VERMONT YANKEE/CONNECTICUT RIVER SYSTEM
ANALYTICAL BULLETIN 78

Abundance of Juvenile American Shad
In the Vernon Pool During 2001

Prepared for

VERMONT YANKEE

Prepared by

NORMANDEAU ASSOCIATES, INC.
25 Nashua Road
Bedford, NH 03110

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ABSTRACT

A second year of sampling was conducted to estimate an index of abundance of juvenile American shad and other fish taxa found in Vernon Pool of the Connecticut River (between Vernon and Brattleboro, VT) during July through October 2001. The program began during 2000 and was continued during 2001 using the same sampling design, gear and deployment techniques. A 30.5 m (100 ft.) beach seine was deployed to sample the shore zone during the day, and a 1.8 m x 1.2 m (6 ft. x 4 ft.) midwater trawl was used to sample pelagic surface waters at night. Twenty randomly selected beaches were sampled with the seine and twelve randomly selected midwater trawl tows were taken during each of eight surveys scheduled on alternating weeks in 2001. The catch of fish in each sample was identified to species, enumerated, and measured. The beach seine survey caught an annual total of 5,691 fish in Vernon Pool during 2001, and the catch was comprised of 20 fish taxa. Bluegill (2,110 fish) and yellow perch (1,668 fish) were the most abundant fish species caught by seines, collectively comprising 66% of the total seine catch in 2001. Juvenile American shad ranked eleventh in abundance (62 fish) among the fish species caught by seines during 2001. The weekly mean catch per unit of effort for juvenile American shad caught by seines was generally low throughout the 2001 survey, and ranged from 0.00 fish/haul among all sampling regions of Vernon Pool during July, August and 17-21 September, to a high of 2.60 fish/haul during the week of 1-5 October 2001. The mean length of American shad caught in the beach seine increased as the fish grew from 106 mm during the fifth week of the program to 118 mm during the last week of the program. No American shad were caught by the midwater trawl among the total of 10 fish representing four fish taxa observed in the pelagic surface waters of Vernon Pool during 2001. Spottail shiner were the most abundant fish species caught, contributing 70% (7 fish) of the total midwater trawl catch. When the weekly mean catch/seine haul of American shad was weighted by the area of beach habitat in each region and summed across regions, the resulting combined standing crop index of juvenile American shad abundance in Vernon Pool averaged 2,433 fish among all eight surveys conducted in 2001. This index was highly variable among weeks and regions, from a low of 0 fish to a high of 17,494 juvenile American shad. The juvenile American shad standing crop index of 31,244 fish for 2000 was nearly 13 times higher than the 2001 index of 2,433.

INTRODUCTION

One of the stated objectives by the Shad Studies Subcommittee of the Connecticut River Atlantic Salmon Commission in " A Management Plan for American Shad in the Connecticut River Basin" (prepared February 1992) is that population monitoring is required to support the achievement of the management goal of sustaining 1.5 to 2 million shad in the Connecticut River system. Vermont Yankee has participated in the long-term population monitoring in previous years (e.g., Vermont Yankee Analytical Bulletin Nos. 40, 42, and 71), and in 1997 agreed to evaluate beach seining and electrofishing at locations that could be used to develop a juvenile shad index of relative abundance (Normandeau 1998, Bulletin No. 71). Sampling via electrofishing and beach seine continued in 1998 and 1999 (Normandeau 1999, Bulletin No. 73; Normandeau 2000, Bulletin No. 75).

The juvenile shad program conducted during 2000 was significantly modified and expanded from the 1999 and previous programs (Normandeau 2001, Bulletin No. 76). Based on three consecutive years of effort with little success (1997, 1998, and 1999), electrofishing for young-of-the-year (YOY or juvenile) shad was judged ineffective and was not conducted above the Vernon Dam in 2000.

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Furthermore, beach seine sampling in the West River near Brattleboro, VT (Retreat Meadows) was not conducted in 2000 because efforts in 1998 and 1999 failed to capture any YOY shad (Normandeau 2000, Bulletin No. 75). Cost savings from these changes and from terminating monthly fish sampling with trap nets in the Connecticut River to provide protection for bald eagles nesting in our sampling area allowed for an expansion of fishing effort for YOY shad in the 2000 study. The sampling design conducted during July through October 2000 replaced approximately 7 beach seine samples and electrofishing samples collected twice per month with a standard design of 20 beach seine samples and 12 midwater trawl samples collected twice per month.

The sampling design first implemented in 2000 obtained sufficient data to calculate a juvenile shad index of relative abundance in Vernon Pool (Normandeau 2001, Bulletin No. 76). The abundance index was defined in terms of the mean catch per unit of effort (CPUE) and standing crop of juvenile shad (Marcy 1976; Crecco et al. 1981) collected in bimonthly samples at a set of sampling stations during a defined time period (July through October). Marcy's (1976) estimation for juvenile shad year class strength in the lower Connecticut River (Essex, CT [rkm 11.3] to Northampton, MA [rkm 138]) was based on bag seine CPUE and trawl CPUE at 12 sampling stations.

The goal of the 2001 program was to repeat the 2000 program and begin to develop a time series of juvenile American shad relative abundance indices to measure interannual variations in year class strength in Vernon Pool.

MATERIALS AND METHODS

Study Area

The proposed study area referred to as "Vernon Pool" was defined as the mainstem Connecticut River extending from the Vernon Hydroelectric Dam in Vernon, VT upstream to the confluence of the West River in Brattleboro, VT (Figure 1). The study area included the "Cersosimo Lake" backwater area of the Connecticut River but not the Retreat Meadows area of the West River or other West River habitat. Vernon Pool was partitioned into the following four regions based on a habitat survey of the shoreline and bathymetry conducted during the 2000 survey (Normandeau 2001, Bulletin No. 76): Vernon, Cersosimo, Brattleboro, and Cersosimo Lake (Figure 2). Each of the four regions was partitioned into a shore zone and a pelagic surface water zone. The shore zone represented beach areas along each bank of the river extending from the shoreline (depth = 0 ft, 0 m) out to a depth of 10 ft (3 m). The pelagic surface water zone represented the layer of water 0-10 ft (0-3 m) deep in the center of each river region bounded on either side by the outer edge of the shore zone (10 ft contour). A third zone, the pelagic bottom zone, represented water in the center of each region at depths greater than 10 ft (3 m). The pelagic bottom zone was not sampled in this study. Surface area or volume of each region and zone were calculated for use to "weight" the abundance index of YOY shad (Table 1). By using these weighting factors, a "combined standing crop" index based on the proportion of the habitat sampled by each gear, the total amount of that habitat in the study area, and the catch of YOY shad in each habitat and week could be calculated for each week.

A total of 131 beaches were identified as sampling sites in Vernon Pool during the 2000 survey, with 46 beaches in the Vernon Region, 25 beaches in the Cersosimo Region, 55 beaches in the Brattleboro Region, and 5 beaches in the Cersosimo Lake backwater (Figure 2, Table 2). A total of 45 midwater trawl tows were identified as sampling sites in Vernon Pool during the 2000 survey, with 20 transects

in the Vernon Region, 13 transects in the Cersosimo Region, and 12 transects in the Brattleboro Region (Figure 2, Table 3). No midwater trawl transects were identified in Cersosimo Lake.

Sampling Design

Beach seine sampling and midwater trawling in the Vernon Pool study area were conducted during July through October 2001 to determine the abundance and catch per unit of effort of YOY American shad and other fish species. We conducted one survey with each gear during the same week, and sampling continued every other week beginning Monday, 9 July 2001 through Friday, 19 October 2001, for a total of eight surveys. The actual number and allocation of 20 seine hauls and 12 midwater trawl tows for each survey was determined based on a proportional allocation scheme (in direct proportion to the amount of habitat in each stratum, Cochran, 1977). Each beach or trawl tow was randomly selected for sampling in each survey (without replacement) from among all available sampling locations in each stratum. For example, in the Brattleboro Region of the Connecticut River, we identified 55 beaches that were potentially available for beach seine sampling based on the shoreline, slope, substrate and absence of large obstructions, and then randomly selected three of these beaches for sampling in each survey. Two alternate sites were also randomly selected for sampling with each gear in each week and region in case it was not possible to sample the primary site due to obstructions or extensive weed beds. Beaches that were identified during the 2000 survey and found to be consistently obstructed or inaccessible during 2001 were eliminated from subsequent sampling. Complete inventories of the station names and GPS coordinates of all beaches and trawl tow transects that were available for sampling during 2001 are presented in this bulletin as Table 2 (beaches) and Table 3 (trawls).

Beach Seine Survey

The beach seining conducted in Vernon Pool since 1997 established the effectiveness of this gear for capturing YOY American shad, and the same sampling design conducted during 2000 was repeated during 2001. For each beach seine survey, 20 beaches were randomly selected from all available beaches and sampled during the day (one hour after sunrise to one hour before sunset) with a 100 ft x 8 ft x 3/8 in. delta mesh beach seine (30.5 m long) using standardized deployment practices. Habitat weighting resulted in the random selection and sampling of 3 beaches in the Brattleboro Region, 3 beaches in the Cersosimo Region, 12 beaches in the Vernon Region, and 2 beaches in the Cersosimo Lake Region of Vernon Pool during each survey (Table 1).

The entire catch of fish in each beach seine sample was identified to species, enumerated, and measured to the nearest mm total length (TL). All American shad caught were identified, enumerated, measured to the nearest mm TL, and weighed to the nearest gram. Unusually large catches of American shad or other fish species were randomly subsampled so that at least 50 individuals of each species in the sample were measured for length and weight, and the remaining portion of the sample was counted.

Midwater Trawl Survey

Midwater trawling was conducted during 2001 to sample the YOY shad population inhabiting the pelagic surface water zone in Vernon Pool that was not sampled by beach seining. The midwater trawl, deployment, and sample allocations during 2001 were the same as in 2000. Midwater trawling was accomplished by randomly selecting 10 surface coordinates and sampling at each location at

night (one hour after sunset to one hour before sunrise) with a fixed-frame midwater trawl. Habitat weighting resulted in the random selection and sampling of 3 midwater trawl tows in the Brattleboro Region, 3 tows in the Cersosimo Region, and 6 tows in the Vernon Region (Table 1). Midwater trawl tows were not taken in the Cersosimo Lake Region of Vernon Pool because this region was too small and shallow to deploy this gear there. The midwater trawl specifications were as follows: 1.8 m x 1.2 m fixed frame net (6 ft wide by 4 ft high), 4.6 m long (15 ft), with 7.9 mm (5/16 in) bar mesh netting throughout and a 6.35 mm (1/4 in) bar mesh cod end liner. The gear was towed 200 ft behind the boat from a bridle, with a calibrated flowmeter (General Oceanics Model 2030) fixed in the center of the frame to measure sample volume. A float was mounted at each upper corner of the midwater trawl frame (20 lb. buoyancy), and each lower corner was rigged with a 5-kg cable depressor. The floats kept the net mouth in close proximity to the water surface, and the cable depressors kept the net mouth oriented vertically when towed behind the boat. Each tow was for 10 minutes of duration, against the current, at a speed (through water) of 4.4 fps + 0.2 fps. Only surface tows were taken in Vernon Pool because we found that there was insufficient water at depths below 10 ft to fish the trawl at night while avoiding "hanging down" on the bottom along a tow path that was between one-quarter and one-half of a mile long.

The entire catch of fish in each midwater trawl sample was identified to species, enumerated, and measured to the nearest mm total length (TL). All American shad caught were identified, enumerated, measured to the nearest mm TL, and weighed to the nearest gram. Unusually large catches of American shad or other fish species were randomly sampled so that at least 50 individuals of each species in the sample were measured for length and weight, and the remaining fish were counted.

Analytical Methods

Catch-Per-Unit-Effort and Density Estimates

Estimates of population densities were made for American shad and other species caught in the beach seine and midwater trawl surveys. For these two surveys the number of fish (by species) in individual samples was first converted to density (number/m^2 for fish caught in the beach seine or number/1000 m^3 of water sampled for the midwater trawl) using the equations shown below. Similarly, the mean density and the standard error of the mean were then calculated for the zone sampled in each region and sampling week using the equations shown below. To obtain a mean density and standard error for each region during each sampling week, the densities were weighted by the proportion of the regional river area (seines) or volume (trawls) found in the zone sampled.

Beach Seine CPUE

Catches from the beach seines were reported as number caught per seine haul (catch-per-unit-effort [CPUE]) by life stage and species. The average CPUE for seines in a region and its standard error were calculated using Equations 1 and 2:

$$C_{rw} = \frac{1}{n_{rw}} \sum_{i=1}^{n_{rw}} C_{irw} \qquad (1)$$

C_{rw} = Average seine CPUE in region r during week w.

C_{irw} = CPUE for sample i in region r during week w.

n_{rw} = Number of samples taken in region r during week w.

$$SE(C_{rw}) = \sqrt{\frac{\sum_{i=1}^{n_{rw}}(C_{irw} - C_{rw})^2}{(n_{rw})(n_{rw}-1)}} \quad (2)$$

where

$SE(C_{rw})$ = Standard error of average seine CPUE in region r during week w.

C_{rw} = Average regional CPUE calculated in Equation 1.

Midwater Trawl Density

Catches from the midwater trawl tows were reported as number caught per 1000 m^3 (density) by species (Equation 3).

$$D_{irw} = \frac{C_{irw}}{V_{irw}} * 1000 \quad (3)$$

where

D_{irw} = Density (for a life stage and species)/1000 m^3 for sample i in region r during week w.

C_{irw} = Number of fish caught in sample i in region r during week w.

V_{irw} = Volume sampled (m^3) by sample i in region r during week w.

The average density of fish in a region (Equation 4) and its standard error (Equation 5) were calculated as:

$$D_{rw} = \frac{1}{n_{rw}} \sum_{i=1}^{n_{rw}} D_{irw} \quad (4)$$

where

D_{rw} = Average density in region r during week w.

D_{irw} = Sample density calculated in Equation 3.

n_{rw} = Number of samples taken in region r during week w.

$$SE(D_{rw}) = \sqrt{\frac{\sum_{i=1}^{n_{rw}} (D_{irw} - D_{rw})^2}{(n_{rw})(n_{rw} - 1)}} \quad (5)$$

where

$SE(D_{rw})$ = Standard error of the average density in region r during week w.

D_{irw} = Sample density calculated in Equation 3.

D_{rw} = Average regional density for week w calculated in Equation 4.

Average Weekly CPUE or Density

The regional CPUE or densities (Equation 6) and standard errors (Equation 7) were weighted by the proportion of the regional river area (seines) or volume (trawls) to determine an average weekly CPUE or density:

$$D_w = \sum_{r=1}^{r} (D_{rw})(P_r) \quad (6)$$

where

D_w = Average seine CPUE or trawl density among regions during week w.

D_{rw} = Average seine CPUE or trawl density in region r during week w.

P_r = Proportion of the regional river area (seines) or volume (trawls) found in region r (Table 1).

$$SE(D_w) = \sqrt{\sum_{r=1}^{r} \left[SE(D_{rw})^2 (P_r)^2\right]} \quad (7)$$

where

$SE(D_w)$ = Standard error of average seine or trawl density among regions during week w.

$SE(D_{rw})$ = Standard error of average region density calculated in Equation 5.

Standing Crop Estimates

An index of standing crop representing the total number of fish in the shore zone or pelagic surface water zone was estimated for American shad for each week.

Shore Zone Standing Crop Index

An index of standing crop (and standard error) of juvenile American shad for the beach seines was obtained by multiplying the regional CPUE (Equation 6) and the surface area of the shore zone and dividing by an empirically derived estimate of the area sampled by the 100 ft (30.5-m) beach seine (Equations 8 and 9). The weekly index of standing crop (and standard error) for the shore zone was calculated as the sum of the four regional standing crops (Equations 10 and 11).

$$SC_{rw} = (C_{rw} A_r) / A \quad (8)$$

SC_{rw} = Standing crop index for the shore zone in region r during week w.

C_{rw} = Average CPUE in region r during week w calculated in Equation 1.

A_r = Surface area (m^2) of the shore zone in region r.

A = Surface area (m^2) sampled by the beach seine (450 m^2) (TI 1981).

$$SE(SC_{rw}) = \frac{[SE(C_{rw})](A_r)}{A} \quad (9)$$

where

$SE(SC_{rw})$ = Standard error of standing crop index for the shore zone in region r during week w.

$SE(C_{rw})$ = Standard error of average CPUE in region r during week w calculated in Equation 2.

$$Seine(SC_w) = \sum_{r=1}^{r} SC_{rw} \quad (10)$$

where

$Seine\,SC_w$ = Shore zone standing crop index for week w.

SC_{rw} = Regional standing crop index for beach seines from Equations 8.

$$SE\,Seine(SC_w) = \sqrt{\sum_{r=1}^{r} [SE(SC_{rw})]^2} \quad (11)$$

where

$SE\,Seine(SC_w)$ = Standard error of shore zone standing crop index for week w.

$SE(SC_{rw})$ = Standard error of regional standing crop index for beach seines from Equation 9.

Pelagic Surface Water Zone Standing Crop Index

Weekly standing crop indices of juvenile American shad and the associated standard errors were calculated for each region by taking the product of the average region midwater trawl density or the standard error (Equations 6 and 7) and the volume of water contained in that region (Table 1). The pelagic surface water zone standing crop index and standard error were then estimated from the sum of the region index values (Equations 12 and 13).

$$Trawl\,SC_w = \sum_{r=1}^{r} (V_r / 1000)(D_{rw}) \quad (12)$$

where

$Trawl\,SC_w$ = Pelagic surface water zone standing crop index during week w.

V_r = River volume (m^3) contained in region r.

D_{rw} = Average trawl density in region r during week w calculated in Equation 4.

$$SE\,Trawl(SC_w) = \sum_{r=1}^{r} (V_r / 1000)[SE(D_{rw})] \quad (13)$$

where

$SE\,Trawl(SC_w)$ = Standard error of the pelagic surface water zone standing crop index during week w.

$SE(D_{rw})$ = Standard error of average regional density for the midwater trawl calculated in Equation 5.

Combined Standing Crop Index

A combined standing crop index of juvenile American shad (and standard error) for the entire Vernon Pool was estimated for each week by summing the standing crops for the four seine river regions and three trawl river regions (Equations 14 and 15). Volumes (Table 1) were used to "weight" the two standing crop indices when combining the catch from the shore zone and the pelagic surface zone. Volumes representing portions of the habitat not sampled (e.g. pelagic bottom zone or Cersosimo Lake surface water zone) were not used in the weighting. Weighting in this manner prevented the catch from sampled areas from being extrapolated to unsampled habitat. The combined standing crop

value is considered an index rather than an absolute measure of standing crop because no adjustment was applied for gear collection efficiency.

$$\text{Combined } SC_w = \text{Seine } SC_w + \text{Trawl } SC_w \quad (14)$$

where

$\text{Combined } SC_w$ = Combined standing crop index for all regions during week w.

$\text{Seine } SC_w$ and $\text{Trawl } SC_w$ as defined in Equations 10 and 12.

$$SE\,\text{Combined}(SC_w) = SE\,\text{Seine}(SC_w) + SE\,\text{Trawl}(SC_w) \quad (15)$$

where

$SE\,\text{Combined}(SC)$ = Combined standard error of standing crop index for all regions during week w.

$SE\,\text{Seine}(SC_w)$ and $SE\,\text{Trawl}(SC_w)$ as defined in Equations 11 and 13.

RESULTS

Sampling Effort

A total of 20 beach seine samples and 12 midwater trawl samples were collected in Vernon Pool of the Connecticut River during each of the eight biweekly surveys, resulting in the collection of 160 beach seine samples and 96 midwater trawl samples in the July through October 2001 period.

Catch and Species Composition

Beach Seine Survey

The beach seine survey caught an annual total of 5,691 fish in Vernon Pool, and the catch was comprised of 20 fish taxa (Table 4). At least one fish was caught in each region and week that the beach seine was fished in Vernon Pool. Bluegill (2,110 fish) was the most abundant fish species caught by seines during 2001. Yellow perch (1,668 fish) ranked second in abundance, golden shiner (614 fish) ranked third in abundance, black crappie (196 fish) was fourth, largemouth bass (192 fish) was fifth, white perch (186 fish) was sixth, and pumpkinseed (180 fish) was seventh in abundance in the 2001 beach seine survey (Table 4). These seven species collectively contributed 90% of the total catch by beach seine. Fewer than 100 individuals of each of the remaining 13 fish taxa were caught, and these 13 taxa collectively contributed only 10% of the total beach seine catch during 2001.

Juvenile American shad ranked eleventh in abundance among the fish species caught by seines. A total of 62 juvenile American shad were caught by beach seine during three of the eight surveys; shad were caught during the weeks of 3-7 September (1 fish), 1-5 October (52 fish), and 15-19 October 2001 (9 fish, Table 4). American shad were most abundant in the Vernon Region of the Connecticut River, and the catch during the week of 1-5 October 2001 contributed most of the shad (51 fish) to the total catch of 52 juvenile shad in that region (Table 4). The high catch in the Vernon Region was

2001 (9 fish, Table 4). American shad were most abundant in the Vernon Region of the Connecticut River, and the catch during the week of 1-5 October 2001 contributed most of the shad (51 fish) to the total catch of 52 juvenile shad in that region (Table 4). The high catch in the Vernon Region was from one seine haul taken at Beach Number 112 (Figure 2) on 1 October 2001 in which 51 juvenile American shad were caught. The Cersosimo Region exhibited the next highest catch of American shad (9 shad), and these fish came from one haul at Beach Number 65 (Figure 2) on 18 October 2001. Only two juvenile American shad were caught in the Cersosimo Lake Region, and no shad were caught in the Brattleboro Region during the July – October 2001 sampling period (Table 4).

The weekly length-frequency distribution for juvenile American shad demonstrated growth throughout the season (Figure 3). The mean length of American shad caught during the week of 3-7 September 2001 was 106 mm based on one fish measured. The mean length of American shad increased to 117 mm during the week of 1-5 October (51 fish measured), and was 118 mm during the week of 15-19 October 2001 (9 fish measured).

The beach seine catch of all fish species combined increased during each successive survey, reached a peak during the week of 17-21 September, and was generally highest during the last four surveys representing the months of September and October 2001 (Table 4). The observed temporal pattern of increase was influenced most by corresponding changes in bluegill abundance in the Vernon Region (Table 4). The Vernon Region also contributed the most fish to the total catch (3,920 fish or 69%), but this was not surprising since this region also had most of the seine sampling effort. Yellow perch abundance in the seine catch was relatively uniform over time and ranged from 117 fish to 294 fish per week (Table 4).

Midwater Trawl Survey

The midwater trawl survey caught an annual total of 10 fish representing four fish taxa in the pelagic waters of Vernon Pool during the 2001 survey (Table 5). The midwater trawl failed to catch any juvenile American shad. Spottail shiner were the most abundant fish species caught, contributing 70% (7 fish) of the total midwater trawl catch. Bluegill, largemouth bass, and black crappie each contributed one fish as the other fish taxa caught by the midwater trawl during July – October 2001. The midwater trawl catch was distributed among all three Connecticut River Regions sampled during the 2001 program (Table 5).

Catch Per Unit Effort (CPUE) and Density (No./1000 m^3)

Beach Seine Survey

The weekly mean CPUE for all fish taxa combined in the beach seine survey increased during successive surveys from a low of 15.40 fish/haul among all sampling regions of Vernon Pool during the first week (9-13 July 2001) to a high of 51.20 fish/haul during the week of 17-21 September 2001 (Table 6). Bluegill (20.50 fish/haul) and yellow perch (14.70 fish/haul) were the fish species contributing most to the seasonal peak in CPUE during the week of 17-21 September 2001 (Table 6). The highest regional mean CPUE of 154.00 fish/haul was observed in the Cersosimo Lake Region of Vernon Pool during the week of 3-7 September 2001, with bluegill, yellow perch, golden shiner, black crappie, and white perch contributing most this regional peak in CPUE (Table 6). The second highest mean CPUE for all fish taxa combined was 78.33 fish/haul observed in the Cersosimo Region of the Connecticut River during the week of 17-21 September 2001 (Table 6). Yellow perch (27.67

fish/haul) and bluegill (30.33 fish/haul) contributed most to this second highest mean CPUE in the Cersosimo Region.

The weekly mean CPUE for American shad in the beach seine survey was generally low throughout the 2001 survey, and ranged from 0.00 fish/haul among all sampling regions of Vernon Pool during July, August and 17-21 September, to a high of 2.60 fish/haul during the week of 1-5 October 2001 (Table 6). Sampling variability was also high, with the standard error of the mean CPUE equal to or nearly equal to the mean CPUE in each week and region (Table 6). The high variability is most likely a result of schooling behavior in juvenile American shad, which makes the probability of catching fish at any one beach low, but when they are present the CPUE will be high. For example, the highest weekly and regional mean CPUE of 4.25 juvenile American shad/haul in the Vernon Region during the week of 1-5 October 2001 was from one seine haul in which 51 shad were caught. The second highest regional and weekly mean CPUE for American shad was 3.00 fish/haul observed in the Cersosimo Region during the week of 15-19 October 2001 (Table 6), and the catch of 9 fish from one seine haul was averaged with two zero catch hauls to produce this mean.

Midwater Trawl Density (No./1000 m^3)

The weekly mean density for all fish taxa combined in midwater trawl survey ranged from a low of 0.00 fish/1,000 m^3 among all sampling regions of Vernon Pool during the weeks of 23-27 July, 20-24 August, and 1-5 October 2001 to a high of 0.29 fish/1,000 m^3 during the last week of the survey (15-19 October 2001, Table 7). No American shad were caught during the midwater trawl survey in 2001. Spottail shiner and bluegill both exhibited the highest density in the midwater trawl, with an observed density of 0.26 fish/1,000 m^3 for each species caught in samples from the Brattleboro Region of Vernon Pool during the week of 15-19 October 2001 (Table 7).

Juvenile American Shad Standing Crop Index

The weekly combined standing crop index for juvenile American shad ranged from a low of 0 fish among all sampling regions of Vernon Pool during five weeks (9-13 July, 23-27 July, 6-10 August, 20-24 August, and 17-21 September) to a high of 17,494 fish during the week of 1-5 October 2001 (Table 8). When the average was taken among all eight weeks in the 2001 survey, the standing crop index was 2,433 juvenile American shad with a standard error of ±2,433 fish. The beach seine survey contributed all of the fish to the index in 2001, because no American shad were caught in the midwater trawl survey. The Vernon Region contributed most (99%) of the American shad to the peak week of 2-6 October 2001, with Cersosimo Lake contributing the remaining fish to the index during that week (1%). The Cersosimo Region contributed all of the fish to the index during the week of 15-19 October, and the Cersosimo Lake Region contributed all of the fish to the index during the week of 3-7 September 2001 (Table 8).

DISCUSSION

The beach seine survey continues to be a highly effective program for sampling juvenile American shad and other fish taxa in Vernon Pool. Random allocation of the sampling effort among four geographic regions made the beach seine survey conducted during 2000 and 2001 more robust and representative of the entire Vernon Pool compared with previous surveys. The random design was not subjected to variability associated with changes in fish distribution compared with a fixed location design such as sampling only in Cersosimo Lake. Both the 2000 and the 2001 surveys demonstrated

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Figures and Tables for the 2001 Juvenile American Shad Bulletin No. 78

Figures

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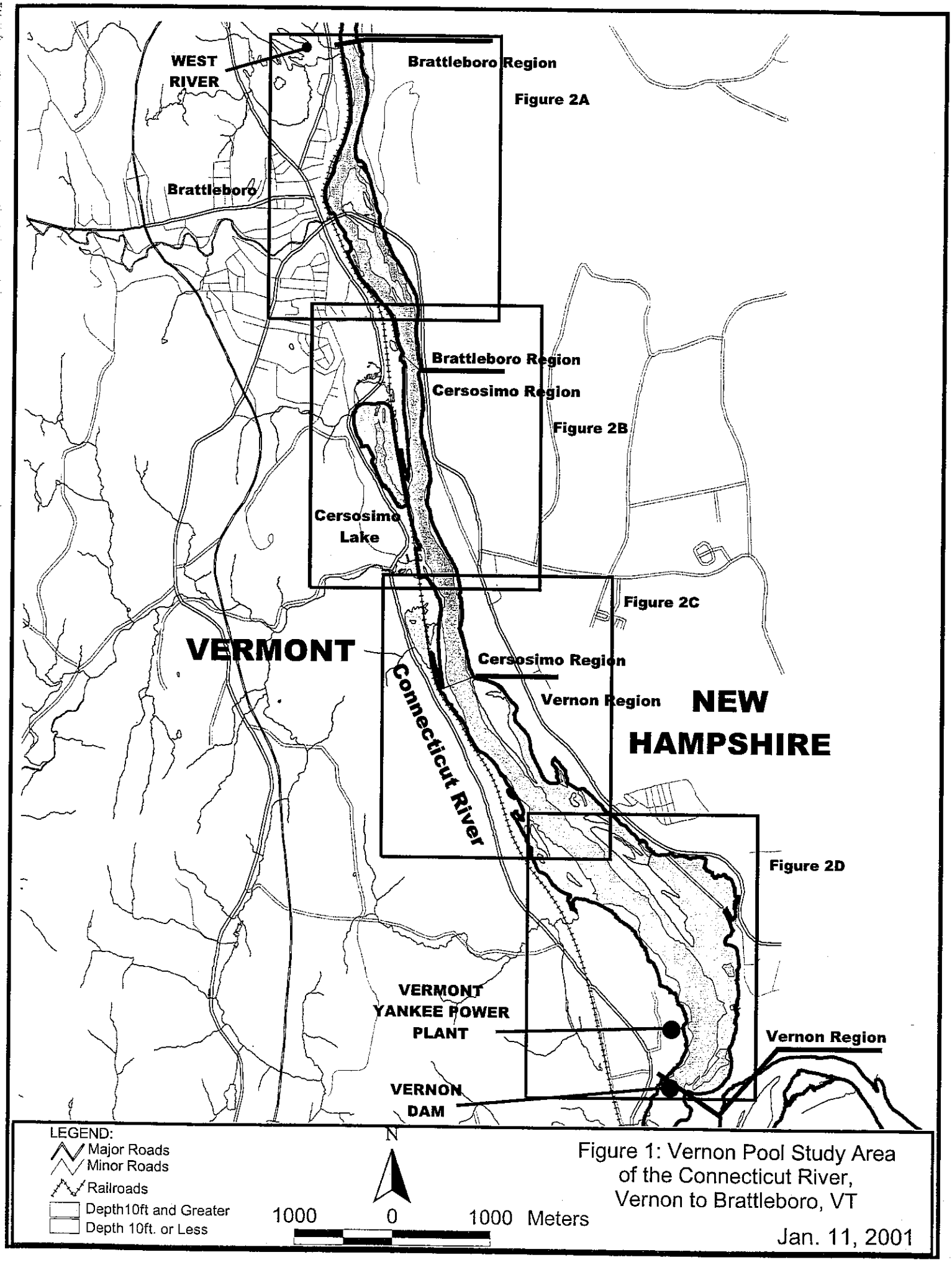

Figure 1: Vernon Pool Study Area of the Connecticut River, Vernon to Brattleboro, VT

Jan. 11, 2001

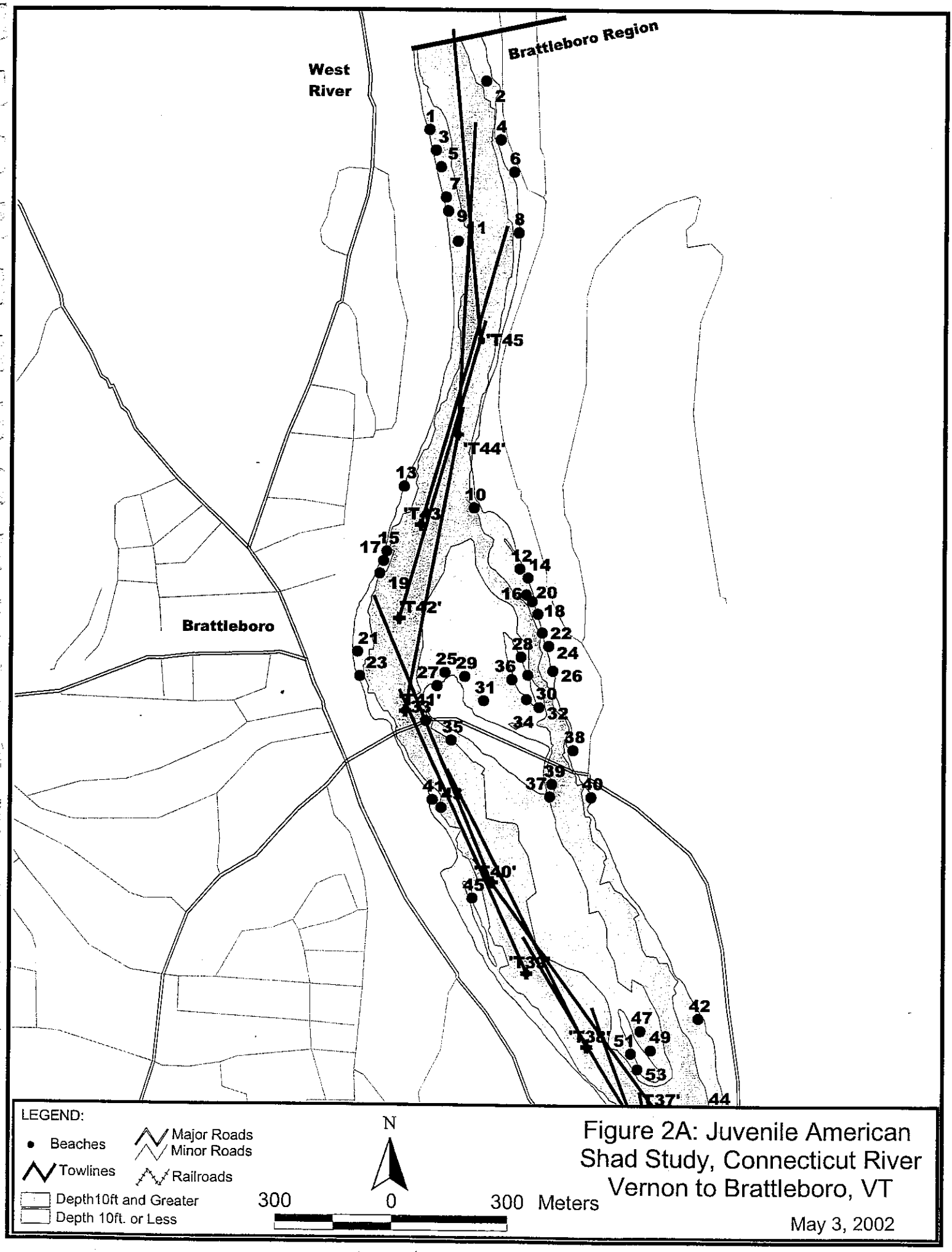

Figure 2A: Juvenile American Shad Study, Connecticut River Vernon to Brattleboro, VT

May 3, 2002

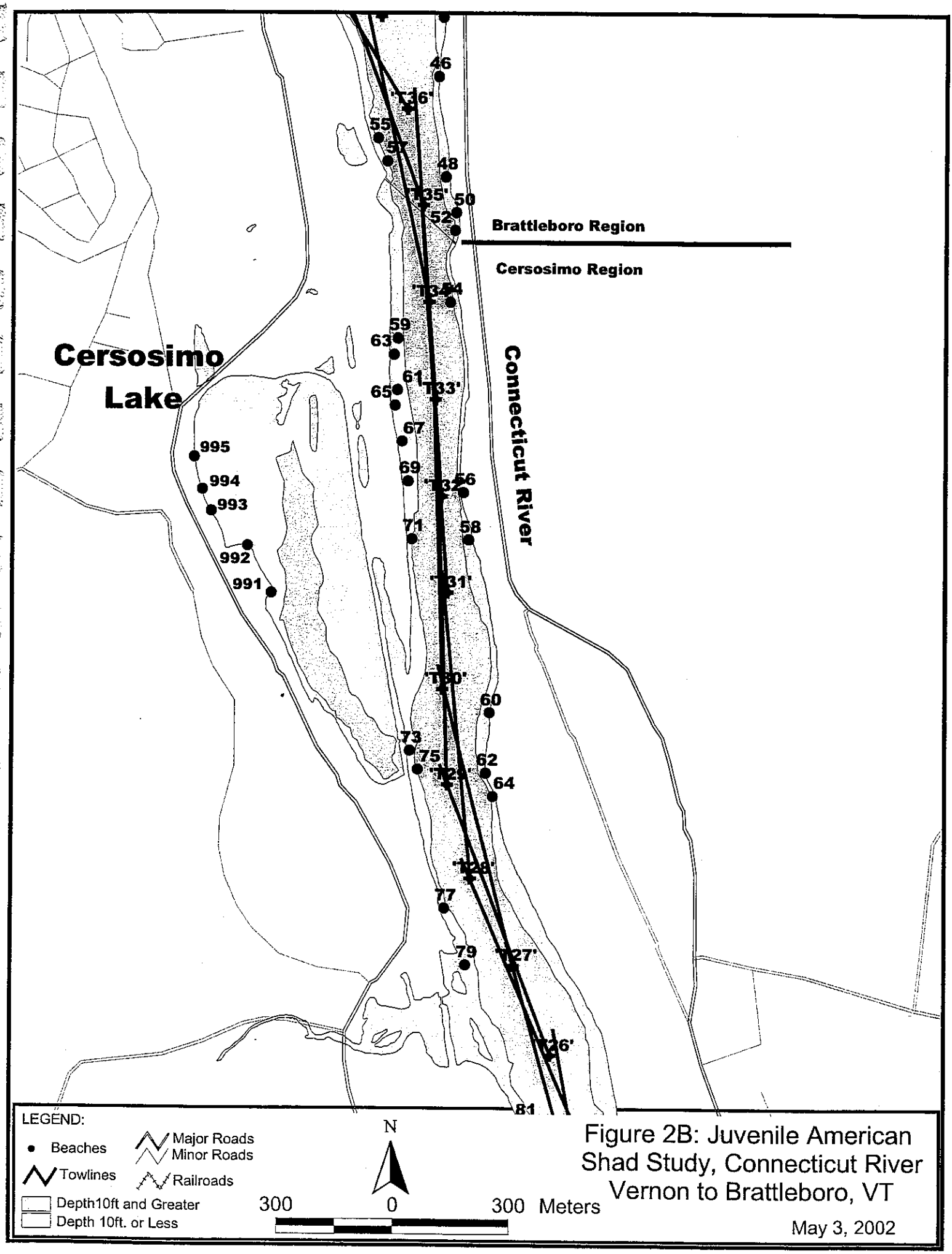

Figure 2B: Juvenile American Shad Study, Connecticut River Vernon to Brattleboro, VT

May 3, 2002

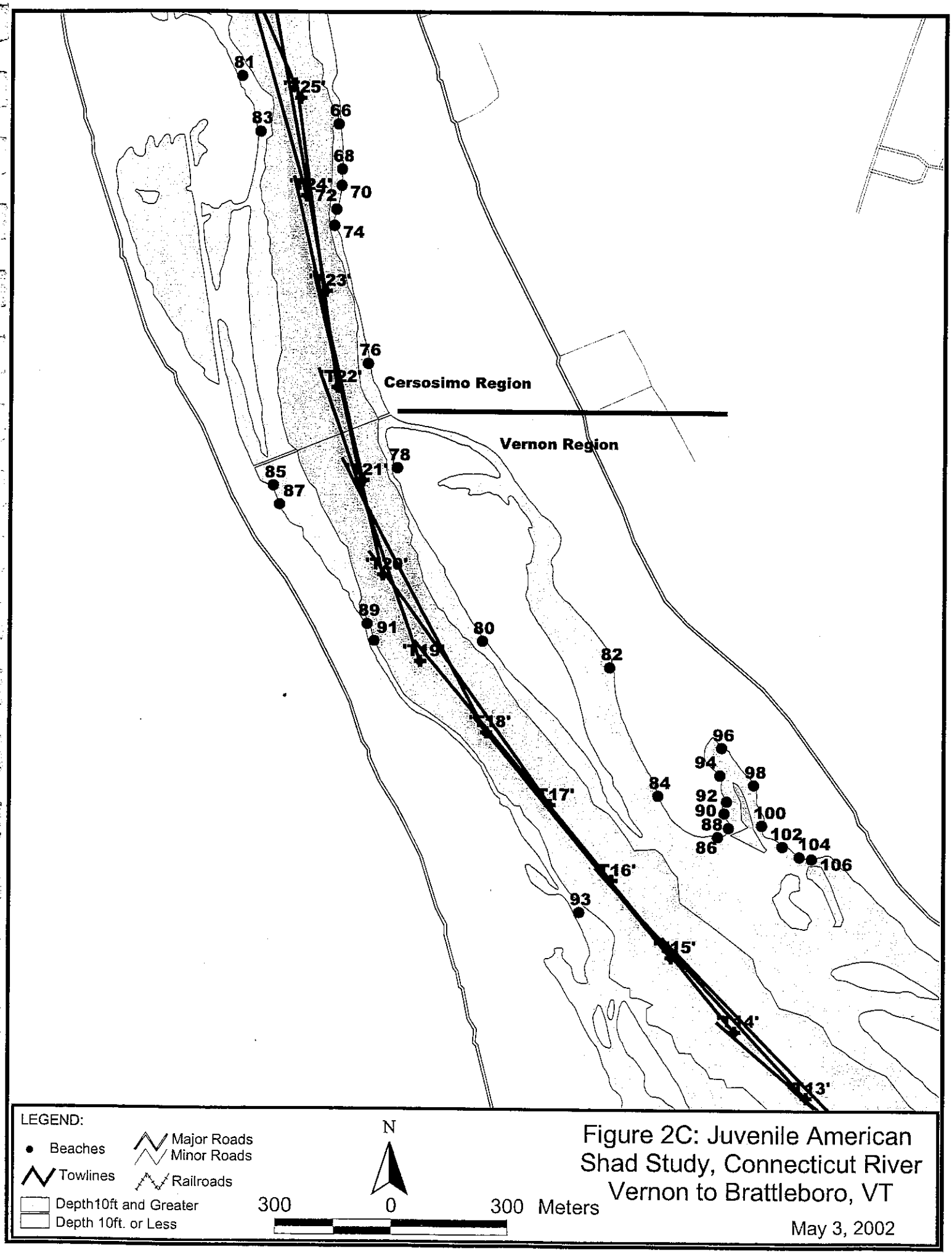

Figure 2C: Juvenile American Shad Study, Connecticut River Vernon to Brattleboro, VT

May 3, 2002

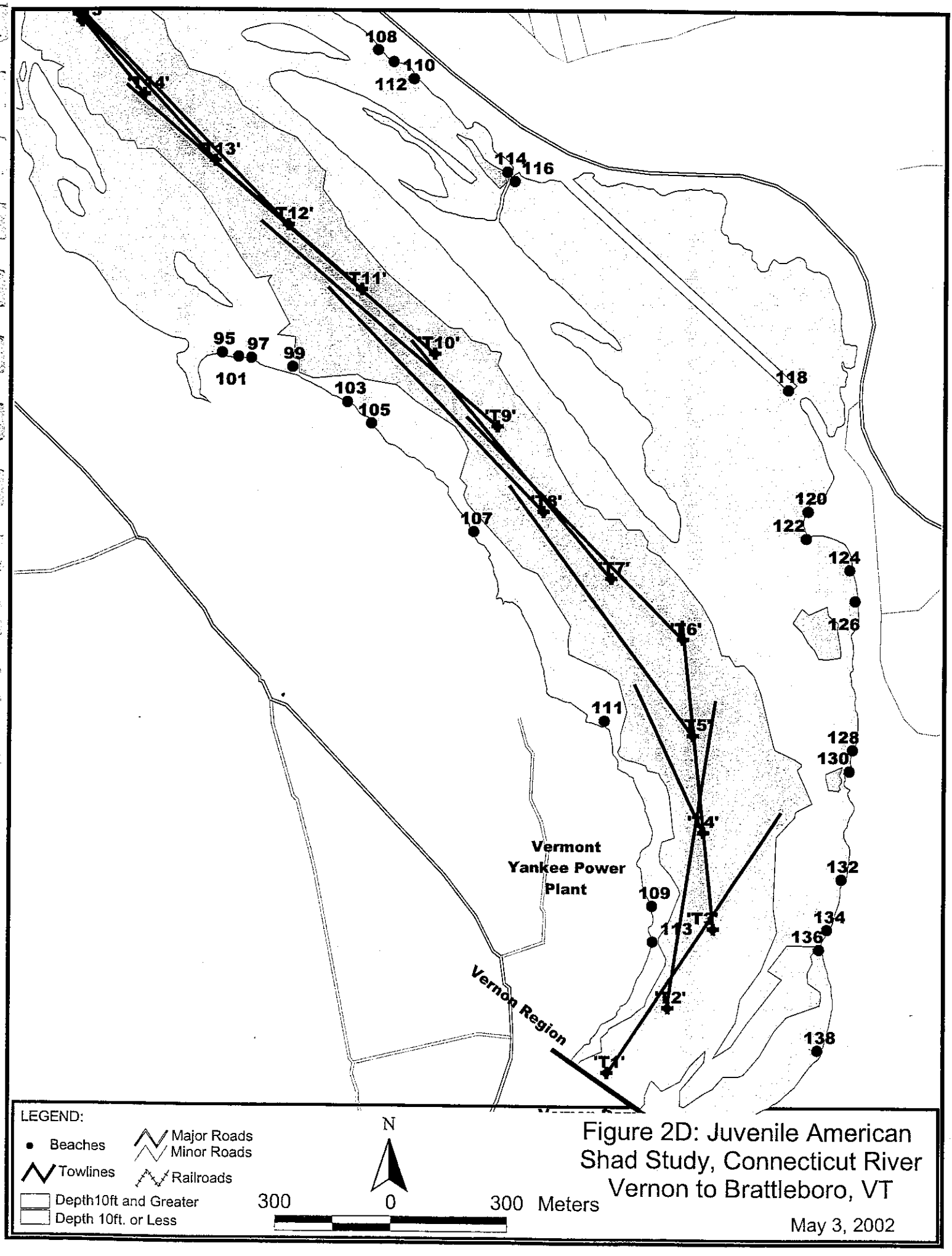

Figure 2D: Juvenile American Shad Study, Connecticut River Vernon to Brattleboro, VT

May 3, 2002

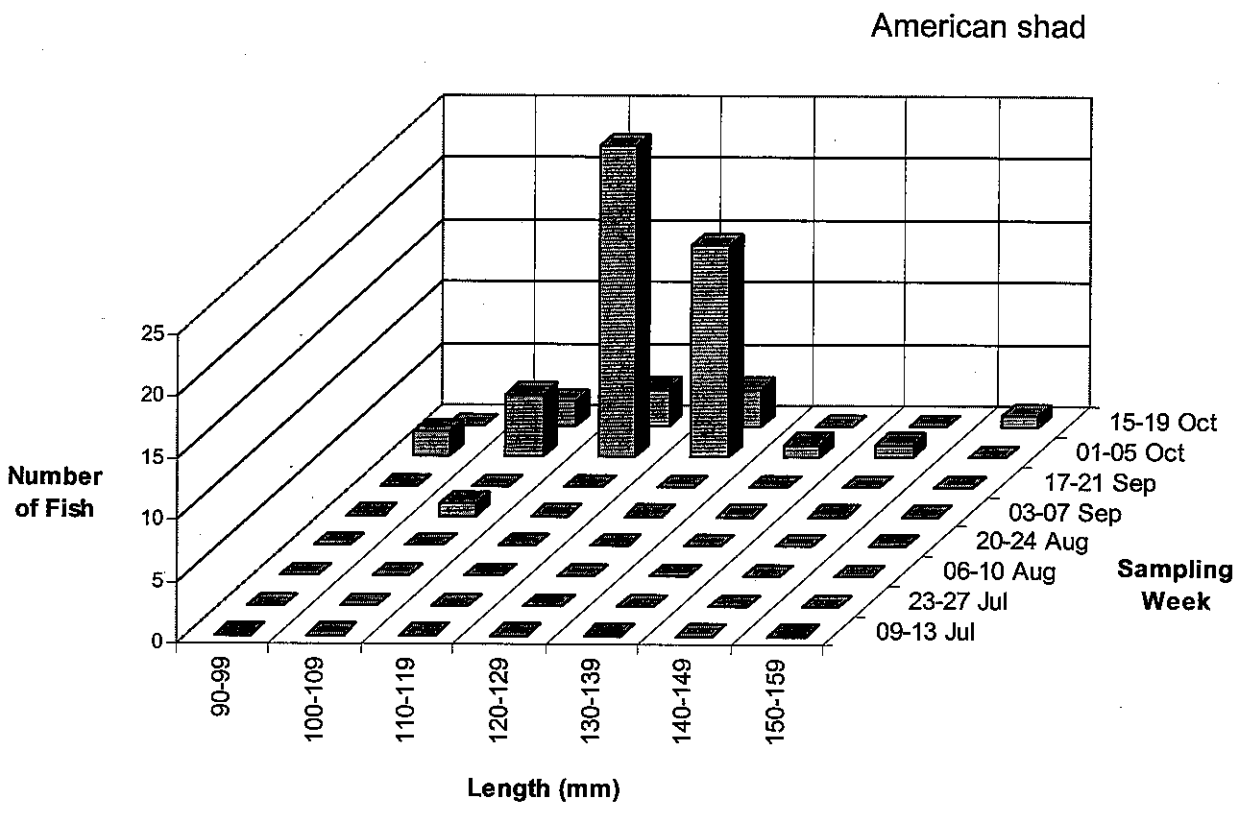

Figure 3. Weekly Length-Frequency of Juvenile American Shad Caught by Seine in Vernon Pool of the Connecticut River, July – October 2001.

Table 1. Area (Square Meters) and Volume (Cubic Meters) of Sampling Regions, and Weighting Factors Used to Calculate the Standing Crop Index for Juvenile American Shad in Vernon Pool of the Connecticut River, July - October 2001.

REGION	Total Water Surface Area (m^2)	Beach (Shore) Zone Surface Area (m^2)	Pelagic Zone Surface Area (m^2)	Number of Seine Sample Units (450 m^2)	Beach Area Weighting Factor	Allocation Number of Seine Samples
Brattleboro	912,828	372,683	540,145	828	0.1392	3
Cersosimo	795,667	259,316	536,351	576	0.0969	3
Vernon	3,127,489	1,826,417	1,301,072	4,059	0.6821	12
Cersosimo Lake	292,504	219,084	73,420	487	0.0818	2
All Regions	5,128,488	2,677,500	2,450,988	5,950	1.0000	20

REGION	Total Volume (m^3)	Volume of Water in Pelagic Bottom Water Zone (m^3)	Volume of Water in Shore Zone (m^3)	Volume of Water in Pelagic Surface Water Zone (m^3)	Beach Weighting Factor	Pelagic Weighting Factor	Allocation Number of Trawl Samples
Brattleboro	3,576,577	1,359,081	572,140	1,645,356	0.0549	0.1578	3
Cersosimo	3,924,770	1,918,552	371,262	1,634,956	0.0356	0.1568	3
Vernon	8,461,697	2,593,130	1,897,588	3,970,979	0.1820	0.3809	6
Cersosimo Lake	569,283	11,181	333,539	224,563	0.0320	0.0000	0
All Regions	16,532,327	5,881,944	3,174,529	7,475,854	0.3045	0.6955	12

Table 2. Station Names and Latitude/Longitude Coordinates for Beach Seine Samples in Vernon Pool of the Connecticut River, July - October 2001.

RIVER REGION	SHORE	STATION (BEACH NUMBER)	MINUTES OF LATITUDE N 42 Deg.	MINUTES OF LONGITUDE W 72 Deg.
Brattleboro	VT	1 [1]	51.9255	33.2941
Brattleboro	NH	2	51.9929	33.1879
Brattleboro	VT	3 [1]	51.8968	33.2822
Brattleboro	NH	4	51.9117	33.1598
Brattleboro	VT	5 [1]	51.8737	33.2727
Brattleboro	NH	6	51.8675	33.1341
Brattleboro	VT	7	51.8321	33.2630
Brattleboro	NH	8	51.7837	33.1249
Brattleboro	VT	9	51.8129	33.2584
Brattleboro	NH	10	51.4018	33.2066
Brattleboro	VT	11	51.7713	33.2397
Brattleboro	NH	12	51.3173	33.1191
Brattleboro	VT	13	51.4312	33.3382
Brattleboro	NH	14	51.3046	33.1035
Brattleboro	VT	15	51.3401	33.3706
Brattleboro	NH	16	51.2814	33.1059
Brattleboro	VT	17	51.3270	33.3766
Brattleboro	NH	18	51.2545	33.0841
Brattleboro	VT	19	51.3095	33.3840
Brattleboro	NH	20	51.2716	33.0954
Brattleboro	VT	21	51.1998	33.4244
Brattleboro	NH	22	51.2280	33.0760
Brattleboro	VT	23	51.1657	33.4202
Brattleboro	NH	24	51.2090	33.0628
Brattleboro	VT	25	51.1714	33.2593
Brattleboro	NH	26	51.1749	33.0550
Brattleboro	VT	27	51.1526	33.2741
Brattleboro	NH	28	51.1937	33.1158
Brattleboro	VT	29	51.1660	33.2216
Brattleboro	NH	30	51.1685	33.1021
Brattleboro	VT	31	51.1323	33.1857
Brattleboro	NH	32	51.1236	33.0806
Brattleboro	VT	33	51.1040	33.2952
Brattleboro	NH	34	51.1346	33.1047
Brattleboro	VT	35	51.0769	33.2470
Brattleboro	NH	36	51.1623	33.1327
Brattleboro	VT	37	50.9990	33.0589
Brattleboro	NH	38	51.0640	33.0155
Brattleboro	VT	39	51.0167	33.0551
Brattleboro	NH	40	50.9986	32.9806
Brattleboro	VT	41	50.9942	33.2817
Brattleboro	NH	42	50.6922	32.7754
Brattleboro	VT	43	50.9832	33.2651
Brattleboro	NH	44	50.5639	32.7361
Brattleboro	VT	45	50.8573	33.2048
Brattleboro	NH	46	50.4804	32.7448

Table 2. (Continued)

RIVER REGION	SHORE	STATION (BEACH NUMBER)	MINUTES OF LATITUDE N 42 Deg.	MINUTES OF LONGITUDE W 72 Deg.
Brattleboro	VT	47	50.6755	32.8840
Brattleboro	NH	48	50.3419	32.7304
Brattleboro	VT	49	50.6485	32.8648
Brattleboro	NH	50	50.2923	32.7100
Brattleboro	VT	51	50.6439	32.9017
Brattleboro	NH	52	50.2676	32.7126
Brattleboro	VT	53	50.6221	32.8894
Brattleboro	VT	55	50.3951	32.8583
Brattleboro	VT	57	50.3634	32.8403
Cersosimo	NH	54	50.1685	32.7202
Cersosimo	NH	56	49.9046	32.6941
Cersosimo	NH	58	49.8384	32.6834
Cersosimo	VT	59	50.1186	32.8186
Cersosimo	NH	60	49.5969	32.6430
Cersosimo	VT	61	50.0469	32.8196
Cersosimo	NH	62	49.5126	32.6496
Cersosimo	VT	63	50.0960	32.8262
Cersosimo	NH	64	49.4802	32.6362
Cersosimo	VT	65	50.0257	32.8243
Cersosimo	NH	66	48.9618	32.3895
Cersosimo	VT	67	49.9757	32.8106
Cersosimo	NH	68	48.8995	32.3828
Cersosimo	VT	69	49.9204	32.7984
Cersosimo	NH	70	48.8769	32.3835
Cersosimo	VT	71	49.8398	32.7912
Cersosimo	NH	72	48.8442	32.3932
Cersosimo	VT	73	49.5438	32.7932
Cersosimo	NH	74	48.8215	32.3967
Cersosimo	VT	75	49.5173	32.7778
Cersosimo	NH	76	48.6312	32.3305
Cersosimo	VT	77	49.3245	32.7262
Cersosimo	VT	79	49.2461	32.6862
Cersosimo	VT	81	49.0282	32.5713
Cersosimo	VT	83	48.9513	32.5365
Vernon	NH	78	48.4866	32.2750
Vernon	NH	80	48.2457	32.1131
Vernon	NH	82 [1]	48.2104	31.8710
Vernon	NH	84 [1]	48.0319	31.7799
Vernon	VT	85	48.4618	32.5088
Vernon	NH	86	47.9749	31.6672
Vernon	VT	87	48.4355	32.4971
Vernon	NH	88	47.9872	31.6469
Vernon	VT	89	48.2695	32.3307
Vernon	NH	90	48.0080	31.6550
Vernon	VT	91	48.2456	32.3175
Vernon	NH	92	48.0240	31.6508
Vernon	VT	93	47.8682	31.9313

Table 2. (Continued)

RIVER REGION	SHORE	STATION (BEACH NUMBER)	MINUTES OF LATITUDE N 42 Deg.	MINUTES OF LONGITUDE W 72 Deg.
Vernon	NH	94	48.0606	31.6635
Vernon	VT	95	47.3485	31.4840
Vernon	NH	96	48.0987	31.6603
Vernon	VT	97	47.3411	31.4301
Vernon	NH	98	48.0471	31.5997
Vernon	VT	99	47.3290	31.3525
Vernon	NH	100	47.9911	31.5845
Vernon	VT	101	47.3428	31.4538
Vernon	NH	102	47.9621	31.5452
Vernon	VT	103	47.2810	31.2483
Vernon	NH	104	47.9455	31.4903
Vernon	VT	105	47.2511	31.2035
Vernon	NH	106	47.9482	31.5137
Vernon	VT	107	47.1011	31.0094
Vernon	NH	108	47.7681	31.1934
Vernon	VT	109	46.8380	30.7601
Vernon	NH	110	47.7284	31.1257
Vernon	VT	111	46.5809	30.6698
Vernon	NH	112	47.7520	31.1641
Vernon	VT	113	46.5315	30.6682
Vernon	NH	114	47.5999	30.9487
Vernon	NH	116	47.5869	30.9346
Vernon	NH	118	47.3001	30.4170
Vernon	NH	120 [1]	47.1317	30.3791
Vernon	NH	122 [1]	47.0937	30.3818
Vernon	NH	124 [1]	47.0502	30.2996
Vernon	NH	126	47.0071	30.2895
Vernon	NH	128	46.7989	30.2935
Vernon	NH	130	46.7695	30.2993
Vernon	NH	132	46.6186	30.3132
Vernon	NH	134	46.5492	30.3401
Vernon	NH	136 [1]	46.5217	30.3546
Vernon	NH	138 [1]	46.3821	30.3575
Cersosimo Lake	VT	991	49.7639	33.0567
Cersosimo Lake	VT	992	49.8296	33.1013
Cersosimo Lake	VT	993	49.8778	33.1700
Cersosimo Lake	VT	994	49.9080	33.1873
Cersosimo Lake	VT	995	49.9531	33.2030

[1] Not sampled in 2001 due to shallow depth or heavy debris.

Table 3. Station Names, Latitude/Longitude Coordinates, and Tow Directions for Midwater Traw Tows in Vernon Pool of the Connecticut River, July-October 2001.

REGION	STATION	MINUTES OF LATITUDE N 42 deg.	MINUTES OF LONGITUDE W 72 deg.	TOW DIRECTION
Brattleboro	'T45'	51.6353	33.1946	'N05'
Brattleboro	'T44'	51.5040	33.2375	'N357'
Brattleboro	'T43'	51.3778	33.3065	'N354'
Brattleboro	'T42'	51.2472	33.3464	'N354'
Brattleboro	'T41'	51.1176	33.3344	'N350'
Brattleboro	'T40'	50.8798	33.1682	'N23'
Brattleboro	'T39'	50.7544	33.1007	'N24'
Brattleboro	'T38'	50.6533	32.9855	'N26'
Brattleboro	'T37'	50.5655	32.8532	'N36'
Brattleboro	'T36'	50.4359	32.8027	'N32'
Brattleboro	'T35'	50.3027	32.7722	'N20'
Brattleboro	'T34'	50.1691	32.7596	'N12'
Cersosimo	'T33'	50.0345	32.7473	'N04'
Cersosimo	'T32'	49.8997	32.7348	'N04'
Cersosimo	'T31'	49.7651	32.7233	'N04'
Cersosimo	'T30'	49.6301	32.7318	'N01'
Cersosimo	'T29'	49.4963	32.7216	'N02'
Cersosimo	'T28'	49.3663	32.6770	'N05'
Cersosimo	'T27'	49.2458	32.5951	'N14'
Cersosimo	'T26'	49.1221	32.5243	'N21'
Cersosimo	'T25'	48.9980	32.4614	'N24'
Cersosimo	'T24'	48.8635	32.4495	'N16'
Cersosimo	'T23'	48.7315	32.4112	'N10'
Cersosimo	'T22'	48.5986	32.3901	'N08'
Cersosimo	'T21'	48.4697	32.3400	'N13'
Vernon	'T20'	48.3384	32.3018	'N13'
Vernon	'T19'	48.2177	32.2309	'N19'
Vernon	'T18'	48.1191	32.1056	'N28'
Vernon	'T17'	48.0184	31.9837	'N36'
Vernon	'T16'	47.9142	31.8670	'N39'
Vernon	'T15'	47.8080	31.7538	'N39'
Vernon	'T14'	47.7060	31.6338	'N39'
Vernon	'T13'	47.6147	31.4989	'N43'
Vernon	'T12'	47.5263	31.3622	'N44'
Vernon	'T11'	47.4371	31.2223	'N49'
Vernon	'T10'	47.3485	31.0844	'N49'
Vernon	'T9'	47.2484	30.9655	'N49'
Vernon	'T8'	47.1297	30.8777	'N44'
Vernon	'T7'	47.0372	30.7493	'N40'
Vernon	'T6'	46.9524	30.6134	'N44'
Vernon	'T5'	46.8182	30.5944	'N36'
Vernon	'T4'	46.6833	30.5742	'N25'
Vernon	'T3'	46.5495	30.5544	'N06'
Vernon	'T2'	46.4404	30.6389	'N352'
Vernon	'T1'	46.3505	30.7530	'N327'

Table 4. Weekly and Regional Number of Fish Taxa Caught by Beach Seine in Vernon Pool of the Connecticut River, July – October 2001.

	Hauls per week	NUMBER OF FISH OF CAUGHT IN SAMPLING WEEK								
		09-13 Jul	23-27 Jul	06-10 Aug	20-24 Aug	03-07 Sep	17-21 Sep	01-05 Oct	15-19 Oct	All Weeks
American shad										
Brattleboro	3	0	0	0	0	0	0	0	0	0
Cersosimo	3	0	0	0	0	0	0	0	9	9
Vernon	12	0	0	0	0	0	0	51	0	51
Cersosimo Lake	2	0	0	0	0	1	0	1	0	2
All Regions	**20**	**0**	**0**	**0**	**0**	**1**	**0**	**52**	**9**	**62**
Bluegill										
Brattleboro	3	0	0	0	0	1	12	2	3	18
Cersosimo	3	0	0	0	36	16	91	14	3	160
Vernon	12	77	45	38	216	221	294	459	365	1715
Cersosimo Lake	2	16	4	71	1	57	13	22	33	217
All Regions	**20**	**93**	**49**	**109**	**253**	**295**	**410**	**497**	**404**	**2110**
Yellow perch										
Brattleboro	3	7	0	2	13	2	77	2	25	128
Cersosimo	3	6	38	39	71	41	83	12	8	298
Vernon	12	41	132	230	79	109	111	153	99	954
Cersosimo Lake	2	63	34	17	26	84	23	19	22	288
All Regions	**20**	**117**	**204**	**288**	**189**	**236**	**294**	**186**	**154**	**1668**
Golden shiner										
Brattleboro	3	0	0	0	0	0	3	0	1	4
Cersosimo	3	0	2	0	1	0	10	0	0	13
Vernon	12	63	6	0	135	67	81	93	100	545
Cersosimo Lake	2	0	0	0	0	51	1	0	0	52
All Regions	**20**	**63**	**8**	**0**	**136**	**118**	**95**	**93**	**101**	**614**
Black crappie										
Brattleboro	3	0	0	0	0	0	0	0	0	0
Cersosimo	3	0	0	0	0	4	3	0	3	10
Vernon	12	2	17	12	10	41	5	20	33	140
Cersosimo Lake	2	0	0	8	0	37	0	1	0	46
All Regions	**20**	**2**	**17**	**20**	**10**	**82**	**8**	**21**	**36**	**196**
Largemouth bass										
Brattleboro	3	0	0	0	0	5	2	1	0	8
Cersosimo	3	1	4	0	0	5	2	0	0	12
Vernon	12	7	34	54	7	22	2	9	19	154
Cersosimo Lake	2	4	3	2	0	6	1	0	2	18
All Regions	**20**	**12**	**41**	**56**	**7**	**38**	**7**	**10**	**21**	**192**
White perch										
Brattleboro	3	0	0	0	0	0	0	0	0	0
Cersosimo	3	0	0	0	0	0	1	0	0	1
Vernon	12	0	0	0	3	0	0	0	0	3
Cersosimo Lake	2	0	9	18	19	68	49	19	0	182
All Regions	**20**	**0**	**9**	**18**	**22**	**68**	**50**	**19**	**0**	**186**

Table 4 (Continued)

	Hauls per week	NUMBER OF FISH OF CAUGHT IN SAMPLING WEEK								
		09-13 Jul	23-27 Jul	06-10 Aug	20-24 Aug	03-07 Sep	17-21 Sep	01-05 Oct	15-19 Oct	All Weeks
Pumpkinseed										
Brattleboro	3	0	0	0	0	0	4	0	2	6
Cersosimo	3	0	0	0	3	1	1	11	2	18
Vernon	12	6	10	8	8	18	33	67	5	155
Cersosimo Lake	2	1	0	0	0	0	0	0	0	1
All Regions	**20**	**7**	**10**	**8**	**11**	**19**	**38**	**78**	**9**	**180**
Spottail shiner										
Brattleboro	3	0	0	0	0	0	4	10	3	17
Cersosimo	3	0	6	0	0	0	10	0	7	23
Vernon	12	1	12	30	8	3	17	17	9	97
Cersosimo Lake	2	0	0	0	0	0	0	0	0	0
All Regions	**20**	**1**	**18**	**30**	**8**	**3**	**31**	**27**	**19**	**137**
Rock bass										
Brattleboro	3	0	0	0	0	22	29	2	0	53
Cersosimo	3	0	0	0	1	8	25	1	0	35
Vernon	12	0	0	0	5	6	2	5	4	22
Cersosimo Lake	2	0	0	4	0	1	0	0	7	12
All Regions	**20**	**0**	**0**	**4**	**6**	**37**	**56**	**8**	**11**	**122**
Smallmouth bass										
Brattleboro	3	1	2	3	11	0	2	0	0	19
Cersosimo	3	1	0	2	8	0	6	0	0	17
Vernon	12	1	0	0	27	1	8	1	2	40
Cersosimo Lake	2	8	2	3	1	0	3	0	2	19
All Regions	**20**	**11**	**4**	**8**	**47**	**1**	**19**	**1**	**4**	**95**
Silvery minnow										
Brattleboro	3	0	0	0	0	0	2	0	0	2
Cersosimo	3	0	0	0	0	49	0	0	0	49
Vernon	12	0	0	0	0	4	0	0	0	4
Cersosimo Lake	2	0	0	0	0	0	0	0	0	0
All Regions	**20**	**0**	**0**	**0**	**0**	**53**	**2**	**0**	**0**	**55**
Chain pickerel										
Brattleboro	3	0	0	0	0	0	0	0	1	1
Cersosimo	3	0	1	2	0	4	0	0	0	7
Vernon	12	2	2	6	3	3	8	1	3	28
Cersosimo Lake	2	0	0	0	0	0	0	0	1	1
All Regions	**20**	**2**	**3**	**8**	**3**	**7**	**8**	**1**	**5**	**37**
White sucker										
Brattleboro	3	0	0	0	0	0	1	0	0	1
Cersosimo	3	0	0	0	0	0	0	0	0	0
Vernon	12	0	4	1	1	0	0	0	0	6
Cersosimo Lake	2	0	0	0	0	2	2	2	1	7
All Regions	**20**	**0**	**4**	**1**	**1**	**2**	**3**	**2**	**1**	**14**
Tessellated darter										
Brattleboro	3	0	0	0	0	1	0	0	3	4
Cersosimo	3	0	0	0	1	0	0	0	0	1
Vernon	12	0	2	0	0	0	0	0	0	2
Cersosimo Lake	2	0	3	0	1	0	0	0	1	5
All Regions	**20**	**0**	**5**	**0**	**2**	**1**	**0**	**0**	**4**	**12**

Table 4 (Continued)

	Hauls per week	NUMBER OF FISH OF CAUGHT IN SAMPLING WEEK								
		09-13 Jul	23-27 Jul	06-10 Aug	20-24 Aug	03-07 Sep	17-21 Sep	01-05 Oct	15-19 Oct	All Weeks
Banded killifish										
Brattleboro	3	0	0	0	0	0	0	0	0	0
Cersosimo	3	0	0	0	0	1	3	0	0	4
Vernon	12	0	0	1	0	1	0	0	0	2
Cersosimo Lake	2	0	0	0	0	0	0	0	1	1
All Regions	**20**	**0**	**0**	**1**	**0**	**2**	**3**	**0**	**1**	**7**
Northern pike										
Brattleboro	3	0	0	0	0	0	0	0	0	0
Cersosimo	3	0	0	0	0	0	0	0	0	0
Vernon	12	0	0	0	1	0	0	0	0	1
Cersosimo Lake	2	0	0	0	0	0	0	0	0	0
All Regions	**20**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**
Common carp										
Brattleboro	3	0	0	0	0	0	0	0	0	0
Cersosimo	3	0	0	0	0	0	0	0	0	0
Vernon	12	0	0	0	0	1	0	0	0	1
Cersosimo Lake	2	0	0	0	0	0	0	0	0	0
All Regions	**20**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**
Brown bullhead										
Brattleboro	3	0	0	0	0	0	0	0	0	0
Cersosimo	3	0	0	0	0	0	0	0	0	0
Vernon	12	0	0	0	0	0	0	0	0	0
Cersosimo Lake	2	0	0	0	0	1	0	0	0	1
All Regions	**20**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**
Walleye										
Brattleboro	3	0	0	0	0	0	0	0	1	1
Cersosimo	3	0	0	0	0	0	0	0	0	0
Vernon	12	0	0	0	0	0	0	0	0	0
Cersosimo Lake	2	0	0	0	0	0	0	0	0	0
All Regions	**20**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**
All Taxa Combined										
Brattleboro	3	8	2	5	24	31	136	17	39	262
Cersosimo	3	8	51	43	121	129	235	38	32	657
Vernon	12	200	264	380	503	497	561	876	639	3920
Cersosimo Lake	2	92	55	123	48	308	92	64	70	852
All Regions	**20**	**308**	**372**	**551**	**696**	**965**	**1024**	**995**	**780**	**5691**

Table 5. Weekly and Regional Number of Fish Taxa Caught by Midwater Trawl in Vernon Pool of the Connecticut River, July – October 2001.

	Hauls per week	NUMBER OF FISH OF CAUGHT IN SAMPLING WEEK								
		09-13 Jul	23-27 Jul	06-10 Aug	20-24 Aug	03-07 Sep	17-21 Sep	01-05 Oct	15-19 Oct	All Weeks
Spottail shiner										
Brattleboro	3	0	0	1	0	1	0	0	1	3
Cersosimo	3	0	0	1	0	0	0	0	1	2
Vernon	6	0	0	0	0	0	1	0	1	2
All Regions	**12**	**0**	**0**	**2**	**0**	**1**	**1**	**0**	**3**	**7**
Bluegill										
Brattleboro	3	0	0	0	0	0	0	0	0	0
Cersosimo	3	0	0	0	0	0	0	0	0	0
Vernon	6	0	0	0	0	0	0	0	1	1
All Regions	**12**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**
Largemouth bass										
Brattleboro	3	1	0	0	0	0	0	0	0	1
Cersosimo	3	0	0	0	0	0	0	0	0	0
Vernon	6	0	0	0	0	0	0	0	0	0
All Regions	**12**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**
Black crappie										
Brattleboro	3	0	0	0	0	0	0	0	0	0
Cersosimo	3	0	0	0	0	0	0	0	1	1
Vernon	6	0	0	0	0	0	0	0	0	0
All Regions	**12**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**
All Taxa Combined										
Brattleboro	3	1	0	1	0	1	0	0	1	5
Cersosimo	3	0	0	1	0	0	0	0	2	3
Vernon	6	0	0	0	0	0	1	0	2	2
All Regions	**12**	**1**	**0**	**2**	**0**	**1**	**1**	**0**	**5**	**10**

Table 6. Weekly and Regional Mean Catch per Unit of Effort (CPUE) of Fish Taxa by Beach Seine in Vernon Pool of the Connecticut River, July – October 2001.

Week and CPUE		VERNON POOL REGION				
		Brattleboro	Cersosimo	Vernon	Cersosimo Lake	All Regions
All Taxa						
09-13JUL	CPUE	2.67	2.67	16.67	46.00	15.40
	SE	2.19	2.67	9.32	21.00	6.34
	NO.HAULS	3	3	12	2	20
23-27JUL	CPUE	0.67	17.00	22.00	27.50	18.60
	SE	0.67	17.00	3.40	18.50	3.70
	NO.HAULS	3	3	12	2	20
06-10AUG	CPUE	1.67	14.33	31.67	61.50	27.55
	SE	0.88	13.84	6.90	46.50	6.65
	NO.HAULS	3	3	12	2	20
20-24AUG	CPUE	8.00	40.33	41.92	24.00	34.80
	SE	5.69	22.38	11.93	18.00	8.23
	NO.HAULS	3	3	12	2	20
03-07SEP	CPUE	10.33	43.00	41.42	154.00	48.25
	SE	9.35	21.50	12.16	41.00	11.87
	NO.HAULS	3	3	12	2	20
17-21SEP	CPUE	45.33	78.33	46.75	46.00	51.20
	SE	25.44	39.79	11.90	20.00	9.66
	NO.HAULS	3	3	12	2	20
01-05OCT	CPUE	5.67	12.67	73.00	32.00	49.75
	SE	4.70	12.67	12.93	13.00	10.33
	NO.HAULS	3	3	12	2	20
15-19OCT	CPUE	13.00	10.67	53.25	35.00	39.00
	SE	6.66	5.61	12.83	2.00	8.75
	NO.HAULS	3	3	12	2	20

(Continued)

Table 6 (Continued).

Week and CPUE		VERNON POOL REGION				
		Brattleboro	Cersosimo	Vernon	Cersosimo Lake	All Regions
American shad						
09-13JUL	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
23-27JUL	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
06-10AUG	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
20-24AUG	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
03-07SEP	CPUE	0.00	0.00	0.00	0.50	0.05
	SE	0.00	0.00	0.00	0.50	0.05
	NO.HAULS	3	3	12	2	20
17-21SEP	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
01-05OCT	CPUE	0.00	0.00	4.25	0.50	2.60
	SE	0.00	0.00	4.25	0.50	2.55
	NO.HAULS	3	3	12	2	20
15-19OCT	CPUE	0.00	3.00	0.00	0.00	0.45
	SE	0.00	3.00	0.00	0.00	0.45
	NO.HAULS	3	3	12	2	20

(Continued)

Table 6 (Continued).

Week and CPUE		VERNON POOL REGION				
		Brattleboro	Cersosimo	Vernon	Cersosimo Lake	All Regions
Yellow perch						
09-13JUL	CPUE	2.33	2.00	3.42	31.50	5.85
	SE	2.33	2.00	0.92	14.50	2.33
	NO.HAULS	3	3	12	2	20
23-27JUL	CPUE	0.00	12.67	11.00	17.00	10.20
	SE	0.00	12.67	3.07	10.00	2.73
	NO.HAULS	3	3	12	2	20
06-10AUG	CPUE	0.67	13.00	19.17	8.50	14.40
	SE	0.67	13.00	5.68	1.50	4.04
	NO.HAULS	3	3	12	2	20
20-24AUG	CPUE	4.33	23.67	6.58	13.00	9.45
	SE	4.33	14.25	2.19	9.00	2.78
	NO.HAULS	3	3	12	2	20
03-07SEP	CPUE	0.67	13.67	9.08	42.00	11.80
	SE	0.67	1.76	5.16	15.00	4.06
	NO.HAULS	3	3	12	2	20
17-21SEP	CPUE	25.67	27.67	9.25	11.50	14.70
	SE	15.32	15.10	4.54	1.50	4.21
	NO.HAULS	3	3	12	2	20
01-05OCT	CPUE	0.67	4.00	12.75	9.50	9.30
	SE	0.67	4.00	3.78	5.50	2.56
	NO.HAULS	3	3	12	2	20
15-19OCT	CPUE	8.33	2.67	8.25	11.00	7.70
	SE	4.26	1.45	4.05	1.00	2.51
	NO.HAULS	3	3	12	2	20

(Continued)

Table 6 (Continued).

Week and CPUE		VERNON POOL REGION				
		Brattleboro	Cersosimo	Vernon	Cersosimo Lake	All Regions
Bluegill						
09-13JUL	CPUE	0.00	0.00	6.42	8.00	4.65
	SE	0.00	0.00	3.83	8.00	2.43
	NO.HAULS	3	3	12	2	20
23-27JUL	CPUE	0.00	0.00	3.75	2.00	2.45
	SE	0.00	0.00	1.86	2.00	1.17
	NO.HAULS	3	3	12	2	20
06-10AUG	CPUE	0.00	0.00	3.17	35.50	5.45
	SE	0.00	0.00	0.95	32.50	3.36
	NO.HAULS	3	3	12	2	20
20-24AUG	CPUE	0.00	12.00	18.00	0.50	12.65
	SE	0.00	4.58	6.33	0.50	4.15
	NO.HAULS	3	3	12	2	20
03-07SEP	CPUE	0.33	5.33	18.42	28.50	14.75
	SE	0.33	2.96	6.25	18.50	4.39
	NO.HAULS	3	3	12	2	20
17-21SEP	CPUE	4.00	30.33	24.50	6.50	20.50
	SE	2.31	15.50	5.90	4.50	4.53
	NO.HAULS	3	3	12	2	20
01-05OCT	CPUE	0.67	4.67	38.25	11.00	24.85
	SE	0.33	4.67	7.02	4.00	5.66
	NO.HAULS	3	3	12	2	20
15-19OCT	CPUE	1.00	1.00	30.42	16.50	20.20
	SE	1.00	1.00	6.27	5.50	4.80
	NO.HAULS	3	3	12	2	20

(Continued)

Table 6 (Continued).

Week and CPUE		VERNON POOL REGION				
		Brattleboro	Cersosimo	Vernon	Cersosimo Lake	All Regions
Golden shiner						
09-13JUL	CPUE	0.00	0.00	5.25	0.00	3.15
	SE	0.00	0.00	5.25	0.00	3.15
	NO.HAULS	3	3	12	2	20
23-27JUL	CPUE	0.00	0.67	0.50	0.00	0.40
	SE	0.00	0.67	0.50	0.00	0.31
	NO.HAULS	3	3	12	2	20
06-10AUG	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
20-24AUG	CPUE	0.00	0.33	11.25	0.00	6.80
	SE	0.00	0.33	4.68	0.00	3.03
	NO.HAULS	3	3	12	2	20
03-07SEP	CPUE	0.00	0.00	5.58	25.50	5.90
	SE	0.00	0.00	4.19	25.50	3.48
	NO.HAULS	3	3	12	2	20
17-21SEP	CPUE	1.00	3.33	6.75	0.50	4.75
	SE	1.00	2.03	3.76	0.50	2.31
	NO.HAULS	3	3	12	2	20
01-05OCT	CPUE	0.00	0.00	7.75	0.00	4.65
	SE	0.00	0.00	4.06	0.00	2.55
	NO.HAULS	3	3	12	2	20
15-19OCT	CPUE	0.33	0.00	8.33	0.00	5.05
	SE	0.33	0.00	4.76	0.00	2.95
	NO.HAULS	3	3	12	2	20

(Continued)

Table 6 (Continued).

Week and CPUE		VERNON POOL REGION				
		Brattleboro	Cersosimo	Vernon	Cersosimo Lake	All Regions
White perch						
09-13JUL	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
23-27JUL	CPUE	0.00	0.00	0.00	4.50	0.45
	SE	0.00	0.00	0.00	4.50	0.45
	NO.HAULS	3	3	12	2	20
06-10AUG	CPUE	0.00	0.00	0.00	9.00	0.90
	SE	0.00	0.00	0.00	7.00	0.80
	NO.HAULS	3	3	12	2	20
20-24AUG	CPUE	0.00	0.00	0.25	9.50	1.10
	SE	0.00	0.00	0.25	8.50	0.90
	NO.HAULS	3	3	12	2	20
03-07SEP	CPUE	0.00	0.00	0.00	34.00	3.40
	SE	0.00	0.00	0.00	14.00	2.55
	NO.HAULS	3	3	12	2	20
17-21SEP	CPUE	0.00	0.33	0.00	24.50	2.50
	SE	0.00	0.33	0.00	24.50	2.45
	NO.HAULS	3	3	12	2	20
01-05OCT	CPUE	0.00	0.00	0.00	9.50	0.95
	SE	0.00	0.00	0.00	9.50	0.95
	NO.HAULS	3	3	12	2	20
15-19OCT	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20

(Continued)

Table 6 (Continued).

Week and CPUE		VERNON POOL REGION				
		Brattleboro	Cersosimo	Vernon	Cersosimo Lake	All Regions
Black crappie						
09-13JUL	CPUE	0.00	0.00	0.17	0.00	0.10
	SE	0.00	0.00	0.11	0.00	0.07
	NO.HAULS	3	3	12	2	20
23-27JUL	CPUE	0.00	0.00	1.42	0.00	0.85
	SE	0.00	0.00	0.60	0.00	0.39
	NO.HAULS	3	3	12	2	20
06-10AUG	CPUE	0.00	0.00	1.00	4.00	1.00
	SE	0.00	0.00	0.64	4.00	0.54
	NO.HAULS	3	3	12	2	20
20-24AUG	CPUE	0.00	0.00	0.83	0.00	0.50
	SE	0.00	0.00	0.41	0.00	0.26
	NO.HAULS	3	3	12	2	20
03-07SEP	CPUE	0.00	1.33	3.42	18.50	4.10
	SE	0.00	1.33	2.98	18.50	2.49
	NO.HAULS	3	3	12	2	20
17-21SEP	CPUE	0.00	1.00	0.42	0.00	0.40
	SE	0.00	1.00	0.29	0.00	0.22
	NO.HAULS	3	3	12	2	20
01-05OCT	CPUE	0.00	0.00	1.67	0.50	1.05
	SE	0.00	0.00	0.87	0.50	0.55
	NO.HAULS	3	3	12	2	20
15-19OCT	CPUE	0.00	1.00	2.75	0.00	1.80
	SE	0.00	1.00	1.62	0.00	1.00
	NO.HAULS	3	3	12	2	20

(Continued)

Table 6 (Continued).

Week and CPUE		VERNON POOL REGION				
		Brattleboro	Cersosimo	Vernon	Cersosimo Lake	All Regions
Rock bass						
09-13JUL	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
23-27JUL	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
06-10AUG	CPUE	0.00	0.00	0.00	2.00	0.20
	SE	0.00	0.00	0.00	2.00	0.20
	NO.HAULS	3	3	12	2	20
20-24AUG	CPUE	0.00	0.33	0.42	0.00	0.30
	SE	0.00	0.33	0.34	0.00	0.21
	NO.HAULS	3	3	12	2	20
03-07SEP	CPUE	7.33	2.67	0.50	0.50	1.85
	SE	7.33	1.45	0.26	0.50	1.10
	NO.HAULS	3	3	12	2	20
17-21SEP	CPUE	9.67	8.33	0.17	0.00	2.80
	SE	5.49	8.33	0.17	0.00	1.57
	NO.HAULS	3	3	12	2	20
01-05OCT	CPUE	0.67	0.33	0.42	0.00	0.40
	SE	0.67	0.33	0.26	0.00	0.18
	NO.HAULS	3	3	12	2	20
15-19OCT	CPUE	0.00	0.00	0.33	3.50	0.55
	SE	0.00	0.00	0.22	3.50	0.37
	NO.HAULS	3	3	12	2	20

(Continued)

Table 6 (Continued).

Week and CPUE		VERNON POOL REGION				
		Brattleboro	Cersosimo	Vernon	Cersosimo Lake	All Regions
Largemouth bass						
09-13JUL	CPUE	0.00	0.33	0.58	2.00	0.60
	SE	0.00	0.33	0.34	1.00	0.24
	NO.HAULS	3	3	12	2	20
23-27JUL	CPUE	0.00	1.33	2.83	1.50	2.05
	SE	0.00	1.33	0.58	0.50	0.45
	NO.HAULS	3	3	12	2	20
06-10AUG	CPUE	0.00	0.00	4.50	1.00	2.80
	SE	0.00	0.00	1.79	1.00	1.16
	NO.HAULS	3	3	12	2	20
20-24AUG	CPUE	0.00	0.00	0.58	0.00	0.35
	SE	0.00	0.00	0.26	0.00	0.17
	NO.HAULS	3	3	12	2	20
03-07SEP	CPUE	1.67	1.67	1.83	3.00	1.90
	SE	0.88	0.88	0.61	0.00	0.40
	NO.HAULS	3	3	12	2	20
17-21SEP	CPUE	0.67	0.67	0.17	0.50	0.35
	SE	0.67	0.33	0.17	0.50	0.15
	NO.HAULS	3	3	12	2	20
01-05OCT	CPUE	0.33	0.00	0.75	0.00	0.50
	SE	0.33	0.00	0.30	0.00	0.20
	NO.HAULS	3	3	12	2	20
15-19OCT	CPUE	0.00	0.00	1.58	1.00	1.05
	SE	0.00	0.00	0.53	1.00	0.36
	NO.HAULS	3	3	12	2	20

(Continued)

Table 6 (Continued).

Week and CPUE		VERNON POOL REGION				
		Brattleboro	Cersosimo	Vernon	Cersosimo Lake	All Regions
Pumpkinseed						
09-13JUL	CPUE	0.00	0.00	0.50	0.50	0.35
	SE	0.00	0.00	0.29	0.50	0.18
	NO.HAULS	3	3	12	2	20
23-27JUL	CPUE	0.00	0.00	0.83	0.00	0.50
	SE	0.00	0.00	0.39	0.00	0.25
	NO.HAULS	3	3	12	2	20
06-10AUG	CPUE	0.00	0.00	0.67	0.00	0.40
	SE	0.00	0.00	0.40	0.00	0.24
	NO.HAULS	3	3	12	2	20
20-24AUG	CPUE	0.00	1.00	0.67	0.00	0.55
	SE	0.00	1.00	0.43	0.00	0.29
	NO.HAULS	3	3	12	2	20
03-07SEP	CPUE	0.00	0.33	1.50	0.00	0.95
	SE	0.00	0.33	0.78	0.00	0.49
	NO.HAULS	3	3	12	2	20
17-21SEP	CPUE	1.33	0.33	2.75	0.00	1.90
	SE	1.33	0.33	1.17	0.00	0.75
	NO.HAULS	3	3	12	2	20
01-05OCT	CPUE	0.00	3.67	5.58	0.00	3.90
	SE	0.00	3.67	1.67	0.00	1.21
	NO.HAULS	3	3	12	2	20
15-19OCT	CPUE	0.67	0.67	0.42	0.00	0.45
	SE	0.67	0.67	0.19	0.00	0.17
	NO.HAULS	3	3	12	2	20

(Continued)

Table 6 (Continued).

Week and CPUE		VERNON POOL REGION				
		Brattleboro	Cersosimo	Vernon	Cersosimo Lake	All Regions
Smallmouth bass						
09-13JUL	CPUE	0.33	0.33	0.08	4.00	0.55
	SE	0.33	0.33	0.08	2.00	0.31
	NO.HAULS	3	3	12	2	20
23-27JUL	CPUE	0.67	0.00	0.00	1.00	0.20
	SE	0.67	0.00	0.00	0.00	0.12
	NO.HAULS	3	3	12	2	20
06-10AUG	CPUE	1.00	0.67	0.00	1.50	0.40
	SE	0.58	0.33	0.00	1.50	0.18
	NO.HAULS	3	3	12	2	20
20-24AUG	CPUE	3.67	2.67	2.25	0.50	2.35
	SE	1.86	2.67	0.58	0.50	0.56
	NO.HAULS	3	3	12	2	20
03-07SEP	CPUE	0.00	0.00	0.08	0.00	0.05
	SE	0.00	0.00	0.08	0.00	0.05
	NO.HAULS	3	3	12	2	20
17-21SEP	CPUE	0.67	2.00	0.67	1.50	0.95
	SE	0.67	1.00	0.36	0.50	0.29
	NO.HAULS	3	3	12	2	20
01-05OCT	CPUE	0.00	0.00	0.08	0.00	0.05
	SE	0.00	0.00	0.08	0.00	0.05
	NO.HAULS	3	3	12	2	20
15-19OCT	CPUE	0.00	0.00	0.17	1.00	0.20
	SE	0.00	0.00	0.11	0.00	0.09
	NO.HAULS	3	3	12	2	20

(Continued)

Table 6 (Continued).

Week and CPUE		VERNON POOL REGION				
		Brattleboro	Cersosimo	Vernon	Cersosimo Lake	All Regions
Spottail shiner						
09-13JUL	CPUE	0.00	0.00	0.08	0.00	0.05
	SE	0.00	0.00	0.08	0.00	0.05
	NO.HAULS	3	3	12	2	20
23-27JUL	CPUE	0.00	2.00	1.00	0.00	0.90
	SE	0.00	2.00	0.49	0.00	0.41
	NO.HAULS	3	3	12	2	20
06-10AUG	CPUE	0.00	0.00	2.50	0.00	1.50
	SE	0.00	0.00	1.23	0.00	0.78
	NO.HAULS	3	3	12	2	20
20-24AUG	CPUE	0.00	0.00	0.67	0.00	0.40
	SE	0.00	0.00	0.67	0.00	0.40
	NO.HAULS	3	3	12	2	20
03-07SEP	CPUE	0.00	0.00	0.25	0.00	0.15
	SE	0.00	0.00	0.13	0.00	0.08
	NO.HAULS	3	3	12	2	20
17-21SEP	CPUE	1.33	3.33	1.42	0.00	1.55
	SE	1.33	3.33	1.16	0.00	0.84
	NO.HAULS	3	3	12	2	20
01-05OCT	CPUE	3.33	0.00	1.42	0.00	1.35
	SE	3.33	0.00	1.00	0.00	0.76
	NO.HAULS	3	3	12	2	20
15-19OCT	CPUE	1.00	2.33	0.75	0.00	0.95
	SE	0.58	2.33	0.39	0.00	0.41
	NO.HAULS	3	3	12	2	20

(Continued)

Table 6 (Continued).

Week and CPUE		VERNON POOL REGION				
		Brattleboro	Cersosimo	Vernon	Cersosimo Lake	All Regions
Silvery minnow						
09-13JUL	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
23-27JUL	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
06-10AUG	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
20-24AUG	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
03-07SEP	CPUE	0.00	16.33	0.33	0.00	2.65
	SE	0.00	16.33	0.26	0.00	2.44
	NO.HAULS	3	3	12	2	20
17-21SEP	CPUE	0.67	0.00	0.00	0.00	0.10
	SE	0.67	0.00	0.00	0.00	0.10
	NO.HAULS	3	3	12	2	20
01-05OCT	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
15-19OCT	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20

(Continued)

Table 6 (Continued).

Week and CPUE		VERNON POOL REGION				
		Brattleboro	Cersosimo	Vernon	Cersosimo Lake	All Regions
Chain pickerel						
09-13JUL	CPUE	0.00	0.00	0.17	0.00	0.10
	SE	0.00	0.00	0.11	0.00	0.07
	NO.HAULS	3	3	12	2	20
23-27JUL	CPUE	0.00	0.33	0.17	0.00	0.15
	SE	0.00	0.33	0.11	0.00	0.08
	NO.HAULS	3	3	12	2	20
06-10AUG	CPUE	0.00	0.67	0.50	0.00	0.40
	SE	0.00	0.67	0.15	0.00	0.13
	NO.HAULS	3	3	12	2	20
20-24AUG	CPUE	0.00	0.00	0.25	0.00	0.15
	SE	0.00	0.00	0.18	0.00	0.11
	NO.HAULS	3	3	12	2	20
03-07SEP	CPUE	0.00	1.33	0.25	0.00	0.35
	SE	0.00	1.33	0.18	0.00	0.22
	NO.HAULS	3	3	12	2	20
17-21SEP	CPUE	0.00	0.00	0.67	0.00	0.40
	SE	0.00	0.00	0.50	0.00	0.30
	NO.HAULS	3	3	12	2	20
01-05OCT	CPUE	0.00	0.00	0.08	0.00	0.05
	SE	0.00	0.00	0.08	0.00	0.05
	NO.HAULS	3	3	12	2	20
15-19OCT	CPUE	0.33	0.00	0.25	0.50	0.25
	SE	0.33	0.00	0.18	0.50	0.12
	NO.HAULS	3	3	12	2	20

(Continued)

Table 6 (Continued).

Week and CPUE		VERNON POOL REGION				
		Brattleboro	Cersosimo	Vernon	Cersosimo Lake	All Regions
White sucker						
09-13JUL	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
23-27JUL	CPUE	0.00	0.00	0.33	0.00	0.20
	SE	0.00	0.00	0.19	0.00	0.12
	NO.HAULS	3	3	12	2	20
06-10AUG	CPUE	0.00	0.00	0.08	0.00	0.05
	SE	0.00	0.00	0.08	0.00	0.05
	NO.HAULS	3	3	12	2	20
20-24AUG	CPUE	0.00	0.00	0.08	0.00	0.05
	SE	0.00	0.00	0.08	0.00	0.05
	NO.HAULS	3	3	12	2	20
03-07SEP	CPUE	0.00	0.00	0.00	1.00	0.10
	SE	0.00	0.00	0.00	1.00	0.10
	NO.HAULS	3	3	12	2	20
17-21SEP	CPUE	0.33	0.00	0.00	1.00	0.15
	SE	0.33	0.00	0.00	1.00	0.11
	NO.HAULS	3	3	12	2	20
01-05OCT	CPUE	0.00	0.00	0.00	1.00	0.10
	SE	0.00	0.00	0.00	1.00	0.10
	NO.HAULS	3.0	3.0	12.0	2.0	20.0
15-19OCT	CPUE	0.00	0.00	0.00	0.50	0.05
	SE	0.00	0.00	0.00	0.50	0.05
	NO.HAULS	3	3	12	2	20

(Continued)

Table 6 (Continued).

Week and CPUE		VERNON POOL REGION				
		Brattleboro	Cersosimo	Vernon	Cersosimo Lake	All Regions
Tesselated darter						
09-13JUL	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
23-27JUL	CPUE	0.00	0.00	0.17	1.50	0.25
	SE	0.00	0.00	0.11	1.50	0.16
	NO.HAULS	3	3	12	2	20
06-10AUG	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
20-24AUG	CPUE	0.00	0.33	0.00	0.50	0.10
	SE	0.00	0.33	0.00	0.50	0.07
	NO.HAULS	3	3	12	2	20
03-07SEP	CPUE	0.33	0.00	0.00	0.00	0.05
	SE	0.33	0.00	0.00	0.00	0.05
	NO.HAULS	3	3	12	2	20
17-21SEP	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
01-05OCT	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
15-19OCT	CPUE	1.00	0.00	0.00	0.50	0.20
	SE	1.00	0.00	0.00	0.50	0.16
	NO.HAULS	3	3	12	2	20

(Continued)

Table 6 (Continued).

Week and CPUE		VERNON POOL REGION				
		Brattleboro	Cersosimo	Vernon	Cersosimo Lake	All Regions
Banded Killifish						
09-13JUL	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
23-27JUL	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
06-10AUG	CPUE	0.00	0.00	0.08	0.00	0.05
	SE	0.00	0.00	0.08	0.00	0.05
	NO.HAULS	3	3	12	2	20
20-24AUG	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
03-07SEP	CPUE	0.00	0.33	0.08	0.00	0.10
	SE	0.00	0.33	0.08	0.00	0.07
	NO.HAULS	3	3	12	2	20
17-21SEP	CPUE	0.00	1.00	0.00	0.00	0.15
	SE	0.00	0.58	0.00	0.00	0.11
	NO.HAULS	3	3	12	2	20
01-05OCT	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
15-19OCT	CPUE	0.00	0.00	0.00	0.50	0.05
	SE	0.00	0.00	0.00	0.50	0.05
	NO.HAULS	3	3	12	2	20

(Continued)

Table 6 (Continued).

Week and CPUE		VERNON POOL REGION				
		Brattleboro	Cersosimo	Vernon	Cersosimo Lake	All Regions
Brown bullhead						
09-13JUL	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
23-27JUL	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
06-10AUG	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
20-24AUG	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
03-07SEP	CPUE	0.00	0.00	0.00	0.50	0.05
	SE	0.00	0.00	0.00	0.50	0.05
	NO.HAULS	3	3	12	2	20
17-21SEP	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
01-05OCT	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
15-19OCT	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20

(Continued)

Table 6 (Continued).

Week and CPUE		VERNON POOL REGION				
		Brattleboro	Cersosimo	Vernon	Cersosimo Lake	All Regions
Walleye						
09-13JUL	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
23-27JUL	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
06-10AUG	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
20-24AUG	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
03-07SEP	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
17-21SEP	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
01-05OCT	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
15-19OCT	CPUE	0.33	0.00	0.00	0.00	0.05
	SE	0.33	0.00	0.00	0.00	0.05
	NO.HAULS	3	3	12	2	20

(Continued)

Table 6 (Continued).

Week and CPUE		VERNON POOL REGION				
		Brattleboro	Cersosimo	Vernon	Cersosimo Lake	All Regions
Northern pike						
09-13JUL	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
23-27JUL	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
06-10AUG	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
20-24AUG	CPUE	0.00	0.00	0.08	0.00	0.05
	SE	0.00	0.00	0.08	0.00	0.05
	NO.HAULS	3	3	12	2	20
03-07SEP	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
17-21SEP	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
01-05OCT	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
15-19OCT	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20

(Continued)

Table 6 (Continued).

Week and CPUE		VERNON POOL REGION				
		Brattleboro	Cersosimo	Vernon	Cersosimo Lake	All Regions
Common carp						
09-13JUL	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
23-27JUL	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
06-10AUG	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
20-24AUG	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
03-07SEP	CPUE	0.00	0.00	0.08	0.00	0.05
	SE	0.00	0.00	0.08	0.00	0.05
	NO.HAULS	3	3	12	2	20
17-21SEP	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
01-05OCT	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20
15-19OCT	CPUE	0.00	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00	0.00
	NO.HAULS	3	3	12	2	20

Table 7. Weekly and Regional Mean Density (Number of Fish per 1000 m3) of Fish Taxa Caught by Midwater Trawl in Vernon Pool of the Connecticut River, July – October 2001.

Week and Taxon		VERNON POOL REGION			
		Brattleboro	Cersosimo	Vernon	All Regions
All Taxa					
09-13JUL	CPUE	0.22	0.00	0.00	0.06
	SE	0.22	0.00	0.00	0.06
	NO.TOWS	3	3	6	12
23-27JUL	CPUE	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00
	NO.TOWS	3	3	6	12
06-10AUG	CPUE	0.22	0.22	0.00	0.11
	SE	0.22	0.22	0.00	0.07
	NO.TOWS	3	3	6	12
20-24AUG	CPUE	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00
	NO.TOWS	3	3	6	12
03-07SEP	CPUE	0.23	0.00	0.00	0.06
	SE	0.23	0.00	0.00	0.06
	NO.TOWS	3	3	6	12
17-21SEP	CPUE	0.00	0.00	0.12	0.06
	SE	0.00	0.00	0.12	0.06
	NO.TOWS	3	3	6	12
01-05OCT	CPUE	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00
	NO.TOWS	3	3	6	12
15-19OCT	CPUE	0.52	0.42	0.11	0.29
	SE	0.52	0.42	0.11	0.16
	NO.TOWS	3	3	6	12

(Continued)

Table 7 (Continued).

Week and Taxon		VERNON POOL REGION			
		Brattleboro	Cersosimo	Vernon	All Regions
Spottail shiner					
09-13JUL	CPUE	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00
	NO.TOWS	3	3	6	12
23-27JUL	CPUE	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00
	NO.TOWS	3	3	6	12
06-10AUG	CPUE	0.22	0.22	0.00	0.11
	SE	0.22	0.22	0.00	0.07
	NO.TOWS	3	3	6	12
20-24AUG	CPUE	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00
	NO.TOWS	3	3	6	12
03-07SEP	CPUE	0.23	0.00	0.00	0.06
	SE	0.23	0.00	0.00	0.06
	NO.TOWS	3	3	6	12
17-21SEP	CPUE	0.00	0.00	0.12	0.06
	SE	0.00	0.00	0.12	0.06
	NO.TOWS	3	3	6	12
01-05OCT	CPUE	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00
	NO.TOWS	3	3	6	12
15-19OCT	CPUE	0.26	0.21	0.11	0.17
	SE	0.26	0.21	0.11	0.09
	NO.TOWS	3	3	6	12

(Continued)

Table 7 (Continued).

Week and Taxon		VERNON POOL REGION			
		Brattleboro	Cersosimo	Vernon	All Regions
Bluegill					
09-13JUL	CPUE	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00
	NO.TOWS	3	3	6	12
23-27JUL	CPUE	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00
	NO.TOWS	3	3	6	12
06-10AUG	CPUE	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00
	NO.TOWS	3	3	6	12
20-24AUG	CPUE	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00
	NO.TOWS	3	3	6	12
03-07SEP	CPUE	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00
	NO.TOWS	3	3	6	12
17-21SEP	CPUE	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00
	NO.TOWS	3	3	6	12
01-05OCT	CPUE	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00
	NO.TOWS	3	3	6	12
15-19OCT	CPUE	0.26	0.00	0.00	0.07
	SE	0.26	0.00	0.00	0.07
	NO.TOWS	3	3	6	12

(Continued)

Table 7 (Continued).

Week and Taxon		VERNON POOL REGION			
		Brattleboro	Cersosimo	Vernon	All Regions
Largemouth bass					
09-13JUL	CPUE	0.22	0.00	0.00	0.06
	SE	0.22	0.00	0.00	0.06
	NO.TOWS	3	3	6	12
23-27JUL	CPUE	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00
	NO.TOWS	3	3	6	12
06-10AUG	CPUE	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00
	NO.TOWS	3	3	6	12
20-24AUG	CPUE	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00
	NO.TOWS	3	3	6	12
03-07SEP	CPUE	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00
	NO.TOWS	3	3	6	12
17-21SEP	CPUE	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00
	NO.TOWS	3	3	6	12
01-05OCT	CPUE	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00
	NO.TOWS	3	3	6	12
15-19OCT	CPUE	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00
	NO.TOWS	3	3	6	12

(Continued)

Table 7 (Continued).

Week and Taxon		VERNON POOL REGION			
		Brattleboro	Cersosimo	Vernon	All Regions
Black crappie					
09-13JUL	CPUE	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00
	NO.TOWS	3	3	6	12
23-27JUL	CPUE	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00
	NO.TOWS	3	3	6	12
06-10AUG	CPUE	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00
	NO.TOWS	3	3	6	12
20-24AUG	CPUE	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00
	NO.TOWS	3	3	6	12
03-07SEP	CPUE	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00
	NO.TOWS	3	3	6	12
17-21SEP	CPUE	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00
	NO.TOWS	3	3	6	12
01-05OCT	CPUE	0.00	0.00	0.00	0.00
	SE	0.00	0.00	0.00	0.00
	NO.TOWS	3	3	6	12
15-19OCT	CPUE	0.00	0.21	0.00	0.05
	SE	0.00	0.21	0.00	0.05
	NO.TOWS	3	3	6	12

Table 8. Standing Crop Index (and Standard Error, SE) for Juvenile American Shad in Vernon Pool Regions of the Connecticut River, July - October 2001.

2001	Brattleboro		Cersosimo		Vernon		Cersosimo Lake		All Regions	
Week	Index	SE	Index	SE	Index	SE	Index	SE	Index	SE
09-13 Jul	0	0	0	0	0	0	0	0	0	0
23-27 Jul	0	0	0	0	0	0	0	0	0	0
06-10 Aug	0	0	0	0	0	0	0	0	0	0
20-24 Aug	0	0	0	0	0	0	0	0	0	0
03-07 Sep	0	0	0	0	0	0	244	244	244	244
17-21 Sep	0	0	0	0	0	0	0	0	0	0
01-05 Oct	0	0	0	0	17251	17251	244	244	17494	17494
15-19 Oct	0	0	1728	1728	0	0	0	0	1728	1728
MEAN	0	0	216	216	2156	2156	61	61	2433	2433

NOTE: Standing Crop Index is the weekly mean estimated total number of juvenile American shad in each region.

Table 9. Standing Crop Index of Juvenile American Shad Abundance in Vernon Pool Regions of the Connecticut River during July October 2000 and 2001.

Region	2000	2001
Brattleboro	1,069	0
Cersosimo	108	216
Cersosimo Lake	944	61
Vernon	29,123	2,156
Combined	**31,244**	**2,433**

Table 10. Annual Juvenile American Shad Standing Crop Index and the Estimated Number of Adult Shad in Vernon Pool of the Connecticut River.

Year	Juvenile Shad Index in Vernon Pool	Adult Shad Passed Upstream at Vernon Dam1			Adult Shad Trucked from Holyoke Lift and Stocked in Vernon Pool2			Combined Number of Adult Shad in Vernon Pool		
		Males	Females	Total	Males3	Females3	Total	Males	Females	Total
2000	31244	632	168	800	474	533	1007	1106	701	1807
2001	2433	1538	128	1666	31	40	71	1569	168	1737

1American shad upstream passage at Vernon Dam as reported in Normandeau 2002 (Bulletin No. 77). A ten-year average of 79% males (1990-2001, 2000 excluded) was used to estimate the sex composition of the run during 2000 because sex composition was not determined in that year.
2American shad trucked as reported by Dr. Caleb Slater, Pers. Comm., 22 April 2002.
3Number of male and female adult American shad estimated from the overall sex ratio reported for the Holyoke lift in each year, Dr. Caleb Slater, Pers. Comm., 22 April 2002.