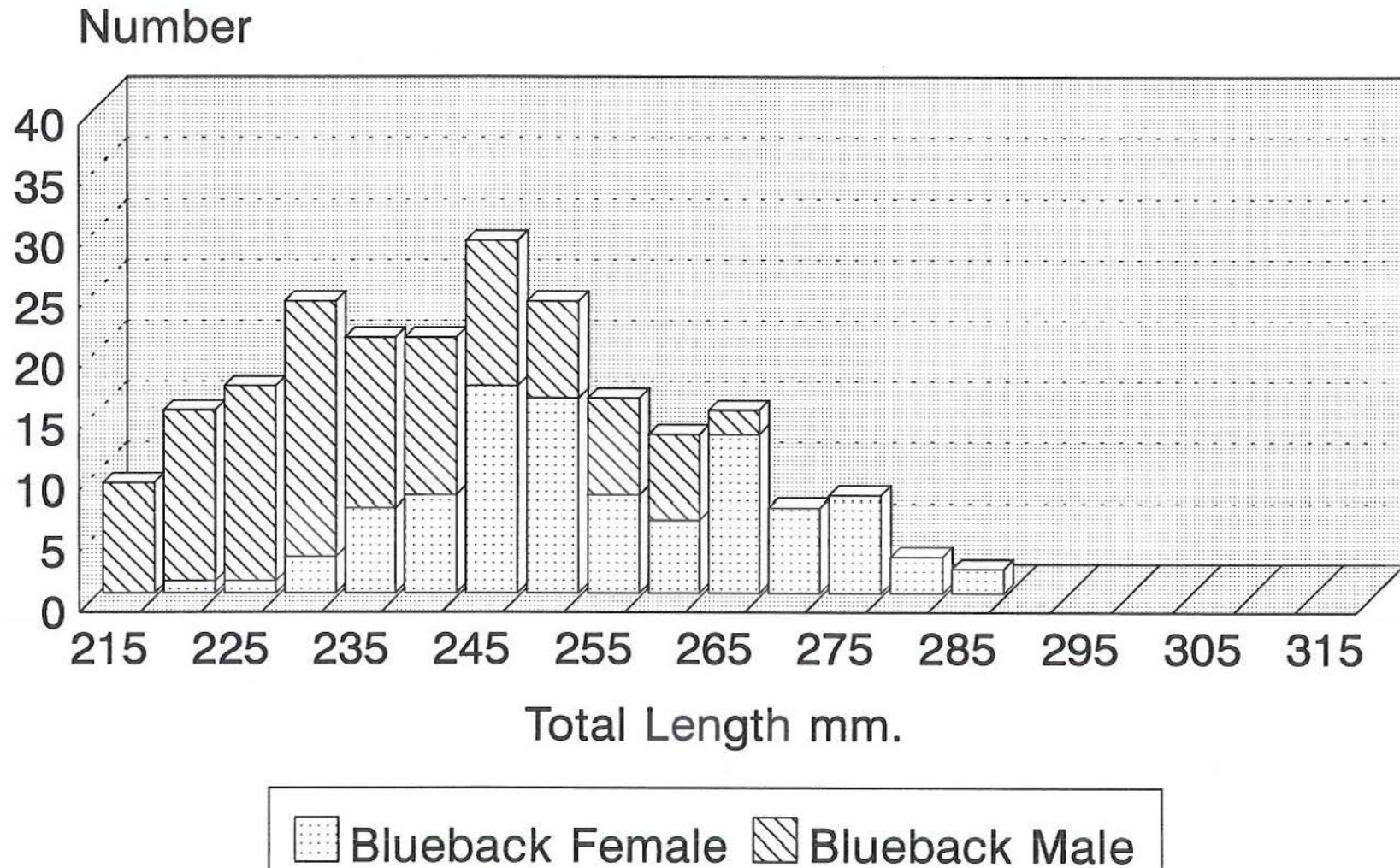


Spring 1997

Figure 10.

River Herring Length Frequency

Monument River, Bourne



Spring 1997

Figure 11.

This year's combined run was the third largest since DMF began monitoring this system. Also the three largest runs in this system have occurred in the past three years (Figure 12).

Table 4 presents average climate and water chemistry information for each month during this spring.

Table 4. Climate and Water Chemistry: Monument River
Counting station Bourne.

	Air Temp ° C	NOAA Temp ° C	NOAA Rain- fall	Water Temp ° C	D.O. mg/l	% Satura- tion	pH	Velocity m/s
March	6	3.2	4.86"	4.7	11.7	89	7.5	1.8
April	11.2	8.4	4.69"	9.4	11.3	97.2	6.2	1.6
May	12.6	13.0	2.69"	12.6	9.0	84.5	6.2	1.2
June	16.8	20.0	2.24"	16.9	7.6	82.6	6.4	1.5

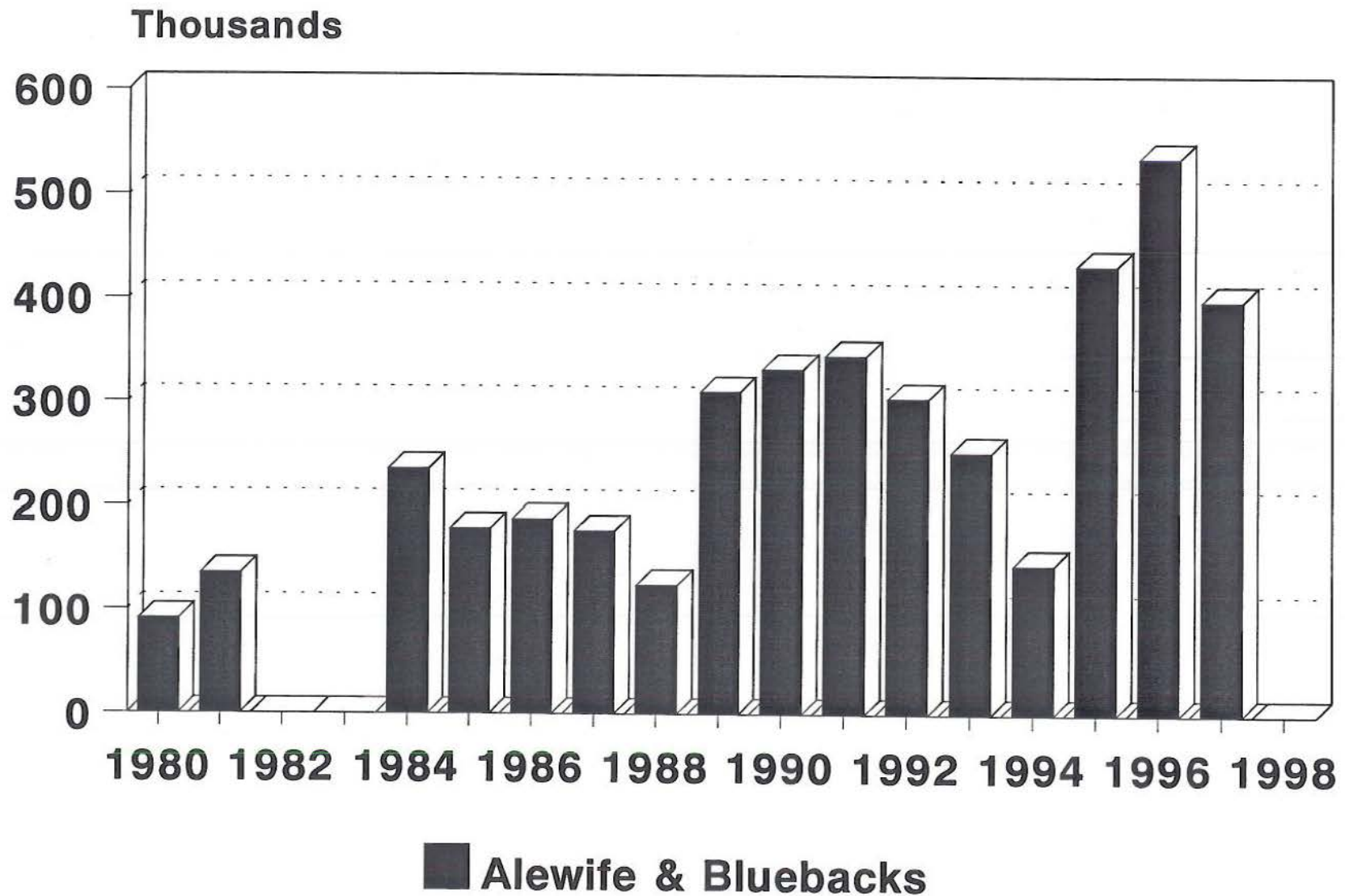
All data are averages, except rainfall is in total inches.

NOAA rainfall data from Providence station 1997
approximately 38 miles due west.

Water temperature averaged 13.1°C during spring and ranged from 4.3°C to 22.2°C, dissolved oxygen levels fluctuated from 6.8 to 12.8 mg/l and averaged 9.5 mg/l. Correspondingly, oxygen saturation levels varied between 72% and 105% and averaged 88%, while pH readings registered from 5.9 to 7.8 and averaged 6.4 over the course of the entire spring migration (Figures 13 A, B, C and D). Weather and water chemistry are presented in Tables 5 and 6.

Anadromous Alosid Runs

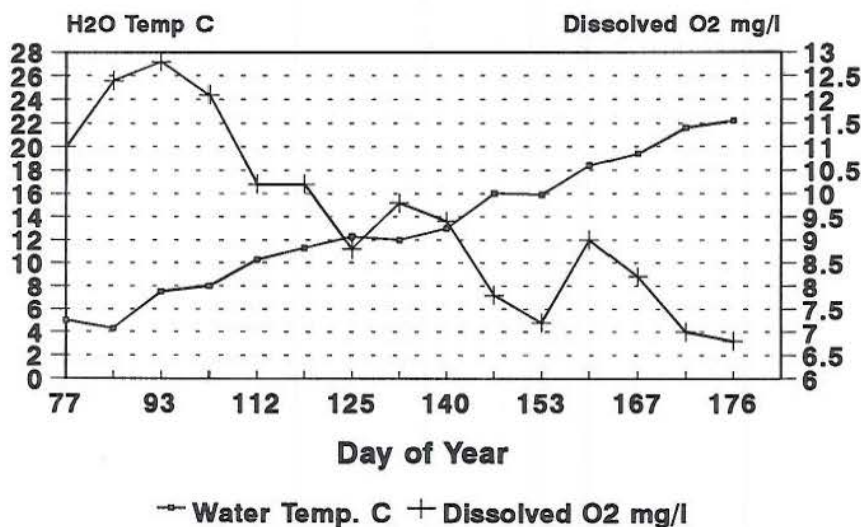
Monument River, Bourne



Estimates rounded to nearest 1,000

Figure 12.

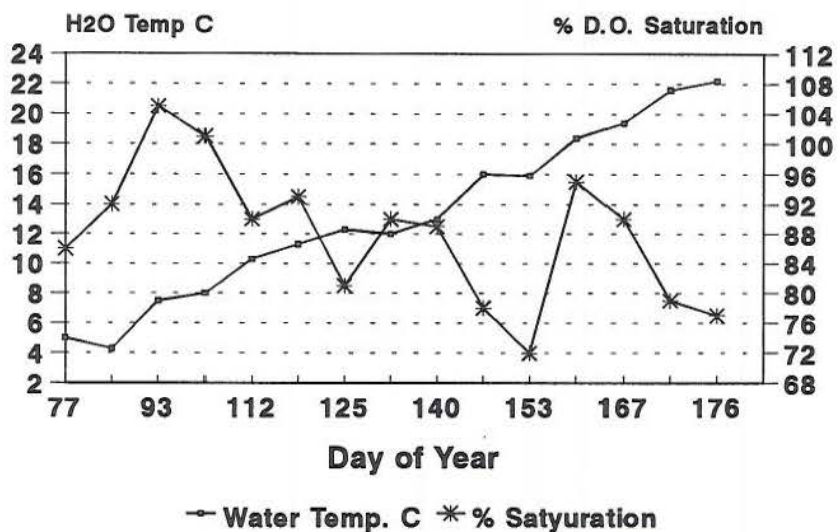
Habitat Parameters Monument River



Bournedale MA.
Spring 1997

A.

Habitat Parameters Monument River

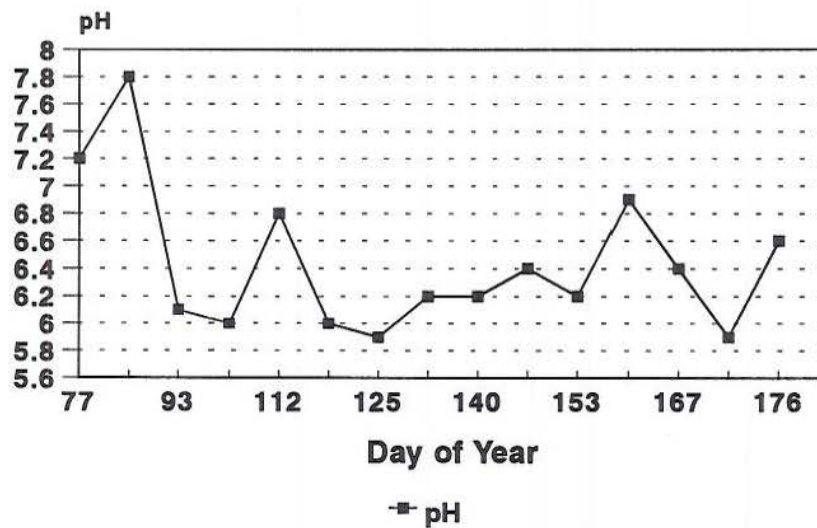


Bournedale MA.
Spring 1997

B.

Figure 13.

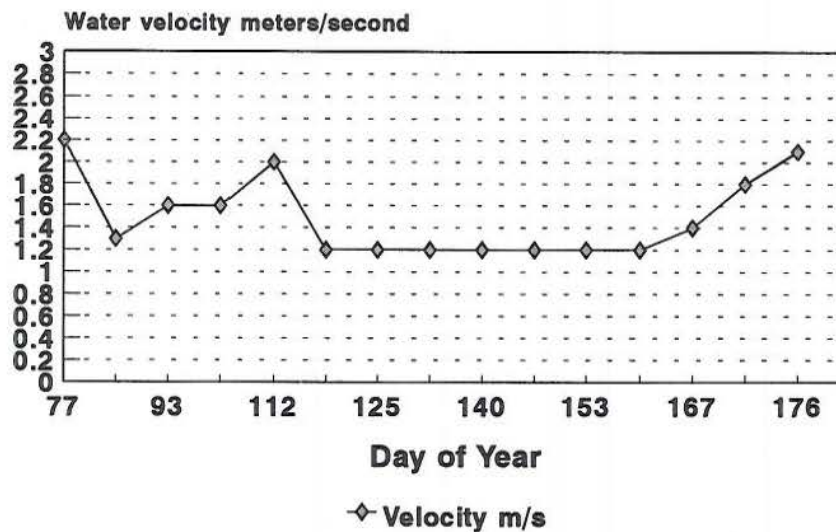
Habitat Parameters Monument River



Bournedale MA.
Spring 1997

C.

Habitat Parameters Monument River



Bournedale MA.
Spring 1997

D.

Figure 13.

Table 5 .

Mill Creek, Sandwich MA Weather and Water Chemistry
Data Spring 1997.

Day of Year	Air Temp. ° C	Water Temp. ° C	pH	D.O. mg/l	% Saturat ion	Weather	Velocity m/s
78	4.7	6.1	6.4	10.8	88	5	0.67
86	9	7.1	7.5	11.2	94	2	0.96
93	10	7.0	7.0	11.6	95	1	1.1
104	9	10.4	6.0	11.8	107	3	1.28
112	10	12.5	7.2	10.2	97	3	1.49
120	19	13.9	6.6	10.2	101	1	1.57
125	10	15.1	7.2	8.0	82	1	1.46
132	13.3	12.0	6.3	10.4	97	4	1.13
140	13	15	7.1	9.6	99	6	1.04
149	16.7	17.7	7.0	7.4	80	2	1.23
153	13	18.4	6.4	5.4	59	5	1.02
160	18	21.2	7.4	9.2	107	1	0.94
167	17.2	22.2	6.2	6.8	80	1	1.69
174	28	24.8	6.4	5.2	65	ND	1.65

Table 6 .
Monument River, Bourne MA. Weather and Water
Chemistry Data Spring of 1997.

Day of Year	Air Temp. °C	Water Temp. °C	pH	D.O. mg/l	% Satur- ation	Weather	Velocity m/s
77	3	5	7.2	11	86	4	2.2
86	9	4.3	7.8	12.4	92	2	1.3
93	10	7.5	6.1	12.8	105	1	1.6
104	12	8	6	12.1	101	2	1.6
112	14	10.3	6.8	10.2	90	3	2.0
120	16	11.3	6	10.2	93	1	1.2
125	12	12.3	5.9	8.8	81	2	1.2
132	15	12	6.2	9.8	90	3	1.2
140	13	13	6.2	9.4	89	6	1.2
149	18	16	6.4	7.8	78	2	1.2
153	13	15.9	6.2	7.2	72	5	1.2
160	17	18.4	6.9	9.0	95	1	1.2
167	20	19.4	6.4	8.2	90	1	1.4
174	28	21.6	5.9	7.0	79	ND	1.8
176	26	22.2	6.6	6.8	77	ND	2.1

III. Alosid Propagation:

Since 1935 the Division of Marine Fisheries has conducted a program of river herring propagation and fishway construction and maintenance. Presently the Division exercises responsibility for approximately 100 anadromous fish runs with more than 200 passage facilities. Each spring the propagation team collects gravid adults from robust runs and transports them into systems where local authorities have requested deposition and/or the Division has performed repair or reconstruction of an existing fishway. Fish are stocked into a system for a minimum of three years. The number of fish transplanted each year is dependent on the availability of stock in donor runs and the number requested. A target of two stockings of up to 2,500 fish each are scheduled for approved receiving systems. Truck load densities are adjusted up or down depending on air and water temperatures and travel time to the release site. Final stocking densities will vary depending on the number and size of stocking loads received, and the size of the receiving water body.

During the spring of 1997, 59,000 running ripe river herring 48,500 alewife (Alosa pseudoharengus) and 10,500 blueback herring (Alosa aestivalis) were transported from five donor systems. Herring River, Bourne, Agawam River, Wareham, Gibbs Brook, Wareham, Town Brook, Plymouth and the Charles River in Watertown provided gravid adults for fifteen coastal systems in an ongoing effort to augment and/or enhance coastal herring runs of the Commonwealth. The following systems received fish:

ALEWIFE

Aaron River Res. Cohasset	2,500
Billington Sea, Plymouth	10,000
Lovers Lake, Chatham	2,500
Middle Pond, Barnstable	5,500
Oldham Pond, Pembroke	5,500
Red Brook, Pocasset	2,500
Cedar Pond, Orleans	2,000
Upper Shawme, Sandwich	5,500
Segreganset River, Dighton	2,500
Halfway Pond, Wareham/Plymouth	5,000
Flax Pond, Falmouth	5,000

Total 48,500

BLUEBACK HERRING

Charles River, Boston	3,000
Ipswich River, Ipswich	2,500
Neponset River, Canton	2,500
Three Mile River, Dighton	2,500

Total 10,500

STOCKING DENSITIES

Alewife

Location	#stocked	Surface area	Stock Density
		Hectares	Per/ha.
Aaron River Res. Cohasset	2,500	62.7	39.9
Billington Sea, Plymouth	10,000	101.2	98.8
Lovers Lake, Chatham	2,500	22.7	110.1
Middle Pond, Barnstable	5,500	41.3	133.2
Oldham Pond, Pembroke	5,500	97.1	56.6
Red Brook, Pocasset	2,500	6.9	362.3
Cedar Pond, Orleans	2,000	6.7	298.5
Upper Shawme, Sandwich	5,500	8.1	679.0
Flax Pond, Falmouth	5,000	8.6	581.4
Halfway Pd. Wareham/Ply.	<u>5,000</u>	<u>82.0</u>	<u>61.0</u>

46,000

Total 437.3* Avg. 105.2/ha

* Represents pond surface area, surface area of main stem rivers and waterways not included.

Job No. 2 Technical Assistance

Throughout the year and each Spring and Fall in particular, numerous contacts and questions are received by this project concerning the diadromous species of the Commonwealth. Information on species biology, fish behavior and temporal occurrences as well as general health and viewing status of the 100 plus active anadromous fish runs within Massachusetts is requested via phone, letter and personal contact. Acting as liaison between the Division of Marine Fisheries and private citizens, local cities and town, consulting firms, counties, state and federal agencies and their representatives. These requests are addressed in as timely and informative a manner as possible. Information is disseminated with the objective of addressing specific impacts or requirements, enhancing group understanding, heightening general subject awareness and fostering a deeper appreciation of these valuable and historic living resources.

During this segment a total of two hundred and thirty-nine inquiries were received and responded to. Fifty-four came from private citizens, ninety-one from State and or County government, forty from cities and towns of the Commonwealth, eighteen from Federal agencies, seventeen from Universities, eight from private consulting firms and eleven from the news media.

Requests varied from evaluation of fish passage problems, fishway maintenance, water regulation, fish biology and behavior, as well as suggestions and input for town discussions of fish

harvests, harvest rules and management regulations.

Responses required everything from concise phone consultations to on-site evaluations and assessments over several days.

Appendix B.

APPENDIX A.

Weather Index

1. Sunny 0% clouds
2. Partly cloudy $\leq 25\%$
3. $\geq 50\%$ Clouds
4. $\geq 75\%$ Clouds
5. Overcast 100% cloud cover
6. Rain Light/Drizzle
7. Rain Moderate/Heavy
8. Sleet/Snow
9. Other (Gale/Hurricane/Hale storm etc.)

APPENDIX B.

Technical Assistance

Throughout the year the anadromous fish investigations project provides timely technical and educational information in matters pertaining to the development and management of the anadromous resources within the Commonwealth of Massachusetts. Practical knowledge and assistance is offered to private citizens, environmental consultants, local, county, state and federal agencies and officials upon written or verbal requests.

Responses:

9/4/96	Town of Dennis, MA. Conservation Commission information on rebuilding Town River herring runs.
9/9/96	National Marine Fisheries Service technical assistance on Commonwealth herring runs.
9/9/96	Commonwealth Department of Environmental Protection. DEP Watershed plans, wetlands restoration and waterway banking program.

9/10/96 Technical assistance Commonwealth Sportfish
Program information on anadromous fish runs of the
Taunton River system.

9/11/96 National Marine Fisheries Service and U.S. Army
Corp of Engineers, Muddy River restoration
project.

9/12/96 Request for information on Neponset River by EOEa.

9/13/96 Commonwealth EOEa comments on the preparation of
watershed - based wetland restoration plans.

9/18/96 Massachusetts Department of Environmental
Protection Mashpee, MA questions on alosid runs
and water levels of Mashpee-Wakeby Pond.

9/18/96 Commonwealth Electric information on Charles River
alosis runs and river velocities.

9/18/96 Department of Environmental Protection Habitat
improvement and compensation programs for
industrial fish kills.

9/18/96 State of New Jersey request for information on
North River system and Coho salmon fishery.

9/18/96 Division of Marine Fisheries technical assistance.

9/19/96 City of Boston, Muddy River restoration proposal.

9/19/96 Atlantic States Marine Fisheries Commission
American Shad and River herring information.

9/19/96 Consultant request for information on the Tunk
River - Oyster Pond system Falmouth MA.

9/20/96 Riverways Program anadromous fish videos for
presentation at EOEa State House Day.

9/23/96 Request for information by local citizen on the
Nemasket river herring run Middleboro MA.

9/25/96 Riverways program Canton Interbasin transfer Well
#9 Neponset River MEPA EIR-EOEA.

9/25/96 City of Somerville. Video and pamphlets on river
herring in the Commonwealth of Massachusetts.

9/26/96 Technical assistance Anadromous species American
shad, Rainbow smelt and River herring video
compilation and shipment.

9/30/96 Massachusetts Sportfish Program field equipment and supplies.

9/30/96 Middleboro alosid group educational materials supplied for Alosid species and the Nemasket river herring run.

10/1/96 Alosid information needed by DEP for Menemsha Pond/Basin/Creek Martha's Vineyard.

10/1/96 Neponset River, Canton Well #9 program fowl meadow impacts.

10/2/96 Neponset River, Stewardship Council ACEC outreach coordinator Anadromous fish pamphlets sent out.

10/2/96 Information on Gay Head herring run, Martha's Vineyard pond water levels.

10/7/96 Input to DEM on Brockton SDEIR proposed Taunton River water diversion.

10/7/96 Information request anadromous fish run inventory for the Taunton River Basin.

10/8/96 Information habitat in Ipswich River for Trout Unlimited. Update on status of DAM's fishway construction project at the Sylvania dam.

10/10/96 Information on pressure treated lumber CCA lechate and marine and fishway construction.

10/12/96 Information on electronic fish counting systems remote power and tunnel configurations.

10/15/96 Resource Protection DEM Taunton River Diversion.

10/18/96 Direction for possible environmental project to be performed by Tufts University interns in the Mystic River.

10/21/96 Information supplied to the Town of Bourne on historic estimates of its Bournedale herring run.

10/21/96 Information request for dredge project impacts on anadromous alosids Charles River Inner Harbor Earth Tech.

10/21/96 Herring run and rainbow smelt in Gulf River - Mills Creek, Cohasset.

- 10/24/96 Save the Bay Program, meeting for discussion on Herring runs in Mount Hope Bay.
- 10/28/96 Department of Environmental Protection Taunton River water diversion project intake structure.
- 11/5/96 Inquiry for resource values for cost benefit analysis coastal dredge impacts. Sandwich.
- 11/6/96 Commonwealth Sport fisheries Program water quality sampling equipment.
- 11/6/96 Pilgrim Nuclear Power Plant studies discussion on resource values.
- 11/7/96 Mass Bays Project Metropolitan Area Planning Council Fresh River rainbow smelt.
- 11/7/96 Information on NPDS permits and water quality standards in relation to regional stream flow policy.
- 11/7/96 Middleboro River herring committee member meeting and discussion of count data for the Las springs spawning run.

- 11/14/96 Fore River Watershed Association river cleanup activities and grant applications.
- 11/19/96 Information on resource restitution lost costs and habitat values for Plymouth area runs.
- 11/19/96 Request for picture slide documentation of river herring in fishways for the Riverways Program.
- 11/21/96 Neponset River Watershed Group request for copies of the Neponset River report.
- 11/25/96 Mass Water Resource Authority Blueback herring chlorine sensitivity levels.
- 11/26/96 Rhode Island Save the Bay Mount Hope Bay,. Taunton River Basin Herring Runs consultations.
- 11/26/96 Proposed Desalinization Plant in Taunton River Basin MEPA response.
- 12/2/96 Inquiries into anadromous resources high of penetration into Charles River system. Stony Brook Reservoir.

12/2/96 Town of Middleboro inquiry into construction questions of the Weir Street fishway and date of completion.

12/4/96 Mass Division of Fisheries and Wildlife discussions of new DEP Code of Mass Regulations on renovation and reclamation of abandoned cranberry bogs.

12/5/96 Mass Sport fisheries program inquiry into water chemistry parameters Jones River Kingston.

12/10/96 Instream flow studies in numerous river herring runs in Southeastern Mass.

12/11/96 City of Boston Conservation Agent requested material on the Anadromous species of the Charles River.

12/12/96 New Hampshire Fish & Game American Shad stocking questions and interest in blueback herring introductions.

12/27/96 Program input into recodification of Massachusetts 322 CMR for Anadromous species.

12/30/96 Town of Weymouth assistant herring agent 1996 run results and discussion of action at the upcoming ASMFC shad and River herring meetings.

1/2/97 Information on anadromous species and run times in the Charles River.

1/7/97 Discussion of EIR response by NMFS on bridge construction and demolition in the Charles River Boston.

1/7/97 Buzzards Bay Project restoration of river herring populations in the Mattapoisett and Weweantic Rivers.

1/7/97 Rhode Island Save the Bay information on Taunton River system Assonet Bay Area fish species present.

1/8/97 G.E.O. Insight inquiry on water withdrawal and water quality information Turners Pond Dartmouth, MA.

1/8/97 Information request on three ponds in Sandwich, MA Massachusetts DEP.

1/8/97 Rhode Island Save the Bay questions on anadromous species Palmer River Swansea.

1/8/97 Private inquiring Wellfleet Herring River-Gull Pond.

1/9/97 Key Associates information request on Atlantic Sturgeon in the Taunton River and Mill River.

1/13/97 National Marine Fisheries Service American shad and River herring information for Commonwealth management approaches.

1/13/97 National Marine Fisheries Service, Massachusetts, American shad landings for ASMFC shad stock assessment.

1/14/97 Commonwealth GIS program Charles River American shad spawning area habitat.

1/15/97 Wareham Herring warden permit fees and catch policies.

1/15/97 Inquiry of anadromous species of Edgertown Great Pond from friends of the fishes of Edgertown Great Pond.

1/24/97 Massachusetts position on American shad and river herring ASMFC board assessments and evaluations.

1/27/97 EPA anadromous resources Agawan River relationship with Wareham wastewater treatment plant.

1/31/97 Tufts University Mystic River - Alewife Brook herring runs biological information.

2/6/97 Tufts University-Mystic River, River, river herring run reference dates.

2/7/97 Fish and Wildlife review and comments ENF Colonial cranberry bog proposal.

2/7/97 DEP dredging permit window for Braintree Yacht club, work window modification.

2/11/97 NMFS fish passage at the Charles River dam.
Incoming evening tides, smelt locking protocol.

2/14/97 Boston office Charles River ENF Central Artery Bridge construction work.

2/14/97 Alewife Anonymous Inc. Stocking of alosids into Leonard's Pond.

2/20/97 VHB Inc. Taunton River, ENF FERC information inventory pipeline construction and river crossing.

2/20/97 Request for information on Anadromous fisheries program videos availability.

2/20/97 Information on Commonwealth state Sportfish records.

2/24/97 Tufts University optimal spawning habitat requirements and standard water quality parameters for anadromous species.

2/25/97 Weymouth Back River information on fishway types, locations and possible passage barriers.

2/25/97 Saltwater Sportfish licenses information.

2/25/97 Sportfishing regulations and abstracts for bait and tackle shop.

2/25/97 Sportfishing information Saltwater derby prints.

2/27/97 Review of Army Corps of Engineers permit for Wading River area, Town of Mansfield, MA.

3/4/97 Private consultant - Charles River work window periods for in river bridge construction.

3/4/97 Buzzards Bay Project Marion submerged aquatic vegetation (SAV) Eelgrass.

3/4/97 Acushnet River crossing work windows for anadromus fish runs.

3/5/97 Back River Weymouth Ma., run and fishway maintenance. Rainbow smelt spawning commencement dates.

3/10/97 Nemasket River water level regulation for fish passage at the Weir street ladder.

3/12/97 Sportfisheries species information striped bass and river herring educational pamphlets.

3/12/97 Sportfish program educational materials.

3/12/97 Pilgrim power plant equipment Jones River Smelt run.

3/12/97 Massachusetts Institute of Technology Directory of Marine Monitoring Program in Massachusetts.

3/18/97 Literature review river herring studies of Parker River Massachusetts.

3/20/97 Inquiry for Sportfish licensing question and follow up.

3/20/97 River Herring run question "Cape Cod Times" newspaper.

3/24/97 Sportfish program request color slides of Anadromous fish and fishways for group presentation.

3/24/97 River herring questions and discussion of the Mattapoissit River fish run. AAI

3/25/97 Sportfish program river herring video program presentation for MSOA.

3/27/97 Riverways program Fore River anadromous fish runs.

3/27/97 Questions on River herring runs in the Commonwealth Taunton River brick yard. Weir section of Taunton.

3/27/97 Anadromous resources of Second Herring Brook area Conservation lands purchase and land accusation.

3/27/97 Cape Cod Times herring runs on Cape Cod, Stoney Brook Brewster.

3/27/97 Life history information on alewife and blueback herring. Pamphlets sent.

3/27/97 Herring article publication for natural resources of the Cape Cod Region

3/27/97 Cape Cod Times life history information on Alewife and Blueback herring. American shad and Rainbow smelt.

3/27/97 Cape Codder Magazine - Herring Runs of Cape Cod Spring activities.

3/27/97 River herring question on run viewing ,catching and preparation for consumption.

3/28/97 River herring samples for Harvard University Medical School and Boston Childrens Hospital.

3/31/97 Barnstable publication on river herring population and runs of Cape Cod.

3/31/97 Middleboro Nemesket River, river herring runs tabulation and counter monitoring.

- 3/31/97 Boston Childrens Hospital river herring species information differentials analysis for Alewife and blueback herring Electrophoreses.
- 4/2/97 Questions and concerns of fish counter operation at Wareham Street Nemasket River Middleboro. Equipment removal.
- 4/2/97 Town of Marion information on dam and ladder works on the Mattapoissett River.
- 4/2/97 Harvard University Medical School request for biological fish samples for bone research study.
- 4/2/97 Inquiry on fish passage at new ladder in Middleboro, MA. Population passage estimates at counting station.
- 4/3/97 State of Connecticut task force for Habitat Suitability data and stream flow information in New England region.
- 4/7/97 Alewife Anonymous Inc. Reports and discussion of adjustments at Mattapoissett Dam fishway during spring herring run.

4/8/97 Nemesket River Alewife Group fish passage at Middleboro ladder inquiring of fish supply to assist Town of Pembroke, MA

4/8/97 Private citizen called to discuss herring runs at the Three Mile River and Segregansett river in Dighton, MA.

4/8/97 Inquiring in herring population estimates technology and methodology.

4/9/97 Town of Ipswich rain gages and precipitation data.

4/8/97 Middleboro Town Manager information on complaint on Middleboro fishway permitting process..

4/9/97 Town of Weymouth herring agent information and discussion of Back river spring herring run. Report of rainbow smelt bill.

4/9/97 Request for educational materials for Marine science and fisheries biology. Connecticut school system.

4/10/97 Graduate studies work on the Fore River Weymouth, MA

4/11/97 Bourne Department of Natural Resources water flow conditions at town catching pool, Monument River.

4/14/97 Seasonal intern interviews with Pilgrim Power Plant Program and Massachusetts Sport Fisheries Program.

4/15/97 Harvard University Medical School and Childrens Hospital biological samples and question on electrophoresis work of alosid species.

4/16/97 Discussions of Mill Creek system with Sandwich town engineer.

4/16/97 Report of fish kill event on Back River Weymouth by Sportfish area biologist.

4/16/97 U.S. Fish and Wildlife Service public affairs request for anadromous species information within the Commonwealth.

4/17/97 Water level adjustments Bournedale Monument River. Control board adjustments.

4/17/97 Inquiry on fish counter technology and methods for river herring population estimations.

4/17/97 Commonwealth Department of Environmental Management (DEM) Concord River information request.

4/18/97 Weymouth Back River herring run informational request on recreational bait and possible impact of menhaden seine boats.

4/22/97 Assistant Director of Research informational request for Gloucester office.

4/23/97 Private citizen requested information on River herring pamphlets, herring bait availability.

4/23/97 Citizen concerns of Johns Pond Mashpee river herring run access blockage. Herring in at gate passage restriction.

4/23/97 Informational request on herring runs within the Commonwealth.

4/23/97 Information on Acushnet River fishway restoration proposal for DMF Assistant Director of Research.

4/24/97 Town of Weymouth report on Back River progression. Population size estimation and passage.

4/24/97 Request by citizen for Sportfish information species pamphlets and state herring harvest regulations.

4/28/97 Request from Department of Environmental Protection Agency.

4/29/97 Boston Childrens Hospital and Harvard Medical School collection of biological samples for bone research.

4/29/97 Request for live herring samples for experimentation at the Silvio ACANTHA Anadromous fish Research Center.

4/30/97 Town of Weymouth Herring agent Condition and activities in the Weymouth Back River herring run.

5/1/97 Private citizen request information on river herring aquaculture.

5/1/97 Division Resource Assessment Program marking materials for tag construction.

5/1/97 Weymouth Town herring officer Back River herring run.

5/5/97 Informational request State Department of
Environmental Protection contact persons Town
River Quincy.

5/6/97 Run progression Weymouth Back River, Herring and
Rainbow smelt run status.

5/6/97 Harvard Medical School request for blueback
herring biological samples.

5/13/97 Bourne Department of Natural Resources Monument
River population information.

5/13/97 Harvard Medical School arrangements for transport
of frozen fish samples.

5/13/97 Inquiry on condition of herring runs in Cape Cod
areas by the reporter from the Bourne AEnterprise
News@.

5/13/97 Town herring warden discussions of herring run
pulses through Back River fishways.

5/14/97 Harvard Medical School and Boston Children's
Hospital bone research program sample collections.

5/14/97 Bourne Enterprise Newspaper update on conditions and occurrence of spawning runs in Cape Cod streams.

5/14/97 Private citizen request on the Mashpee River herring run species present date that ladder was first built.

5/14/97 Local resident inquiry on status of herring in Great Herring Pond Bourne/Plymouth. Concern over numbers of fish sighted this spring.

5/14/97 Middleboro herring agent request for information on stocking schedule and donor streams.

5/15/97 Weymouth herring agent report on run condition Back River Whitmans Pond Weymouth, MA.

5/15/97 Bourne Department of Natural Resources information on 1997 Monument River Run for presentation to Town Board of Selectmen.

5/21/97 EOEa information request Neponset River American shad restoration assessment survey and species pamphlets.

5/21/97 Town of Weymouth herring agent spring run conditions and status.

5/21/97 News Radio WJDA request for information on Weymouths Back River, Whitmans Pond Herring runs.

5/22/97 Centerville resident request for information on Johns Pond and Quashnet River Herring.

5/23/97 Centerville resident discussion of John's Pond river herring Childs and Quashnet River.

5/27/97 Middleboro herring agent information request on fish tagging programs and patchiness of blueback herring in Wareham Street ladder.

5/27/97 Inquiry into seasonal intern position on Anadromous fisheries Program Pocasset Office.

5/27/97 Charles River Watershed Association inquiry into timing of American shad Rainbow smelt and Blueback herring spawning runs.

5/28/97 Sport fisheries program Island area biologists seasonal personal discussions.

5/28/97 Charles River Watershed Association River herring literature and Anadromous fish video request.

5/30/97 Interview with news reporter for the Dedham Daily transcript. Herring runs in the Charles River.

6/2/97 Harvard Medical School, Boston Children's Hospital Alewife and blueback herring samples for bone research.

6/3/97 Boston office Assistant Director seasonal intern Division policy.

6/3/97 Request for information of Alosid Biology and discharge flow data from the Charles River USGS gage stations.

6/5/97 River ways program information request - herring harvest units bushels/barrels. Silver Lake - Brockton water supply.

6/5/97 Consultant request for information on withdrawal from the Taunton River Desalination proposal.

6/9/97 Request for shipment of fish for stocking purposes in Three Mile River Dighton.

6/9/97 Department of Environmental Protection Office of Water Management information request anadromous resource of the Jones River watershed.

6/10/97 TAB Community Newspaper Charles River herring runs and biological information.

6/10/97 Charles River Watershed Association timing and duration of the 1997 Spring spawning run.

6/10/97 FWELE Riverways Program inquiry on stocking schedules for collection and transport of Charles River herring.

6/11/97 Request for meeting NOAA strategic Environmental Assessments Division Rockville, Maryland.

6/12/97 U.S. Army Corp of Engineers Cape Cod Canal, Buzzards Bay area inquiry on Limulus biology and horseshoe crab management.

6/12/97 Request for jurisdictional information on coastal herring runs.

6/12/97 Marion herring warden discussions regarding 1997 Mattapoissett River herring run.

- 6/12/97 Rochester, Marion Alewives Anonymous, Inc.
Snipatuit River, Mary's Pond and bottom fishing in
Sippican Harbor.
- 6/13/97 Discussion of transplanted alewife into Three Mile
River at Harodite Company property.
- 6/16/97 Phone interview river herring in the Charles
River, Watertown TAB-press.
- 6/18/97 Citizen inquiry on new fishway Nemesket River
Middleboro and Regulation Information on ACOE.
- 6/20/97 Army Corps of Engineers Park Ranger Sportfish
program data on horseshoe crabs and Cape Cod
Canal/Buzzards Bay.
- 6/23/97 Background information request from DMF Assistant
Director fishway Nemasket River Middleboro.
- 6/23/97 Bourne Natural Resource Office Bournedale Monument
River Run screen equipment for bypass channel.
- 6/23/97 Inquiry in dock and pier information private
consultant Boston Charles River.

6/23/97 Discussion fishway restoration program Acushnet River, New Bedford/Acushnet, Mass.

6/23/97 Citizen report and discussion Harodite Company fishway construction Three Mile River North, Dighton, MA.

6/24/97 MCZM Technical advisor Hull tide gate Straits Pond project.

6/30/97 Hull Conservation Agent technical information

6/30/97 BSC group Boston. Anadromous species information four coastal systems.

7/1/97 Informational request on Cape Cod Pond pH levels during seasonal anadromous fish runs U-Mass, Amherst.

7/1/97 Commissioners office background information on the Ten Mile River for input into the Ten Mile River Basin Team.

7/7/97 Town of Acushnet Conservation Commission agent, Acushnet River sediment contamination levels.

7/7/97 Identification Keys for Clupeids of New England forwarded to Island Sportfish regional biologist.

7/7/97 National Oceanic and Atmospheric Administration listing of endangered and threatened species current for Massachusetts.

7/8/97 Marston Mills herring run concern of development adjacent to local herring run request response to Riverways Program FWELE.

7/8/97 Letter of concern regarding development adjacent to Marstons Mills River herring run. Application of Rivers Protections Act applicability.

7/8/97 Coastal Zone Management information on emerging screening technology for surface water withdrawals.

7/8/97 U.S. Fish & Wildlife Service location information on submerged culvert impacts on local APurple Cow@ herring run.

7/9/97 Information on North Shore river herring runs.

7/14/97 Request for information on preliminary flow measurements regarding Drexal Brook by private citizen.

7/14/97 Habitat and fauna information regarding night crown herring in area of Charles River by Boston Globe correspondent.

7/23/97 Assistant Director of Research informational request on maps - memos and fishway information for the Acushnet River System.

7/24/97 Boston office discussions of Neponset River Canton Well Inter Basin Transfer copy of transfer application.

7/29/97 Weymouth Back River herring run population estimates town herring officer.

7/29/97 Riverways Program inquiry on procedure for observing river herring in the Parker River.

7/29/97 Town of Acushnet Conservation agent fisheries pamphlets and River Herring Video.

8/2/97 Request for information on spawning habitat above the Bakers Dam on the Neponset River Request from Sport fisheries program for DEP Wetlands Restoration and Banking program.

8/5/97 U.S. Fish & Wildlife Service information on the Acushnet River fishways construction program.

8/12/97 Discussion of Cantons Interbasin application for the Neponset River Basin as to its completeness.

8/12/97 Boston DMF Assistant Director of Research requested input on Acushnet River fish passage restoration program.

8/14/97 Clarification on construction parameters on the Hanlon Street road and bridgework. Commonwealth foot print program and fish passage construction at the dam site.

8/14/97 Town of Acushnet Conservation agent clarification State Highway Department Footprint program funding issues for Hanlon Street reconstruction work.

8/21/97 Rhode Island, Save the Bay Program information request on Cape Cod Bay herring runs.

- 8/26/97 Information on Atlantic sturgeon in the Taunton River Watershed to National Marine Fisheries Service.
- 8/26/97 State DEP discussion of endangered species and salt wedge location in Taunton River Watershed
- 8/27/97 Species sampling in Weir Village section of Taunton River Species occurrence listings.
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- 8/28/97 Riverways Program Cape Cod technical meeting.
- 8/29/97 Inquiry into five hundred year flood flows and discharge in the Acushnet River for fishway construction designs at New Bedford Reservoir.