Predation on Salvaged Fish During the Collection, Handling, Transport, and Release Phase of the State Water Project's John E. Skinner Delta Fish Protective Facility

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ABSTRACT

Predation by fish on fish salvaged at the John E. Skinner Delta Fish Protective Facility could reduce this facility's ability to mitigate the entrainment loss of listed fishes such as delta smelt (*Hypomesus transpacificus*). This study attempted to determine if predation by fish within the facility was significant during the collection, handling, transport, and release phase (CHTR phase) of salvage operations during spring 2005 and winter 2006. A diet study determined if predators fed during the CHTR phase and described the extent of predation. A digestion study evaluated whether characteristics of digested fish could be used to determine if the diet items were consumed during the CHTR phase. Predators fed during the CHTR phase. Comparison of mean diet contents from predators did not show significant differences between CHTR phases. Striped bass (*Morone saxatilis*) preyed selectively on Chinook salmon (*Oncorhynchus tshawytscha*), threadfin shad (*Dorosoma petenense*), delta smelt, prickly sculpin (*Cottus asper*), western mosquitofish (*Gambusia affinis*), and largemouth bass (*Micropterus salmoides*), but only the occurrence of threadfin shad and delta smelt were found to be density dependent. Most indices of digestion were not effective in determining when a prey item was eaten relative to the CHTR phase. Values for frequency of occurrence and the relative degree of body digestion suggest that the predation of rare species such as delta smelt may be low in the CHTR phase. Stomach contents suggest that overall consumption within the fish facility were comparable to that reported outside of facilities. Differences in seasonal diet composition and prey selection were noted and explanations for these differences discussed.

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INTRODUCTION

The John E. Skinner Delta Fish Protective Facility (Skinner Fish Facility) is the fish-collection facility to the State Water Project's (SWP) California Aqueduct located in Byron, California (Figure 1). Its purpose is to reduce the number of fish lost into the California Aqueduct. Fish are collected at the facility, trucked away from the immediate influence of the export pumps, and released back into the Sacramento-San Joaquin Estuary.

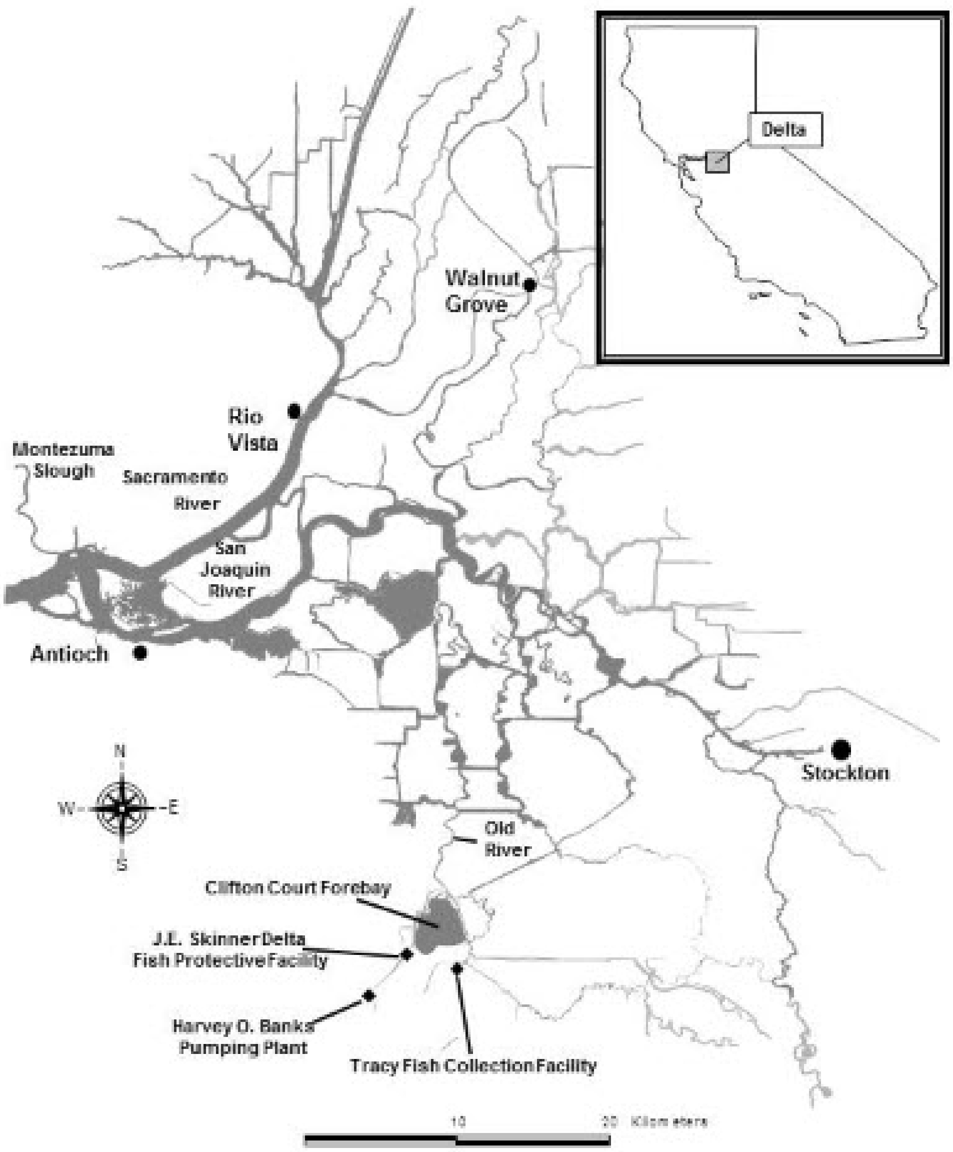

Figure 1 Location of the John E. Skinner Delta Fish Protective Facility

Increased fish predation has been associated with structures such as dams and water diversions (Stevens 1959; Blackwell and Juanes 1998; Tucker and others 1998). These structures can provide hydraulic refuges for predators to rest and to ambush concentrated numbers of prey.

Predation within the Skinner Fish Facility has been of special concern since the facility concentrates prey and provides feeding habitat for predators. Predation on juvenile Chinook salmon (*Oncorhynchus tshawytscha*) and delta smelt (*Hypomesus transpacificus*) were of particular interest due to their federal and state Endangered Species Act listings. Both species are prey of striped bass (*Morone saxatilis*) in the Sacramento-San Joaquin Estuary and Sacramento River (Stevens 1966; Tucker and others 1998).

The SWP salvage process consists of a series of sequential steps that fish must negotiate successfully to survive and be returned to the Delta. As water flows from Clifton Court Forebay (CCF) towards the export pumps, fish are diverted by a set of primary louvers into a bypass channel (Figure 2). Fish are guided from the secondary channel by either screens or louvers into holding tanks. Fish are held in the tanks for a period generally ranging from 8 to 24 hours (holding tank phase). Water is drained from holding tanks into loading buckets (collection phase = C). Loading buckets are raised via a crane and moved to trucks into which contents of the bucket are released (handling phase = H). The trucks are driven approximately 50 minutes to one of 2 release sites in the Delta (transport phase = T). Fish are discharged from trucks through a pipe into the Delta (release phase = R) away from the hydraulic influence of the pumps (Aasen 2004).

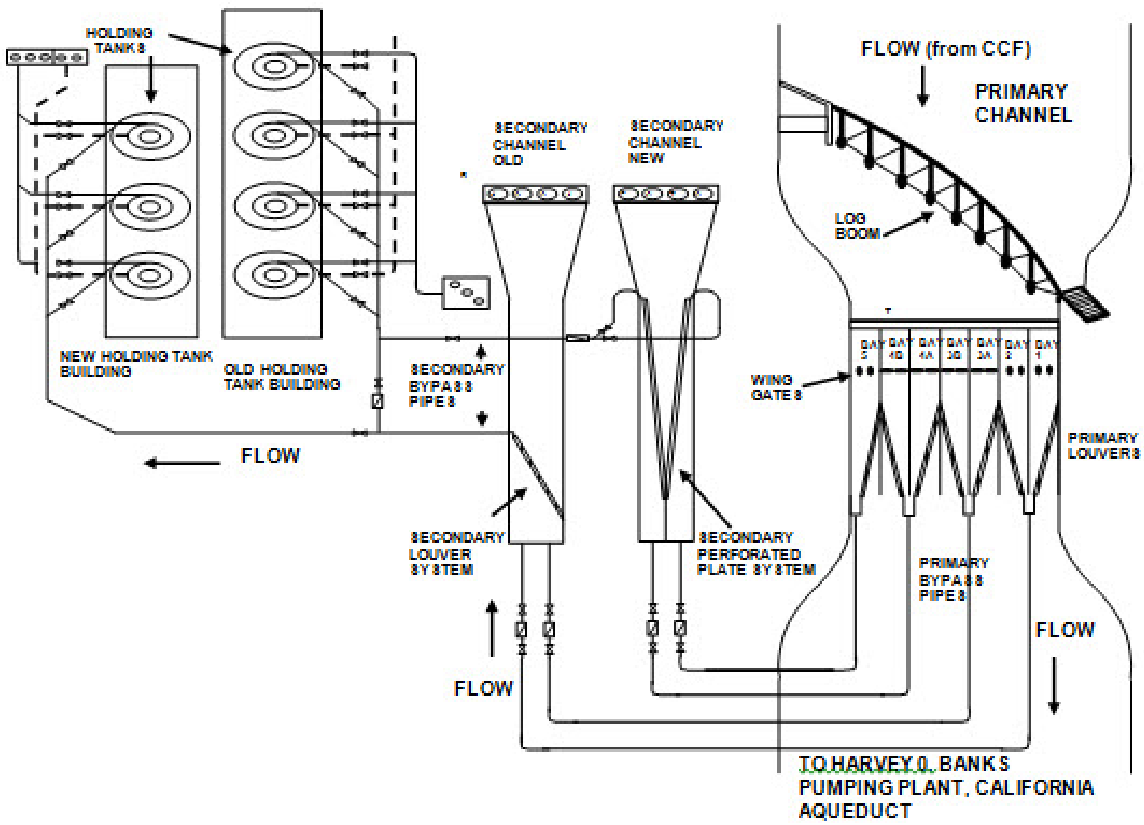

Figure 2 **Schematic diagram of the John E. Skinner Delta Fish Protective Facility**

The collection, handling, transport, and release (CHTR) phase was of particular interest because delta smelt were considered to be sensitive to handling (Moyle 2002). The process was believed to cause harm through mortality, stress, and possibly predation (Raquel 1989). Resource and water managers were concerned that delta smelt might be suffering high rates of mortality during this phase of fish salvage. The Department of Fish and Game (in 2013, the department changed it's name to California Department of Fish and Wildlife) initiated a series of integrated studies to assess the acute and sublethal effects of the CHTR phase to delta smelt and determine whether these impacts could be mitigated through improved or new fish salvage technologies.

Most predation studies on the export facilities of the SWP have focused on fish loss occurring in CCF. Kano (1990) reported that 7 species of potential predators were present in CCF including white catfish (*Ameiurus catus*), striped bass, channel catfish (*Ictalurus punctatus*), black crappie (*Pomoxis nigromaculatus*), largemouth bass (*Micropterus salmoides*), brown bullhead (*A. nebulosus*), and Sacramento pikeminnow (*Ptychocheilus grandis*). Predation in CCF has been studied for juvenile Chinook salmon (Gingras 1997) and studies have recently been completed for steelhead trout (*Oncorhynchus mykiss*) and delta smelt. Prescreen loss estimates for juvenile Chinook salmon ranged from 63.3% to 98.7%. Predation by striped bass is thought to be the largest component of these losses (Tillman 1994; Gingras 1997) although predation by birds has not been measured.

Predation has been documented in the channels and collection tanks of fish facilities. Liston and others (1994) reported that stomachs removed from striped bass at the Central Valley Project's Tracy Fish Collection Facility contained prey fish including striped bass, shimofuri goby *(Tridentiger bifasciatus*), threadfin shad (*Dorosoma petenense*), American shad (*Alosa sapidissima*), bigscale logperch (*Percina macrolepida*), and possibly delta smelt.

Little is known about predation during the later phases of fish salvage operations, because previous CHTR studies used mortality estimate methods that did not include predation losses (Raquel 1989; Coulston and others 2004). No previous studies have focused on predation occurring in the CHTR phase. It was hypothesized that predation is a likely mortality source because predator and prey fish are concentrated, held, transported, and released at the highest densities experienced during the fish salvage process (Coulston and others 2004).

The main objectives of this study were to determine if predators fed during the CHTR phase and to quantify the extent of predation. The diets of predatory fish (diet study) were examined during the CHTR process and concurrent experimental feeding experiments were conducted to quantify the state of digestion of consumed fish within a time period associated with the CHTR phase (digestion study). This study had 5 original hypotheses to test:

- Hypothesis 1: Predators feed during the CHTR process.
- Hypothesis 2: Predation varies by salvage component (CH versus CHTR phase).
- Hypothesis 3: Predation is affected by variations in densities of predators and prey.
- Hypothesis 4: Predation is affected by prey life stage and season.
- Hypothesis 5: Predation is affected by diel period (day and night).

The last hypothesis was not tested because haul outs at night did not consistently occur.

METHODS

To assess whether predators fed during CHTR (Hypothesis 1), I first needed to examine the digestion rates and devise means to distinguish fish eaten during the relatively short CHTR period ($\leq$ 2 h) from fish ingested in the holding tank or upstream of the fish-collection building. I conducted a digestion study to document the digestive process at time intervals necessary to distinguish fish eaten during the CHTR from fish eaten prior. Digestion trials were conducted with captive predatory fish to evaluate whether characteristics of consumed fish could be used to determine when they were consumed.

I also conducted a diet study to describe the stomach contents of predators collected from the CHTR process and characteristics of consumed items. Diet contents of predators were sampled at 2 points during and after the CHTR process.

Field work was performed during 2 seasons: April through July 2005 and December 2005 through March 2006. The winter and spring seasons were chosen to coincide with the period when delta smelt are normally entrained into the SWP.

The field collections for the diet studies were conducted on site of the Skinner Fish Facility on the State Water Project's (SWP) California Aqueduct located in Byron, California or at their salvaged-fish release site at Horseshoe Bend (Figure 1).

Diet Study

The study design used 2 predator samples taken during a single CHTR process per day. During the handling phase, the contents of each holding tank were drained into a loading bucket. Holding times prior to sampling varied from 8 to 24 hours depending on the presence of delta smelt (8 hours maximum), Chinook salmon (12 hours), or low salvage with no presence of species of special interest (24 hours).

Predators were collected from the bucket by 3 staff using dip nets for 2 minutes. A sub-sample of predators was removed from the loading bucket with dip nets (CH sample). Up to 4 holding tanks were sampled per day. No sampling was attempted prior to the collection phase since staff was forbidden to enter holding tanks. Any non-predator caught was returned to the bucket alive.

After the first predator samples were taken, the contents of the loading buckets were placed into the truck and driven for 50 minutes to simulate routine transportation to a release site. After the simulated haul was completed, the truck released its contents into a 45,425-L pool on Skinner Fish Facility grounds. Water from the pool was drained through a screened outlet and predators were collected with dip nets. In the spring 2005, the later sample represented the remaining fish that underwent the entire CHTR phase (CHTR sample).

In winter 2006, the second predator sample was collected from the truck at the release sites in the Sacramento-San Joaquin Estuary instead of the release pool to reduce costs. Although fish in these collections did not undergo the release phase, I considered these to be equivalent to the

CHTR samples for analysis purposes. Sampling was done by 2 staff using dip nets for 6 minutes. Facility counts were compared to concurrent CHTR Acute Mortality Study release-pool counts (Morinaka, personal communication, see "Notes").

Stomachs from predators were immediately removed by incisions to the esophagus and upper intestine and preserved at low temperature (-30 °C) using dry ice. Predator size was measured (fork length, FL or total length, TL) to the nearest millimeter and weighed to the nearest tenth of a gram. Stomach samples were stored in an ultra-low temperature freezer until they were prepared for dissection at the CHTR test building. After stomachs were thawed to room temperature, a lengthwise incision was made to the stomach, and the number of identifiable prey fish per stomach was recorded. Prey fish were removed and identified to nearest taxa. We used a photographic cleithrum key to help identify partially-digested fish. A stereo dissecting microscope (Bausch & Lomb StereoZoom 5) was used to identify small prey items and an electronic balance scale (Acculab Balance VIC-4mq) was used to obtain the wet weight (g) of each consumed fish. Each prey was measured and recorded for standard length (mm). Standard length of prey was converted to a length measurement (FL or TL) commonly used for each species if length conversion factors existed (Froese and Pauly 2007).

Each prey was inspected visually in the laboratory and the percent of scales digested, percent of body digested, the degree of color fading, and the extent of fin digestion was determined. Based on these determinations, rank scores were assigned for percent of scales digested and percent of body digested. The extent of fin digestion was recorded as attribute data (Table 1). The rank and attribute categories were determined from pilot study results. Color fading is not reported here since virtually all were faded regardless of digestion time.

Table 1 Rank or attribute values for digestion indices

Scale digestion (%)	Body digestion (%)	Fin digestion
0 = Scales intact	0 = Flesh intact	0 = Fins intact
1 = <1	1 = <10	1 = Fins frayed
2 = 11-25	2 = 11-25	2 = Pelvic fully digested
3 = 26-50	3 = 26-50	3 = Pectoral fully digested
4 = 51-75	4 = 51-75	4 = Anal fully digested
5 = 76-100	5 = 76-100	5 = Dorsal fully digested
		6 = Caudal fully digested
		7 = All fins fully digested

To document prey available for consumption (Hypothesis 3), all non-predators were identified to species, counted, and measured to the nearest millimeter (FL or TL) in the spring 2005 trials. When non-predators were too numerous to process individually, volumetric counts were obtained by measuring the number of fish per deciliter based on a count of 50 fish and then multiplied by the total volume of fish collected. In the winter of 2006, prey composition, abundance, and size distributions were estimated from routine salvage data.

To determine if facility operations affected predation, these parameters were noted: Primary and secondary channel water velocities and bypass ratios, collection tanks in use or sampled, collection tank water depths, and collection tank flows. Those parameters affect salvage efficiency and the number of fish collected in the salvage operations. Those factors may also affect the condition of fish collected.

To determine whether environmental conditions affected predation, these parameters were recorded: Water temperature (°C), dissolved oxygen (mg/L), and specific conductivity (µS/cm) were measured using a water quality meter (YSI Model 556 Multi-Probe System). Water clarity (cm) was measured by a 120 cm Secchi tube. Measurements were taken in the collection tank and from the release pool prior to the tank release in spring 2005 and from the truck in winter 2006. Type and weight (kg) of debris were also recorded in spring 2005.

The principal approach to determine the extent of predation occurring in the CHTR phase (Hypotheses 1 and 2) was to compare the magnitude of stomach contents between CH and CHTR samples. The number of prey fish per stomach was determined for each paired CH and CHTR sample. I compared the results by season-year to determine seasonal differences in predator diet (Hypothesis 4).

The diet data was determined to be parametric or nonparametric based upon inspection of frequency distributions. A Mann-Whitney significance test was used (Zar 1999), since the data did not appear to be normally distributed due to a high number of zero samples. Only prey judged to have been eaten within 2 hours of CHTR were included in the analysis, because CHTR takes approximately 2 hours. By extrapolating the results from the predator digestion study, prey with more than 51% body digestion were consumed prior to CHTR. A Mann-Whitney test was used to determine if differences in the mean number of prey per stomach during CH and CHTR were significant at $\alpha = 0.05$. If mean prey per stomach in CHTR was significantly greater than in CH, it would infer that predation in CHTR was occurring at a significant level.

The diets of predators were analyzed in 3 groups: *all predators*, *striped bass*, and adult *white catfish* (*all predators*, *striped bass*, and *white catfish* will be in italics when referring only to these 3 analysis groups). Frequency of occurrence, which is the proportion of predators that contained a given prey, was calculated for certain species and for all prey combined. Striped bass were grouped into 3 season-specific categories: young (6 to 14 cm in spring 2005 and 12 to 23 cm in winter 2006), juvenile (15 to 26 cm in spring 2005 and 24 to 35 cm in winter 2006), and sub-adult (27 to 47 cm in spring 2005 and 36 to 47 cm in winter 2006). The striped bass stomach contents were otherwise pooled to increase sample size due to zero or low numbers of prey per stomach. A Strauss selectivity index, L = r¡ - p¡, where r¡ is the relative abundance of prey type ¡ in the diet and p¡ is the relative abundance of prey type ¡ in the environment, was used to determine prey selectivity of predator fish (Bowen 1996). The p¡ value was calculated as the number of given prey divided by total number of all prey available collected during CHTR. The r¡ value was calculated as the number of particular prey divided by total number of prey. Predators were considered to display positive selectivity if $L > 0.100$ or negative selection if $L < -0.100$ for a given prey species; neutral selectivity would be near 0.000. Simple linear correlation coefficients were calculated to determine if the relationships between environmental parameters and the mean number of prey per stomach were significant at the $\alpha = 0.05$ level.

I plotted the combined mean prey per stomach as a function of available prey fish density for samples from which predators were derived and used linear regression to determine if the relationship was significant at the $\alpha = 0.05$ level (Zar 1999). No regression analysis was attempted if the criteria of the regression models were not met such as a high incident of zero samples (obviously non-linear). The length distributions for consumed prey and prey fish available in the CHTR environment were compared to determine if predators selected prey by size.

Digestion Study

Several digestion indices were developed to determine when individual prey from predator stomachs were consumed relative to when predators were sampled (CHTR). The extent and degree of digestion for each index was empirically determined through feeding seasonally-available prey fish, delta smelt, and splittail (*Pogonichthys macrolepidotus*) to captive striped bass and white catfish. The predators were euthanized and their stomachs were dissected after either 1 hour (the minimum time it would take to complete the CHTR phase), 2 hours (the maximum time it would take to complete the CHTR phase), or 4 hours (feeding during the holding tank period or earlier). The digestion of prey was evaluated to see if digestion indices could accurately predict whether prey items were consumed during the holding tank period or during the CHTR phase.

Based on pilot study results, these 4 digestion parameters were evaluated for utility in documenting digestion time: percent of scales digested, percent of body digested, degree of fin digestion, and color fading (Table 1). Color fading results were not included in the analysis since the majority of prey were faded within 1 hour of time interval trials (Appendix M). A total of 56 digestion experiments were conducted in spring 2005 and 68 experiments were completed in the winter of 2006. By determining the digestion characteristics of prey fish after 1, 2, and 4 hours, a digestion criterion was selected and used to determine if individual prey fish were consumed during or prior to the CHTR phase.

Striped bass and white catfish were also used in digestion experiments. Subject fish were collected during predator removals from the Skinner Fish Facility's salvage operation and from CCF by angling. Predators were held without food in 1,363-L circular tanks for at least 5 days to purge their stomachs and encourage feeding. At the start of each experiment, 3 predators were placed in a 341-L tank and were offered 10 prey fish. Only predators less than 440 mm FL in length and prey less than 80 mm FL in length were used. The tank was left undisturbed and checked after 10 minutes to see if any of the prey were eaten. If no prey were eaten, another 10 minutes was allowed for predators to feed. If no feeding occurred after 20 minutes, the experiment was ended. If feeding occurred, all remaining prey were removed and predators were euthanized after either 1, 2, or 4 hours of digestion. Water temperature, dissolved oxygen, and specific conductivity were measured and recorded during the digestion period.

Fish length and weight measurements, the laboratory methods for processing the stomach samples, and the scoring method for the digestion indices were consistent with those used in the diet study. The same inspection method was used to evaluate the statistical properties of the digestion data.

Inspection of the digestion scores indicated that non-parametric significance testing was appropriate. Kruskal-Wallis significance tests were used to determine whether there were statistically significant differences in digestion scores between 1, 2, and 4 hour digestion intervals at the $\alpha = 0.05$ level (Zar 1999). Nonparametric multiple comparison tests were used to determine which digestion intervals were significantly different (Zar 1999). A nonparametric Mann-Whitney significance test was used to determine if the occurrence of feeding varied significantly with water temperature.

Predator and Prey Estimates

Seasonal estimates of predator-sized striped bass and juvenile Chinook salmon salvage at the Skinner Fish Facility were compared to examine their relative abundances and to evaluate their potential predation. Monthly estimates of juvenile Chinook salmon and predator-sized striped bass salvage during winter and spring of 2005 and 2006 were obtained from the Skinner Fish Facility by querying the Department of Fish and Game's salvage databases (Aasen 2008). Monthly estimates of predator-sized striped bass salvage were determined by selecting the minimum predator size necessary to consume the smallest Chinook salmon. Striped bass can eat prey approximately half their size; therefore, the minimum size of striped bass considered predatory was set by multiplying the minimum monthly length of juvenile Chinook salmon by 2. The proportions of striped bass greater than or equal to these minimum sizes were used to estimate the number of predatory striped bass by month. The monthly totals of Chinook salmon and predator-sized striped bass salvage were analyzed to determine the predation potential during the juvenile Chinook salmon-salvage season.

Quality Control Methods

The YSI meter was calibrated for specific conductance before and once during the study using a factory-prepared 1,430 µS/cm KCl solution. Dissolved oxygen measurements were calibrated daily by entering the barometric pressure and using the instrument's calibration routine. The electronic balance was calibrated daily using a 200 g certified weight. The operator's "accuracy" was calculated from determining the difference between a measurement made by technician and a second QC value recorded by the lead person. Mean accuracy and standard deviation were calculated and reported. Acceptable performance goals were achieved when mean accuracy was below stated acceptable performance goal precision levels (Table 2). A minimum of 5% of the field and laboratory data observations were checked, and relative accuracy of duplicate measurements during both study elements were determined for most of the study parameters. Performance measurements for precision were not attempted for any parameters.

Data Entry and Data Analysis

Field and laboratory data sheets were reviewed for completeness and legibility prior to key entry. Observations regarding accuracy were recorded on the data sheets. Study data were entered into

MS Access databases by a key entry operator and checked line-by-line for accuracy. Key entry accuracy was audited a second time by subsampling 10 % of the data entered, comparing values against the original data sheets, and calculating a percent error rate. Data were summarized using MS Excel spreadsheets or analyzed using Systat Version 9. Some nonparametric analyses were performed manually using procedures described by Zar (1999). Written and electronic documentation on the data files and the data analyses were developed and maintained at the Stockton DFG Bay Delta Region office.

Table 2 Quality control performance goals

Variable	Calibration frequency	Accuracy check frequency	Error allowed for accuracy
Dissolved O2	Daily	5% Random sample	5%
Specific conductance	Before and once during trial period	5% Random sample	5%
Water Temperature	NA	5% Random sample	5%
Water clarity	NA	5% Random sample	5%
Predator weight	Daily	5% Random sample	<0.75 grams for fish less than 50 grams and <1.5 grams for fish equal to or more than 50 grams
Prey weight	Daily	5% Random sample	<0.75 grams for fish less than 50 grams and <1.5 grams for fish equal to or more than 50 grams
Predator length	NA	5% Random sample	<3 mm for fish less than 100 mm and <5 mm for fish equal to or more than 100mm
Prey length	NA	5% Random sample	<3 mm for fish less than 100 mm and <5 mm for fish equal to or more than 100mm
Predator counts	NA	5% Random sample	3%
Species identification	NA	5% Random sample	3%
Non-predatory species counts	NA	5% Random sample	3%
Prey counts	NA	5% Random sample	3%

Table 2 (Cont.) Quality control performance goals

Variable	Calibration frequency	Accuracy check frequency	Error allowed for accuracy
Percent of scales digested	NA	5% Random sample	3%
Type of fins digested	NA	5% Random sample	3%
Percent of body digested	NA	5% Random sample	3%

RESULTS

Diet Study

Species Composition

The spring 2005 collections showed greater numbers and diversity in both predator and prey species compared to collections in winter 2006. From 17 paired collections, a total of 216 predators were sampled during the spring of 2005. Striped bass were the most numerous of the 11 predator species sampled (Table 3 and Figure 3). The spring 2005 stomach samples yielded 204 identifiable fish representing 17 species or taxa (Table 4). In descending order, the most numerous prey fish in the diet were juvenile Chinook salmon, unidentified prey, threadfin shad, delta smelt, prickly sculpin (*Cottus asper*), striped bass, American shad, and largemouth bass.

Table 3 Number and mean length (FL or TL) of predators sampled in spring 2005 and winter 2006

Species	Number	Mean length (mm + SE)
Spring 2005		
Striped bass	100	188.7 ± 7.8
White catfish	62	259.0 ± 6.7
Yellowfin goby	18	77.1 ± 7.0
Pacific staghorn sculpin	10	78.7 ± 3.3
Black crappie	9	126.2 ±13.9
Prickly sculpin	6	45.6 ± 6.6
Largemouth bass	4	146.8 ± 59.6
Channel catfish	2	111.7 ± 14.1

Table 3 (Cont.) Number and mean length (FL or TL) of predators sampled in spring 2005 and winter 2006

Species	Number	Mean length (mm + SE)
Spring 2005		
Brown bullhead	2	213.7 ± 7.8
Warmouth	2	91.0 ± 3.0
Black bullhead	1	277.0
	___	
Annual total	216	
Winter 2006		
Striped bass	526	147.2 ± 2.8
Yellowfin goby	77	179.8 ± 2.6
White catfish	40	268.4 ± 11.2
Channel catfish	15	275.1 ± 24.5
Black crappie	9	231.1 ± 23.9
Largemouth bass	1	272.0
Black bullhead	1	280.0

Annual total	669	

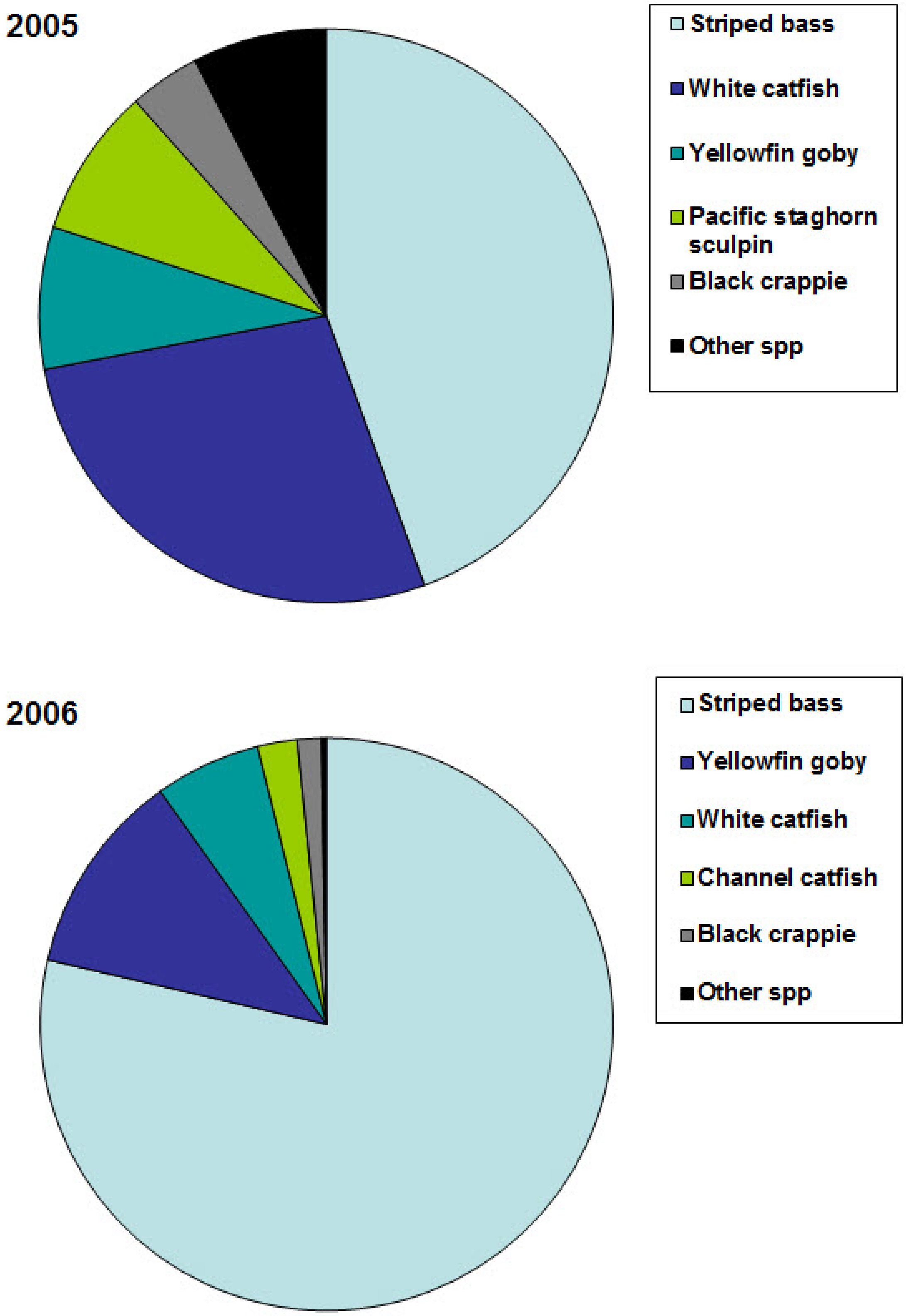

Figure 3 **Proportions of predator species in spring 2005 and winter 2006**

The higher numbers of predator collections performed and predators sampled in the winter of 2006 reflected the change in collection procedures (Table 3). In the winter of 2006, 669 predators were sampled from 42 paired collections. Out of the 7 predator species observed, striped bass were the most numerous species, representing over 78% of the predators sampled (Table 3 and Figure 3). Despite the larger number of stomachs sampled, fewer prey fish (n = 84), species (8) and fewer unidentified fish (4) were observed from the winter 2006 stomach samples (Table 4).

Table 4 Prey fish consumed by *all predators* in spring 2005 and winter 2006

Spring 2005		Winter 2006	
Prey common name	**Prey number**	**Prey common name**	**Prey number**
Chinook salmon	36	Threadfin shad	22
Unknown fish species	30	American shad	21
Threadfin shad	24	Bluegill	12
Delta smelt	23	Inland silverside	12
Prickly sculpin	20	Chinook salmon	7
Striped bass	18	Unknown fish species	4
American shad	15	Western mosquitofish	3
Largemouth bass	11	Delta smelt	2
Rainwater killifish	6	Prickly sculpin	1
Unknown smelt species	5		
Splittail	4		
Bluegill	4		
Unknown sculpin species	3		
Unknown goby species	2		
Inland silverside	1		
Yellowfin goby	1		
Shimofuri goby	1		
Total	204	Total	84

Operational and Environmental Conditions

The observed conditions for specific conductivity, dissolved oxygen, primary channel flow, holding tank flow, and export rates were generally consistent with operational or environmental conditions either measured independently at the Skinner Fish Facility or expected under normal seasonal conditions. Observed water temperatures varied from 14.1 to 25.6°C in the spring of 2005 and from 8.8 to 14.3°C in the winter 2006 (Appendix E and F). Primary velocities ranged from 1,130 to 8,660 cfs in the spring 2005 and from 1,130 to 9,415 cfs in the winter 2006 (Table 5). Observed water temperatures were higher than those reported at the Skinner Fish Facility in winter 2006, but the differences were probably due to calibration errors with the Skinner Fish Facility's monitoring equipment. Mean salvage collection times in the holding tanks prior to initial sampling were 10.6 hours in 2005 and 18.1 hours in 2006.

Table 5 Operational parameters at the John E. Skinner Delta Fish Protective Facility in spring 2005 and winter 2006

Date	Collection tank time (h)	Export rate (AF)	Primary channel flow (cfs)	Collection tank flow (cfs)
Spring 2005				
4/1/2005	12	7,934	6,780	7.7
4/8/2005	12	11,721	4,895	8.5
4/13/2005	12	11,164	4,895	8.4
4/14/2005	12	11,580	4,895	8.2
4/21/2005	8	6,870	1,130	7.5
5/19/2005	12	2,666	4,520	9.6
5/20/2005	12	2,657	4,520	8.1
5/25/2005	12	2,595	1,130	3.5
6/2/2005	8	6,806	1,880	3.7
6/14/2005	8	12,848	8,660	7.5
6/15/2005	8	12,653	8,660	15.6
6/16/2005	8	11,639	6,780	10.0
6/21/2005	8	2,376	5,650	5.7
6/29/2005	12	13,054	7,910	7.7
7/8/2005	12	14,026	7,910	7.4
7/13/2005	12	14,050	8,660	0.9
7/15/2005	12	14,515	8,660	7.2
Winter 2006				
12/5/2005	24	8,711	3,390	7.5
12/6/2005	24	10,916	4,520	7.6

Table 5 (Cont.) **Operational parameters at the John E. Skinner Delta Fish Protective Facility in spring 2005 and winter 2006**

Date	Collection tank time (h)	Export rate (AF)	Primary channel flow (cfs)	Collection tank flow (cfs)
12/12/2005	24	13,147	6,780	7.1
12/13/2005	12	12,092	5,650	9.5
12/15/2005	24	12,054	5,650	9.5
12/16/2005	24	12,014	4,520	76.6
12/21/2005	24	13,785	9,415	9.0
1/4/2006	NA	NA	NA	NA
1/5/2006	8	6,264	7,910	9.2
1/10/2006	8	6,809	4,895	8.6
1/12/2006	12	5,225	1,130	7.8
1/18/2006	12	6,358	1,130	7.3
1/19/2006	12	5,117	7,155	7.7
1/20/2006	12	6,687	7,155	7.6
1/24/2006	12	6,088	7,155	7.4
1/27/2006	12	4,907	7,155	6.6
2/2/2006	12	8,469	3,390	7.3
2/3/2006	8	7,861	2,260	7.1
2/7/2006	12	6,147	7,910	8.8
2/8/2006	24	8,356	2,260	7.5
2/9/2006	24	8,356	2,260	7.3
2/10/2006	24	9,275	2,260	7.6
2/14/2006	24	8,959	7,910	8.7
2/15/2006	24	10,645	9,415	9.1
2/16/2006	24	14,293	7,910	8.7
2/17/2006	24	11,905	7,910	9.4
2/21/2006	24	11,958	7,910	9.4
2/22/2006	12	12,640	7,910	8.9
2/23/2006	12	10,959	7,910	9.0

Table 5 (Cont.) Operational parameters at the John E. Skinner Delta Fish Protective Facility in spring 2005 and winter 2006

Date	Collection tank time (h)	Export rate (AF)	Primary channel flow (cfs)	Collection tank flow (cfs)
3/1/2006	12	5,107	2,635	7.9
3/2/2006	12	5,107	2,635	8.3
3/3/2006	16	3,626	2,635	8.6
3/6/2006	12	4,622	6,780	8.8
3/7/2006	12	4,822	6,780	7.0
3/8/2006	12	4,841	6,780	7.6
3/9/2006	12	4,079	6,780	7.2
3/13/2006	24	4,747	6,780	7.3
3/14/2006	24	3,808	6,780	7.1
3/15/2006	24	3,927	1,130	7.7
3/17/2006	24	4,958	5,650	8.7
3/20/2006	24	7,200	5,650	9.3
3/22/2006	24	6,259	1,130	7.4
3/24/2006	24	5,859	6,780	9.5
3/27/2006	24	5,899	6,780	8.3
3/28/2006	24	7,092	6,780	8.0
4/3/2006	24	3,837	5,650	8.7

Predator Size

During the spring of 2005, predators were generally small and ranged from 45.6 mm mean TL for prickly sculpin to 277 mm mean TL for black bullhead (Table 3). Striped bass, white catfish, yellowfin goby, channel catfish, largemouth bass, and warmouth were predominantly juveniles. Pacific staghorn sculpin, black crappie, prickly sculpin, brown bullhead, and black bullhead were predominantly adults.

Predators collected during the winter of 2006 were generally larger compared to the spring of 2005 (Table 3). The mean size of predators ranged from 147.2 mm FL for striped bass to 280 mm TL for black bullhead (Table 3).

Mean Prey per Stomach Comparisons

No significant differences were observed between the mean number of prey per stomach from CH and CHTR samples (Table 6).

The winter 2006 results showed that mean number of prey per stomach was equal for the two groups tested. Mean number of prey per stomach was not significantly different during CH and CHTR for *all predators* or *striped bass* (Table 6). *White catfish* did not feed in either the CH or the CHTR samples.

Table 6 Mean prey per stomach for CH and CHTR samples with corresponding U statistic, degrees of freedom, and probability

	Mean prey per stomach ± SE				
Predator species	**CH**	**CHTR**	**U**	**df**	***p***
Spring 2005					
All predators:					
All prey	0.87 ± 0.50	0.44 ± 0.11	121.5	1	0.41
Delta smelt	0.07 ± 0.05	0.05 ± 0.03	128.5	1	0.41
C. Salmon	0.05 ± 0.04	0.16 ± 0.09	125.5	1	0.33
Striped bass	1.65 ± 0.97	0.55 ± 0.19	51.5	1	0.91
White catfish	0.05 ± 0.04	0.13 ± 0.09	48.0	1	0.83
Winter 2006					
All predators					
All prey	0.09 ± 0.02	0.09 ± 0.03	900.5	1	0.49
Striped bass	0.19 ± 0.10	0.09 ± 0.03	811.0	1	0.52

Effects of Environmental and Operational Factors on Predation

Mean numbers of prey per stomach were correlated with water temperature and dissolved oxygen for *striped bass*, *white catfish*, and *all predators* combined. No significant correlations were observed between the number of prey per stomach and specific conductance, debris load, collection tank time, export rate, primary channel flow, or collection tank flow (Tables 7 and 8). Water clarity was correlated with the number of prey per stomach for *white catfish* and *striped bass*, but not for *all predators*.

Table 7 **Correlation coefficients and probabilities for the relationship between mean prey per stomach for *all predators* and selected operational parameters. Asterisks indicate significant differences at a = 0.05**

Species/parameter	*r*	*p*
All predators		
Temperature (°C)	0.27	0.04*
Dissolved oxygen (mg/L)	0.31	0.01*
Specific conductance (µs/cm)	0.14	0.27
Water clarity (cm)	0.25	0.59
Debris level (kg)	0.14	0.66
Striped bass		
Temperature	0.33	0.01*
Dissolved oxygen	0.29	0.03*
Specific conductance	0.13	0.33
Water clarity	0.25	0.06
Debris level	0.18	0.60
White catfish		
Temperature	0.87	0.01*
Dissolved oxygen	0.86	0.01*
Specific conductance	0.26	0.56
Water clarity	0.84	0.01*
Debris level	0.25	0.52

Table 8 **Correlation coefficients and probabilities for the relationship between mean prey per stomach for *all predators* and selected operational parameters. Asterisks indicate significant differences at a = 0.05**

Species/parameter	*r*	*p*
All predators		
Collection tank time (h)	0.24	0.06
Export rate (AF)	0.06	0.61
Primary channel flow (cfs)	0.01	0.88

Table 8 (Cont.) Correlation coefficients and probabilities for the relationship between mean prey per stomach for *all predators* and selected operational parameters. Asterisks indicate significant differences at a = 0.05

Species/parameter	*r*	*p*
Collection tank flow (cfs)	0.05	0.67
Striped bass		
Collection tank time	0.23	0.09
Export rate	0.12	0.38
Primary channel flow	0.09	0.50
Collection tank flow	0.04	0.76
White catfish		
Collection tank time	0.96	0.001*
Export rate	0.22	0.62
Primary channel flow	0.04	0.92
Collection tank flow	0.42	0.34

Selectivity Indices

In winter 2005, positive selection was observed for juvenile Chinook salmon, delta smelt, threadfin shad, and largemouth bass (Table 9) when *all predators* were pooled. Striped bass, white catfish, bluegill, prickly sculpin, western mosquitofish (*Gambusia affinis*), and shimofuri goby were eaten in proportion to their abundance. Predators tended not to eat American shad and splittail. The selectivity indices were similar when calculated for predatory *striped bass* (Table 10). *White catfish* exhibited a different set of selection values compared to those observed for *striped bass* (Table 11).

Table 9 Strauss selectivity index values for prey fish consumed by *all predators* in spring 2005

Species name	Prey number	Prey environment	P_i	Eaten prey	Total prey eaten	R_i	Selectivity
Chinook salmon	676	14,213	0.048	36	130	0.277	0.229
Delta smelt	38	8,995	0.004	23	106	0.217	0.212
Largemouth bass	65	33,868	0.002	11	89	0.124	0.121

Table 9 (Cont.) **Strauss selectivity index values for prey fish consumed by *all predators* in spring 2005**

Species name	Prey number	Prey environment	P_i	Eaten prey	Total prey eaten	R_i	Selectivity
Threadfin shad	1,102	31,726	0.035	24	156	0.154	0.119
Bluegill	146	14,075	0.010	4	130	0.031	0.020
Prickly sculpin	2,881	36,381	0.079	20	201	0.010	0.020
Shimofuri goby	100	32,983	0.003	1	170	0.006	0.002
Striped bass	5,389	33,906	0.159	18	114	0.158	-0.001
Western mosquitofish	48	35,005	0.001	0	127	0	-0.001
White catfish	947	39,254	0.024	0	177	0	-0.024
Splittail	6,198	39,254	0.158	4	177	0.023	-0.135
American shad	10,276	31,988	0.321	15	102	0.147	-0.174

Table 10 **Strauss selectivity index values of prey fish consumed by *striped bass* in spring 2005**

Species name	Prey number	Prey environment	P_i	Eaten prey	Total prey eaten	R_i	Selectivity
Chinook salmon	676	14,213	0.048	34	94	0.362	0.314
Delta smelt	38	8,995	0.004	12	85	0.142	0.136
Threadfin shad	1,102	31,726	0.035	20	122	0.164	0.129
Largemouth bass	65	33,868	0.002	10	77	0.130	0.127
Striped bass	5,389	33,906	0.159	15	79	0.190	0.030
Bluegill	146	14,075	0.010	3	94	0.032	0.022
Prickly sculpin	2,881	36,381	0.079	14	155	0.090	0.011
Western mosquitofish	48	35,005	0.001	0	156	0	-0.001
White catfish	947	39,254	0.024	0	131	0	-0.024
Shimofuri goby	100	32,983	0.003	0	156	0	-0.003
Splittail	6,198	39,254	0.158	3	131	0.023	-0.134
American shad	10,276	31,988	0.321	11	76	0.145	-0.176

Table 11 Strauss selectivity index values of prey fish consumed by *white catfish* in spring 2005

Species name	Prey number	Prey environment	P_i	Eaten prey	Total prey eaten	R_i	Selectivity
Splittail	4,992	36,901	0.135	5	18	0.278	0.142
Striped bass	5,389	31,809	0.169	4	13	0.308	0.138
Delta smelt	18	11,334	0.002	2	17	0.118	0.116
Prickly sculpin	2,185	33,715	0.065	3	18	0.167	0.101
Bluegill	144	11,860	0.012	1	17	0.059	0.046
Chinook salmon	346	11,860	0.029	0	17	0	-0.029
Threadfin shad	1,083	36,938	0.029	0	18	0	-0.029
White catfish	891	36,901	0.024	0	18	0	-0.024
Shimofuri goby	97	32,865	0.003	0	8	0	-0.002
Largemouth bass	62	31,771	0.002	0	13	0	-0.001
Western mosquitofish	45	32,652	0.001	0	5	0	-0.001
American shad	10,267	31,470	0.326	0	13	0	-0.326

In the winter of 2006 when *all predators* were combined, prickly sculpin and western mosquitofish were among the selected species instead of delta smelt and largemouth bass (Table 12). Inland silversides were only observed in 2006 collections and were selected for. Similar to spring 2005, juvenile Chinook salmon were selected in proportion to their abundance. In contrast, striped bass and American shad were selected against.

Table 12 Strauss selectivity index values for prey fish consumed by *all predators* in winter 2006

Species name	Prey number	Prey environment	P_i	Eaten prey	Total prey eaten	R_i	Selectivity
Chinook salmon	1,301	89,643	0.015	7	28	0.250	0.235
Western mosquitofish	33	14,496	0.002	3	17	0.176	0.174
Prickly sculpin	293	37,113	0.008	1	6	0.167	0.158
Inland silverside	3,121	152,608	0.020	12	85	0.141	0.120

Table 12 (Cont.) **Strauss selectivity index values for prey fish consumed by *all predators* in winter 2006**

Species name	Prey number	Prey environment	P_i	Eaten prey	Total prey eaten	R_i	Selectivity
Bluegill	13,025	151,612	0.086	12	87	0.138	0.052
Largemouth bass	139	58,863	0.002	0	4	0	-0.002
White catfish	2,230	65,767	0.034	0	80	0	-0.033
Splittail	172	29,978	0.006	0	28	0	-0.005
Shimofuri goby	372	66,228	0.006	0	0	0	-0.005
American shad	72,889	159,478	0.457	21	79	0.266	-0.191
Striped bass	26,501	43,301	0.612	0	87	0	-0.612
Delta smelt	NA	NA	NA	NA	NA	NA	NA
Threadfin shad	NA	NA	NA	NA	NA	NA	NA

Because *striped bass* were the most numerous predator sampled in winter 2006, the selectivity values for *all predators* category were similar to those reported for *striped bass*. *Striped bass* showed a strong preference for western mosquitofish and juvenile Chinook salmon (Table 13). Inland silversides were a new prey item and were selected by *striped bass*. In contrast, striped bass and American shad were selected against. No selectivity index was calculated for delta smelt or threadfin shad since the 2006 facility counts were markedly different from those observed concurrently during counts of non-predatory fish species collected from the release pool during the CHTR Acute Mortality Study (Morinaka, personal communication, see "Notes").

Table 13 **Strauss selectivity index values for prey fish consumed by *striped bass* in winter 2006**

Species name	Prey number	Prey environment	P_i	Eaten prey	Total prey eaten	R_i	Selectivity
Western mosquitofish	33	14,496	0.002	3	4	0.750	0.747
Chinook salmon	1,283	89,472	0.014	7	26	0.269	0.254
Inland silverside	3,109	152,437	0.020	10	70	0.143	0.122

Table 13 (Cont.) Strauss selectivity index values for prey fish consumed by *striped bass* in winter 2006

Species name	Prey number	Prey environment	P_i	Eaten prey	Total prey eaten	R_i	Selectivity
Bluegill	13,025	151,612	0.086	6	66	0.091	0.004
Largemouth bass	139	58,863	0.002	0	0	0	-0.002
Shimofuri goby	372	66,228	0.006	0	0	0	-0.005
Splittail	172	29,978	0.006	0	38	0.023	-0.005
Prickly sculpin	293	37,113	0.008	0	3	0	-0.007
White catfish	2,218	65,692	0.034	0	67	0	-0.033
American shad	72,877	159,307	0.457	18	66	0.273	-0.184
Striped bass	26,501	43,225	0.613	0	73	0	-0.612
Delta smelt	NA	NA	NA	NA	NA	NA	NA
Threadfin shad	NA	NA	NA	NA	NA	NA	NA

Prey Abundance Regression

The mean number of delta smelt found in the stomachs of *all predators* was directly proportional to the abundance of available delta smelt (Figure 4). The mean number of threadfin shad per stomach increased at high numbers of available threadfin shad (Figure 4). Typical of other relationships not presented, Chinook salmon data displayed a fan-shaped distribution with unequal variance and consequently did not fit any regression models (Figure 5).

Similar to the results for *all predators*, mean numbers of delta smelt found in the stomachs of *striped bass* were significantly higher (Table 14) with increased numbers of delta smelt (Figure 6). No regression analysis was attempted using *white catfish* since prey species either were not present in many samples or their scatter plots did not show linear patterns.

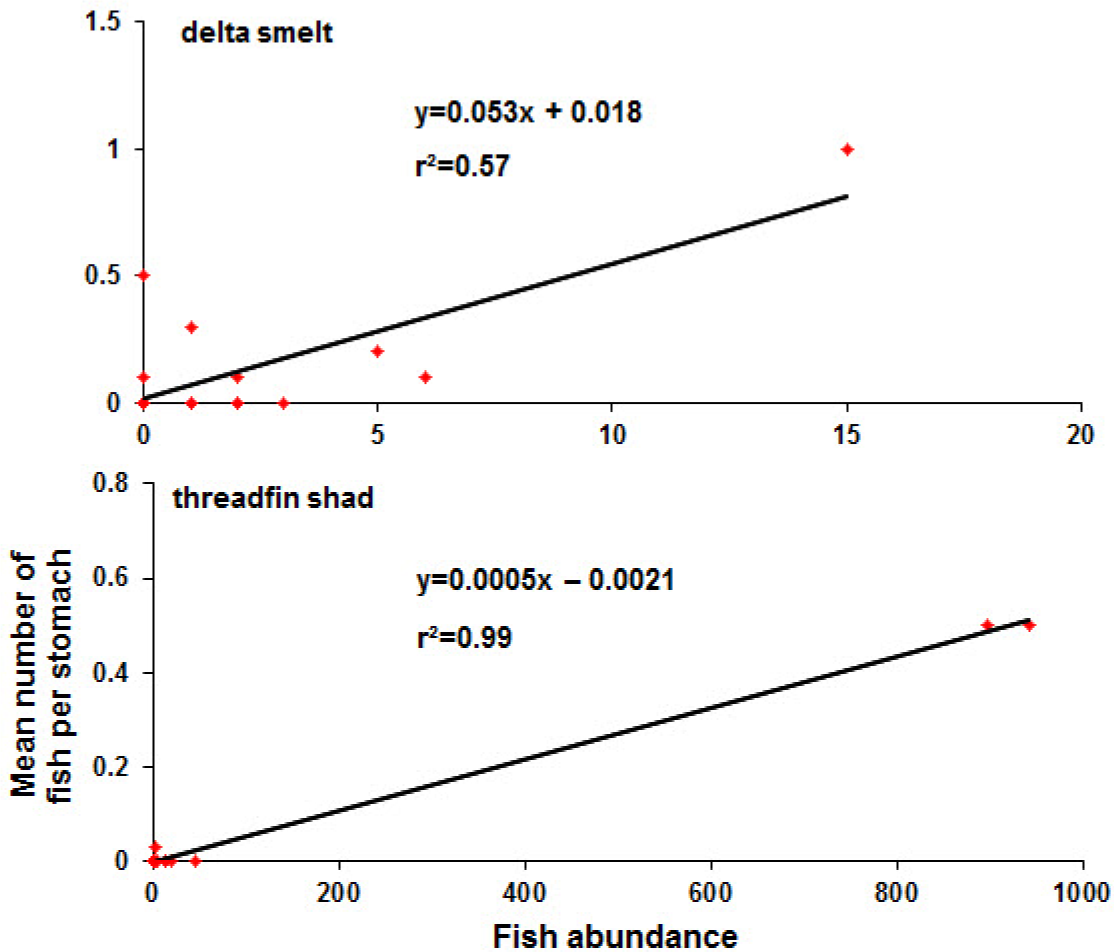

Figure 4 Regression plots for available delta smelt and threadfin shad by ***all predators*** in spring 2005

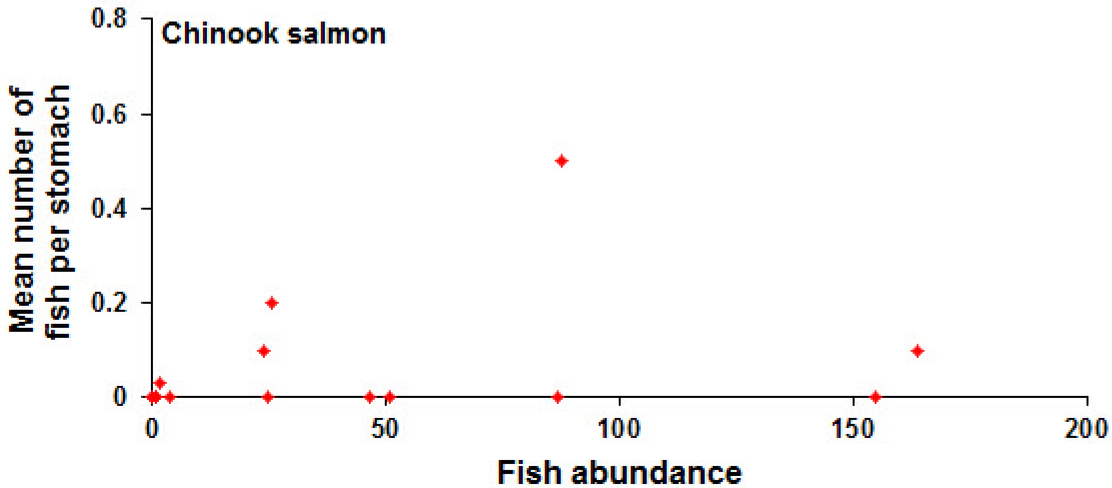

Figure 5 **Scatter plot for available and consumed Chinook salmon by *all predators* in spring 2005**

Table 14 **Linear regression relationships between the spring 2005 mean number of prey per stomach and available prey for *all predators* and *striped bass*. Asterisks indicate significant differences at a = 0.05**

Predator/prey	r^2	n	df	*p*
All predators:				
Delta smelt	0.57	16	1	0.001*
Threadfin shad	0.99	16	1	0.000*
Striped bass:				
Delta smelt	0.37	16	1	>0.001*

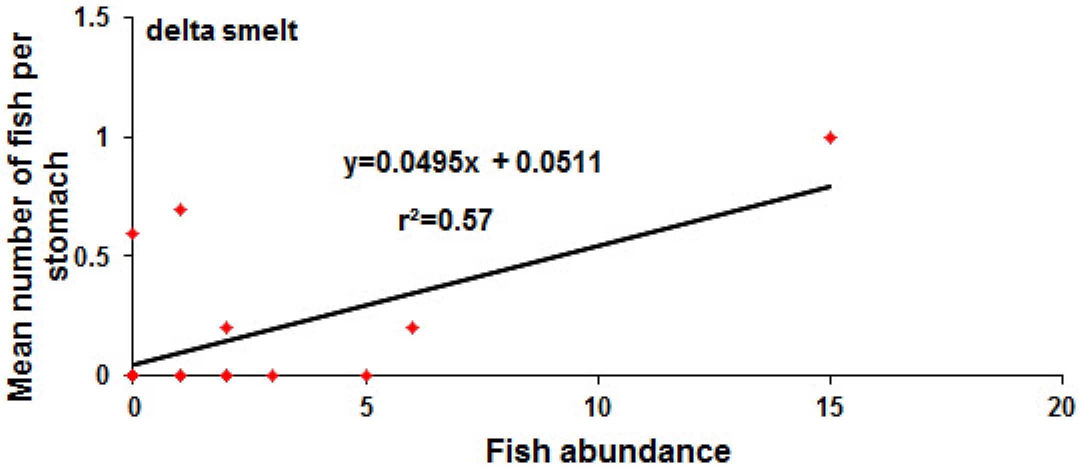

Figure 6 Regression plot for available and consumed delta smelt by *striped bass* in spring 2005

Prey Length Frequency Distributions

In the spring of 2005, *all predators* and *striped bass* fed on smaller prey individuals compared to the size distribution of prey available with delta smelt as the exception (Figures 7 and 8). This trend was observed with juvenile Chinook salmon, young striped bass, juvenile American shad, juvenile threadfin shad, and juvenile prickly sculpin (Figures 7 and 8). Predators fed frequently on juvenile fish in the 10 to 40 mm size range such as American shad, threadfin shad, and prickly sculpin. In contrast, *all predators* fed throughout the range of available size classes of juvenile and adult delta smelt (Figure 8). Almost all of the consumed fish were less than 80 mm in length. Similarly, *white catfish* fed on prey individuals less than 80 mm in length.

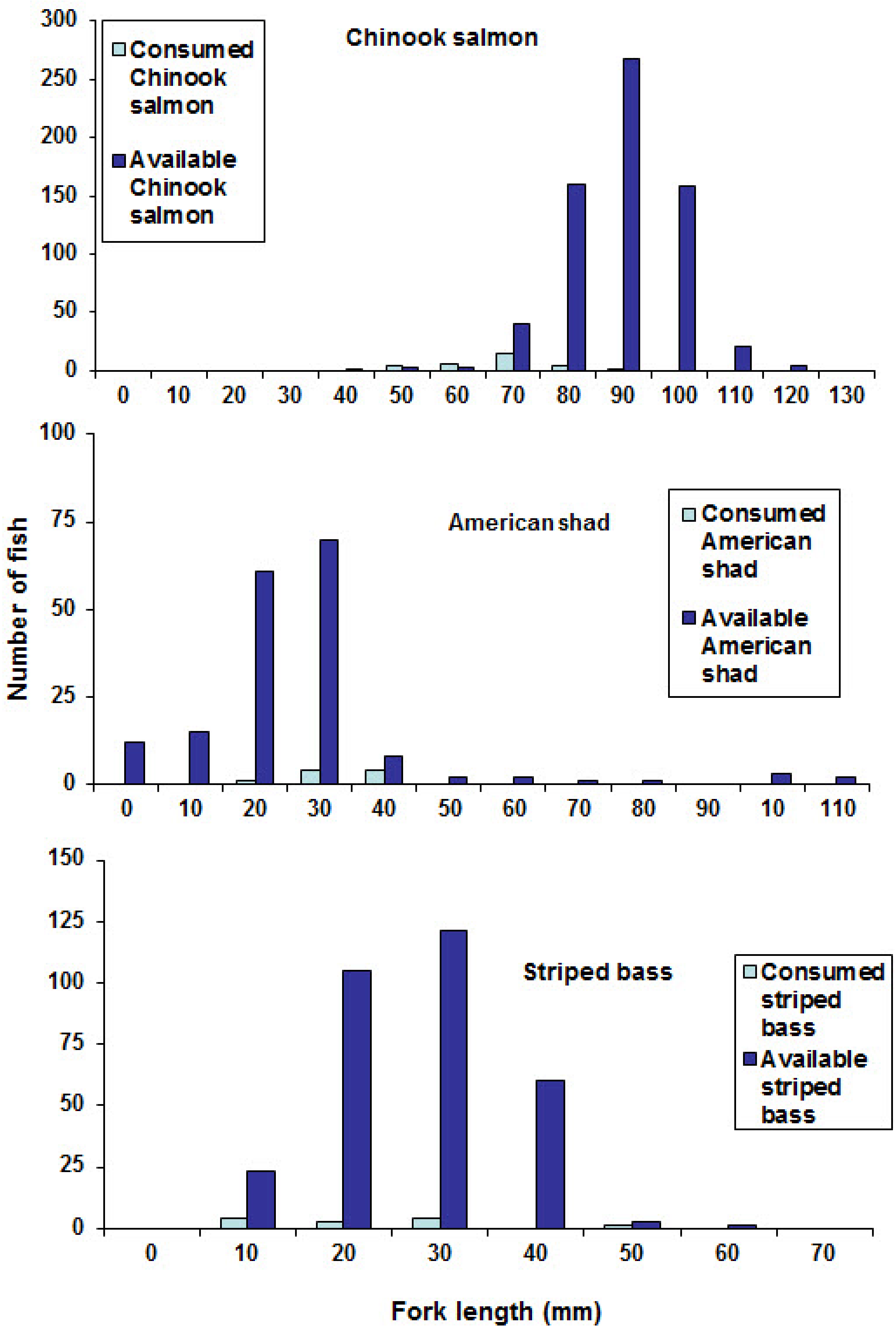

Figure 7 Length frequencies of Chinook salmon, striped bass, and American shad available and consumed by *striped bass* in spring 2005

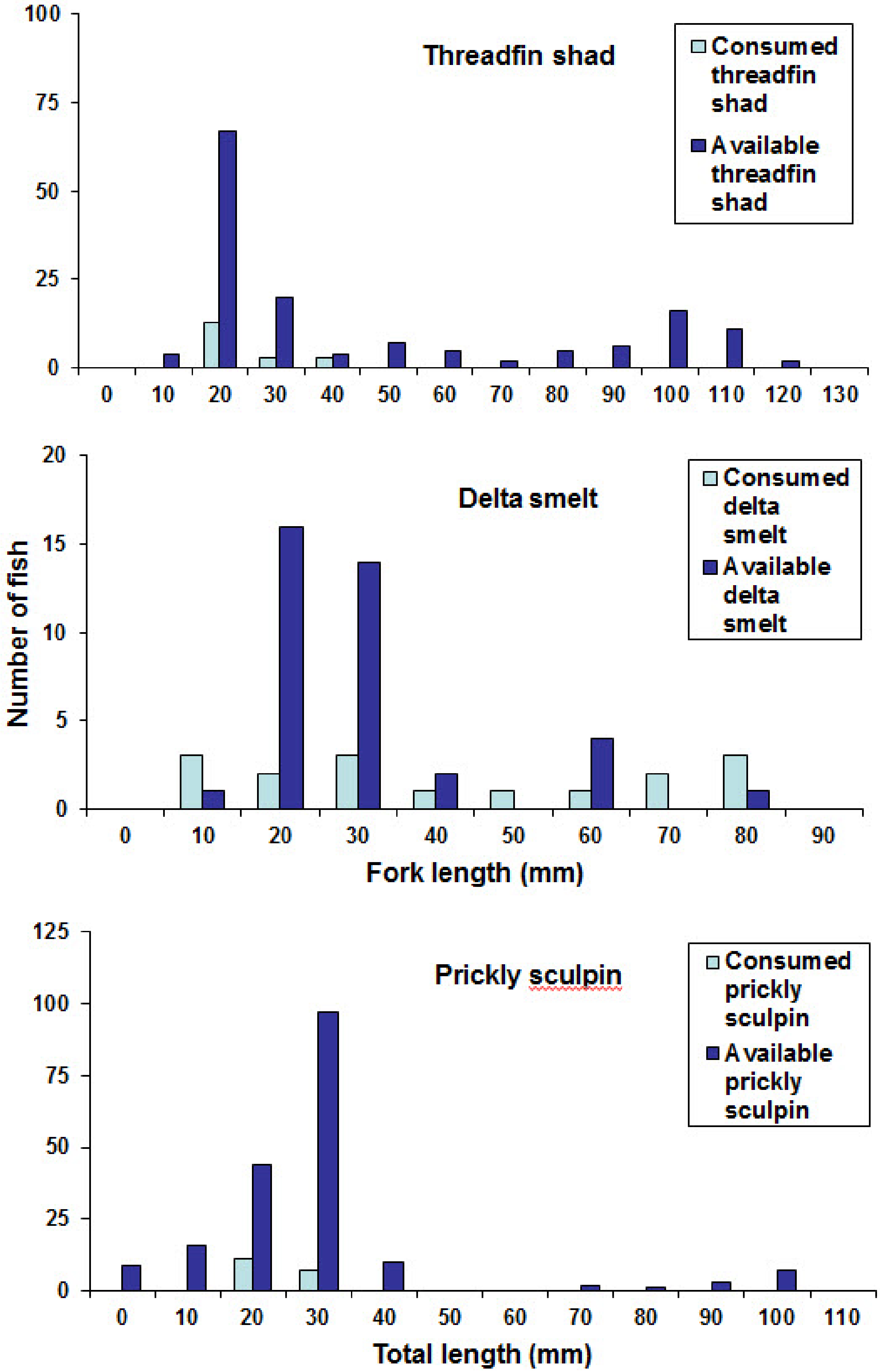

Figure 8 Length frequencies of threadfin shad, delta smelt, and prickly sculpin available and consumed by *all predators* in spring 2005

Winter 2006 prey size distributions tended to be more unimodal in 2006 (Figures 9 and 10) whereas the distributions in spring 2005 were bimodal. Fish less than 100 mm in length dominated the diet compared to the majority of the larger fish found in the salvage collections.

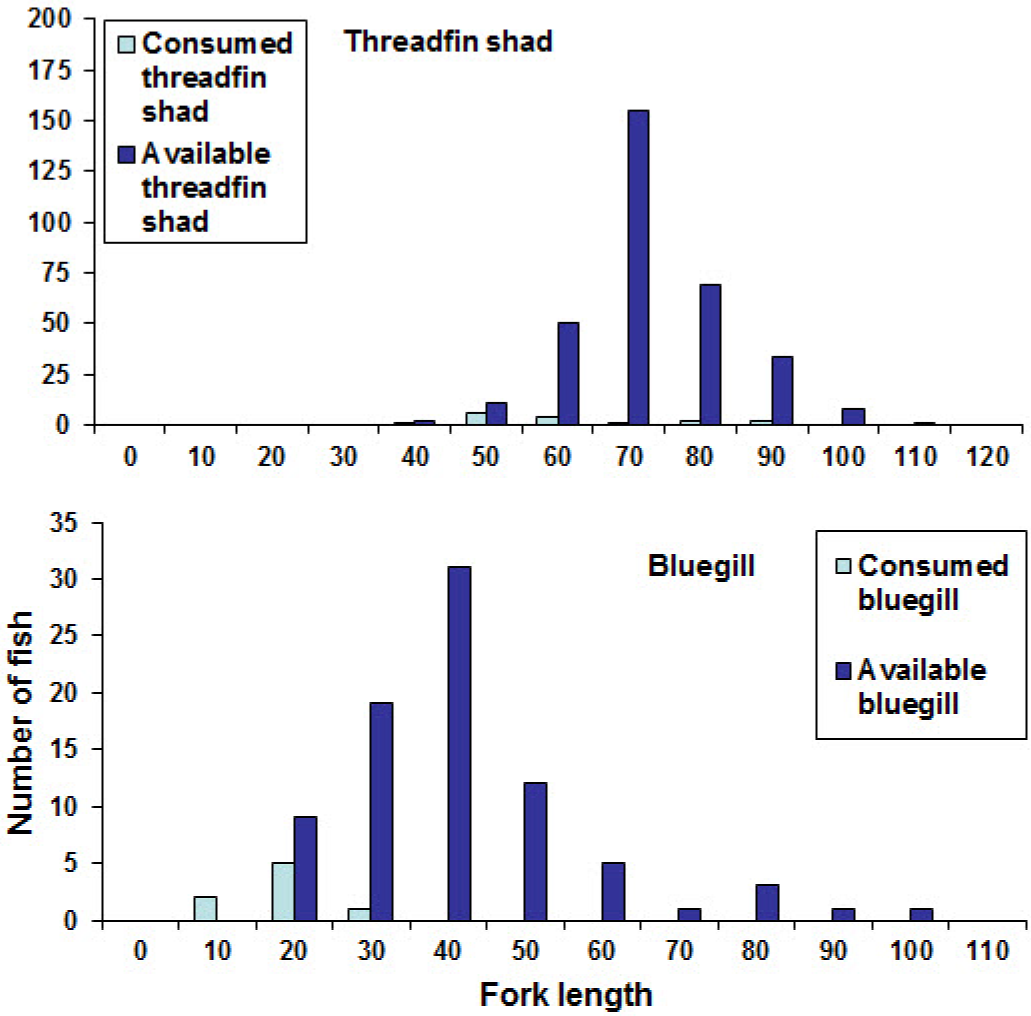

Figure 9 **Length frequencies of threadfin shad and bluegill available and consumed by *all predators* in winter 2006**

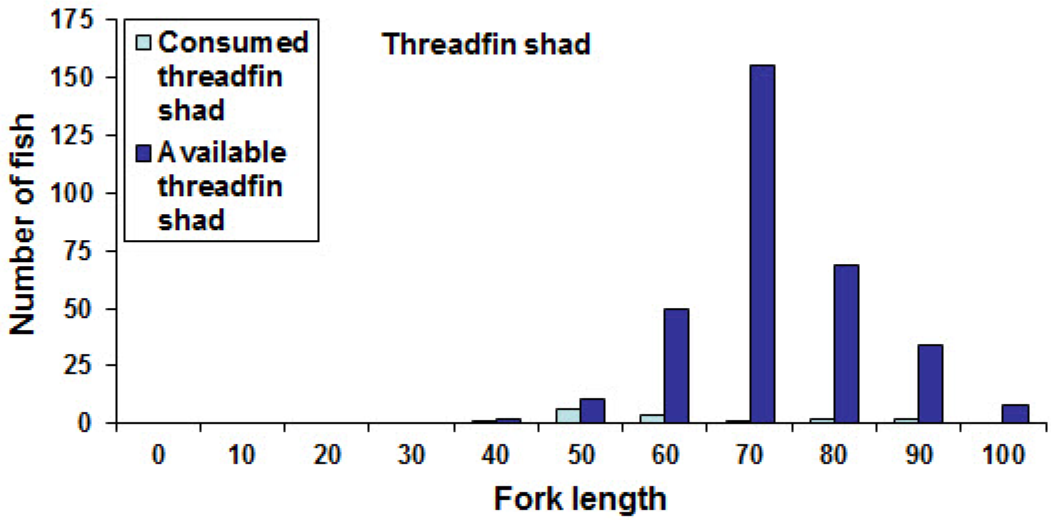

Figure 10 **Length frequencies of threadfin shad available and consumed by *striped bass* in winter 2006**

Frequency of Occurrence

For *all predators* examined in the spring of 2005, a little over one-third of the stomachs contained prey fish (Table 15). Frequency of occurrence of each prey fish species in stomachs was generally low, ranging from 0 to 7.4%. Juvenile Chinook salmon (7.4%) had the highest frequency of occurrence followed by delta smelt (6.0%) and largemouth bass (4.2%). Nearly half (42.6%) of the *striped bass* had fish in their stomachs. Juvenile Chinook salmon had the highest frequency of occurrence followed by American shad and largemouth bass. Juvenile and sub-adult *striped bass* had higher frequencies of stomach items than younger fish (Table 16). Prey fish were found less frequently in the stomachs of *white catfish* and the percentages of species of prey fish were low. Delta smelt and juvenile Chinook salmon were the 2 species most frequently found in the stomachs of *white catfish*.

Table 15 **Frequency of occurrence of prey species in spring 2005**

	Prey occurrence (%)		
Prey species	***All predators***	***Striped bass***	***White catfish***
Chinook salmon	7.4	14.8	0.0
Striped bass	4.1	4.9	3.2
American shad	3.7	6.9	0.0
Threadfin shad	2.8	4.9	1.6
Splittail	0.9	3.2	0.9
Bluegill	1.4	1.9	1.6
Largemouth bass	4.2	5.9	0.0

Table 15 (Cont.) Frequency of occurrence of prey species in spring 2005

	Prey occurrence (%)		
Prey species	***All predators***	***Striped bass***	***White catfish***
Delta smelt	6.0	1.6	6.9
Prickly sculpin	3.2	3.9	1.6
Any prey fish	33.7	42.6	14.5

Table 16 Frequency of occurrence for all prey species combined for *striped bass* of different sizes

Season	Young	Juvenile	Sub-adult
Spring 2005	26.9	46.4	52.6
Winter 2006	5.5	31.6	28.6

Prey items were found less frequently in the stomachs of *all predators* in winter 2006 (Table 17). Frequencies of individual prey fish species in stomachs were about one-fifth less than those observed in spring 2005, ranging from 0 to 1.3%. Unlike the spring of 2005, threadfin shad, American shad, and inland silverside were found most frequently in these later diet studies. Not surprising given their dominance in the predators observed, the percentages of individual prey species found in the stomachs of *striped bass* generally mirrored those reported for *all predators*. Few prey fish were found in the stomachs of young *striped bass* in winter 2006 (Table 17).

Table 17 Frequency of occurrence of prey species in winter 2006

	Prey Occurrence (%)	
Prey species	***All predators***	***Striped bass***
Chinook salmon	0.4	0.6
Striped bass	0.0	0.0
White catfish	0.0	0.0
American shad	1.0	1.9
Threadfin shad	1.3	1.9
Splittail	0.0	0.0
Bluegill	0.7	1.5
Largemouth bass	0.0	0.0

Table 17 (Cont.) Frequency of occurrence of prey species in winter 2006

	Prey Occurrence (%)	
Prey species	***All predators***	***Striped bass***
Delta smelt	0.1	0.4
Prickly sculpin	0.0	0.0
Western mosquitofish	0.4	0.6
Inland silverside	1.0	1.7
Shimofuri goby	0.0	0.0
Percent containing prey fish	7.1	7.4

Prey Digestion Observations

The digestion scores of selected prey items from predatory fish collected from the CHTR collections appear to vary by prey species and digestion indices (Figure 11; Appendixes I to L). High proportions of eaten delta smelt, threadfin shad, and Chinook salmon had most of their scales digested. Partially or completely digested ventral fins were common for delta smelt and Chinook salmon. Body digestion commonly ranged between 0 to 50% digested (Figure 11).

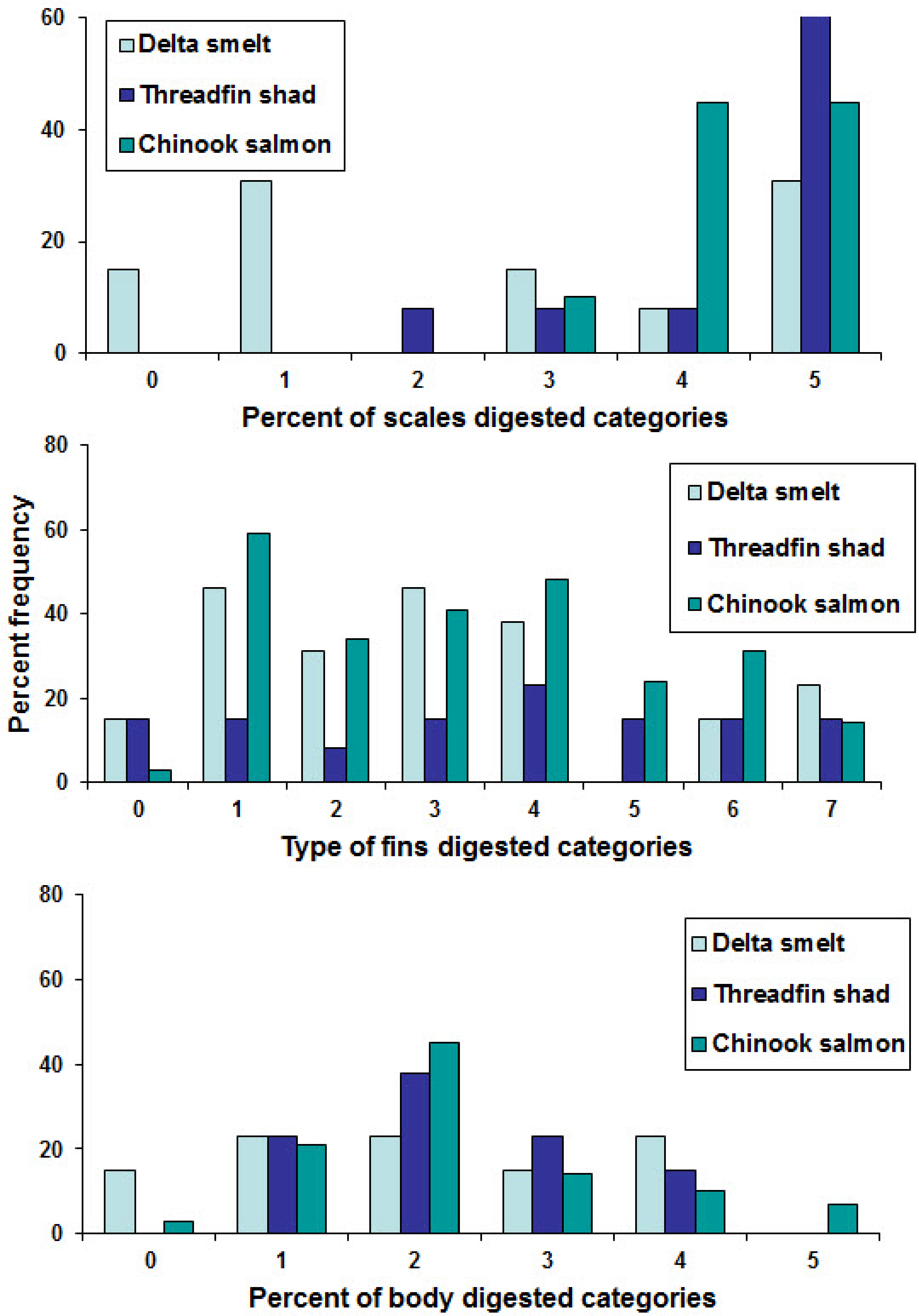

Figure 11 **Digestion scores for selected prey species consumed by wild predators in spring 2005**

Predatory Striped Bass

Predatory striped bass salvage was highest in January and decreased progressively until June of 2005 and 2006 (Table 18). Conversely, Chinook salmon salvage increased to peak levels in May and June. Therefore, juvenile Chinook salmon were exposed to the lowest numbers of predatory striped bass during the spring of 2005 and 2006.

Table 18 Chinook salmon, striped bass, and predator-sized striped bass salvage estimates

Year/month	Striped bass salvage	Predatory striped bass	Juvenile Chinook salmon salvage	Ratio predator: Chinook salmon	Minimum Chinook salmon size (mm FL)
2005					
January	24,540	24,540	814	30.15	26
February	9,841	9,802	506	19.37	30
March	4,318	3,420	506	6.76	48
April	1,503	1,266	3,787	0.33	51
May	529	309	5,338	0.06	70
June	28,652	1,878	1,859	1.01	76
July	137,307	1,392	12	116.00	95
2006					
January	6,847	6,821	250	27.28	30
February	1,840	833	216	3.86	55
March	756	725	568	1.28	34
April	442	424	2,047	0.21	40
May	253	127	471	0.27	80
June	2,561	461	4,932	0.09	74
July	75,220	1,545	132	11.70	74

Digestion Study

Spring 2005

During the spring of 2005, I performed a total of 56 experiments using predator-sized striped bass. Twenty-nine experiments were done with delta smelt as prey and 27 experiments were done with splittail as prey. Striped bass size varied from 191 to 429 mm FL. Eaten delta smelt ranged in size from 35 to 74 mm SL. Eaten splittail ranged in size from 35 to 76 mm SL. The water temperature during these experiments ranged from 11.0 to 22.4°C. White catfish largely did not feed. No significant differences (U = 626, 1df, p = 0.09) were observed between occurrence of feeding and water temperature.

There were significant differences in both percentages of scales and body digested between 1, 2, and 4 hours from the feeding experiments involving striped bass and delta smelt (Table 19). Multiple comparison tests showed that there were significant differences in these digestion indicators between 1 and 4 hours (Table 20). Conversely, there was no significant difference observed in degree of fin digestion (Table 19).

Table 19 Kruskal-Wallis test results for the comparison of striped bass digestion categories 1, 2, and 4 hours. Asterisks indicate significant differences at a = 0.05

Prey species	n	H	df	*p*
Spring 2005				
Delta smelt				
% Scales digested	29	8.8	2	0.01*
Type of fins digested	45	5.4	2	0.06
% Body digested	29	13.7	2	0.001*
Splittail				
% Scales digested	27	0.6	2	0.73
Type of fins digested	56	2.6	2	0.26
% body digested	27	8.5	2	0.01*
Winter 2006				
Delta smelt				
% Scales digested	73	0.8	2	0.64
Type of fins digested	95	10.0	2	0.007*
% Body digested	74	4.1	2	0.12

Similar to the delta smelt trials, eaten splittail significantly differed in the percent of body digested between 1 and 4 hours (Table 20). In contrast, trials using splittail as prey showed no significant difference in percent of scales digested between 1, 2, and 4 hours and no significant difference was observed in the degree of fin digestion (Table 19).

The lack of significance between digestion intervals was not surprising. Percentages of scale digestion and degree of fin digestion showed large overlaps in digestion responses with no distinct differences between 1, 2, and 4 hour experiments for delta smelt and splittail (Figures 12 and 13). However, the results for the percent of body digested categories, 0 (“flesh intact”) and 1 ("less than 10 % of body digested") showed that 73.9% of delta smelt and 47.6% of splittail consumed fell into these categories after 2 hours.

Table 20 Multiple comparison test results on striped bass digestion categories. Asterisks indicate significant differences at a = 0.05

Prey species	n	Q	*p*
Spring 2005			
Delta smelt			
% Scales digested			
1 hour vs. 2 hour	19	0.7	> 0.05
1 hour vs. 4 hour	20	2.7	< 0.05*
2 hour vs. 4 hour	19	2.0	> 0.05
% Body digested			
1 hour vs. 2 hour	19	1.3	> 0.05
1 hour vs. 4 hour	20	3.5	< 0.05*
2 hour vs. 4 hour	19	2.2	> 0.05
Splittail			
% Body digested			
1 hour vs. 2 hour	21	1.3	> 0.05
1 hour vs. 4 hour	17	2.7	< 0.05*
2 hour vs. 4 hour	16	1.6	> 0.05
Winter 2006			
Delta smelt			
Type of fins digested			
1 hour vs. 2 hour	64	0.8	> 0.05
1 hour vs. 4 hour	63	2.4	< 0.05*
2 hour vs. 4 hour	63	1.6	> 0.05

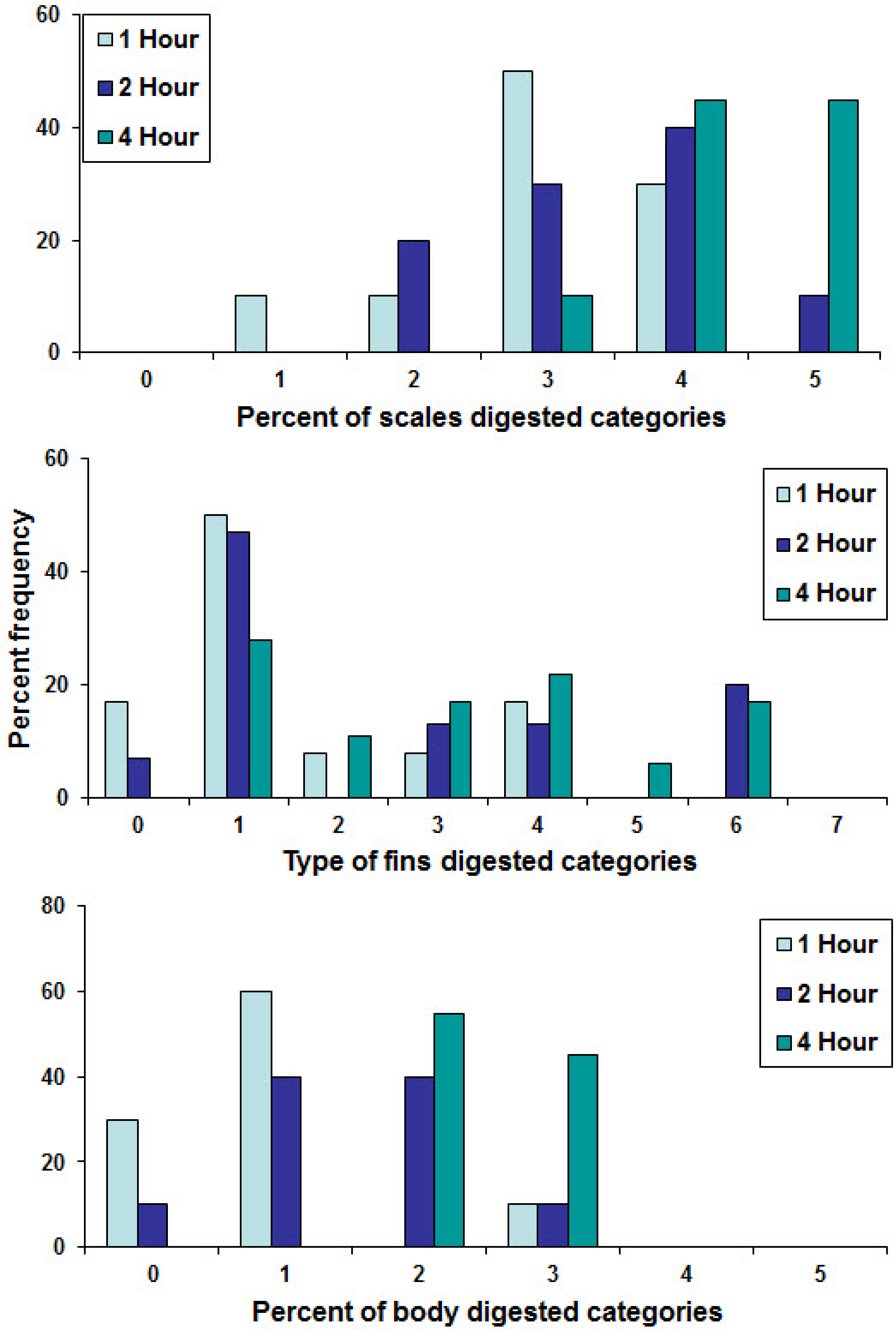

Figure 12 Digestion scores for delta smelt consumed by captive striped bass in spring 2005

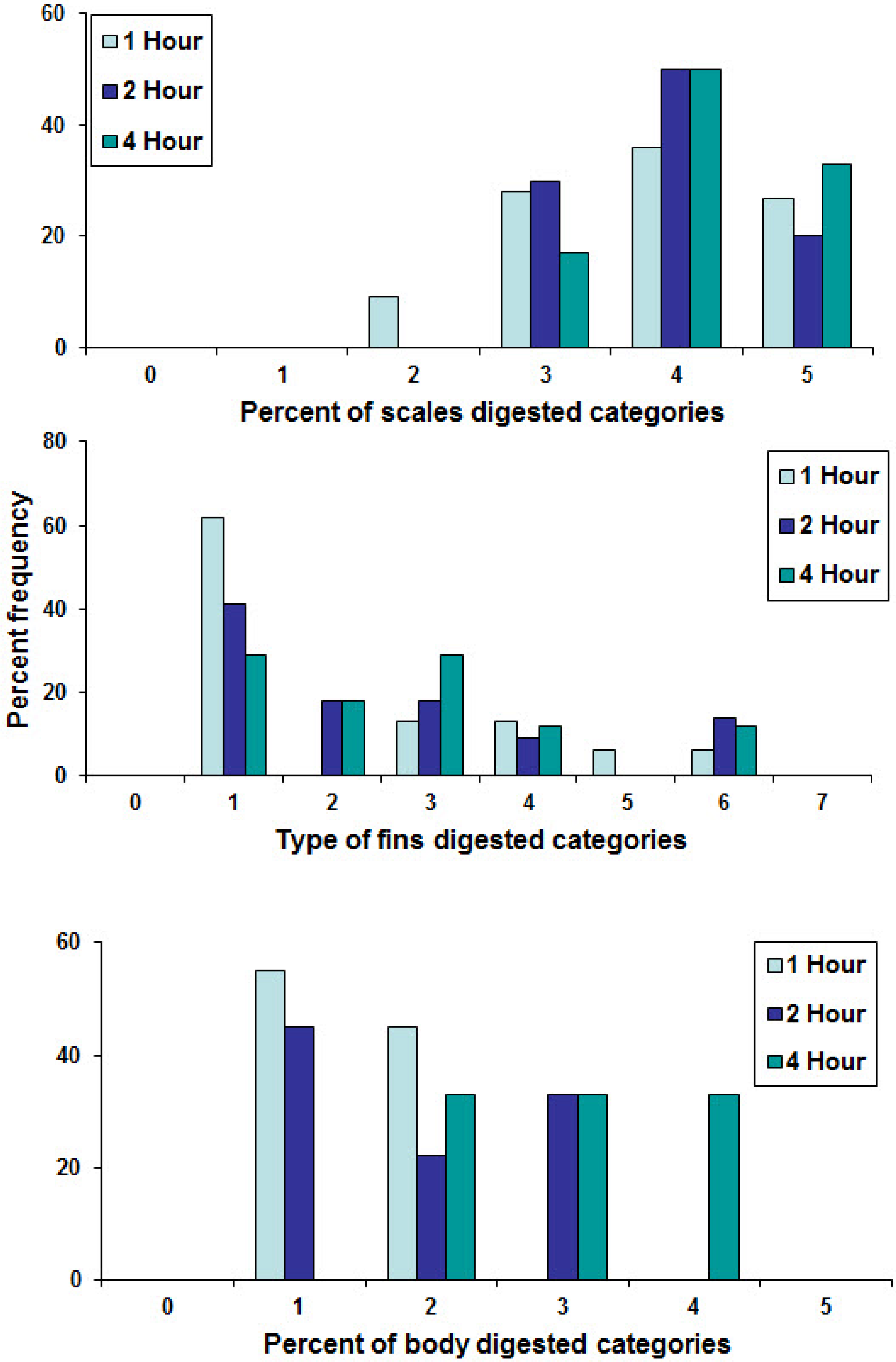

Figure 13 Digestion scores for splittail consumed by captive striped bass in spring 2005

Winter 2006

A total of 68 experiments were conducted using striped bass from 89 to 404 mm FL in the winter of 2006. Eaten delta smelt ranged in size from 26 to 77 mm SL. Feeding experiments were conducted in water temperatures ranging from 9.3 to 13.9°C. No significant differences ($u = 2492$, 1 df, $p = 0.49$) were observed between occurrence of feeding and water temperatures. No significant differences were observed in the percentages of scales or body digested between the three time intervals (Table 19). A significant difference occurred in the degree of fin digestion. Multiple comparison testing determined that a significant difference was observed between 1 and 4 hours (Table 20). Frequency plots of the percentages of scale and fin digestion showed large overlaps of the ranks with no clear differences between the digestion periods (Figure 14). 94.3% of the consumed delta smelt exposed to digestion up to 2 hours were ranked as having flesh intact or less than 10% of body digested (Figure 14).

Quality Control

Diet Study

A total of 9.8% of the field observations underwent quality control checks for both seasons and were deemed to have met quality control expectations for accuracy. The following field parameters were checked: predator and non-predatory species counts, species identification, fish length and weight measurements, water temperature, dissolved oxygen, specific conductivity, water clarity, and debris load. These measurement checks were within their specified precision range and the results are given in Tables 21 to 25.

A total of 7.5% of the laboratory observations underwent quality control checks during this study. Much of the QC checks were performed on empty stomachs since most predators did not eat. Of the 39 predator stomachs which underwent quality control, only 1 stomach contained prey fish (Table 24) and therefore performance on digestion attributes or biological parameters were under-represented. QC checks on prey counts, species identification, prey length and prey weight measurements were within their specified performance ranges. No deviations or mistakes were found for digestion parameters for percent scales digested, type of fins digested, and percent of body digested on the contents of the single stomach examined (Table 24).

Digestion Study

A total of 8.4% of the field observations underwent quality control checks during the 2 years of study and were deemed to have met quality control expectations. Predator counts, species identification, predator length and weight measurements, water temperature, dissolved oxygen, and specific conductivity were examined and specific results are presented in Tables 21 to 25.

A total of 5.0% of the laboratory observations underwent quality control checks. The contents of three predator stomachs for a total of 3 prey items were examined (Table 24). Checks on prey count, species identification, and prey weight measurements were within their specified accuracy range which met quality control expectations. Prey length measurements did not meet expectation and the appropriate personnel were informed and re-trained. No deviations or mistakes were found for digestion parameters for percent scales digested, degree of fins digestion, and percent of body digested (Table 25).

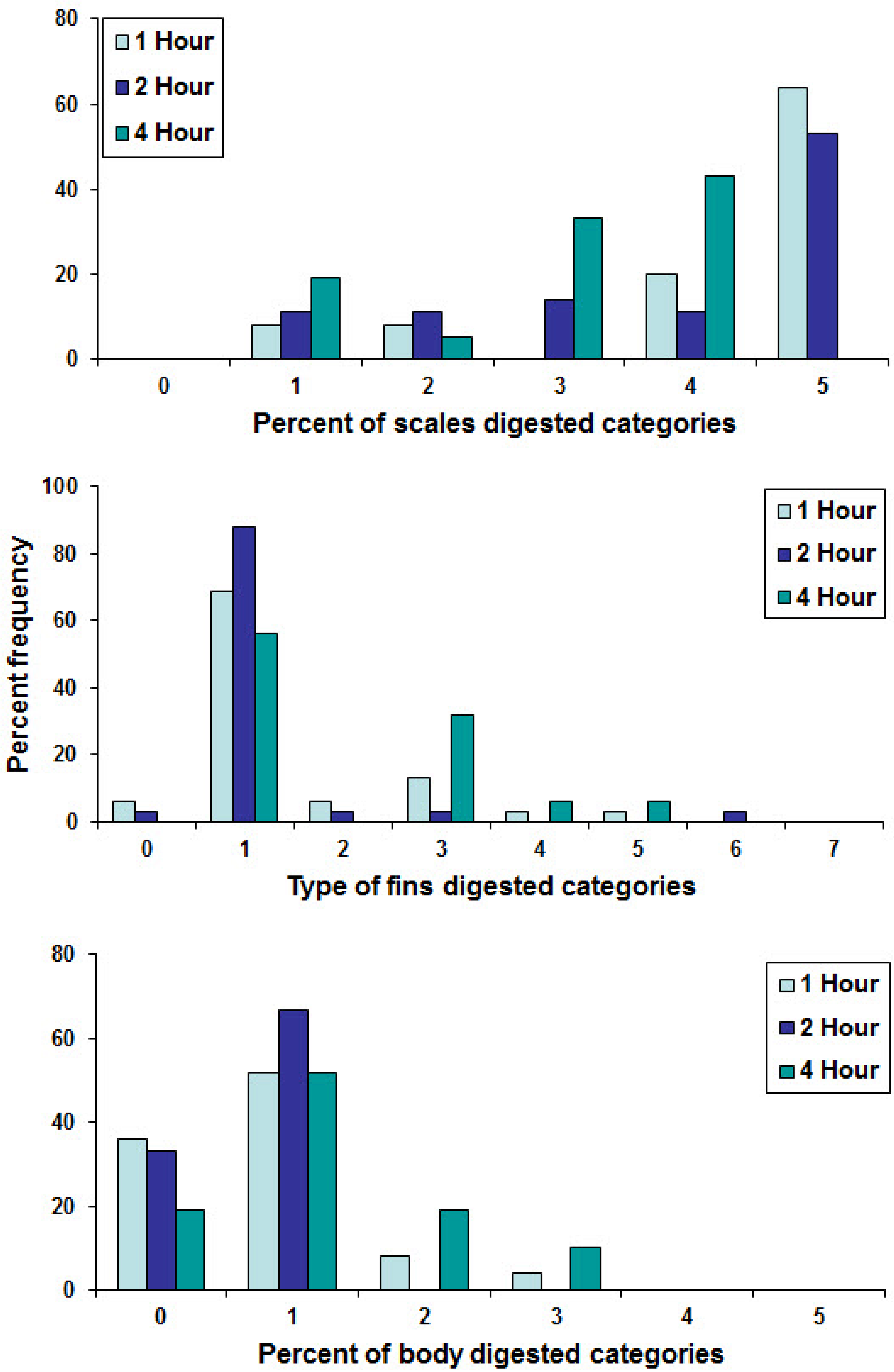

Figure 14 Digestion scores for delta smelt consumed by captive striped bass in winter 2006

Table 21 Quality control accuracy results for predator field observations for the diet study and digestion study

		Counts		Species Identification		Length		Weight	
Study/Year	Number of fish	Accuracy	Standard deviation	Accuracy	Standard deviation	Accuracy	Standard deviation	Accuracy	Standard deviation
Diet Study									
2005	29	0	0	0	0	0.9	1.3	0.6	0.16
2006	19	0	0	0	0	0.5	0.9	0.9	4.0
Digestion Study									
2005	6	0	0	0	0	0.2	0.2	0.05	0.07
2006	6	0	0	0	0	0.2	0.3	0.2	0.2

Table 22 Quality control accuracy results of field observations on non-predatory fish in spring 2005

		Non-predatory species counts		Species identification		Non-predatory species length	
Year	Number of fish	Accuracy	Deviation	Accuracy	Deviation	Accuracy	Deviation
2005	171	0	0	0	0	1.4	2.1

Table 23 Quality control accuracy results for field environmental observations for the diet study and digestion study

		Temperature (°C)		Dissolved oxygen (mg/L)		Specific conductivity (μS/cm)		Water clarity (cm)		Debris (kg)	
Study/year	**Number of measurements**	**Accuracy**	**Standard deviation**	**Accuracy**	**Standard deviation**	**Accuracy**	**Standard deviation**	**Accuracy**	**Standard deviation**	**Accuracy**	**Standard deviation**
Diet Study											
2005	6	0.008	0.02	1.1	0.9	0.2	0.4	2.1	1.1	0.4	0.6
2006	6	0.6	0.3	0.5	0.5	0.2	0.2	1.8	1.3	na	na
Digestion Study											
2005	6	0	0	0.1	0.1	0.1	0.2	na	na	na	na
2006	6	0.03	0.06	0.8	0.9	2.7	2.2	na	na	na	na

Table 24 Quality control accuracy results for laboratory observations for the diet study and digestion study. Number of prey fish examined in parentheses

		Counts		Species Identification		Length		Weight	
Study/year	Number of samples	Accuracy	Standard deviation	Accuracy	Standard deviation	Accuracy	Standard deviation	Accuracy	Standard deviation
Diet Study									
2005	20 (0)	0	0	0	0	na	na	na	na
2006	19 (1)	0	0	0	0	0	na	2.6	na
Digestion Study									
2005	6 (1)	0	0	0	0	1.6	na	2.3	na
2006	6 (2)	0	0	0	0	3.9	3.1	2.7	0.6

Table 25 Quality control accuracy results for digestion observations for the diet study and digestion study

Study/year/parameter	Category	Repeat category	Difference
Diet study			
Winter 2006			
percent scales digested	5	5	No difference
type of fins digested	1,2,3,4,5	1,2,3,4,5	No difference
percent body digested	2	2	No difference
Digestion study			
Spring 2005			
percent scales digested	4	4	No difference
type of fins digested	1	1	No difference
percent body digested	1	1	No difference
Winter 2006			
Fish 1			
percent scales digested	5	5	No difference
type of fins digested	1	1	No difference
percent body digested	1	1	No difference
Fish 2			
percent scales digested	5	5	No difference
type of fins digested	1 and 3	1 and 3	No difference
percent body digested	2	2	No difference

Data Entry and Analysis

A total of 10.0% (n = 4,512) of the key entered data was checked for accuracy by comparison with the original data sheets for both diet and digestion studies. The audit showed that a high degree of key entry accuracy was achieved in the studies databases and the measured performance exceeded expectations. Only 3 entry errors were found for an error rate of 0.066%.

DISCUSSION

Predation in the CHTR Phase

The digestion study and CHTR sampling results made it difficult to distinguish digestion time using the digestion indices selected. The small numbers of weakly digested prey items obtained from predators from the CHTR samples suggest that some predators fed within this period. The primary method used to measure the magnitude of the predation did not demonstrate an increase in mean prey number during the CHTR phase. Although not statistically different, the mean number of prey per stomach tended to be higher for the CH sample than the CHTR sample for *all predators* and *striped bass*, opposite of expectations assuming that predators feed during this process. Predators undergoing the full CHTR phase would have the greatest opportunity to feed on smaller prey fish based on fish densities. Possible explanations for these unexpected findings include an artifact of changing the method of sampling after the CHTR period, regurgitation of stomach contents, or that predatory fish did not feed during the CHTR period. The author doubts that sampling biases caused this difference. Although regurgitation was not observed in these studies, others have reported predators regurgitating prey during predator removals at the Tracy Fish Collection Facility (Bridges, personal communication, see “Notes”).

Significance of the Observed Predation

This study provides no evidence that predation was occurring during the CHTR phase at a level detectable using the study’s methods or that predation was occurring in the CHTR phase at a greater level than reported from other environments. The majority of the predator stomachs sampled was empty. The frequency of occurrence of prey in young, juvenile and sub-adult striped bass stomachs from this study were lower than reported by Thomas (1967) who found that 50% of all age striped bass stomachs contained prey based on sampling in the Sacramento-San Joaquin Estuary during all seasons from 1957 through 1961. At the Red Bluff Diversion Dam on the Sacramento River, Tucker and others (1998) found about the same percentage of adult striped bass stomachs (59%) contained prey fish. Similar to this study, Turner (1966) reported that 5.8% of juvenile and adult white catfish stomachs contained prey fish during all seasons in the Sacramento-San Joaquin Estuary. Stevens (1959) found a significantly higher proportion (64.4%) of white catfish stomachs contained prey during winter and spring in the Santee-Cooper Reservoir, South Carolina. These results would support the conclusion that although predation occurred in the Skinner Fish Facility and the CHTR phase, it was at or below frequency of occurrence levels for striped bass and white catfish from other environments. Although frequency of occurrence does not directly equate to predation in the CHTR phase as defined by prey per stomach, it may indicate that predation in the CHTR phase may not be a major loss source.

To explore the significance of the diet and digestion studies’ results, I developed a crude model to estimate the frequency of occurrence for striped bass that fed on delta smelt during the CHTR phase. I first developed a model to estimate the proportion of eaten delta smelt that were consumed during the CHTR phase. This equation states that:

(1) Percentage of delta smelt consumed in the CHTR phase = (A x B) x 100%, where:

A = the proportion of delta smelt that have undergone 2 hours of digestion and displayed less than 10% of the body digested during the digestion study

B = the proportion of delta smelt found in the diet study that scored less than 10% of the body digested

(2) Substituting results from the spring 2005 trials, where:

A = 73.9% of delta smelt showed less than 10% body digested from the digestion study

B = 38.4% of delta smelt had less than 10% of the body digested from the diet study

Therefore the estimated percentage of delta smelt consumed in the 2005 CHTR samples = (0.739 x 0.384) x 100% = 28.3%.

The second step was to develop an estimate for the frequency of occurrence of striped bass that fed on delta smelt in the CHTR phase using the following equation:

(3) Frequency of occurrence of striped bass that fed on delta smelt during CHTR = (A x B x C) x 100%, where:

C = the frequency of occurrence of delta smelt in the diet of striped bass

Using the observed frequency of delta smelt from striped bass collected from the 2005 diet study, the estimated delta smelt frequency of occurrence from predatory striped bass in the CHTR = (0.739 x 0.384 x 0.016) x 100% = 0.45%. Although more research is needed to directly link laboratory feeding experiments with observational diet studies, the result of this model suggests that the probability that a predator will consume a specific rare prey item such as delta smelt may be relatively low in the CHTR phase.

Predation and Prey Density

Only threadfin shad and delta smelt predation were density dependent where predation increased with higher relative densities of these 2 species in the CHTR phase. The higher salvage of Chinook salmon from the Skinner Fish Facility during spring 2005 may explain the higher frequency of occurrence for this species in the diet of predators. Stevens (1966) reported that juvenile and sub-adult striped bass in the Sacramento-San Joaquin Delta selected for threadfin shad and striped bass at a rate more directly related to their densities, but also fed on small quantities of delta smelt and Chinook salmon in the spring. Wilde and Paulson (1989) also reported that sub-adult striped bass selected for threadfin shad in Lake Mead in proportions to their abundance in the reservoir. As in this study, Stevens (1966) and Thomas (1967) also found that striped bass avoided American shad as prey for unknown reasons despite high densities. The low salvage of delta smelt in the winter of 2006 may also explain the low frequency of delta smelt found in the diet of predators. Despite the low incidence of predation in the diet study, evidence of density dependence suggests that delta smelt would be more vulnerable to predation if densities increased in the CHTR phase.

Predator Life Stage or Size Relationships

Differences in the frequency of occurrence of prey varied by life stage of striped bass and the observed frequencies appear to differ from previous diet studies. The percent frequency of young, juvenile, and sub-adult striped bass stomachs which contained prey fish for both CH and CHTR samples were 26.9%, 46.4%, and 52.6% in the spring and 5.5%, 31.6%, and 28.6% in winter, respectively. Stevens (1966) reported that percent frequency of young, juvenile, and sub-adult striped bass stomachs from the south Delta, which contained prey were 87%, 64%, and 3% in the spring and 88%, 78%, and 75% in winter, respectively.

Seasonal Changes

This study observed a different pattern of seasonal diet than previous studies. Stevens (1966) reported a higher occurrence of items in striped bass stomachs during winter than in spring. Higher frequencies of occurrence in striped bass during winter than in spring has been attributed to decreased feeding during spawning in April through June and a decrease in prey-fish abundance (Moyle 2002; Stevens 1966). Walter III and others (2003) reported that striped bass reduced but did not cease feeding in spring during the spawning period. The relatively-high frequencies of occurrence I observed during spring may be due to the fact that most striped bass collected at the Skinner Fish Facility were not likely reproductive.

Turner (1966) reported a slightly-higher occurrence of items in white catfish stomachs during winter than in spring. Stevens (1959) — reporting about juvenile and adult white catfish from the Santee-Cooper Reservoir — noted that the fraction with food in their stomachs was higher in the winter than in the spring.

The marked increase in the number of prey per *striped bass* stomach in spring 2005 may be due to the exclusion of the release phase in the 2006 winter trials. The release phase may have provided an additional opportunity for predators to capture prey. In spring 2005, it took approximately 1 hour to drain and remove predators from the release pool and it is conceivable that limited feeding could have occurred during this time span.

Seasonal changes in specific conductance, debris load, collection tank time, export rate, primary channel flow, or collection tank flow probably had little effect on predation during spring 2005 and winter 2006. However, increased water temperature and dissolved oxygen were significantly correlated with increased mean number of prey per stomach in spring. Bucknel and others (1995) showed under controlled laboratory conditions that young-of-the-year bluefish increased their consumption of Atlantic silversides with increased temperatures ranging from 17 to 30°C. Increased feeding in warmer spring months may also be related more to opportunistic feeding than to temperature dependence since juvenile fish salvage at the Skinner Fish Facility is higher in spring than in the winter (Gartz, personal communication, see “Notes”; Bay-Delta Fishery Project 1981). *White catfish* did not consume any prey in winter 2006, possibly because water temperatures were colder than white catfish prefer (i.e., 21°C; Moyle 2002).

Diet Composition and Prey Selection

Differences in the diet composition were evident between this study and other studies conducted in the Sacramento-San Joaquin Estuary. Stevens (1966) reported that threadfin shad were the only prey fish consumed by sub-adult striped bass in the winter and none in the spring in the south Delta. Thomas (1967) reported that prey fish consumed by striped bass (of all ages) in the Delta consisted of unknown species of lamprey (Lampetra species), striped bass, threadfin shad, and unknown species of fish in the winter, but only striped bass and unknown species of fish in the spring. This study found a greater range of prey species consumed for both seasons.

Although the estuary has undergone drastic changes in species richness due to introduced species since the Turner (1966) and Stevens (1966) studies, the differences in seasonal frequency of occurrence and the diversity of prey species found in diet studies from the Estuary and from the Skinner Fish Facility may be explained by prey density and opportunistic feeding. The Skinner Fish Facility is designed to crowd fish with different habitats and life strategies to facilitate collection and transport. The author hypothesizes that the artificially higher densities of prey and predators in the CHTR phase causes predatory interactions not typically seen in the natural environment. Striped bass are highly opportunistic in their diet preference, and their diet can vary greatly within a small geographical area (Moyle 2002). High concentrations of juvenile fish are collected at the Skinner Fish Facility in the spring and provide a rich environment for opportunistic feeding (Gartz, personal communication, see "Notes"; Bay-Delta Fishery Project 1981). Striped bass are predominantly pelagic fishes and they do not normally feed on shore-oriented prey fish such as bluegill and western mosquitofish (Moyle 2002). The SWP's ability to entrain species from different habitats and the salvage facility's function to concentrate predators and prey into the same space may increase predation between species normally separated by habitat preference.

The size distributions of predators and prey were major factors in prey composition and selection. Predators fed predominantly on smaller juvenile fish, less than 80 mm FL in spring 2005 and less than 100 mm FL in winter 2006, compared to the size distribution of prey available. Stevens (1966) also reported that juvenile, sub-adult, and adult striped bass fed on smaller sized prey, primarily striped bass and threadfin shad, in the Sacramento-San Joaquin Estuary. Striped bass and white bass (*Morone chrysops*) hybrids were reported to feed selectively on smaller size classes in controlled experiments even when larger prey were available (Gleason and Bentson 1996; Dettmers and others 1998). This feeding strategy is usually attributed to less energy and effort needed to catch smaller prey than larger prey which are faster and have better endurance.

The relatively small size of predators sampled in this study may also explain the selection for smaller prey. For instance, the dimension 'snout to end of abdominal cavity' in striped bass is approximately half of total length and striped bass were rarely observed with prey larger than this relationship. Given the mean sizes of striped bass in spring 2006 (188.7 mm) and winter 2006 (147.2 mm), 80 mm or less was comparable to half the total length. Other researchers have noted similar predator-prey size relationships. Chervinski and others (1989) reported that striped bass ate redbelly tilapia (*Tilapia zilli*; deep-bodied) less than 30% of its length and common carp (*Cyprinus carpio*; slender-bodied) less than 44% of its length. Fausch (2000) found that a 400 mm striped bass can eat common carp up to 150 mm while a 200 mm striped bass can eat common carp up to 73 mm. When feeding on juvenile American shad, juvenile and adult threadfin shad, and prickly sculpin, striped bass fed opportunistically on the most- abundant size classes. This trend was not observed for white catfish which fed infrequently on multiple size classes.

The seasonal predator-prey size distributions appear to have influenced prey selection by striped bass. The change in selectivity from threadfin shad, largemouth bass, and delta smelt in spring 2005 to western mosquitofish and prickly sculpin appears to be related to growth and the larger size of prey in winter 2006 and a decrease in predator size. As threadfin shad, American shad, and delta smelt increased in size, small predators selected for smaller prey such as Chinook salmon and western mosquitofish. Juvenile Chinook salmon were selected during both years, most likely due to the relatively small size of smolts (< 100 mm FL) salvaged at the facility during winter and spring (Bay-Delta Fishery Project 1981). The higher Chinook salmon selection in spring 2005 than in winter 2006 may be explained by the markedly-higher abundance of juvenile Chinook salmon compared to predator-sized striped bass in the spring.

Digestion Indicator Performance

The digestion indicators used did not produce sufficient differences to distinguish between prey eaten 2-4 hours earlier from one eaten more recently. However, a gradual increase in digestion for scales, body, and fins was seen over the 1, 2, and 4 hour experiments. Macdonald and others (1982) found that digestion rates increased with time for bivalves, amphipods, and polychaetes consumed by Atlantic cod (*Gadus morhua*), ocean pout (*Macrozoarces americanus*), and winter flounder (*Hippoglossoides platessoides*). The percentage of the body digested showed the greatest potential to separate fish between 1 and 4 hour experiments in this study. Controlled digestion studies using other indicators and using many other prey species will be needed to achieve the original objective of pin-pointing the time of prey consumption within a short time interval.

RECOMMENDATIONS

No significant differences in the indices used to estimate predation in the CHTR phase of the Skinner Fish Facility were observed and the predation was low compared to other locations within and outside the Skinner Fish Facility. Given these findings, attempts to determine the predation in the CHTR phase or other components of the Skinner Fish Facility should use traditional mark-recovery techniques. The release and recapture of marked fish would allow the researcher to control prey density and size. Known numbers of prey fish released into the CHTR phase would likely reduce the variance of predation estimates and increase the statistical power. Although predation on delta smelt and winter run Chinook salmon was found to be relatively low in CHTR, CHTR is only a small component of predation associated with fish entrainment; thus, management actions to reduce predation mortality associated with the SWP may be warranted.

Given this preliminary evidence that predation in the CHTR phase is not substantial and given on-going observations that predators are abundant immediately preceding the CHTR phase, efforts to reduce predation in the fish-salvage process preceding the CHTR phase may be more beneficial than reducing predation in the CHTR phase. Current operations periodically remove predatory fish from secondary channels and associated bypass pipes through dewatering, hydraulic flushing, and manual netting. Electrofishing, gill-netting, chemical treatment, and light barriers have been considered as predator-management measures in the primary louver channel to discourage residency. Mechanical means to separate larger predators from smaller prey — thereby reducing predation mortality within the holding tanks or CHTR phase — have been discussed as facility improvements or features in new facilities. Fausch (2000) discussed the expected performance of a grading system to be used in conjunction with the federal fish salvage facility. He estimated that striped bass as small as 145 to 165 mm would be excluded from the salvage holding tanks using a 19 mm grader screen. Striped bass in this size range could eat fish up to 65 mm, so larger prey fish such as Chinook salmon smolts over 65 mm could see reductions in facility-associated predation while smaller-sized adult delta smelt (60 to 70 mm) would see less benefit. The relatively-high ratio of predator-sized striped bass to juvenile Chinook salmon salvaged in winter also suggests use of mechanical means to separate larger predators from prey. Frequent predator removals from the secondary channels and bypass systems would likely be the most beneficial and cost effective method to lower predation within the Skinner Fish Facility, since predator removal involves only a small personnel cost and no alterations to the facility.

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APPENDIXES

Appendix A: Predator and eaten prey species data for spring 2005 diet study

Date	Sample number	Predator species	Length	Eaten prey species
4/1/2005	010-040105-0820-B	white catfish	207	
4/1/2005	011-040105-0820-B	white catfish	213	
4/1/2005	002-040105-0820-B	striped bass	149	
4/1/2005	004-040105-0820-B	striped bass	303	Chinook salmon
4/1/2005	004-040105-0820-B	striped bass	303	Chinook salmon
4/1/2005	004-040105-0820-B	striped bass	303	Chinook salmon
4/1/2005	001-040105-0820-B	striped bass	167	Chinook salmon
4/1/2005	009-040105-0820-B	striped bass	186	Chinook salmon
4/1/2005	008-040105-0820-B	striped bass	204	Chinook salmon
4/1/2005	008-040105-0820-B	striped bass	204	Chinook salmon
4/1/2005	006-040105-0820-B	striped bass	280	Chinook salmon
4/1/2005	006-040105-0820-B	striped bass	280	Chinook salmon
4/1/2005	006-040105-0820-B	striped bass	280	Chinook salmon
4/1/2005	006-040105-0820-B	striped bass	280	Chinook salmon
4/1/2005	006-040105-0820-B	striped bass	280	Chinook salmon
4/1/2005	003-040105-0820-B	striped bass	295	Chinook salmon
4/1/2005	003-040105-0820-B	striped bass	295	Chinook salmon
4/1/2005	003-040105-0820-B	striped bass	295	Chinook salmon
4/1/2005	003-040105-0820-B	striped bass	295	Chinook salmon
4/1/2005	003-040105-0820-B	striped bass	295	Chinook salmon
4/1/2005	004-040105-0820-B	striped bass	303	delta smelt
4/1/2005	004-040105-0820-B	striped bass	303	delta smelt
4/1/2005	001-040105-0622-A	black crappie	214	delta smelt
4/1/2005	005-040105-0820-B	striped bass	172	delta smelt
4/1/2005	007-040105-0820-B	striped bass	288	delta smelt
4/1/2005	007-040105-0820-B	striped bass	288	delta smelt
4/1/2005	001-040105-0820-B	striped bass	167	unknown

Appendix A (Cont.): Predator and eaten prey species data for spring 2005 diet study

Date	Sample number	Predator species	Length	Eaten prey
4/8/2005	005-040805-0601-A	striped bass	335	
4/8/2005	014-040805-0732-B	striped bass	111	
4/8/2005	012-040805-0732-B	striped bass	266	
4/8/2005	005-040805-0732-B	striped bass	304	
4/8/2005	003-040805-0732-B	striped bass	355	
4/8/2005	006-040805-0601-A	white catfish	203	
4/8/2005	004-040805-0732-B	channel catfish	250	
4/8/2005	017-040805-0732-B	yellowfin goby	143	
4/8/2005	003-040805-0601-A	striped bass	270	Chinook salmon
4/8/2005	004-040805-0601-A	striped bass	276	Chinook salmon
4/8/2005	004-040805-0601-A	striped bass	276	Chinook salmon
4/8/2005	004-040805-0601-A	striped bass	276	Chinook salmon
4/8/2005	007-040805-0732-B	striped bass	252	Chinook salmon
4/8/2005	006-040805-0732-B	striped bass	282	Chinook salmon
4/8/2005	009-040805-0732-B	striped bass	310	Chinook salmon
4/8/2005	009-040805-0732-B	striped bass	310	Chinook salmon
4/8/2005	009-040805-0732-B	striped bass	310	Chinook salmon
4/8/2005	009-040805-0732-B	striped bass	310	Chinook salmon
4/13/2005	002-041305-0821-B	striped bass	174	
4/13/2005	001-041305-0610-A	white catfish	301	
4/13/2005	004-041305-0821-B	white catfish	471	
4/13/2005	002-041305-0610-A	black bullhead	277	
4/13/2005	003-041305-0821-B	striped bass	221	Chinook salmon
4/14/2005	004-041405-0625-A	striped bass	166	
4/14/2005	003-041405-0730-B	striped bass	115	
4/14/2005	005-041405-0730-B	prickly sculpin	115	
4/21/2005	007-042105-0928-B	striped bass	109	
4/21/2005	003-042105-0928-B	prickly sculpin	110	
4/21/2005	005-042105-0626-A	striped bass	188	Chinook salmon
4/21/2005	001-042105-0928-B	striped bass	111	Chinook salmon

Appendix A (Cont.): Predator and eaten prey species data for spring 2005 diet study

Date	Sample number	Predator species	Length	Eaten prey
5/19/2005	004-051905-0739-A	striped bass	200	
5/19/2005	033-051905-0936-B	striped bass	44	
5/19/2005	019-051905-0936-B	striped bass	52	
5/19/2005	040-051905-0936-B	striped bass	52	
5/19/2005	038-051905-0936-B	striped bass	65	
5/19/2005	018-051905-0936-B	striped bass	79	
5/19/2005	023-051905-0936-B	striped bass	137	
5/19/2005	027-051905-0936-B	striped bass	188	
5/19/2005	012-051905-0936-B	striped bass	195	
5/19/2005	017-051905-0936-B	white catfish	242	
5/19/2005	006-051905-0936-B	white catfish	246	
5/19/2005	004-051905-0936-B	white catfish	440	
5/19/2005	087-051905-0936-B	yellowfin goby	50	
5/19/2005	093-051905-0936-B	yellowfin goby	55	
5/19/2005	047-051905-0936-B	Pacific staghorn	68	
5/19/2005	071-051905-0936-B	Pacific staghorn	81	
5/19/2005	075-051905-0936-B	Pacific staghorn	99	
5/19/2005	054-051905-0936-B	Pacific staghorn	75	Chinook salmon
5/19/2005	054-051905-0936-B	Pacific staghorn	75	Chinook salmon
5/19/2005	002-051905-0739-A	striped bass	185	splittail
5/19/2005	002-051905-0739-A	striped bass	185	splittail
5/19/2005	002-051905-0739-A	striped bass	185	splittail
5/19/2005	002-051905-0739-A	striped bass	185	delta smelt
5/19/2005	002-051905-0739-A	striped bass	185	delta smelt
5/19/2005	001-051905-0739-A	white catfish	235	prickly sculpin
5/19/2005	045-051905-0936-B	Pacific staghorn	63	prickly sculpin
5/19/2005	015-051905-0936-B	striped bass	50	shimofuri goby
5/19/2005	002-051905-0739-A	striped bass	185	rainwater killifish
5/19/2005	002-051905-0739-A	striped bass	185	rainwater killifish
5/19/2005	002-051905-0739-A	striped bass	185	rainwater killifish

Appendix A (Cont.): Predator and eaten prey species data for spring 2005 diet study

Date	Sample number	Predator species	Length	Eaten prey
5/19/2005	002-051905-0739-A	striped bass	185	rainwater killifish
5/19/2005	002-051905-0739-A	striped bass	185	rainwater killifish
5/19/2005	043-051905-0936-B	Pacific staghorn	90	rainwater killifish
5/19/2005	002-051905-0739-A	striped bass	185	unknown
5/19/2005	001-051905-0739-A	white catfish	235	unknown
5/19/2005	007-051905-0936-B	yellowfin goby	110	unknown
5/19/2005	048-051905-0936-B	Pacific staghorn	73	unknown
5/19/2005	048-051905-0936-B	Pacific staghorn	73	unknown
5/19/2005	002-051905-0739-A	striped bass	185	sculpin unknown
5/19/2005	002-051905-0739-A	striped bass	185	sculpin unknown
5/19/2005	002-051905-0739-A	striped bass	185	sculpin unknown
5/19/2005	002-051905-0739-A	striped bass	185	smelt unknown
5/19/2005	002-051905-0739-A	striped bass	185	smelt unknown
5/19/2005	002-051905-0739-A	striped bass	185	smelt unknown
5/19/2005	002-051905-0739-A	striped bass	185	smelt unknown
5/19/2005	015-051905-0936-B	striped bass	50	smelt unknown
5/20/2005	001-052005-0856-B	striped bass	179	
5/20/2005	001-052005-0730-A	striped bass	176	striped bass
5/20/2005	001-052005-0730-A	striped bass	176	striped bass
5/20/2005	001-052005-0730-A	striped bass	176	delta smelt
5/20/2005	001-052005-0730-A	striped bass	176	delta smelt
5/25/2005	001-052505-0626-A	white catfish	295	
5/25/2005	003-052505-0802-B	white catfish	298	
5/25/2005	002-052505-0802-B	black crappie	115	
6/2/2005	008-060205-0831-B	warmouth	94	
6/2/2005	007-060205-0659-A	largemouth bass	177	
6/2/2005	005-060205-0831-B	yellowfin goby	112	
6/2/2005	015-060205-0831-B	white catfish	347	bluegill
6/2/2005	011-060205-0831-B	black crappie	133	largemouth bass
6/2/2005	001-060205-0659-A	white catfish	262	delta smelt

Appendix A (Cont.): Predator and eaten prey species data for spring 2005 diet study

Date	Sample number	Predator species	Length	Eaten prey
6/2/2005	003-060205-0831-B	black crappie	125	delta smelt
6/2/2005	007-060205-0831-B	black crappie	130	delta smelt
6/2/2005	004-060205-0659-A	black crappie	113	prickly sculpin
6/2/2005	004-060205-0659-A	black crappie	113	prickly sculpin
6/2/2005	004-060205-0659-A	black crappie	113	unknown
6/2/2005	010-060205-0831-B	black crappie	122	unknown
6/16/2005	002-061605-0801-B	brown bullhead	273	
6/16/2005	001-061605-0618-A	largemouth bass	211	
6/16/2005	004-061605-0618-A	striped bass	297	chinook salmon
6/16/2005	024-061605-0801-B	white catfish	248	striped bass
6/16/2005	024-061605-0801-B	white catfish	248	striped bass
6/16/2005	007-061605-0801-B	white catfish	275	striped bass
6/16/2005	009-061605-0801-B	striped bass	155	threadfin shad
6/16/2005	003-061605-0801-B	white catfish	233	splittail
6/16/2005	019-061605-0801-B	white catfish	274	splittail
6/16/2005	019-061605-0801-B	white catfish	274	splittail
6/16/2005	019-061605-0801-B	white catfish	274	splittail
6/16/2005	027-061605-0801-B	Pacific staghorn	84	delta smelt
6/16/2005	027-061605-0801-B	Pacific staghorn	84	delta smelt
6/16/2005	027-061605-0801-B	Pacific staghorn	84	delta smelt
6/16/2005	027-061605-0801-B	Pacific staghorn	84	delta smelt
6/15/2005	005-061505-0605-A	white catfish	224	
6/16/2005	022-061605-0801-B	striped bass	240	
6/16/2005	003-061605-0618-A	white catfish	203	
6/16/2005	012-061605-0618-A	white catfish	207	
6/16/2005	008-061605-0618-A	white catfish	231	
6/16/2005	007-061605-0618-A	white catfish	235	
6/16/2005	009-061605-0618-A	white catfish	247	
6/16/2005	011-061605-0618-A	white catfish	277	
6/16/2005	010-061605-0618-A	white catfish	365	

Appendix A (Cont.): Predator and eaten prey species data for spring 2005 diet study

Date	Sample number	Predator species	Length	Eaten prey
6/16/2005	017-061605-0801-B	white catfish	218	
6/16/2005	013-061605-0801-B	white catfish	230	
6/16/2005	008-061605-0801-B	white catfish	231	
6/16/2005	001-061605-0801-B	white catfish	261	
6/16/2005	018-061605-0801-B	white catfish	275	
6/16/2005	011-061605-0801-B	white catfish	277	
6/16/2005	006-061605-0801-B	white catfish	291	
6/16/2005	020-061605-0801-B	striped bass	188	unknown
6/16/2005	012-061605-0801-B	white catfish	218	unknown
6/16/2005	003-061605-0801-B	white catfish	233	unknown
6/16/2005	007-061605-0801-B	white catfish	275	striped bass
6/21/2005	002-062105-0611-A	striped bass	195	
6/21/2005	001-062105-0611-A	striped bass	265	
6/21/2005	004-062105-0754-B	striped bass	192	
6/21/2005	005-062105-0754-B	striped bass	208	
6/21/2005	004-062105-0611-A	white catfish	187	
6/21/2005	005-062105-0611-A	white catfish	227	
6/21/2005	003-062105-0611-A	white catfish	231	
6/21/2005	006-062105-0754-B	white catfish	210	
6/21/2005	003-062105-0754-B	white catfish	420	
6/21/2005	002-062105-0754-B	striped bass	195	delta smelt
6/21/2005	002-062105-0754-B	striped bass	195	unknown
6/29/2005	001-062905-0822-B	striped bass	140	
6/29/2005	003-062905-0822-B	striped bass	149	
6/29/2005	002-062905-0705-A	white catfish	205	
6/29/2005	001-062905-0705-A	white catfish	280	
6/29/2005	003-062905-0705-A	white catfish	420	
6/29/2005	002-062905-0822-B	white catfish	208	
7/8/2005	003-070805-0710-A	striped bass	198	
7/8/2005	005-070805-0710-A	striped bass	250	

Appendix A (Cont.): Predator and eaten prey species data for spring 2005 diet study

Date	Sample number	Predator species	Length	Eaten prey
7/8/2005	002-070805-0710-A	striped bass	255	
7/8/2005	001-070805-0710-A	striped bass	279	
7/8/2005	020-070805-0841-B	striped bass	45	
7/8/2005	014-070805-0841-B	striped bass	54	
7/8/2005	031-070805-0841-B	striped bass	54	
7/8/2005	011-070805-0841-B	striped bass	61	
7/8/2005	012-070805-0841-B	striped bass	61	
7/8/2005	006-070805-0841-B	striped bass	233	
7/8/2005	010-070805-0841-B	white catfish	230	
7/8/2005	008-070805-0841-B	white catfish	440	
7/8/2005	023-070805-0841-B	prickly sculpin	64	
7/8/2005	027-070805-0841-B	yellowfin goby	54	
7/8/2005	028-070805-0841-B	yellowfin goby	56	
7/8/2005	030-070805-0841-B	yellowfin goby	56	
7/8/2005	026-070805-0841-B	yellowfin goby	57	
7/8/2005	022-070805-0841-B	yellowfin goby	61	
7/8/2005	025-070805-0841-B	yellowfin goby	61	
7/8/2005	033-070805-0841-B	yellowfin goby	63	
7/8/2005	006-070805-0710-A	striped bass	191	striped bass
7/8/2005	006-070805-0710-A	striped bass	191	striped bass
7/8/2005	006-070805-0710-A	striped bass	191	striped bass
7/8/2005	006-070805-0710-A	striped bass	191	striped bass
7/8/2005	006-070805-0710-A	striped bass	191	striped bass
7/8/2005	008-070805-0710-A	striped bass	231	striped bass
7/8/2005	005-070805-0841-B	striped bass	203	American shad
7/8/2005	005-070805-0841-B	striped bass	203	American shad
7/8/2005	005-070805-0841-B	striped bass	203	American shad
7/8/2005	009-070805-0841-B	striped bass	208	American shad
7/8/2005	009-070805-0841-B	striped bass	208	American shad
7/8/2005	001-070805-0841-B	striped bass	279	American shad

Appendix A (Cont.): Predator and eaten prey species data for spring 2005 diet study

Date	Sample number	Predator species	Length	Eaten prey
7/8/2005	001-070805-0841-B	striped bass	279	American shad
7/8/2005	008-070805-0710-A	striped bass	231	threadfin shad
7/8/2005	008-070805-0710-A	striped bass	231	threadfin shad
7/8/2005	008-070805-0710-A	striped bass	231	threadfin shad
7/8/2005	008-070805-0710-A	striped bass	231	threadfin shad
7/8/2005	008-070805-0710-A	striped bass	231	threadfin shad
7/8/2005	008-070805-0710-A	striped bass	231	threadfin shad
7/8/2005	008-070805-0710-A	striped bass	231	threadfin shad
7/8/2005	008-070805-0710-A	striped bass	231	threadfin shad
7/8/2005	008-070805-0710-A	striped bass	231	threadfin shad
7/8/2005	008-070805-0710-A	striped bass	231	threadfin shad
7/8/2005	008-070805-0710-A	striped bass	231	threadfin shad
7/8/2005	007-070805-0841-B	striped bass	262	threadfin shad
7/8/2005	004-070805-0841-B	striped bass	265	threadfin shad
7/8/2005	004-070805-0841-B	striped bass	265	threadfin shad
7/8/2005	004-070805-0841-B	striped bass	265	threadfin shad
7/8/2005	001-070805-0841-B	striped bass	298	threadfin shad
7/8/2005	001-070805-0841-B	striped bass	298	threadfin shad
7/8/2005	001-070805-0841-B	striped bass	298	threadfin shad
7/8/2005	001-070805-0841-B	striped bass	298	threadfin shad
7/8/2005	001-070805-0841-B	striped bass	298	threadfin shad
7/8/2005	001-070805-0841-B	striped bass	298	threadfin shad
7/8/2005	001-070805-0841-B	striped bass	298	threadfin shad
7/8/2005	007-070805-0710-A	striped bass	187	largemouth bass
7/8/2005	007-070805-0710-A	striped bass	187	largemouth bass
7/8/2005	007-070805-0710-A	striped bass	187	largemouth bass
7/8/2005	007-070805-0710-A	striped bass	187	largemouth bass
7/8/2005	009-070805-0710-A	striped bass	202	largemouth bass
7/8/2005	013-070805-0841-B	striped bass	66	unknown
7/8/2005	004-070805-0841-B	striped bass	265	unknown

Appendix A (Cont.): Predator and eaten prey species data for spring 2005 diet study

Date	Sample number	Predator species	Length	Eaten prey
7/8/2005	001-070805-0841-B	striped bass	298	unknown
7/8/2005	024-070805-0841-B	yellowfin goby	77	unknown
7/8/2005	008-070805-0710-A	striped bass	231	goby unknown
7/13/2005	001-071305-0627-A	striped bass	151	
7/13/2005	001-071305-0756-B	white catfish	232	threadfin shad
7/15/2005	001-071505-0618-A	white catfish	205	
7/15/2005	003-071505-0618-A	white catfish	235	
7/15/2005	002-071505-0748-B	white catfish	219	
7/15/2005	001-071505-0748-B	largemouth bass	396	
7/15/2005	006-071505-0748-B	prickly sculpin	41	
7/15/2005	002-071505-0618-A	striped bass	185	American shad
7/15/2005	007-071505-0748-B	largemouth bass	36	unknown
7/15/2005	004-071505-0748-B	yellowfin goby	83	unknown

Appendix B: Predator and eaten prey species data for winter 2006 diet study

Date	Sample number	Predator species	Length	Eaten prey species
12/12/2005	007-121205-0745-A	Striped bass	187	
12/12/2005	008-121205-0745-A	Striped bass	172	
12/12/2005	009-121205-0745-A	Striped bass	168	
12/12/2005	010-121205-0745-A	Striped bass	127	
12/12/2005	011-121205-0745-A	Striped bass	164	
12/12/2005	013-121205-0745-A	Striped bass	337	
12/12/2005	014-121205-0745-A	Striped bass	152	
12/12/2005	015-121205-0745-A	Striped bass	113	
12/12/2005	016-121205-0745-A	Striped bass	109	
12/12/2005	012-121205-0745-A	White catfish	421	
12/12/2005	003-121205-0745-A	Yellowfin goby	198	
12/13/2005	001-121305-0940-B	Striped bass	126	
12/13/2005	002-121305-0940-B	Striped bass	365	American shad
12/13/2005	002-121305-0940-B	Striped bass	365	American shad
12/13/2005	002-121305-0940-B	Striped bass	365	American shad
12/13/2005	002-121305-0940-B	Striped bass	365	American shad
12/13/2005	002-121305-0940-B	Striped bass	365	American shad
12/13/2005	002-121305-0940-B	Striped bass	365	American shad
12/13/2005	003-121305-0940-B	Striped bass	156	
12/13/2005	004-121305-0940-B	Striped bass	157	
12/13/2005	005-121305-0940-B	Striped bass	133	
12/13/2005	007-121305-0940-B	Striped bass	156	
12/13/2005	008-121305-0940-B	Striped bass	182	
12/13/2005	009-121305-0940-B	Striped bass	168	
12/13/2005	010-121305-0940-B	Striped bass	139	
12/13/2005	011-121305-0940-B	Striped bass	145	
12/13/2005	012-121305-0940-B	Striped bass	150	
12/13/2005	014-121305-0940-B	Striped bass	115	
12/13/2005	015-121305-0940-B	Striped bass	132	
12/13/2005	016-121305-0940-B	Striped bass	83	

Appendix B (Cont.): Predator and eaten prey species data for winter 2006 diet study

Date	Sample number	Predator species	Length	Eaten prey species
12/13/2005	017-121305-0940-B	Striped bass	123	
12/13/2005	018-121305-0940-B	Striped bass	122	
12/13/2005	019-121305-0940-B	Striped bass	120	
12/13/2005	020-121305-0940-B	Striped bass	147	
12/13/2005	021-121305-0940-B	Striped bass	124	Bluegill
12/13/2005	022-121305-0940-B	Striped bass	87	
12/13/2005	023-121305-0940-B	Striped bass	113	
12/13/2005	024-121305-0940-B	Striped bass	84	
12/13/2005	025-121305-0940-B	Striped bass	88	
12/13/2005	026-121305-0940-B	Striped bass	89	
12/13/2005	001-121305-0755-A	Striped bass	155	
12/13/2005	002-121305-0755-A	Striped bass	136	
12/13/2005	003-121305-0755-A	Striped bass	138	
12/13/2005	004-121305-0755-A	Striped bass	91	
12/13/2005	005-121305-0755-A	Striped bass	172	
12/13/2005	006-121305-0755-A	Striped bass	162	
12/13/2005	007-121305-0755-A	Striped bass	127	
12/13/2005	008-121305-0755-A	Striped bass	123	
12/13/2005	009-121305-0755-A	Striped bass	115	
12/13/2005	010-121305-0755-A	Striped bass	382	American shad
12/13/2005	010-121305-0755-A	Striped bass	382	American shad
12/13/2007	010-121305-0755-A	Striped bass	382	American shad
12/13/2007	010-121305-0755-A	Striped bass	382	Threadfin shad
12/13/2007	010-121305-0755-A	Striped bass	382	Threadfin shad
12/13/2005	012-121305-0755-A	Striped bass	156	
12/13/2005	013-121305-0755-A	Striped bass	213	
12/13/2005	014-121305-0755-A	Striped bass	145	
12/13/2005	015-121305-0755-A	Striped bass	155	
12/13/2005	016-121305-0755-A	Striped bass	137	
12/13/2005	017-121305-0755-A	Striped bass	175	

Appendix B (Cont.): Predator and eaten prey species data for winter 2006 diet study

Date	Sample number	Predator species	Length	Eaten prey species
12/13/2005	018-121305-0755-A	Striped bass	107	
12/13/2005	019-121305-0755-A	Striped bass	159	
12/13/2005	020-121305-0755-A	Striped bass	112	
12/13/2005	022-121305-0755-A	Striped bass	154	
12/13/2005	023-121305-0755-A	Striped bass	164	
12/13/2005	024-121305-0755-A	Striped bass	152	
12/13/2005	025-121305-0755-A	Striped bass	138	
12/13/2005	026-121305-0755-A	Striped bass	140	
12/13/2005	027-121305-0755-A	Striped bass	152	
12/13/2005	028-121305-0755-A	Striped bass	124	
12/13/2005	029-121305-0755-A	Striped bass	150	
12/13/2005	030-121305-0755-A	Striped bass	134	
12/13/2005	031-121305-0755-A	Striped bass	127	
12/13/2005	032-121305-0755-A	Striped bass	125	
12/13/2005	033-121305-0755-A	Striped bass	135	Western mosquitofish
12/13/2005	034-121305-0755-A	Striped bass	119	
12/13/2005	035-121305-0755-A	Striped bass	129	
12/13/2005	036-121305-0755-A	Striped bass	128	
12/13/2005	037-121305-0755-A	Striped bass	105	
12/13/2005	038-121305-0755-A	Striped bass	101	
12/13/2005	021-121305-0755-A	Channel catfish	180	
12/15/2005	001-121505-0954-B	Striped bass	162	Inland silverside
12/15/2005	002-121505-0954-B	Striped bass	168	
12/15/2005	003-121505-0954-B	Striped bass	166	
12/15/2005	005-121505-0954-B	Striped bass	128	
12/15/2005	006-121505-0954-B	Striped bass	128	
12/15/2005	007-121505-0954-B	Striped bass	158	
12/15/2005	008-121505-0954-B	Striped bass	121	

Appendix B (Cont.): Predator and eaten prey species data for winter 2006 diet study

Date	Sample number	Predator species	Length	Eaten prey species
12/15/2005	009-121505-0954-B	Striped bass	132	
12/15/2005	011-121505-0954-B	Striped bass	125	
12/15/2005	012-121505-0954-B	Striped bass	127	
12/15/2005	013-121505-0954-B	Striped bass	161	
12/15/2005	014-121505-0954-B	Striped bass	138	
12/15/2005	015-121505-0954-B	Striped bass	132	
12/15/2005	016-121505-0954-B	Striped bass	162	
12/15/2005	017-121505-0954-B	Striped bass	166	
12/15/2005	018-121505-0954-B	Striped bass	173	
12/15/2005	019-121505-0954-B	Striped bass	172	
12/15/2005	020-121505-0954-B	Striped bass	117	
12/15/2005	021-121505-0954-B	Striped bass	143	
12/15/2005	022-121505-0954-B	Striped bass	146	
12/15/2005	023-121505-0954-B	Striped bass	149	
12/15/2005	025-121505-0954-B	Striped bass	115	
12/15/2005	026-121505-0954-B	Striped bass	170	
12/15/2005	027-121505-0954-B	Striped bass	149	
12/15/2005	028-121505-0954-B	Striped bass	151	
12/15/2005	029-121505-0954-B	Striped bass	143	
12/15/2005	030-121505-0954-B	Striped bass	127	
12/15/2005	004-121505-0801-A	Striped bass	160	
12/15/2005	006-121505-0801-A	Striped bass	120	
12/15/2005	007-121505-0801-A	Striped bass	115	
12/15/2005	008-121505-0801-A	Striped bass	150	
12/15/2005	010-121505-0801-A	Striped bass	125	
12/15/2005	011-121505-0801-A	Striped bass	152	
12/15/2005	012-121505-0801-A	Striped bass	88	
12/15/2005	013-121505-0801-A	Striped bass	151	
12/15/2005	014-121505-0801-A	Striped bass	127	

Appendix B (Cont.): Predator and eaten prey species data for winter 2006 diet study

Date	Sample number	Predator species	Length	Eaten prey species
12/15/2005	015-121505-0801-A	Striped bass	201	
12/15/2005	017-121505-0801-A	Striped bass	126	
12/15/2005	018-121505-0801-A	Striped bass	168	
12/15/2005	019-121505-0801-A	Striped bass	140	
12/15/2005	020-121505-0801-A	Striped bass	118	
12/15/2005	021-121505-0801-A	Striped bass	163	
12/15/2005	022-121505-0801-A	Striped bass	128	
12/15/2005	024-121505-0801-A	Striped bass	129	
12/15/2005	025-121505-0801-A	Striped bass	142	
12/15/2005	026-121505-0801-A	Striped bass	131	
12/15/2005	027-121505-0801-A	Striped bass	120	
12/15/2005	028-121505-0801-A	Striped bass	142	
12/15/2005	029-121505-0801-A	Striped bass	125	
12/15/2005	030-121505-0801-A	Striped bass	109	
12/15/2005	031-121505-0801-A	Striped bass	124	
12/15/2005	010-121505-0954-B	White catfish	218	
12/15/2005	002-121505-0801-A	White catfish	244	
12/15/2005	023-121505-0801-A	White catfish	200	
12/15/2005	024-121505-0954-B	Black crappie	125	
12/15/2005	004-121505-0954-B	Yellowfin goby	192	
12/15/2005	001-121505-0801-A	Yellowfin goby	154	
12/15/2005	005-121505-0801-A	Yellowfin goby	207	
12/15/2005	009-121505-0801-A	Yellowfin goby	202	
12/16/2005	001-121605-1115-B	Striped bass	156	
12/16/2005	002-121605-1115-B	Striped bass	147	
12/16/2005	003-121605-1115-B	Striped bass	139	
12/16/2005	004-121605-1115-B	Striped bass	130	
12/16/2005	005-121605-1115-B	Striped bass	145	
12/16/2005	006-121605-1115-B	Striped bass	131	

Appendix B (Cont.): Predator and eaten prey species data for winter 2006 diet study

Date	Sample number	Predator species	Length	Eaten prey species
12/16/2005	007-121605-1115-B	Striped bass	155	
12/16/2005	008-121605-1115-B	Striped bass	130	
12/16/2005	009-121605-1115-B	Striped bass	131	
12/16/2005	010-121605-1115-B	Striped bass	133	
12/16/2005	011-121605-1115-B	Striped bass	155	
12/16/2005	013-121605-1115-B	Striped bass	119	
12/16/2005	014-121605-1115-B	Striped bass	179	
12/16/2005	015-121605-1115-B	Striped bass	171	
12/16/2005	016-121605-1115-B	Striped bass	131	
12/16/2005	017-121605-1115-B	Striped bass	136	
12/16/2005	018-121605-1115-B	Striped bass	109	
12/16/2005	019-121605-1115-B	Striped bass	119	
12/16/2005	020-121605-1115-B	Striped bass	130	
12/16/2005	021-121605-1115-B	Striped bass	150	
12/16/2005	022-121605-1115-B	Striped bass	157	
12/16/2005	023-121605-1115-B	Striped bass	131	
12/16/2005	025-121605-1115-B	Striped bass	129	
12/16/2005	002-121605-0910-A	Striped bass	151	
12/16/2005	003-121605-0910-A	Striped bass	135	
12/16/2005	004-121605-0910-A	Striped bass	149	
12/16/2005	005-121605-0910-A	Striped bass	134	
12/16/2005	006-121605-0910-A	Striped bass	298	Bluegill
12/16/2005	007-121605-0910-A	Striped bass	127	
12/16/2005	008-121605-0910-A	Striped bass	151	
12/16/2005	009-121605-0910-A	Striped bass	114	
12/16/2005	010-121605-0910-A	Striped bass	140	
12/16/2005	011-121605-0910-A	Striped bass	160	
12/16/2005	012-121605-0910-A	Striped bass	134	
12/16/2005	013-121605-0910-A	Striped bass	126	

Appendix B (Cont.): Predator and eaten prey species data for winter 2006 diet study

Date	Sample number	Predator species	Length	Eaten prey species
12/16/2005	014-121605-0910-A	Striped bass	151	
12/16/2005	015-121605-0910-A	Striped bass	143	
12/16/2005	016-121605-0910-A	Striped bass	125	
12/16/2005	017-121605-0910-A	Striped bass	137	
12/16/2005	018-121605-0910-A	Striped bass	134	Bluegill
12/16/2005	019-121605-0910-A	Striped bass	130	
12/16/2005	020-121605-0910-A	Striped bass	136	
12/16/2005	021-121605-0910-A	Striped bass	124	
12/16/2005	022-121605-0910-A	Striped bass	128	
12/16/2005	023-121605-0910-A	Striped bass	158	
12/16/2005	024-121605-0910-A	Striped bass	118	
12/16/2005	025-121605-0910-A	Striped bass	121	
12/16/2005	026-121605-0910-A	Striped bass	171	
12/16/2005	027-121605-0910-A	Striped bass	266	
12/16/2005	029-121605-0910-A	Striped bass	271	Threadfin shad
12/16/2005	031-121605-0910-A	Striped bass	138	
12/16/2005	032-121605-0910-A	Striped bass	113	
12/16/2005	012-121605-1115-B	White catfish	205	
12/16/2005	030-121605-0910-A	White catfish	273	
12/16/2005	033-121605-0910-A	Channel catfish	329	
12/16/2005	026-121605-1115-B	Black crappie	236	
12/16/2005	001-121605-0910-A	Black crappie	262	American shad
12/16/2005	001-121605-0910-A	Black crappie	262	Threadfin shad
12/21/2005	001-122105-1059-B	Striped bass	152	
12/21/2005	002-122105-1059-B	Striped bass	167	
12/21/2005	003-122105-1059-B	Striped bass	132	
12/21/2005	004-122105-1059-B	Striped bass	110	
12/21/2005	005-122105-1059-B	Striped bass	140	
12/21/2005	006-122105-1059-B	Striped bass	147	

Appendix B (Cont.): Predator and eaten prey species data for winter 2006 diet study

Date	Sample number	Predator species	Length	Eaten prey species
12/21/2005	007-122105-1059-B	Striped bass	164	
12/21/2005	008-122105-1059-B	Striped bass	135	
12/21/2005	009-122105-1059-B	Striped bass	157	
12/21/2005	010-122105-1059-B	Striped bass	136	
12/21/2005	011-122105-1059-B	Striped bass	152	
12/21/2005	012-122105-1059-B	Striped bass	142	
12/21/2005	013-122105-1059-B	Striped bass	126	
12/21/2005	014-122105-1059-B	Striped bass	126	
12/21/2005	015-122105-1059-B	Striped bass	104	
12/21/2005	016-122105-1059-B	Striped bass	93	
12/21/2005	002-122105-0715-A	Striped bass	149	
12/21/2005	003-122105-0715-A	Striped bass	138	
12/21/2005	005-122105-0715-A	Striped bass	286	
12/21/2005	009-122105-0715-A	Striped bass	126	
12/21/2005	011-122105-0715-A	Striped bass	134	
12/21/2005	012-122105-0715-A	Striped bass	155	Bluegill
12/21/2005	013-122105-0715-A	Striped bass	145	
12/21/2005	015-122105-0715-A	Striped bass	127	
12/21/2005	016-122105-0715-A	Striped bass	156	
12/21/2005	017-122105-0715-A	Striped bass	152	
12/21/2005	018-122105-0715-A	Striped bass	157	
12/21/2005	020-122105-0715-A	Striped bass	135	
12/21/2005	022-122105-0715-A	Striped bass	144	
12/21/2005	014-122105-0715-A	White catfish	255	
12/21/2005	001-122105-0715-A	Channel catfish	489	
12/21/2005	010-122105-0715-A	Black crappie	238	
12/21/2005	006-122105-0715-A	Yellowfin goby	154	
12/21/2005	007-122105-0715-A	Yellowfin goby	197	
12/21/2005	008-122105-0715-A	Yellowfin goby	205	

Appendix B (Cont.): Predator and eaten prey species data for winter 2006 diet study

Date	Sample number	Predator species	Length	Eaten prey species
12/21/2005	019-122105-0715-A	Yellowfin goby	200	
12/21/2005	021-122105-0715-A	Yellowfin goby	208	
12/21/2005	023-122105-0715-A	Yellowfin goby	222	
12/21/2005	024-122105-0715-A	Yellowfin goby	207	
1/4/2006	001-010406-0745-B	Striped bass	107	
1/4/2006	002-010406-0745-B	Striped bass	162	
1/4/2006	003-010406-0745-B	Striped bass	128	
1/4/2006	004-010406-0745-B	Striped bass	95	
1/4/2006	005-010406-0745-B	Striped bass	100	
1/4/2006	006-010406-0745-B	Striped bass	81	
1/4/2006	008-010406-0745-B	Striped bass	162	Inland silverside
1/4/2006	008-010406-0745-B	Striped bass	162	Inland silverside
1/4/2006	009-010406-0745-B	Striped bass	110	Inland silverside
1/4/2006	010-010406-0745-B	Striped bass	111	
1/4/2006	012-010406-0745-B	Striped bass	81	
1/4/2006	013-010406-0745-B	Striped bass	93	
1/4/2006	014-010406-0745-B	Striped bass	92	
1/4/2006	015-010406-0745-B	Striped bass	102	
1/4/2006	016-010406-0745-B	Striped bass	225	American shad
1/4/2006	016-010406-0745-B	Striped bass	225	American shad
1/4/2006	017-010406-0745-B	Striped bass	104	
1/4/2006	019-010406-0745-B	Striped bass	381	Inland silverside
1/4/2006	019-010406-0745-B	Striped bass	381	Lamprey unknown
1/4/2006	019-010406-0745-B	Striped bass	381	Unknown
1/4/2006	011-010406-0745-B	Yellowfin goby	175	
1/4/2006	018-010406-0745-B	Yellowfin goby	184	
1/5/2006	001-010506-0848-B	White catfish	375	
1/5/2006	002-010506-0848-B	Striped bass	82	
1/5/2006	003-010506-0848-B	Striped bass	109	

Appendix B (Cont.): Predator and eaten prey species data for winter 2006 diet study

Date	Sample number	Predator species	Length	Eaten prey species
1/5/2006	004-010506-0848-B	Striped bass	81	
1/5/2006	005-010506-0848-B	Striped bass	91	
1/5/2006	006-010506-0848-B	Striped bass	135	
1/5/2006	007-010506-0848-B	Striped bass	84	
1/5/2006	008-010506-0848-B	Striped bass	101	
1/5/2006	009-010506-0848-B	Striped bass	105	
1/5/2006	010-010506-0848-B	Striped bass	103	
1/5/2006	011-010506-0848-B	Striped bass	143	Inland silverside
1/5/2006	014-010506-0848-B	Striped bass	97	
1/5/2006	015-010506-0848-B	Striped bass	359	American shad
1/5/2006	015-010506-0848-B	Striped bass	359	American shad
1/5/2006	015-010506-0848-B	Striped bass	359	American shad
1/5/2006	001-010506-0503-A	Striped bass	175	
1/5/2006	002-010506-0503-A	Striped bass	114	
1/5/2006	004-010506-0503-A	Striped bass	168	Threadfin shad
1/5/2006	005-010506-0503-A	Striped bass	92	
1/5/2006	006-010506-0503-A	Striped bass	97	
1/5/2006	007-010506-0503-A	Striped bass	90	
1/5/2006	013-010506-0503-A	Striped bass	218	Threadfin shad
1/5/2006	014-010506-0503-A	Striped bass	158	Threadfin shad
1/5/2006	012-010506-0503-A	Black crappie	241	
1/5/2006	012-010506-0848-B	Yellowfin goby	162	
1/5/2006	013-010506-0848-B	Yellowfin goby	202	
1/5/2006	008-010506-0503-A	Yellowfin goby	180	
1/5/2006	009-010506-0503-A	Yellowfin goby	179	
1/5/2006	010-010506-0503-A	Yellowfin goby	191	
1/5/2006	011-010506-0503-A	Yellowfin goby	155	
1/5/2006	015-010506-0503-A	Yellowfin goby	167	
1/5/2006	016-010506-0503-A	Yellowfin goby	192	

Appendix B (Cont.): Predator and eaten prey species data for winter 2006 diet study

Date	Sample number	Predator species	Length	Eaten prey species
1/5/2006	017-010506-0503-A	Yellowfin goby	195	
1/5/2006	018-010506-0503-A	Yellowfin goby	185	
1/5/2006	019-010506-0503-A	Yellowfin goby	184	
1/5/2006	020-010506-0503-A	Yellowfin goby	200	
1/5/2006	021-010506-0503-A	Yellowfin goby	173	
1/5/2006	022-010506-0503-A	Yellowfin goby	176	
1/10/2006	001-011006-0801-B	Striped bass	308	
1/10/2006	002-011006-0801-B	Striped bass	238	Threadfin shad
1/10/2006	003-011006-0801-B	Striped bass	142	
1/10/2006	004-011006-0801-B	Striped bass	118	
1/10/2006	005-011006-0801-B	Striped bass	119	
1/10/2006	006-011006-0801-B	Striped bass	129	
1/10/2006	008-011006-0801-B	Striped bass	103	
1/10/2006	010-011006-0801-B	Striped bass	103	
1/10/2006	011-011006-0801-B	Striped bass	93	
1/10/2006	012-011006-0801-B	Striped bass	90	
1/10/2006	013-011006-0801-B	Striped bass	92	
1/10/2006	001-011006-0508-A	Striped bass	110	
1/10/2006	002-011006-0508-A	Striped bass	105	
1/10/2006	003-011006-0508-A	Striped bass	117	
1/10/2006	004-011006-0508-A	Striped bass	103	
1/10/2006	005-011006-0508-A	Striped bass	125	
1/10/2006	015-011006-0508-A	Striped bass	110	
1/10/2006	016-011006-0508-A	Striped bass	95	
1/10/2006	017-011006-0508-A	Striped bass	103	
1/10/2006	008-011006-0508-A	Channel catfish	408	
1/10/2006	006-011006-0508-A	Yellowfin goby	195	
1/10/2006	007-011006-0508-A	Yellowfin goby	186	
1/10/2006	009-011006-0508-A	Yellowfin goby	165	

Appendix B (Cont.): Predator and eaten prey species data for winter 2006 diet study

Date	Sample number	Predator species	Length	Eaten prey species
1/10/2006	010-011006-0508-A	Yellowfin goby	198	
1/10/2006	011-011006-0508-A	Yellowfin goby	170	
1/10/2006	012-011006-0508-A	Yellowfin goby	181	
1/10/2006	013-011006-0508-A	Yellowfin goby	184	
1/10/2006	014-011006-0508-A	Yellowfin goby	211	
1/10/2006	018-011006-0508-A	Yellowfin goby	178	
1/10/2006	019-011006-0508-A	Yellowfin goby	188	
1/12/2006	001-011206-0754-A	Striped bass	405	
1/12/2006	002-011206-0930-B	Striped bass	96	
1/12/2006	005-011206-0754-A	White catfish	335	
1/12/2006	008-011206-0754-A	Black crappie	315	American shad
1/12/2006	002-011206-0754-A	Yellowfin goby	175	
1/12/2006	004-011206-0754-A	Yellowfin goby	170	
1/12/2006	007-011206-0754-A	Yellowfin goby	173	
1/12/2006	001-011206-0930-B	Yellowfin goby	208	
1/12/2006	003-011206-0930-B	Yellowfin goby	195	
1/12/2006	004-011206-0930-B	Yellowfin goby	168	
1/12/2006	005-011206-0930-B	Yellowfin goby	151	
1/12/2006	006-011206-0930-B	Yellowfin goby	93	
1/18/2006	001-011806-1007-B	Striped bass	156	
1/18/2006	002-011806-1007-B	Striped bass	239	
1/18/2006	003-011806-1007-B	Striped bass	277	Threadfin shad
1/18/2006	003-011806-1007-B	Striped bass	277	Threadfin shad
1/18/2006	003-011806-1007-B	Striped bass	277	Threadfin shad
1/18/2006	004-011806-1007-B	Striped bass	95	
1/18/2006	005-011806-1007-B	Striped bass	112	
1/18/2006	001-011806-0830-A	Striped bass	275	
1/18/2006	002-011806-0830-A	Striped bass	184	
1/18/2006	003-011806-0830-A	Striped bass	160	

Appendix B (Cont.): Predator and eaten prey species data for winter 2006 diet study

Date	Sample number	Predator species	Length	Eaten prey species
1/18/2006	004-011806-0830-A	Striped bass	306	Threadfin shad
1/18/2006	005-011806-0830-A	Striped bass	152	
1/18/2006	006-011806-0830-A	Yellowfin goby	165	
1/19/2006	002-011906-0859-B	Striped bass	97	
1/19/2006	003-011906-0859-B	Striped bass	95	
1/19/2006	004-011906-0859-B	Striped bass	249	Unknown
1/19/2006	005-011906-0710-A	Striped bass	121	
1/19/2006	011-011906-0710-A	Striped bass	90	
1/19/2006	004-011906-0710-A	White catfish	278	
1/19/2006	001-011906-0859-B	Yellowfin goby	176	
1/19/2006	002-011906-0710-A	Yellowfin goby	190	
1/19/2006	003-011906-0710-A	Yellowfin goby	194	
1/19/2006	006-011906-0710-A	Yellowfin goby	208	
1/19/2006	008-011906-0710-A	Yellowfin goby	196	
1/19/2006	009-011906-0710-A	Yellowfin goby	195	
1/19/2006	010-011906-0710-A	Yellowfin goby	163	
1/20/2006	001-012006-0859-B	Striped bass	153	
1/20/2006	002-012006-0859-B	Striped bass	117	
1/20/2006	003-012006-0859-B	Striped bass	94	
1/20/2006	004-012006-0859-B	Striped bass	118	
1/20/2006	001-012006-0711-A	Striped bass	116	
1/20/2006	005-012006-0711-A	Striped bass	105	
1/20/2006	006-012006-0711-A	Striped bass	94	
1/20/2006	002-012006-0711-A	Yellowfin goby	170	
1/20/2006	003-012006-0711-A	Yellowfin goby	153	
1/20/2006	004-012006-0711-A	Yellowfin goby	173	
1/24/2006	001-012406-0938-B	Striped bass	151	
1/24/2006	002-012406-0938-B	Striped bass	95	
1/24/2006	003-012406-0938-B	Striped bass	243	Threadfin shad

Appendix B (Cont.): Predator and eaten prey species data for winter 2006 diet study

Date	Sample number	Predator species	Length	Eaten prey species
1/24/2006	003-012406-0748-A	Striped bass	421	American shad
1/24/2006	003-012406-0748-A	Striped bass	421	Threadfin shad
1/24/2006	003-012406-0748-A	Striped bass	421	Threadfin shad
1/24/2006	003-012406-0748-A	Striped bass	421	Threadfin shad
Date	Sample number	Predator species	Length	Eaten prey species
1/24/2006	001-012406-0748-A	White catfish	239	
1/24/2006	004-012406-0748-A	Yellowfin goby	175	
1/27/2006	002-012706-1003-B	Striped bass	141	
1/27/2006	003-012706-1003-B	Striped bass	88	
1/27/2006	003-012706-0757-A	Striped bass	88	
1/27/2006	005-012706-0757-A	Striped bass	168	
1/27/2006	006-012706-0757-A	Striped bass	166	
1/27/2006	001-012706-0757-A	Yellowfin goby	208	
1/27/2006	002-012706-0757-A	Yellowfin goby	165	
1/27/2006	004-012706-0757-A	Yellowfin goby	177	
2/2/2006	001-020206-0718-A	Striped bass	94	
2/2/2006	001-020206-0921-B	Striped bass	131	
2/2/2006	002-020206-0921-B	Striped bass	97	
2/2/2006	003-020206-0921-B	Striped bass	180	
2/2/2006	003-020206-0718-A	Yellowfin goby	195	
2/7/2006	001-020706-0850-A	Striped bass	93	
2/7/2006	002-020706-0850-A	Striped bass	101	
2/7/2006	001-020706-0952-B	Striped bass	93	
2/7/2006	002-020706-0952-B	Striped bass	240	
2/7/2006	003-020706-0850-A	White catfish	349	
2/8/2006	003-020806-0855-A	Striped bass	133	Inland silverside
2/8/2006	001-020806-1003-B	Striped bass	97	
2/8/2006	001-020806-0855-A	Yellowfin goby	182	
2/8/2006	002-020806-0855-A	Yellowfin goby	162	

Appendix B (Cont.): Predator and eaten prey species data for winter 2006 diet study

Date	Sample number	Predator species	Length	Eaten prey species
2/9/2006	001-020906-1124-B	Striped bass	72	
2/9/2006	002-020906-1124-B	Striped bass	102	
2/9/2006	003-020906-1124-B	Striped bass	86	
2/9/2006	004-020906-1124-B	Striped bass	73	
2/9/2006	005-020906-1124-B	Striped bass	118	
2/9/2006	006-020906-1124-B	Striped bass	107	
2/9/2006	007-020906-1124-B	Striped bass	93	
2/9/2006	009-020906-1124-B	Striped bass	92	
2/9/2006	010-020906-1124-B	Striped bass	97	
2/9/2006	011-020906-1124-B	Striped bass	86	
2/9/2006	007-020906-0945-A	Striped bass	112	
2/9/2006	009-020906-0945-A	Striped bass	99	
2/9/2006	010-020906-0945-A	Striped bass	100	
2/9/2006	011-020906-0945-A	Striped bass	106	
2/9/2006	012-020906-0945-A	Striped bass	87	
2/9/2006	001-020906-0945-A	Striped bass	240	
2/9/2006	002-020906-0945-A	Striped bass	101	
2/9/2006	005-020906-0945-A	White catfish	291	
2/9/2006	004-020906-0945-A	White catfish	345	
2/9/2006	008-020906-1124-B	Channel catfish	150	
2/9/2006	008-020906-0945-A	Channel catfish	208	
2/9/2006	003-020906-0945-A	Black crappie	102	
2/10/2006	002-021006-1039-B	Striped bass	210	
2/10/2006	003-021006-1039-B	Striped bass	116	
2/10/2006	004-021006-1039-B	Striped bass	69	
2/10/2006	005-021006-1039-B	Striped bass	79	
2/10/2006	006-021006-1039-B	Striped bass	83	
2/10/2006	007-021006-1039-B	Striped bass	78	
2/10/2006	008-021006-1039-B	Striped bass	112	

Appendix B (Cont.): Predator and eaten prey species data for winter 2006 diet study

Date	Sample number	Predator species	Length	Eaten prey species
2/10/2006	009-021006-1039-B	Striped bass	86	
2/10/2006	010-021006-1039-B	Striped bass	110	
2/10/2006	011-021006-1039-B	Striped bass	101	
2/10/2006	012-021006-1039-B	Striped bass	107	
2/10/2006	013-021006-1039-B	Striped bass	98	
2/10/2006	014-021006-1039-B	Striped bass	101	
2/10/2006	005-021006-0920-A	Striped bass	102	
2/10/2006	006-021006-0920-A	Striped bass	103	Longfin smelt
2/10/2006	008-021006-0920-A	Striped bass	90	
2/10/2006	001-021006-0920-A	Striped bass	88	
2/10/2006	002-021006-0920-A	Striped bass	94	
2/10/2006	015-021006-1039-B	Striped bass	98	
2/10/2006	003-021006-0920-A	White catfish	269	
2/10/2006	001-021006-1039-B	Yellowfin goby	88	
2/13/2006	002-021306-0715-A	Striped bass	79	
2/13/2006	003-021306-0715-A	Yellowfin goby	153	
2/14/2006	001-021406-0947-B	Striped bass	153	
2/14/2006	002-021406-0947-B	Striped bass	113	
2/14/2006	001-021406-0815-A	Striped bass	110	
2/14/2006	002-021406-0815-A	Striped bass	114	
2/14/2006	003-021406-0815-A	Striped bass	98	
2/14/2006	004-021406-0815-A	Striped bass	78	
2/14/2006	005-021406-0815-A	White catfish	178	
2/14/2006	006-021406-0815-A	White catfish	264	
2/14/2006	007-021406-0815-A	Brown bullhead	280	
2/15/2006	001-021506-0815-A	Striped bass	168	
2/15/2006	002-021506-0815-A	Striped bass	116	Bluegill
2/15/2006	003-021506-0815-A	Striped bass	109	
2/15/2006	004-021506-0815-A	Yellowfin goby	162	

Appendix B (Cont.): Predator and eaten prey species data for winter 2006 diet study

Date	Sample number	Predator species	Length	Eaten prey species
2/16/2006	001-021606-0823-A	Striped bass	165	
2/16/2006	002-021606-0823-A	Striped bass	158	
2/16/2006	003-021606-0823-A	Striped bass	76	
2/16/2006	004-021606-0823-A	Striped bass	91	
2/16/2006	005-021606-0823-A	Striped bass	86	
2/16/2006	001-021606-1055-B	Striped bass	142	
2/16/2006	003-021606-1055-B	Striped bass	238	Unknown
2/16/2006	004-021606-1055-B	Striped bass	108	
2/16/2006	005-021606-1055-B	Striped bass	253	
2/16/2006	006-021606-1055-B	Striped bass	97	
2/16/2006	007-021606-1055-B	Striped bass	104	
2/16/2006	006-021606-0823-A	White catfish	232	
2/16/2006	009-021606-0823-A	White catfish	242	
2/16/2006	008-021606-1055-B	Channel catfish	245	
2/16/2006	007-021606-0823-A	Yellowfin goby	180	
2/17/2006	001-021706-1001-B	Striped bass	126	
2/17/2006	002-021706-1001-B	Striped bass	108	
2/17/2006	003-021706-1001-B	Striped bass	96	
2/17/2006	004-021706-1001-B	Striped bass	110	
2/17/2006	005-021706-1001-B	Striped bass	79	
2/17/2006	006-021706-1001-B	Striped bass	91	
2/17/2006	001-021706-0810-A	Striped bass	111	
2/17/2006	002-021706-0810-A	Striped bass	99	
2/17/2006	003-021706-0810-A	Striped bass	165	
2/17/2006	004-021706-0810-A	Striped bass	190	
2/17/2006	005-021706-0810-A	Striped bass	340	Threadfin shad
2/17/2006	005-021706-0810-A	Striped bass	340	Threadfin shad
2/17/2006	007-021706-1001-B	White catfish	275	
2/17/2006	008-021706-1001-B	White catfish	258	

Appendix B (Cont.): Predator and eaten prey species data for winter 2006 diet study

Date	Sample number	Predator species	Length	Eaten prey species
2/17/2006	006-021706-0810-A	White catfish	245	
2/21/2006	004-022106-0815-A	Striped bass	168	
2/21/2006	005-022106-0815-A	Striped bass	84	
2/21/2006	003-022106-0815-A	White catfish	240	
2/21/2006	002-022106-0815-A	Channel catfish	395	
2/22/2006	001-022206-0800-A	Striped bass	363	
2/22/2006	002-022206-0800-A	Striped bass	220	
2/22/2006	003-022206-0800-A	Striped bass	125	
2/22/2006	004-022206-0800-A	Striped bass	101	
2/22/2006	005-022206-0800-A	Striped bass	113	Western mosquitofish
2/22/2006	006-022206-0800-A	Striped bass	108	
2/22/2006	007-022206-0800-A	Striped bass	107	
2/22/2006	001-022206-1000-B	Striped bass	80	
2/22/2006	003-022206-1000-B	Striped bass	105	
2/22/2006	004-022206-1000-B	Striped bass	95	
2/22/2006	005-022206-1000-B	Striped bass	94	
2/23/2006	001-022306-1013-B	Striped bass	283	
2/23/2006	002-022306-1013-B	Striped bass	231	Threadfin shad
2/23/2006	003-022306-1013-B	Striped bass	176	
2/23/2006	004-022306-1013-B	Striped bass	100	
2/23/2006	001-022306-0815-A	Striped bass	348	
2/23/2006	002-022306-0815-A	Striped bass	76	
2/23/2006	003-022306-0815-A	Striped bass	242	Threadfin shad
3/1/2006	001-030106-0923-A	Striped bass	442	
3/1/2006	002-030106-0923-A	Striped bass	135	
3/1/2006	003-030106-0923-A	Striped bass	144	
3/1/2006	004-030106-0923-A	Striped bass	176	
3/1/2006	005-030106-0923-A	Striped bass	97	

Appendix B (Cont.): Predator and eaten prey species data for winter 2006 diet study

Date	Sample number	Predator species	Length	Eaten prey species
3/1/2006	006-030106-0923-A	Striped bass	114	Bluegill
3/1/2006	007-030106-0923-A	Striped bass	243	
3/1/2006	001-030106-1123-B	Striped bass	118	
3/1/2006	002-030106-1123-B	Striped bass	116	
3/1/2006	004-030106-1123-B	Striped bass	254	
3/2/2006	001-030203-1039-B	Striped bass	395	
3/2/2006	002-030203-1039-B	Striped bass	145	
3/2/2006	003-030203-1039-B	Striped bass	126	
3/2/2006	001-030206-0923-A	Striped bass	370	
3/2/2006	003-030206-0923-A	Striped bass	155	
3/2/2006	005-030206-0923-A	Striped bass	171	
3/2/2006	006-030206-0923-A	Striped bass	133	
3/2/2006	007-030206-0923-A	Striped bass	116	
3/2/2006	004-030206-0923-A	Yellowfin goby	162	
3/3/2006	001-030306-1425-B	Striped bass	228	Delta smelt
3/3/2006	001-030306-1425-B	Striped bass	228	Delta smelt
3/3/2006	002-030306-1425-B	Striped bass	113	
3/3/2006	003-030306-1425-B	Striped bass	103	
3/3/2006	001-030306-1300-A	Striped bass	273	
3/3/2006	002-030306-1300-A	Striped bass	107	
3/3/2006	003-030306-1300-A	Striped bass	124	
3/3/2006	004-030306-1300-A	Striped bass	118	
3/3/2006	005-030306-1300-A	Striped bass	94	
3/3/2006	006-030306-1300-A	Striped bass	152	
3/3/2006	007-030306-1300-A	Striped bass	264	
3/3/2006	001-030606-0810-A	Striped bass	139	
3/3/2006	002-030606-0810-A	Striped bass	94	
3/3/2006	003-030606-0810-A	Striped bass	116	
3/3/2006	001-030606-1018-B	Striped bass	100	

Appendix B (Cont.): Predator and eaten prey species data for winter 2006 diet study

Date	Sample number	Predator species	Length	Eaten prey species
3/7/2006	001-030706-0815-A	Striped bass	282	
3/7/2006	002-030706-0815-A	Striped bass	208	
3/7/2006	001-030706-1004-B	Striped bass	157	
3/8/2006	001-030806-0810-A	Striped bass	134	
3/8/2006	001-030806-1005-B	Striped bass	122	
3/8/2006	002-030806-1005-B	Striped bass	114	
3/9/2006	001-030906-1041-B	Striped bass	78	
3/9/2006	001-030906-0800-A	Striped bass	302	
3/9/2006	002-030906-0800-A	Striped bass	258	
3/9/2006	003-030906-0800-A	Striped bass	300	
3/9/2006	004-030906-0800-A	Striped bass	137	
3/13/2006	001-031306-0800-A	Striped bass	91	
3/13/2006	002-031306-0800-A	Striped bass	88	
3/13/2006	001-031306-0937-B	Striped bass	101	
3/14/2006	001-031406-0808-A	Striped bass	143	
3/14/2006	002-031406-0808-A	Striped bass	97	
3/14/2006	001-031406-0910-B	Striped bass	123	
3/14/2006	002-031406-0910-B	Striped bass	166	
3/14/2006	003-031406-0808-A	White catfish	131	
3/15/2006	001-031506-0814-A	White catfish	157	
3/15/2006	002-031506-0814-A	White catfish	154	
3/15/2006	003-031506-0814-A	White catfish	262	
3/17/2006	001-031706-1055-B	Striped bass	230	
3/17/2006	002-031706-1055-B	Striped bass	92	
3/17/2006	001-031706-0820-A	Striped bass	226	
3/17/2006	002-031706-0820-A	Striped bass	160	
3/20/2006	003-032006-0800-A	Striped bass	225	
3/20/2006	004-032006-0800-A	Striped bass	364	
3/20/2006	005-032006-0800-A	Striped bass	102	

Appendix B (Cont.): Predator and eaten prey species data for winter 2006 diet study

Date	Sample number	Predator species	Length	Eaten prey species
3/20/2006	001-032006-0800-A	White catfish	402	
3/20/2006	002-032006-0800-A	Yellowfin goby	165	
3/22/2006	001-032206-1005-A	Striped bass	152	
3/22/2006	001-032206-1253-B	Striped bass	173	
3/22/2006	003-032206-1005-A	White catfish	240	
3/22/2006	004-032206-1253-B	White catfish	359	
3/22/2006	002-032206-1005-A	Channel catfish	222	
3/22/2006	004-032206-1005-A	Channel catfish	328	
3/22/2006	003-032206-1253-B	Channel catfish	228	
3/22/2006	005-032206-1253-B	Channel catfish	228	
3/22/2006	002-032206-1253-B	Largemouth bass	272	
3/24/2006	001-032406-0858-A	Striped bass	371	
3/27/2006	001-032706-1038-B	Striped bass	143	
3/27/2006	002-032706-0901-A	Striped bass	339	
3/27/2006	003-032706-0901-A	Striped bass	375	
3/27/2006	002-032706-1038-B	White catfish	239	
3/27/2006	001-032706-0901-A	White catfish	363	
3/28/2006	001-032806-1055-B	Striped bass	240	
3/28/2006	002-032806-1055-B	Striped bass	370	
3/28/2006	001-032806-0800-A	Striped bass	326	
3/28/2006	002-032806-0800-A	Striped bass	237	
3/28/2006	003-032806-0800-A	Striped bass	323	
3/28/2006	004-032806-0800-A	Striped bass	137	
4/3/2006	001-040306-0935-B	Striped bass	263	Chinook salmon
4/3/2006	002-040306-0800-A	Striped bass	282	Chinook salmon
4/3/2006	002-040306-0800-A	Striped bass	282	Chinook salmon
4/3/2006	003-040306-0800-A	Striped bass	245	
4/3/2006	004-040306-0800-A	Striped bass	240	Chinook salmon

Appendix B (Cont.): Predator and eaten prey species data for winter 2006 diet study

Date	Sample number	Predator species	Length	Eaten prey species
4/3/2006	004-040306-0800-A	Striped bass	240	Chinook salmon
4/3/2006	004-040306-0800-A	Striped bass	240	Chinook salmon
4/3/2006	004-040306-0800-A	Striped bass	240	Chinook salmon
4/3/2006	005-040306-0800-A	Striped bass	168	
4/3/2006	007-040306-0800-A	Striped bass	140	
4/3/2006	001-040306-0800-A	White catfish	364	

Appendix C: Daily numbers of predator species and prey in spring 2005

	CH sample		CHTR sample	
Date	**Predator #**	**Prey #**	**Predator #**	**Prey #**
4/1/2005	1	1	11	19
4/8/2005	5	4	9	10
4/13/2005	2	0	4	1
4/14/2005	1	0	2	1
4/21/2005	1	0	3	1
5/19/2005	3	23	23	4
5/20/2005	1	2	1	0
5/25/2005	2	0	4	1
6/2/2005	8	3	12	3
6/14/2005	5	0	3	0
6/15/2005	4	0	8	6
6/16/2005	9	1	24	14
6/21/2005	5	0	5	2
6/29/2005	3	0	3	0
7/8/2005	10	25	30	28
7/13/2005	1	0	1	0
7/15/2005	3	1	5	1
Total	64	60	148	91

Appendix D: Daily numbers of predator species and prey in winter 2005-2006

	CH sample		CHTR sample	
Date	**Predator #**	**Prey #**	**Predator #**	**Prey #**
12/5/2005	8	1	8	0
12/6/2005	20	0	4	0
12/12/2005	16	0	6	0
12/13/2005	38	8	26	6
12/15/2005	31	0	30	1
12/16/2005	33	3	26	0
12/21/2005	24	0	16	0
1/4/2006	21	8	19	8
1/5/2006	22	3	15	2
1/10/2006	19	1	13	0
1/12/2006	8	1	6	0
1/18/2006	6	1	5	2
1/19/2006	11	0	4	0
1/20/2006	7	0	4	0
1/24/2006	5	4	3	1
1/27/2006	6	0	3	0
2/2/2006	3	0	3	0
2/7/2006	3	0	2	0
2/8/2006	3	1	1	0
2/9/2006	13	0	11	0
2/10/2006	8	0	15	0
2/14/2006	7	0	2	0
2/16/2006	9	0	8	0
2/17/2006	6	0	8	2
2/22/2006	7	1	5	0
2/23/2006	3	1	4	1
3/1/2006	7	1	4	0
3/2/2006	7	0	3	0
3/3/2006	7	0	3	2

Appendix D (Cont.): Daily numbers of predator species and prey in winter 2005-2006

	CH sample		CHTR sample	
Date	**Predator #**	**Prey #**	**Predator #**	**Prey #**
3/6/2006	3	0	1	0
3/7/2006	2	0	2	0
3/8/2006	1	0	2	0
3/9/2006	4	0	1	0
3/13/2006	3	0	1	0
3/14/2006	3	0	2	0
3/17/2006	2	0	2	0
3/20/2006	5	0	1	0
3/22/2006	4	0	5	0
3/27/2006	3	0	2	0
3/28/2006	4	0	2	0
4/3/2006	7	3	1	1
Total:	399	37	279	26

Appendix E: Environmental readings from the diet study in spring 2005

Date	WaterTemperature (°C)	Water clarity (cm)	Dissolved oxygen (mg/L)	Specific conductivity (μS/cm)	Debris (kg)	Debris type
4/1/2005	14.5	58	8.43	248	13.7	Egeria
4/8/2005	14.1	75	8.20	235	12.7	Egeria
4/13/2005	14.1	81	9.13	298	4.9	Egeria
4/14/2005	14.4	84	8.74	304	9.2	Egeria
4/21/2005	15.9	66	8.71	276	23.3	Egeria
5/19/2005	18.3	21	7.09	219	5.1	Egeria
5/20/2005	17.9	27	7.67	211	md	Md
5/25/2005	21.8	39	7.83	163	3.2	Egeria
6/2/2005	20.1	69	7.26	119	md	Md
6/14/2005	22.1	52	6.08	201	2.9	Egeria
6/15/2005	21.1	51	6.69	186	1.8	Algae
6/16/2005	20.2	39	5.73	177	1.2	Algae
6/21/2005	20.1	65	7.58	174	4.1	Egeria
6/29/2005	21.8	49	8.21	191	0.0	
7/8/2005	21.6	24	7.09	195	0.0	
7/13/2005	25.2	50	6.89	207	0.2	Debris
7/15/2005	25.6	50	6.29	203	0.0	

md = missing observations

Appendix F: Environmental readings from the diet study in winter 2005-2006

Date	Temperature (°C)	Water clarity (cm)	Dissolved oxygen (mg/L)	Specific conductivity (µS/cm)
12/5/2005	10.4	89	9.8	375
12/6/2005	10.4	76	10.11	373
12/12/2005	9.9	105	10.3	344
12/13/2005	9.7	105	13.99	347
12/15/2005	8.8	91	10	5506
12/16/2005	9.1	83	9.9	5739
12/21/2005	11.3	92	9.24	422
1/5/2006	10.7	42	10.93	201
1/10/2006	10.8	43	9.94	3942
1/12/2006	10.7	47	13.9	132
1/18/2006	10.6	61	12.5	173
1/19/2006	10.1	69	10.62	62.5
1/20/2006	9.5	58	8.45	167
1/24/2006	9.7	50	0.25	417
1/27/2006	10.0	70	10.9	55.7
2/2/2006	11.7	88	11.02	257
2/3/2006	12.3	19	10.21	4402
2/7/2006	12.3	104	9.93	350
2/8/2006	12.2	105	8.72	262
2/9/2006	11.8	106	10.2	251
2/10/2006	11.9	102	10.42	250
2/10/2006	11.9	102	10.42	250
2/14/2006	13.2	44	8.67	258
2/15/2006	12.7	82	9.41	329
2/16/2006	11.3	56	8.43	322
2/17/2006	11.4	90	9.88	314
2/21/2006	11.1	95	10.48	221
2/22/2006	11.4	92	9.77	228
2/23/2006	11.0	111	9.39	210

Appendix F (Cont.): **Environmental readings from the diet study in winter 2005-2006**

Date	Temperature (°C)	Water clarity (cm)	Dissolved oxygen (mg/L)	Specific conductivity (µS/cm)
3/1/2006	12.6	76	7.08	223
3/2/2006	12.8	41	9.4	225
3/3/2006	13.1	122	9.67	497
3/7/2006	12.7	96	9.09	239
3/8/2006	12.0	120	11.02	5770
3/9/2006	12.2	110	10.84	186
3/13/2006	10.6	120	10.22	10660
3/15/2006	12.0	121	13.63	194
3/17/2006	13.1	120	11.45	208
3/20/2006	12.4	120	10.26	181
3/22/2006	12.9	122	13.6	197
3/24/2006	13.8	89	10.47	199
3/26/2006	11.8	101	9.1	218
3/27/2006	14.3	78	10.63	200
3/28/2006	14.2	93	9.99	204
4/3/2006	14.2	65	8.04	179

Appendix G: Digestion scores for captive fed striped bass in spring 2005

				Digestion scores		
Date	**Time**	**Prey species**	**Digestion period (h)**	**Scales (%)**	**Body (%)**	**Fin digestion**
4/26/05	0855	Delta smelt	1	2	1	1
4/26/05	0855	Delta smelt	1	3	0	0
4/26/05	0900	Delta smelt	1	4	1	1
5/17/05	1003	Delta smelt	1	3	0	1
5/17/05	1005	Delta smelt	1	1	0	0
5/18/05	1240	Delta smelt	1	4	1	1
5/18/05	1240	Delta smelt	1	3	1	1
6/17/05	1005	Delta smelt	1	3	1	4
6/17/05	1005	Delta smelt	1	3	1	1
6/17/05	1005	Delta smelt	1	4	3	2, 3, 4
6/07/05	0955	Splittail	1	5	2	1
6/07/05	1000	Splittail	1	4	2	1, 4, 6
6/09/05	1117	Splittail	1	2	1	1, 4
6/09/05	1125	Splittail	1	3	1	1, 3
6/09/05	1125	Splittail	1	4	1	1
6/09/05	1125	Splittail	1	4	2	1, 3
6/09/05	1125	Splittail	1	5	1	1
6/17/05	0955	Splittail	1	5	2	1
6/17/05	0955	Splittail	1	3	1	5
6/17/05	0955	Splittail	1	4	2	1
6/17/05	0955	Splittail	1	3	1	1
5/17/05	1003	Delta smelt	2	3	1	1
5/17/05	1003	Delta smelt	2	2	0	0
5/17/05	1003	Delta smelt	2	2	1	6
6/06/05	1150	Delta smelt	2	5	3	1
6/09/05	1117	Delta smelt	2	3	1	1, 3, 4
6/09/05	1117	Delta smelt	2	3	1	4, 6
6/09/05	1117	Delta smelt	2	4	2	1

Appendix G (Cont.): Digestion scores for captive fed striped bass in spring 2005

				Digestion scores		
Date	Time	Prey species	Digestion period (h)	Scales (%)	Body (%)	Fin digestion
6/17/05	1005	Delta smelt	2	4	2	1, 6
6/17/05	1005	Delta smelt	2	4	2	1, 3
6/17/05	1005	Delta smelt	2	4	2	1
6/07/05	0955	Splittail	2	4	3	2, 3, 4, 6
6/07/05	0955	Splittail	2	3	1	1, 3
6/07/05	0955	Splittail	2	3	1	1, 6
6/07/05	1000	Splittail	2	4	3	1, 6
6/07/05	1000	Splittail	2	5	3	1, 2, 3, 4
6/07/05	1000	Splittail	2	3	2	1, 2
6/17/05	0955	Splittail	2	4	1	1
6/17/05	0955	Splittail	2	4	2	1
6/17/05	0955	Splittail	2	4	1	1
7/18/05	1200	Splittail	2	5	4	1, 2, 3
6/06/05	1150	Delta smelt	4	5	3	2, 3, 4, 6
6/06/05	1150	Delta smelt	4	5	3	2, 4, 5, 6
6/06/05	1150	Delta smelt	4	4	2	1, 3, 4
6/06/05	1150	Delta smelt	4	4	2	1
6/09/05	1117	Delta smelt	4	3	2	1, 4, 6
6/09/05	1117	Delta smelt	4	4	3	1
6/09/05	1117	Delta smelt	4	4	3	1, 3
6/17/05	1005	Delta smelt	4	5	2	7
6/17/05	1005	Delta smelt	4	5	2	7
6/07/05	0955	Splittail	4	5	3	2, 3, 4, 6
6/07/05	0955	Splittail	4	5	3	1, 2, 3
6/07/05	1000	Splittail	4	4	2	1, 3
6/07/05	1000	Splittail	4	3	2	1, 3
6/17/05	0955	Splittail	4	4	4	1, 4, 6

Appendix G (Cont.): Digestion scores for captive fed striped bass in spring 2005

				Digestion scores		
Date	**Time**	**Prey species**	**Digestion period (h)**	**Scales (%)**	**Body (%)**	**Fin digestion**
6/17/05	0955	Splittail	4	4	4	1, 2, 3

Appendix H: Digestion scores for captive fed striped bass in winter 2006

Date	Time	Prey species	Digestion period (h)	Digestion scores		
				Scales (%)	Body (%)	Fin digestion
12/29/05	0940	Delta smelt	1	4	0	1
12/29/05	0940	Delta smelt	1	2	0	1
12/29/05	0940	Delta smelt	1	5	1	1
1/05/06	1046	Delta smelt	1	5	1	1
1/05/06	1046	Delta smelt	1	5	1	1
1/13/06	0947	Delta smelt	1	4	0	0
1/13/06	0947	Delta smelt	1	5	0	1
1/13/06	0947	Delta smelt	1	4	0	0
1/13/06	0947	Delta smelt	1	5	1	1
3/13/06	1135	Delta smelt	1	1	0	1
3/13/06	1135	Delta smelt	1	2	0	1
3/13/06	1135	Delta smelt	1	1	0	1
3/20/06	1140	Delta smelt	1	5	1	5
3/02/06	1140	Delta smelt	1	4	1	1
3/20/06	1140	Delta smelt	1	5	1	1
3/20/06	1140	Delta smelt	1	5	1	1
3/20/06	1140	Delta smelt	1	5	1	1
3/21/06	1017	Delta smelt	1	5	2	1,3
3/21/06	1017	Delta smelt	1	5	2	1,3
3/21/06	1017	Delta smelt	1	5	1	1
3/21/06	1017	Delta smelt	1	5	1	1
3/21/06	1017	Delta smelt	1	5	1	1
3/21/06	1017	Delta smelt	1	5	3	1, 2, 3, 4
3/21/06	1017	Delta smelt	1	4	1	1
3/29/06	0926	Delta smelt	1	5	0	1, 2, 3
12/29/05	0940	Delta smelt	2	3	0	1
12/29/05	0940	Delta smelt	2	5	1	1
1/04/06	1005	Delta smelt	2	5	1	1

Appendix H (Cont.): Digestion scores for captive fed striped bass in winter 2006

				Digestion scores		
Date	**Time**	**Prey species**	**Digestion period (h)**	**Scales (%)**	**Body (%)**	**Fin digestion**
1/05/06	1046	Delta smelt	2	4	1	1
1/05/06	1046	Delta smelt	2	3	0	0
1/05/06	1046	Delta smelt	2	5	1	1
1/05/06	1046	Delta smelt	2	5	1	1
1/05/06	1046	Delta smelt	2	5	1	1
1/05/06	1046	Delta smelt	2	4	1	1
1/05/06	1046	Delta smelt	2	5	1	1
1/05/06	1046	Delta smelt	2	5	1	1
1/05/06	1046	Delta smelt	2	4	1	
1/05/06	1046	Delta smelt	2	5	1	1
1/05/06	1020	Delta smelt	2	5	1	1
1/06/06	1020	Delta smelt	2	5	1	
1/23/06	1224	Delta smelt	2	5	1	1
1/24/06	1022	Delta smelt	2	5	1	1, 2, 3
3/13/06	1115	Delta smelt	2	1	0	1
3/13/06	1115	Delta smelt	2	2	1	1
3/13/06	1115	Delta smelt	2	3	1	1
3/13/06	1115	Delta smelt	2	1	0	1
3/13/06	1115	Delta smelt	2	2	0	1
3/13/06	1115	Delta smelt	2	2	0	1
3/13/06	1115	Delta smelt	2	1	0	1
3/21/06	1017	Delta smelt	2	3	1	1
3/21/06	1017	Delta smelt	2	5	1	1
3/21/06	1017	Delta smelt	2	5	1	1
3/27/06	1131	Delta smelt	2	5	1	1, 6
1/04/06	1005	Delta smelt	4	5	2	1, 3
1/26/06	0919	Delta smelt	4	5	2	1, 3

Appendix H (Cont.): Digestion scores for captive fed striped bass in winter 2006

				Digestion scores		
Date	Time	Prey species	Digestion period (h)	Scales (%)	Body (%)	Fin digestion
3/08/06	0902	Delta smelt	4	4	3	1, 3
3/08/06	0902	Delta smelt	4	2	1	1
3/08/06	0902	Delta smelt	4	4	3	1, 3
3/08/06	0902	Delta smelt	4	4	1	1, 4
3/08/06	0902	Delta smelt	4	3	0	1
3/08/06	0902	Delta smelt	4	2	1	1
3/09/06	1008	Delta smelt	4	2	0	1
3/09/06	1008	Delta smelt	4	4	0	1
3/09/06	1008	Delta smelt	4	2	0	1
3/09/06	1008	Delta smelt	4	5	1	1, 3, 4
3/09/06	1008	Delta smelt	4	5	2	1, 3, 5
3/20/06	1140	Delta smelt	4	5	1	3
3/20/06	1140	Delta smelt	4	5	2	3, 5
3/20/06	1140	Delta smelt	4	4	1	3
3/20/06	1140	Delta smelt	4	5	1	1
3/20/06	1140	Delta smelt	4	5	1	1
3/27/06	1134	Delta smelt	4	5	1	1
3/27/06	1134	Delta smelt	4	4	1	1, 3

Appendix I: Skin color scores for selected prey from the spring 2005 diet study

		Skin color score	
Species	**Number**	**Unfaded**	**Faded**
Delta smelt	13	2	11
Threadfin shad	13	0	13
Chinook salmon	29	1	28

Appendix J: Scale digestion scores for selected prey from the spring 2005 diet study

		Percent of scale digestion					
Species	Number	0%	< 10%	11 – 25%	26 – 50%	51 – 75%	76 –100%
Delta smelt	13	2	4	0	2	1	4
Threadfin shad	13	0	0	1	1	1	10
Chinook salmon	29	0	5	4	3	2	15

Appendix K: Fin digestion scores for selected prey from the spring 2005 diet study

		Fin digestion category							
Species	Number	Fins intact	Fins frayed	Pelvic fin fully digested	Pectoral fin fully digested	Anal fin fully digested	Dorsal fin fully digested	Caudal fin fully digested	All fins fully digested
Delta smelt	13	2	6	4	6	5	0	2	3
Threadfin shad	13	2	2	1	2	3	2	2	2
Chinook salmon	29	1	17	10	12	14	7	9	4

Appendix L: Body digestion scores for selected prey from the spring 2005 diet study

		Percentage of body digested					
Species	**Number**	**0%**	**< 10%**	**11 – 25%**	**26 – 50%**	**51 – 75%**	**76 – 100%**
delta smelt	13	2	3	3	2	3	0
threadfin shad	13	0	3	5	3	2	0
Chinook salmon	29	1	6	13	4	3	2

Appendix M: Skin color scores for eaten delta smelt and Sacramento splittail from captive striped bass in spring 2005

		Skin color scores	
Species/digestion time	**Number**	**Unfaded**	**Faded**
Delta smelt			
1 hour	10	1	9
2 hours	10	0	10
4 hours	9	0	9
Splittail			
1 hour	11	0	11
2 hours	10	0	10
4 hours	6	0	6