

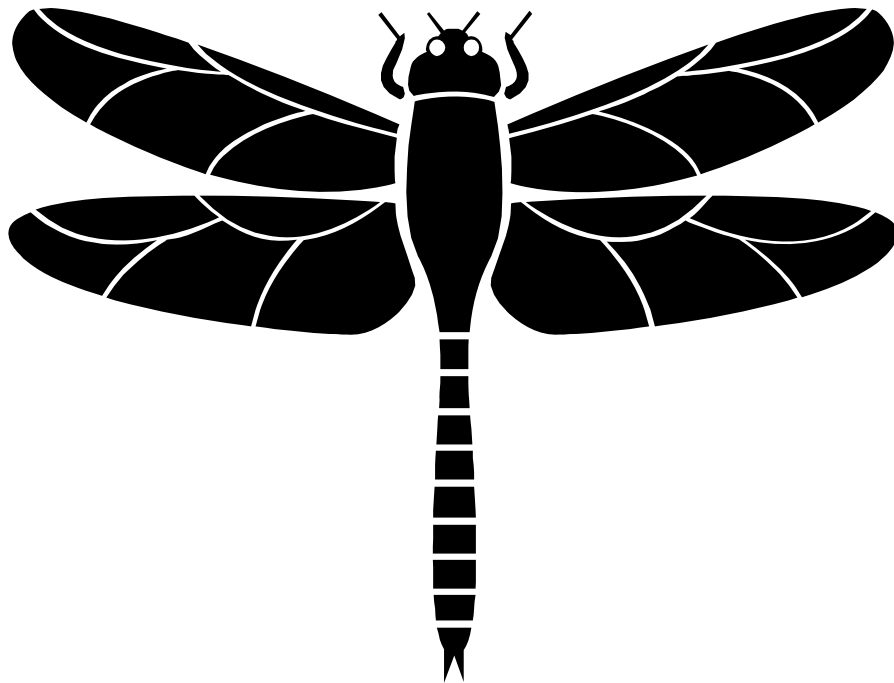
*Postdrawdown Composition of the Benthic  
Invertebrate Community of  
Lake Wissota, Wisconsin.*

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**Table of Contents**

Acknowledgements .....3

Introduction .....4

Methods .....6

Results .....8

Discussion.....14

Conclusion .....17

References .....19

Appendix A - Drawdown History of Lake Wissota.....21

Appendix B - Species List.....24

Appendix C - Tables and Figures.....28

Appendix D - Maps.....89

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## **Introduction**

As a base level in the food chain, the aquatic macroinvertebrate community affects an entire lake system. Maintaining a stable condition in the lake littoral zone, the most diverse area of a lake system (Wetzel, 2001), is therefore crucial to maintaining an ecologically sound body of water. There is evidence that suggests water level fluctuations have a profound effect on lake littoral zone macroinvertebrate communities (e.g., Aroviita, 2008; Haxton, 2008; White, 2008). Late-winter drawdowns on impoundments lead to poor quality, in terms of abundance and diversity, of the benthic invertebrate community. This affects the productivity of the fish and wildlife community as potential food sources are diminished.

Lake Wissota in Chippewa County was created in 1917 with the construction of a hydroelectric dam on the Chippewa River. Lake Wissota was historically drawdown 10-15 feet every winter (with some drawdowns beginning as early as mid December and some lasting as late into the spring as the middle of April) in anticipation of the spring thaw and to sustain power-production. This drawdown was maintained for several weeks annually (Chippewa River Settlement Team, 2001). The Lower Chippewa River Settlement Agreement was established in 2001 as part of the Federal Energy Regulatory Commission re-licensing procedure. One issue raised during re-licensing was concern over the effects the winter drawdowns were having on the Lake Wissota ecosystem. As required in this agreement, Lake Wissota drawdowns were reduced from the 10-15 ft norm to a 3 ft maximum maintained for a maximum of seven days with a final extensive drawdown occurring in 1999 (Appendix A).

A study conducted in 1993/94 on Lake Wissota demonstrated that the extended period of winter drawdown had negative effects on the macroinvertebrates inhabiting the littoral zone impacted by the drawdown (DeLong and Mundahl, 1995). Benthic invertebrate samples were taken at 2 ft, 5 ft, 10 ft and 15 ft depths on transects around the main body of Lake Wissota, Moon Bay and Little Lake Wissota (see map Appendix D). Sampling periods occurred in November 1993 (pre-drawdown), immediately following the ice out in April 1994 (post-drawdown) and throughout the spring and summer 1994 to determine re-colonization of the littoral zone and post emergence populations. This study revealed significant effects of an extended late winter drawdown on the benthic macroinvertebrate community. These effects were manifested in significant declines in the total numbers of individuals and densities of invertebrates in the post-drawdown period compared to pre-drawdown period. There were significantly higher declines in densities observed in the 2 ft and 5 ft depths (depth affected by drawdown) than at the 15 ft depth (depth that remained inundated). Given the documented effects of extended periods of drawdown it is expected that a reduction in the drawdown (from 10-15 ft to 3 ft) will have resulted in a stabilization of the benthic invertebrate community with less fluctuation in community structure, which would lead to the overall improved health of the littoral zone ecosystem. The goals of this study were to document: the response of the benthic invertebrate community since the drawdown regime was changed in 2000, the current composition of the benthic invertebrate community and the value of critical habitat areas as fish and wildlife food sources.

## **Methods**

### **Site Description**

Lake Wissota is located east of Chippewa Falls, Wisconsin (T 28-29 N, R 7-8 W). It is a 6,300-acre impoundment and has a maximum depth of 72 feet and approximately 56 miles of shoreline. Lake Wissota is generally considered to be a eutrophic lake. It has a characteristic reddish-brown color from humic and tannic acids originating from decomposing wetland vegetation throughout the Chippewa River Basin. It is subject to frequent algal blooms particularly in late summer. Much of the lake has a steeply sloping littoral zone and wave action plays a large role in the littoral zone composition (Borman, 1991). The lake can be divided into four main areas. Moon Bay separates the main lake from the Yellow River tributary in the northeast. Little Lake Wissota separates the main lake from the Paint Creek and Stillson Creek tributaries in the south. Both of these areas are characterized by shallow slopes, soft sediments and high levels of vegetation. The portion of the Chippewa River north of Highway S to the Jim Falls Dam is considered part of the Lake Wissota system and is generally characterized by steep slopes interspersed with shallow heavily vegetated areas. The main body of Lake Wissota is characterized by steep slopes, low levels of vegetation and hard sediments.

### **Critical Habitat Areas.**

In 2006, 13 areas of Lake Wissota were designated as Critical Habitat Areas based on an evaluation of aquatic plant data, fish and wildlife surveys and aesthetic beauty (Konkel, 2007). These areas were deemed critical to protecting the health of the lake as a whole based in part on their ability to provide adequate wildlife and fish habitat. The presence and abundance of invertebrates directly affect the ability of these

areas to provide that habitat as they supply a food resource and affect the plant and algal populations.

### Field Methods.

Benthic invertebrate sampling followed protocols established by Delong and Mundahl (1995). Twenty-eight transects that approximated the locations of those used in 1993/94 were established (see maps Appendix D). These transects were approximated because they were not geo-referenced in 1993/94. Global Positioning System (GPS) was used to geo-reference transects for the current study. Six additional transects were established to incorporate sampling of all Critical Habitat Areas. Samples were collected at 2 ft, 5 ft, 10 ft and 15 ft depths along these transects. Sampling dates were November 11-12, 17-18, 2009, April 26-28, 2010 and June 24-26, 2010. The number of spring sampling periods was reduced from Delong and Mundahl (1995) as re-colonization was not assessed. An Eckman dredge was used to collect benthic samples. Samples were washed through a 200- $\mu\text{m}$  sieve in the field to remove fine substrates. Samples were preserved in 70% ethanol and stained with Rose Bengal stain in the laboratory. Samples were sorted with dissecting microscopes and all invertebrates removed. All specimens except Oligochaeta and Chironomidae were identified to lowest possible taxonomic level.

### Data Analysis

Data were analyzed separately for the main body of Lake Wissota, Moon Bay, Little Lake Wissota and Critical Habitat Areas. Data pooled from Lake Wissota, Moon Bay and Little Lake Wissota were also analyzed to assess the community as a whole. Analysis of Variance (ANOVA) was used to conduct pair-wise comparisons between

dates, between depth zones and between depth zones by date. Data were transformed ( $\log_{10}(x + 1)$ ) to meet assumptions of normality. Mean densities of major taxonomic groups, total number of taxa and total number of individuals were used to identify significant differences ( $P < 0.05$ ).

## **Results**

A total of 91 taxa were collected from Lake Wissota as compared to 97 collected in 1993/94 (Appendix B). All taxa were classified into the following groups: Ephemeroptera (mayflies), Trichoptera (caddisflies), Chironomidae (midges), non-Chironomid Diptera (true flies), Annelida (segmented worms), Crustacea (sowbugs, water fleas, copepods etc.) and Mollusca (clams, snails) and other invertebrates. Pooled data from the three main areas of the lake identified 12 taxa that represented more than 1% of entire invertebrate population (Table 1). Separate analysis of each area of the lake identified 12 taxa in the main body of Lake Wissota (Table 2), 13 taxa in Moon Bay (Table 3), 14 taxa in Little Lake Wissota (Table 4) and 16 taxa in Critical Habitat Areas (Table 5) that represented more than 1% of the total taxa of each area. Taxa that comprised more than 1% of the total taxa are denoted for each region for the current study as well as for the 1993/94 study in Appendix B.

## **ANOVA**

F statistics, *P* values and degrees of freedom for the following Analysis of Variances are given in tables and data are summarized in figures in Appendix C. All differences discussed in the following results section are significant at  $P < 0.05$ . Non-significant differences can be found in tables in Appendix C.

### *Main Lake*

In analysis between depth zones, there were more total taxa in 5 ft and 15 ft compared to 2 ft. There were more total individuals in 15 ft compared to 2 ft. There were fewer Ephemeroptera, Diptera and Annelida in 2 ft compared to all other depths. There were more Chironomidae in 10 ft compared to 2 ft (Table 1, Figure 6).

In analysis between dates, there were fewer total taxa, total individuals, Ephemeroptera, Trichoptera, Chironomidae and other invertebrates in June compared to November and April. There were fewer Annelida in June compared to April (Table 2, Figure 7).

In analysis between dates by depth zone, there were fewer total taxa in 5 ft in April compared to November. There were fewer total individuals in 10 ft and 15 ft in June compared to November and April. There were fewer Ephemeroptera in 10 ft in June compared to November and April. There were fewer Trichoptera in 5 ft and 10 ft in June compared to April and fewer in 15 ft in June compared to November. There were fewer Chironomidae in 10 ft in June compared to April. There were fewer Mollusca in 10 ft in June compared to November. There were fewer other invertebrates in 5 ft in June compared to November and fewer in 15 ft in June compared to April (Table 3, Figure 8).

Means ( $m^{-2}$ ) for samples collected by date, by depth and by depth for each date can be found in Table 4.

### *Moon Bay*

In analysis between depth zones, there were more total taxa in 2 ft compared to 15 ft. There were fewer Ephemeroptera in 15 ft compared to 2 ft and 5 ft. There were

fewer Trichoptera in 15 ft compared to all other depth zones and fewer in 10 ft compared to 2 ft. There were fewer Annelida in 5 ft compared to 10 ft and 15 ft. There were more Crustacea in 2 ft compared to 10 ft and 15 ft (Table 5, Figure 9).

In analysis between dates, there were fewer total taxa, total individuals, Chironomidae and other invertebrates in June compared to November and April. There were fewer Ephemeroptera, and Diptera in June compared to April. There were fewer Annelida in June compared to November (Table 6, Figure 10).

In analysis between dates by depth zone, there were fewer total taxa in 15 ft in November compared to April and fewer in 15 ft in June compared to November. There were fewer Ephemeroptera in 5 ft in June compared to April. There were fewer Trichoptera in 5 ft in June compared to November. There were fewer Chironomidae in 10 ft in June compared to November. There were fewer other invertebrates in 5 ft in June compared to November and April, fewer in 2 ft in June compared to April and fewer in 10 ft in June compared to November (Table 7, Figure 11).

Means ( $m^{-2}$ ) for samples collected by date, by depth and by depth for each date can be found in Table 8.

#### *Little Lake Wissota*

In analysis between depth zones, there were fewer total taxa, total individuals and Chironomidae in 15 ft compared to all other depths. There were more Trichoptera in 5 ft compared to 10 ft and 15 ft and more in 2 ft compared to 15 ft. There were fewer Crustacea in 15 ft compared to 5 ft and 10 ft (Table 9, Figure 12).

In analysis between dates, there were fewer Trichoptera and Chironomidae in June compared to November and April. There were more Annelida in April compared to November (Table 10, Figure 13).

In analysis between dates by depth zone, there were fewer Trichoptera in 15 ft in April compared to November. There were fewer Chironomidae in 10 ft in June compared to November and fewer in 15 ft in April compared to November. There were fewer Annelida in 2 ft in June compared to April and fewer in 5 ft in June compared to November (Table 11, Figure 14).

Means ( $m^{-2}$ ) for samples collected by date, by depth and by depth for each date can be found in Table 12.

#### *Critical Habitat Areas*

In analysis between depth zones, there were more total individuals and Trichoptera in 2 ft and 5 ft compared to 10 ft and 15 ft. There were fewer Ephemeroptera in 15 ft compared to 2 ft and 5 ft. There were fewer Chironomidae in 15 ft compared to all other depth zones (Table 13, Figure 15).

In analysis between dates, there were fewer total individuals, Ephemeroptera, Chironomidae and Annelida in June compared to November and April. There were fewer Trichoptera and other invertebrates in June compared to November (Table 14, Figure 16).

In analysis between dates by depth zone, there were fewer total taxa in 10 ft in June compared to April. There were fewer total individuals in 5 ft and 10 ft in June compared to November and April and fewer in 15 ft in June compared to November. There were fewer Ephemeroptera in 10 ft in June compared to April. There were fewer

Chironomidae in 10 ft in June compared to November and April and fewer in 5ft in June compared to April. There were fewer Mollusca in 15 ft in June compared to November and April. There were fewer Annelida in 15 ft in June compared to November and April, fewer in 5 ft in June compared to April and fewer in 10 ft in June compared to November (Table 15, Figure 17).

Means ( $m^{-2}$ ) for samples collected by date, by depth and by depth for each date can be found in Table 16

#### *Pooled data*

In analysis between depth zones, there were more taxa in 5 ft compared to 2 ft and 15 ft and more taxa in 10 ft compared to 15 ft. There were more Ephemeroptera in 5 ft compared to 2 ft and 15 ft and more in 10 ft compared to 15 ft. There were more Trichoptera in 2 ft and 5 ft compared to 10 ft and 15 ft and more in 10 ft compared to 15 ft. There were more Diptera in 10 ft and 15 ft compared to 2 ft. There were more Chironomidae in 5 ft compared to 15 ft. There were fewer Annelida in 2 ft compared to all other depths. There were fewer Crustacea in 15 ft compared to 5 ft and 15 ft (Table 17, Figure 18).

In analysis between dates, there were fewer total taxa, total individuals, Ephemeroptera, Trichoptera, Diptera, Chironomidae, and other invertebrates in June compared to November and April. There were fewer Mollusca in June compared to November. There were fewer Annelida in June compared to April. There were fewer Trichoptera in April compared to November (Table 18, Figure 19).

In analysis between dates by depth zone, there were fewer total taxa in 10 ft in June compared to November and April and fewer taxa in 15 ft in June compared to

November. There were fewer total individuals in 2 ft and 15 ft in June compared to November. There were fewer individuals in 10 ft in June compared to November and April. There were fewer Ephemeroptera in 2 ft and 10 ft in June compared to November and April. There were fewer Ephemeroptera in 5 ft in June compared to November. There were fewer Trichoptera in 10 ft in June compared to November and April. There were more Trichoptera in 5 ft in November compared to April and June. There were fewer Diptera in 2 ft in June compared to November and April. There were fewer Chironomidae in all depth zones in June compared to November and fewer in 5 and 10 ft in June compared to April. There were fewer Annelida in 10 ft in June compared to November and April and fewer in 5 ft in June compared to April. There were fewer other invertebrates in 10 ft in June compared to November and April and fewer in 15 ft in June compared to November (Table 19, Figure 20).

Means ( $m^{-2}$ ) for samples collected by date, by depth and by depth for each date can be found in Table 20.

#### *Critical Habitat Areas (CHA) compared to non-Critical Habitat Areas (non-CHA)*

In analysis between depth zones, there were more Diptera in 2 ft, 5 ft and 10 ft in CHA. There were more Annelida in 5 ft, 10 ft and 15 ft in CHA. There were more Crustacea in 2 ft in CHA (Table 21, Figure 21).

In analysis between dates, there were more total individuals in April in CHA. There were more Diptera and Annelida in all dates in CHA (Table 22, Figure 22).

In analysis between dates by depth zone, there were more total individuals in 5 ft in April in CHA. There were more Ephemeroptera in 2 ft in June in CHA. There were more Diptera in 2 and 5 ft in April and June in CHA and more in 5 ft in November in

CHA. There were more Chironomidae in 5 ft in April in CHA. There were more Mollusca in 2ft in April in CHA. There were more Annelida in 5 ft in April and more in 10 ft and 15 ft in November in CHA. There were more other invertebrates in 2 ft in April in CHA (Table 23, Figure 23).

## **Discussion**

Data analysis from the 1993/94 survey revealed significant decreases in invertebrate densities from November 1993 to April 1994. The current survey followed this trend of decreased densities following winter ice out however, these differences were rarely significant. Even without external influence, some overwinter mortality is expected for aquatic invertebrates. The fact that there were significant overwinter decreases in 1993/94 and not in the current study could be explained by the additional mortality experienced due to effects of the more extensive winter drawdown. Furthermore, in 1993/94, decreases in densities were higher at 2 ft and 5 ft (the zones most affected by the drawdown) compared to 10 ft and 15 ft whereas in the current study, the shallower zones decreased only slightly or even increased in April compared to November as seen in Moon Bay.

Further evidence of normal overwinter mortality versus mortality due to the drawdown can be seen in a discussion of how invertebrate densities changed at 15 ft over the course of the two studies. As 15 ft is below the zone impacted by the drawdown, invertebrate densities at this depth should not have been affected by the drawdown and any decreases can be attributed to normal overwinter mortality. Delong and Mundahl (1995) hypothesized that decreases seen at shallow depths impacted by the drawdown would be countered by increased densities at 15 ft as invertebrates

migrated to deeper zones in response to changing water levels. However, this trend was observed only in Little Lake Wissota in 1993/94 while Moon Bay and the main lake actually showed decreased densities at 15 ft. It is important to note again however that this decrease was not as pronounced as those seen at shallower depths that were impacted by the drawdown. In the current study, there were very few differences observed at 15 ft between November 2009 and April 2010. The exception to this was seen in Little Lake Wissota where total individual decreased mainly due to decreases in Chironomidae.

Many significant differences were seen in the June densities compared to November and April in both surveys. Most of these differences can be explained by emergence as differences were primarily seen in species that have terrestrial adult life stages (i.e. Ephemeroptera, Trichoptera, Diptera and Chironomidae). There were few differences between any sampling period for organisms that have an entirely aquatic lifecycle (i.e. Annelida, Crustacea and Mollusca).

Delong and Mundahl (1995) found that Moon Bay and the main lake responded similarly to the drawdown. The current study showed these two areas varied in their differences.

The shallow zone of the main body of Lake Wissota is characterized by steep slopes with hard substrates and sparse vegetation. This area also experiences physical onslaught of intense wave action. This could account for the decreased densities seen at 2 ft compared to the other depth zones. Moon Bay on the other hand showed higher densities in 2 ft than at deeper zones whereas in 1993/94 the 2 ft depth zone experienced decreased densities over the course of the study.

Many of the differences seen in Little Lake Wissota occurred between 15 ft and shallower depths. The shallower zones of Little Lake Wissota often have a heavy detritus layer making them more suitable habitat for invertebrates than the 15 ft depth which was often silt or sand. Overall, there were fewer differences observed on Little Lake Wissota than the other areas of the lake during the current study as well. DeLong and Mundahl attributed the 1993/94 increase in overall densities at 15 ft in Little Lake Wissota to a migration of Chironomidae from shallow to deeper depths. In the current study, Chironomidae densities in shallow zones did not change whereas densities in deeper water decreased over the sampling periods suggesting the detrital layer present in the shallow zones provides better habitat for surviving causes of normal overwinter mortality.

CHA are generally located in areas of the lake with shallower slopes, have more abundant plant life and are better protected from intense wave action. As expected, all differences in comparisons between CHA and non-CHA were expressed as increased densities of individuals found in CHA. Comparisons can not be made between CHA areas of 1993/94 and 2009/10 as CHA were not established until after the regime change.

Many differences were seen in the pooled data as would be expected as the data from vastly different areas of the whole lake were combined. However, the pooled data gives a view of the overall health of the lake in terms of invertebrate populations. Total invertebrate densities were largely driven by Chironomidae and Crustacea. Ephemeroptera and Trichoptera were also frequently encountered however, in low densities. The "other" category of invertebrates included insects such as Odonata and

Coleoptera which were found infrequently and at very low densities. Oligochaetes which can survive in poor quality waters were abundant whereas indicators of healthy water such as Plecoptera were absent from samples indicating that Lake Wissota may not contain proper habitat or have high enough water quality to support these species.

In an examination of total numbers of individuals in 1993/94 compared to 2009/10, general trends appear (refer to DeLong and Mundahl, 1995 figures). When samples were separated by depth zone, there were generally more individuals in the 2009/10 study in all depth zones. When samples were separated by date there were more individuals in November 1993 and more individuals in April 2010. The number of individuals in June was close to equal in both studies with slight increases in 1994. When samples were separated by depth zone and date there were more individuals in 2 ft and 5 ft in November and June 1993/94 and more individuals in 2 ft and 5 ft April 2009/10. There were generally more individuals in 10 ft and 15 ft in 2009/10 for all sampling periods. These trends suggest there was a denser population of invertebrates in 1993/94 however, the 1993/94 population was heavily impacted by some force not present in the 2009/2010 study, namely the winter drawdown, as post winter populations were greater in 2010 than 1994.

### **Conclusion**

The differences seen in the current study can largely be explained by natural phenomena whereas invertebrate densities in 1993/94 were impacted by the winter drawdown. This study provides evidence of a stabilization in the benthic macroinvertebrate community of Lake Wissota that has occurred since the reduction in the extent and depth of the late winter drawdown.

This study also gives an evaluation of the positive value of Critical Habitat Areas as food sources. The increase in invertebrate densities found in CHA can be assumed to translate to better habitat for organisms higher up on in that food chain.

The effects of management decisions are felt on a regional as well as local scale. Lake Wissota can be thought of as a “nursery” that “seeds” waters downstream with aquatic invertebrates. A deeper understanding of the invertebrate community of Lake Wissota will therefore improve our understanding of the entire Lower Chippewa River Basin now and into the future.

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*Hydrobiologia*. 613(1): 21-21.

**Appendix A:** Drawdown history of Lake Wissota, Wisconsin from 1966 to 2008

2008 Lowered approximately 3 ft. from March 31 to April 5

2007 No drawdown

2006 No drawdown

2005 No drawdown

2004 No drawdown

2003 No drawdown

2002 No drawdown

2001 Lowered 3 ft. beginning March 15 and refilled on April 5

2000 No drawdown

1999 Lowered 9.2 ft. beginning March 16 and refilled on April 1 (for entrainment study)

1998 Lake drawdown did not occur due to the lack of snow in upstream watershed.

1997 Lowered 12 ft. beginning 2/17/97 and refilled on 3/31/97 (high flood threat).

1996 Lowered 10 ft. between 2/12/96 and 4/17/96 (high flood threat).

1995 Lowered 5 ft. between 3/1/95 and 3/18/95; (early runoff)

1994 Lowered 10 ft. between 2/14/94 and 4/9/94 (macroinvertebrates/drawdown assessment study)

1993 Lowered 12 ft. between 2/16/93 and 4/5/93 for inspection of spillway gates.

1992 Lowered 5 ft. between 2/19/92 and 3/8/92. Lowered 5 ft. again on 3/17/92 to 4/9/92.

1991 Lowered 5 ft. between 3/6/91 and 3/23/91.

1990 Lowered 8 ft. between 12/14/89 and 1/10/90 for dam repairs; began refilling on 1/22/90.

1989 Lowered 8 ft. between 1/30/89 and 2/17/89 for dam repairs.

1988 Lowered 5 ft. beginning first week of March (6"/day)

1987 Lowered 5 ft. beginning 2/23/87 (6"/day)

1986 Lowered 15 ft. throughout the period 1/1/86 to 3/17/86 (construction drawdown).

1985 Began 15 ft. construction drawdown on 12/15/85 at rate of 6"/day. Began 15 ft. spring drawdown on 3/1/85.

1984 Began 14.5 ft. spring drawdown on 2/13/84 and completed about 3/25/84.

1983 Drawdown information is not available.

1982 Drawdown information is not available.

1981 Drawdown information is not available.

1980 15 ft. drawdown \*

1979 15 ft. drawdown; 2/26/79 - 4/1/79 \*\*

1978 Began 15 ft. spring drawdown on 2/10/78; drawdown was terminated on 4/6/78 (55 days).

1977 Began 4 ft. spring drawdown on 3/1/77; drawdown was completed on 3/30/77 (4 days).

1976 Began 15 ft. spring drawdown on 1/21/76; drawdown was completed on 3/30/76 (68 days).

1975 15 ft. drawdown; 2/10/75 - 3/27/75. \*\* 49 1974 15 ft. drawdown; 2/11/74 - 3/27/74.

1973 14 ft. drawdown; 2/12/73 - 3/27/73. \*\*

1972 15 ft. drawdown; 2/14/72 - 3/27/72. \*\*

1971 15 ft. drawdown; 2/11/71 - 3/27/71. \*\*

1970 15 ft. drawdown; 2/9/70 - 3/27/70. \*\*

1969 15 ft. drawdown (actual)

1968 7.4 ft. drawdown (actual)

1967 Began 15 ft. drawdown on 2/1/67 for concrete work on piers of spillway.

Drawdown continued until 3/27/67. \*\*

1966 7.8 ft. drawdown (actual).

\* The dates indicate the time that the pond was reduced from below the normal low water level (897.0) until the pond was refilled to the normal low water level at the conclusion of the drawdown.

\*\* The dates and the extent of drawdown performed on Lake Wissota was dependent upon snow conditions in the Chippewa and Flambeau River Basins and the timing of spring runoff.

+ This appendix was taken directly from Braun (2010).

**Appendix B.** List of taxa present in samples collected on transects in Lake Wissota, Wisconsin during 1993/94 study and 2009/10 study. Species present during each study are denoted by \*. Taxa which represented more than 1% of the total taxa are denoted for: Main Lake Wissota (W), Moon Bay (M), Little Lake Wissota (L).

	1993/94		2009/10	
	Present	>1%	Present	>1%
<b>EPHEMEROPTERA</b>				
<b>Baetida</b>				
Imature Baetidae	*	M, W	*	
<i>Baetis sp.</i>	*			
<i>Pseudocloeon dubium</i>	*		*	
<i>Centroptilum sp.</i>	*		*	
<b>Heptageniidae</b>				
Immature Heptageniidae	*		*	
<i>Stenonema tripunctatum</i>	*		*	
<b>Ephemeridae</b>				
<i>Hexagenia limbata</i>	*	M, L, W	*	
<i>Ephemera infrequens</i>	*		*	
<i>Litobranchia recurvata</i>	*		*	
<b>Caenidae</b>				
<i>Caenis sp.</i>	*	W	*	M
<b>Tricorythida</b>				
<i>Tricorythodes sp.</i>	*			
<b>Ephemerellidae</b>				
<i>Attenella sp.</i>	*			
<i>Eurylophella lutulenta</i>	*			
<b>Leptophlebiidae</b>				
<i>Leptophlebia sp.</i>	*	M	*	
<b>Siphoneuridae</b>				
immature Siphoneuridae	*		*	
<b>Potamantidae</b>				
<i>Potamanthis sp.</i>	*			
<b>TRICHOPTERA</b>				
<b>Hydropsychidae</b>				
immature Hydropsychidae	*	W	*	
<i>Cheumatopsyche sp.</i>	*	W		
<i>Hydropsyche sp.</i>	*		*	
<i>Hydropsyche bronta</i>	*			
<i>Hydropsyche orris</i>	*			
<b>Leptoceridae</b>				
immature Leptoceridae	*		*	
<i>Oecetis sp.</i>	*		*	W
<i>Oecetis osteni</i>	*		*	
<i>Oecetis inconspicua</i>	*		*	
<i>Oecetis cinerascens</i>	*		*	
<i>Nectopsyche candida</i>	*		*	L

	1993/94		2009/10	
	Present	>1%	Present	>1%
<i>Ceraclea sp</i>	*			
<i>Mystacides longicornis</i>	*			
<b>Polyentropidae</b>				
immature Polycentropidae	*	W	*	
<i>Neureclipsis sp</i>	*		*	
<i>Cynellus fraternus</i>	*		*	
<i>Phylocentropus placidus</i>	*	M, L	*	M
<i>Polycentropus sp</i>	*	M, W	*	
<b>Helicopsycheidae</b>				
<i>Helicopsyche borealis</i>	*		*	
<b>Philipotamidae</b>				
<i>Chimarra sp</i>	*		*	
<b>Hydroptilidae</b>				
immature Hydroptilidae	*		*	
<i>Hydroptila sp</i>	*		*	
<i>Orthotrichia sp</i>	*		*	
<b>Molannidae</b>				
<i>Molanna longicornis</i>	*		*	
<b>Phychomyiidae</b>				
<i>Psychomyia flava</i>	*	W	*	
<b>Lepidostomatidae</b>				
<i>Lepidostoma sp</i>	*			
<b>Limnephilidae</b>				
immature Limniphilidae	*		*	
<i>Pycnopsyche sp</i>	*		*	
<b>Phrygaeniidae</b>				
<i>Ptilostomis ocellifera</i>	*		*	
<i>Phryganea sp.</i>			*	
<b>Rhyacophilidae</b>				
<i>Rhyacophila sp</i>			*	
<b>COLEPTERA</b>				
<b>Elmidae</b>				
<i>Dubiraphia bivattata</i>	*	M, L	*	
<i>Stenelmis sp larvae</i>	*		*	
<i>Stenelmis crenata adults</i>	*			
<b>Psephenidae</b>				
<i>Ectopria nervosa</i>	*	M	*	
<b>Hydrophilidae</b>				
<i>Berosus pugnax</i>	*		*	
<b>Limnichidae</b>				
<i>Lutrochus sp</i>			*	
<b>Haliplidae</b>				
<i>Haliplus sp</i>			*	
<i>Peltodytes sp</i>			*	
<b>DIPTERA</b>				
<b>Ceratopogonidae</b>				
<i>Bezzia sp complex</i>	*	M, L, W	*	M, L
<i>Culicoides sp</i>	*		*	
<b>Chaoboridae</b>				
<i>Chaoborus bicinctus</i>	*	M, L	*	M

	1993/94		2009/10	
	Present	>1%	Present	>1%
<b>Chironomidae</b>	*	M, L, W	*	M, L, W
<b>Culicidae</b>				
<i>Aedes sp</i>	*		*	
<b>Empididae</b>				
<i>Hemerodromia sp</i>	*			
<b>Simuliidae</b>				
<i>Simulim sp</i>	*			
<i>Simulium jenningsi</i>	*			
<i>Simulium vittatum</i>	*			
<b>Tabanidae</b>				
<i>Chrysops sp</i>	*			
<b>Tipulidae</b>				
Immature Tipulidae	*		*	
<i>Antocha sp</i>	*			
<b>LEPIDOTERA</b>				
<b>Pyralidae</b>				
<i>Acentria sp</i>	*		*	
<i>Parapoynx sp.</i>			*	
<b>ODONATA</b>				
<b>Coenagrionidae</b>				
<i>Enallagma sp</i>	*		*	
<i>Nehalennia sp</i>	*		*	
<i>Ischnura sp</i>	*		*	
<b>Calopterygidae</b>				
<i>Tetragonia sp</i>	*		*	
<b>Corduliidae</b>				
<i>Didymops sp.</i>			*	
<i>Epitheca sp</i>			*	
<b>Libellulidae</b>				
<i>Libellulae sp</i>			*	
<b>Aeshnidae</b>				
<i>Anax sp.</i>			*	
<b>Gomphidae</b>				
<i>Gomphus sp</i>	*		*	
<i>Stylurus sp</i>	*		*	
<b>MEGALOPTERA</b>				
<b>Sialidae</b>				
<i>Sialis sp</i>	*		*	
<b>NEUROPTERA</b>				
<b>Sisyridae</b>				
<i>Sisyra sp</i>	*		*	
<b>HEMIPTERA</b>				
<b>Corixidae</b>	*		*	
<b>MOLLUSCA</b>				
<b>Sphaeriidae</b>	*	M, L, W	*	M, L, W
<b>Unionidae</b>				
immature Unionidae	*		*	
<i>Lampsilis teres</i>	*		*	
<b>Ancylidae</b>				
<i>Ferrissia sp</i>	*		*	

	1993/94		2009/10	
	Present	>1%	Present	>1%
<b>Hydrophiidae</b>	*	M, L, W	*	L, W
<b>Lymnaeidae</b>				
<i>Fossoria sp</i>	*		*	
<b>Physellidae</b>				
<i>Physella sp</i>	*		*	
<b>Planorbidae</b>				
<i>Gyraulus sp</i>	*		*	
<i>Helisoma sp</i>	*		*	M, L
<b>Valvatidae</b>				
<i>Valvata tricarinata</i>	*			
<b>Viviparidae</b>				
<i>Cipangopaludina japonica</i>	*		*	
<i>Viviparus malleatus</i>			*	
<b>CNIDARIA</b>				
<i>Hydra sp</i>	*		*	M
<b>PLATHELMINTHES</b>				
<i>Dugesia sp</i>	*	M, W	*	W
<b>NEMATODA</b>	*	M, L, W	*	W, L
<b>ANNELIDAE</b>				
<b>Oligochaeta</b>	*		*	M, L, W
<b>Hirudinea</b>				
<i>Glossiphonia sp</i>	*		*	
<i>Helbdella stagnalis</i>	*		*	
<i>Placobdella</i>	*		*	
<b>ACARI</b>	*	L, W	*	
<b>CRUSTACEA</b>				
<b>Amphipoda</b>				
<i>Crangonyx sp</i>	*	L	*	L, W
<i>Hyalella azteca</i>	*	M, L, W	*	M, L, W
<b>Isopoda</b>				
<i>Asellus racovitzae</i>	*	M, L, W	*	M, L, W
<b>Copepoda</b>	*	L, W	*	M, L, W
<b>Cladocera</b>	*	W	*	M, L, W
<b>Ostracoda</b>			*	
<b>Decapoda</b>				
<i>Orconectes sp</i>	*		*	
<i>Orconectes rusticus</i>			*	L

**Appendix C.** Tables and Figures

List of Tables

*Main Lake Wissota*

Table 1 – ANOVA by depth.....36  
Table 2 – ANOVA by date.....38  
Table 3 – ANOVA depth by date.....40  
Table 4 – Mean number of individuals.....43

*Moon Bay*

Table 5 – ANOVA by depth.....45  
Table 6 – ANOVA by date.....47  
Table 7 – ANOVA depth by date.....49  
Table 8 – Mean number of individuals.....52

*Little Lake Wissota*

Table 9 – ANOVA by depth.....54  
Table 10 – ANOVA by date.....56  
Table 11 – ANOVA depth by date.....58  
Table 12 – Mean number of individuals.....61

*Critical Habitat Areas*

Table 13 – ANOVA by depth.....63  
Table 14 – ANOVA by date.....65  
Table 15 – ANOVA depth by date.....67  
Table 16 – Mean number of individuals.....70

*Pooled Data*

Table 17 – ANOVA by depth.....72  
Table 18 – ANOVA by date.....74  
Table 19 – ANOVA depth by date.....76  
Table 20 - Mean number of individuals.....79

*Critical Habitat Areas vs. Non-Critical Habitat Areas*

Table 21 – ANOVA by depth.....81  
Table 22 – ANOVA by date.....83  
Table 23 – ANOVA depth by date.....85

List of Figures

Mean Number of Taxa

Figure 1. - *Pooled Data*.....30

Figure 2 - *Main Lake Wissota*.....31

Figure 3 - *Moon Bay*.....32

Figure 4 - *Little Lake Wissota*.....33

Figure 5 - *Critical Habitat Areas* .....34

*Main Lake Wissota*

Figure 6 – Mean number of individuals by depth.....36

Figure 7 – Mean number of individuals by date.....38

Figure 8 – Mean number of individuals depth by date.....42

*Moon Bay*

Figure 9 – Mean number of individuals by depth.....45

Figure 10 – Mean number of individuals by date.....47

Figure 11 – Mean number of individuals depth by date.....51

*Little Lake Wissota*

Figure 12 – Mean number of individuals by depth.....54

Figure 13 – Mean number of individuals by date.....56

Figure 14 – Mean number of individuals depth by date.....60

*Critical Habitat Areas*

Figure 15 – Mean number of individuals by depth.....63

Figure 16 – Mean number of individuals by date.....65

Figure 17 – Mean number of individuals depth by date.....69

*Pooled Data*

Figure 18 – Mean number of individuals by depth.....72

Figure 19 – Mean number of individuals by date.....74

Figure 20 – Mean number of individuals depth by date.....78

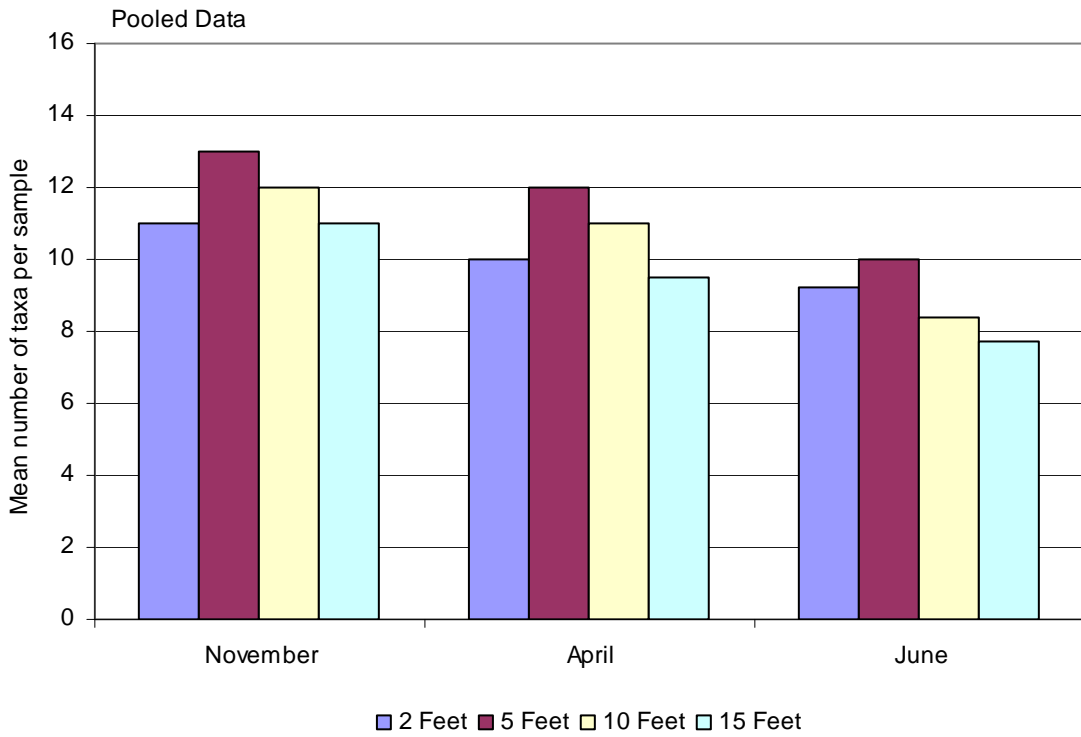
*Critical Habitat Areas vs. Non-Critical Habitat Areas*

Figure 21 – Mean number of individuals by depth.....81

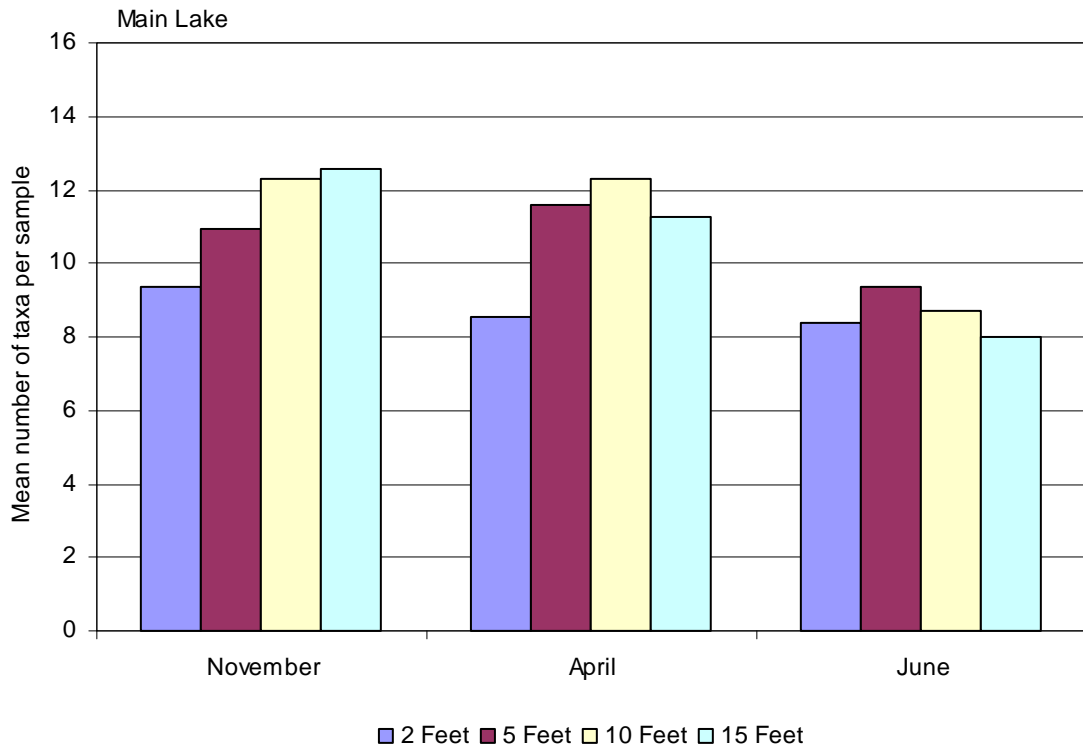
Figure 22 – Mean number of individuals by date.....83

Figure 23 – Mean number of individuals depth by date.....87

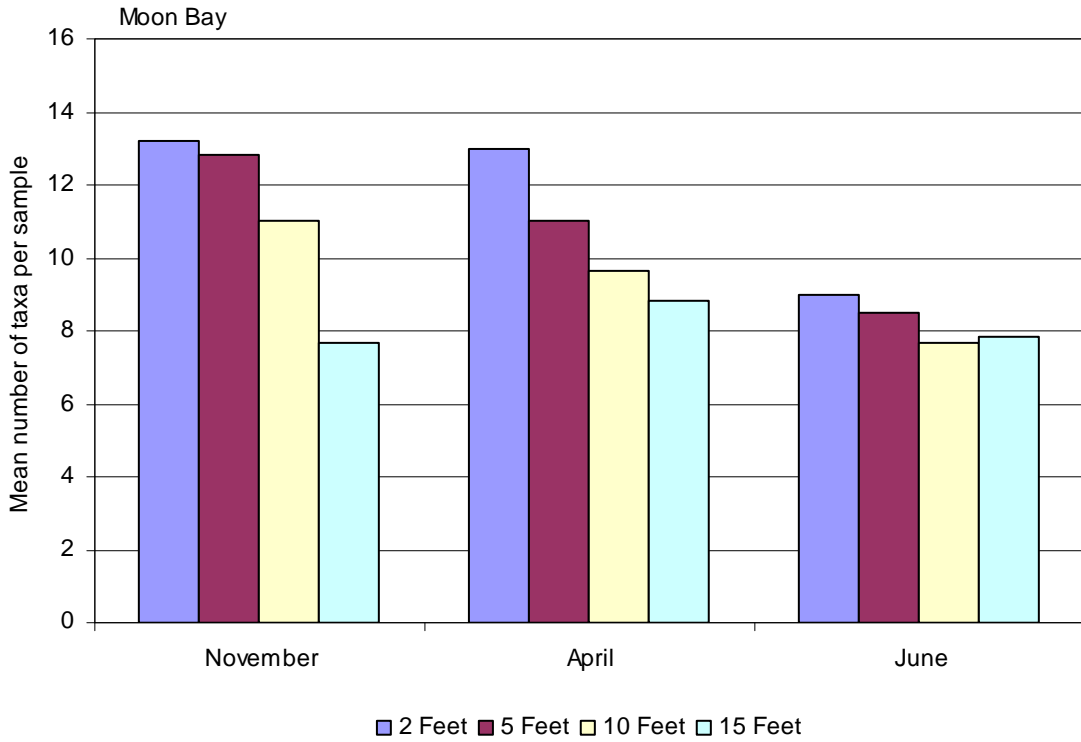
**Figure 1.** Mean number of taxa collected in samples from 2 ft, 5 ft, 10 ft and 15 ft in November 2009, April 2010 and June 2010 from Lake Wissota, Wisconsin (pooled data).



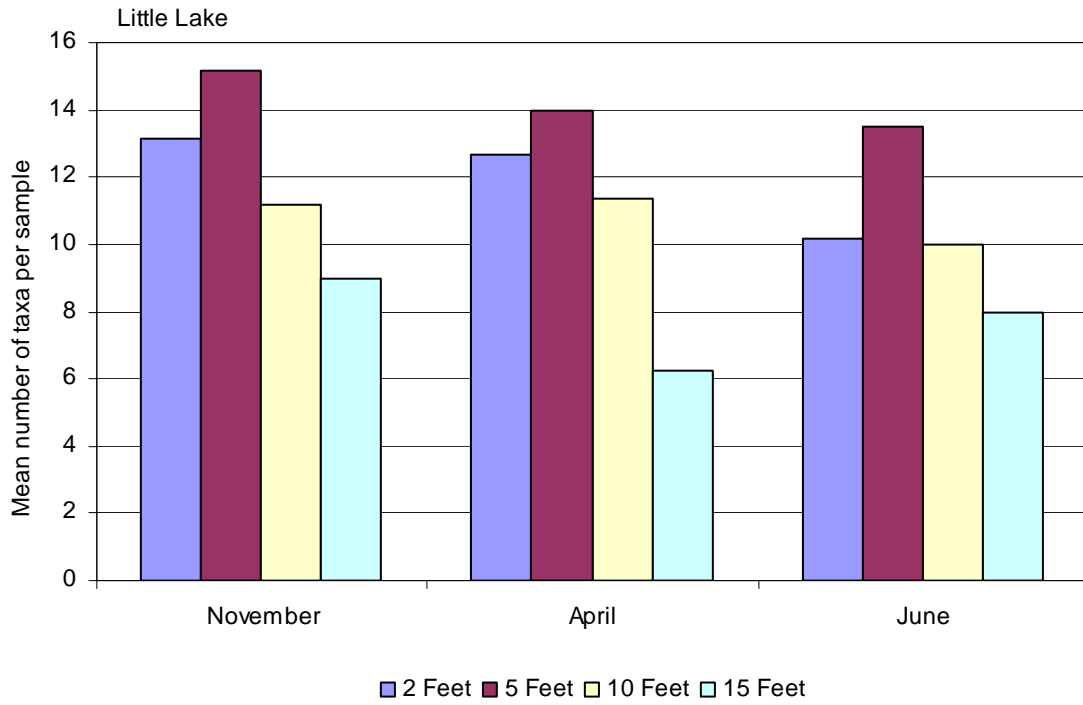
**Figure 2.** Mean number of taxa collected in samples at 2 ft, 5 ft, 10 ft and 15 ft in November 2009, April 2010 and June 2010 from Main Lake Wissota, Wisconsin.



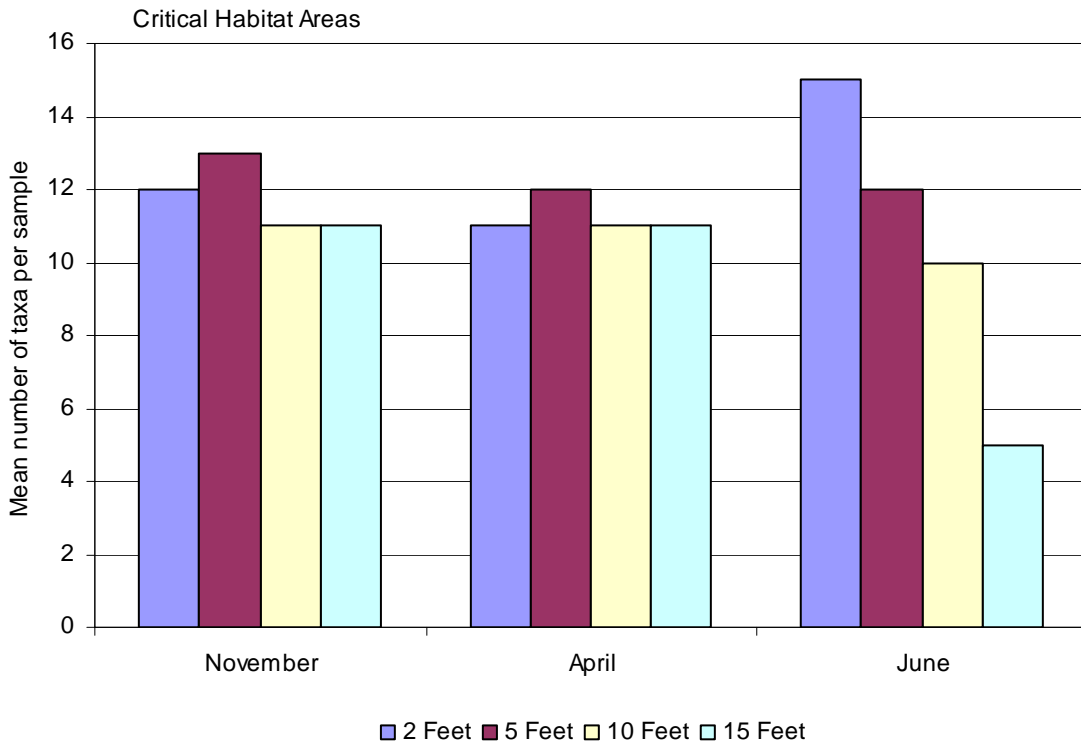
**Figure 3.** Mean number of taxa collected in samples at 2 ft, 5 ft, 10 ft and 15 ft in November 2009, April 2010 and June 2010 from Moon Bay, Wisconsin.



**Figure 4.** Mean number of taxa collected in samples at 2 ft, 5 ft, 10 ft and 15 ft in November 2009, April 2010 and June 2010 from Little Lake Wissota, Wisconsin.



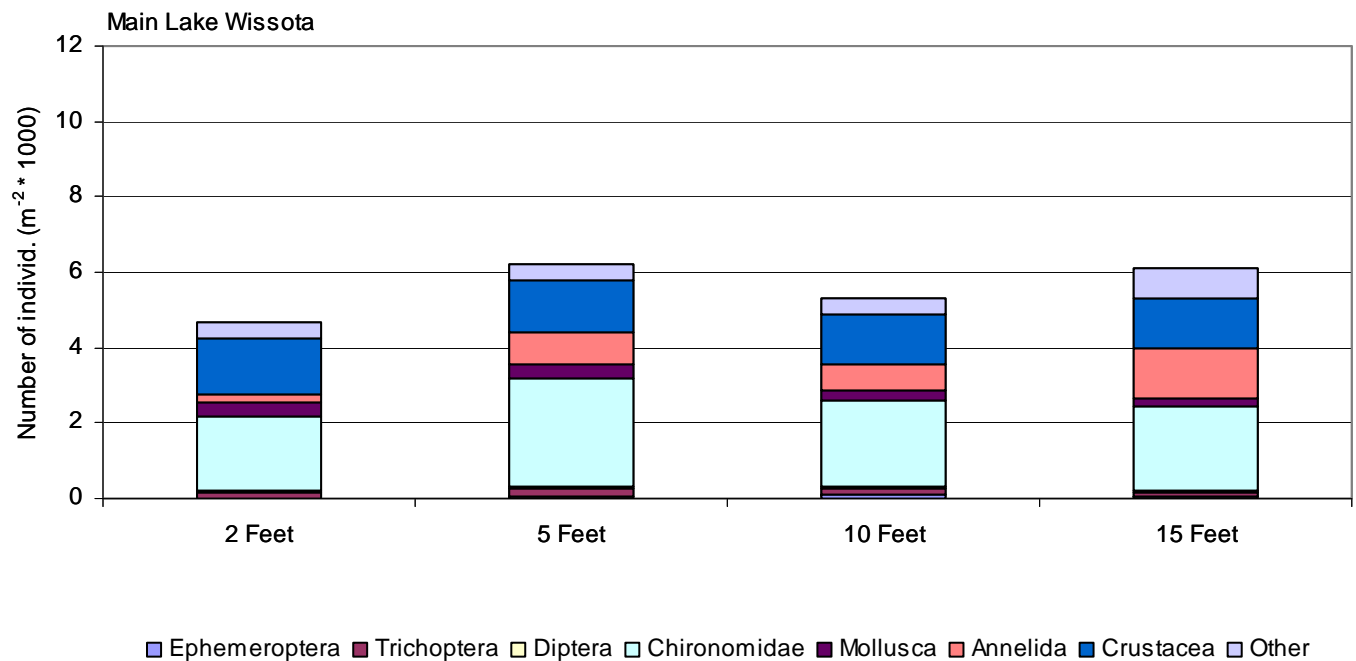
**Figure 5.** Mean number of taxa collected in samples at 2 ft, 5 ft, 10 ft and 15 ft in November 2009, April 2010 and June 2010 from Critical Habitat Areas of Lake Wissota, Wisconsin.



**Table 1.** Analysis of Variance (F statistics, *P* values and degrees of freedom) of the mean total number of taxa, mean number of individuals and mean number of individuals within major taxonomic groups from samples collected at 2 ft, 5 ft, 10 ft and 15 ft averaged over all sample dates from Main Lake Wissota, Wisconsin.

**Figure 6.** Mean number of individuals and mean number of individuals within major taxonomic groups from samples collected at 2 ft, 5 ft, 10 ft and 15 ft averaged over all sample dates from Main Lake Wissota, Wisconsin ( $m^{-2} \times 1,000$ ).

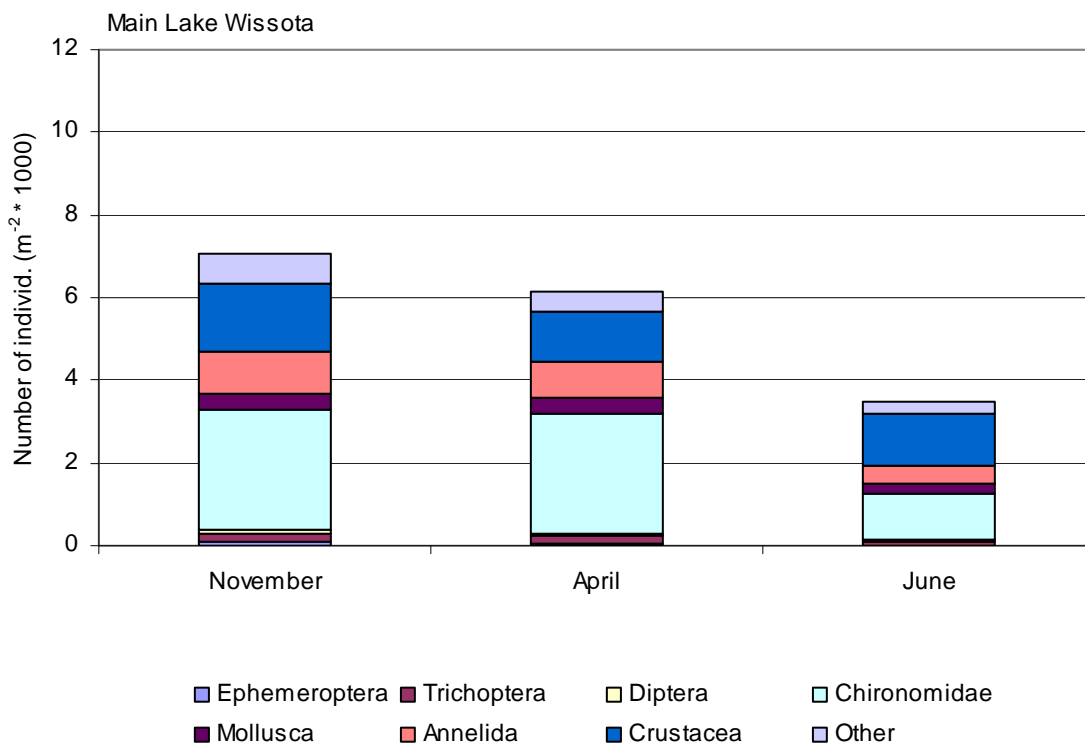
Main Lake Wissota	2 ft vs 5 ft		2 ft vs 10 ft		2 ft vs 15 ft		5 ft vs 10 ft		5 ft vs 15 ft		10 ft vs 15 ft	
	df (1,82)		df (1,82)		df (1,82)		df (1,82)		df (1,82)		df (1,82)	
	F	P-value	F	P-value	F	P-value	F	P-value	F	P-value	F	P-value
Number of Taxa	5.391	<b>0.023</b>	5.555	<b>0.021</b>	2.919	0.091	0.018	0.893	0.153	0.697	0.245	0.622
Number of Individuals	3.912	0.051	2.624	0.109	5.135	<b>0.026</b>	0.274	0.602	0.056	0.814	0.651	0.422
Ephemeroptera	4.697	<b>0.033</b>	9.510	<b>0.003</b>	5.020	<b>0.028</b>	0.963	0.329	0.055	0.814	1.631	0.205
Trichoptera	0.070	0.792	0.057	0.812	2.802	0.098	0.238	0.627	3.568	0.062	1.884	0.174
Diptera	4.061	<b>0.047</b>	7.934	<b>0.006</b>	4.237	<b>0.043</b>	0.187	0.667	0.026	0.873	0.437	0.510
Chironomidae	3.516	0.064	4.075	0.047	3.125	0.081	0.003	0.954	0.052	0.820	0.038	0.846
Mollusca	1.643	0.203	0.119	0.731	0.413	0.522	1.079	0.302	0.587	0.446	0.102	0.750
Annelida	13.377	<b>0.000</b>	18.489	<b>0.000</b>	33.432	<b>0.000</b>	0.072	0.790	2.889	0.093	2.389	0.126
Crustacea	1.357	0.247	0.505	0.479	0.398	0.530	0.237	0.628	0.267	0.607	0.003	0.955
Other Invertebrates	1.053	0.308	0.072	0.789	3.940	0.050	0.603	0.440	1.251	0.267	3.190	0.078



**Table 2.** Analysis of Variance (F statistics, *P* values and degrees of freedom) of the mean total number of taxa, mean number of individuals and mean number of individuals within major taxonomic groups from samples collected in November 2009, April 2010 and June 2010 averaged over all sample depths from Main Lake Wissota, Wisconsin.

**Figure 7.** Mean number of individuals and mean number of individuals within major taxonomic groups from samples collected in November 2009, April 2010 and June 2010 averaged over all sample depths from Main Lake Wissota, Wisconsin ( $\text{m}^{-2} \times 1,000$ ).

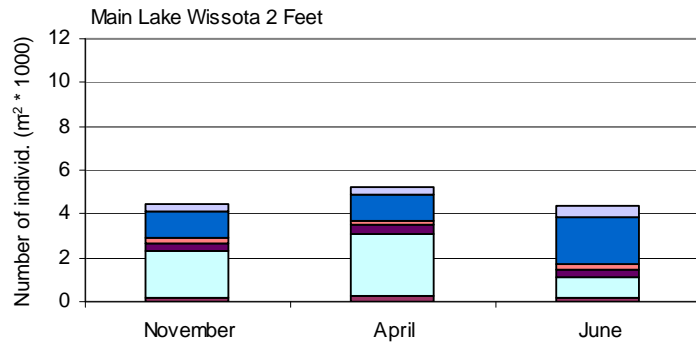
Main Lake Wissota	November vs April		April vs June		November vs June	
	df (1, 110)		df (1, 110)		df (1, 110)	
	F	P-value	F	P-value	F	P-value
Number of Taxa	0.001	0.969	9.970	<b>0.002</b>	8.397	<b>0.005</b>
Number of Individuals	0.973	0.326	7.430	<b>0.007</b>	14.480	<b>0.000</b>
Ephemeroptera	0.238	0.627	10.599	<b>0.002</b>	10.102	<b>0.002</b>
Trichoptera	0.399	0.529	8.828	<b>0.004</b>	11.697	<b>0.001</b>
Diptera	0.310	0.579	0.417	0.520	1.416	0.237
Chironomidae	0.004	0.949	9.637	<b>0.002</b>	8.962	<b>0.003</b>
Mollusca	0.042	0.838	2.119	0.148	2.859	0.094
Annelida	0.796	0.374	5.911	<b>0.017</b>	1.456	0.230
Crustacea	0.988	0.322	0.073	0.787	0.546	0.462
Other Invertebrates	0.005	0.943	6.626	<b>0.011</b>	4.921	<b>0.029</b>



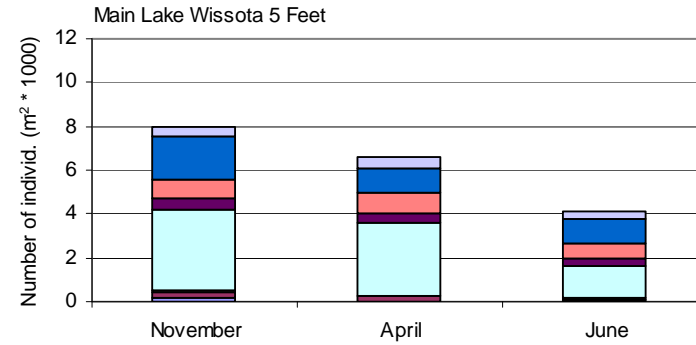
**Table 3.** Analysis of Variance (F statistics, *P* values and degrees of freedom) of the mean total number of taxa, mean number of individuals and mean number of individuals within major taxonomic groups from samples collected at 2 ft, 5 ft, 10 ft and 15 ft in November 2009, April 2010 and June 2010 from Main Lake Wissota, Wisconsin.

Main Lake Wissota			November vs April		April vs June		November vs June	
			F	P-value	F	P-value	F	P-value
Total Taxa	2 ft	df (1, 27)	0.084	0.775	0.123	0.729	0.431	0.517
	5 ft	df (1, 27)	6.389	<b>0.018</b>	1.940	0.175	1.782	0.193
	10 ft	df (1, 27)	0.135	0.716	2.762	0.109	2.109	0.158
	15 ft	df (1, 27)	2.385	0.135	0.497	0.487	0.471	0.499
Total Individuals	2 ft	df (1, 27)	0.008	0.929	0.004	0.949	0.030	0.864
	5 ft	df (1, 27)	0.044	0.836	1.844	0.186	1.832	0.188
	10 ft	df (1, 27)	0.826	0.372	9.398	<b>0.005</b>	14.986	<b>0.001</b>
	15 ft	df (1, 27)	1.212	0.281	4.445	0.045	14.682	<b>0.001</b>
Ephemeroptera	2 ft	df (1, 27)	1.470	0.236	2.607	0.118	1.000	0.327
	5 ft	df (1, 27)	1.118	0.300	1.879	0.182	3.471	0.074
	10 ft	df (1, 27)	0.000	0.997	4.795	<b>0.038</b>	4.450	<b>0.045</b>
	15 ft	df (1, 27)	0.119	0.732	1.799	0.191	1.746	0.198
Trichoptera	2 ft	df (1, 27)	0.023	0.880	0.005	0.943	0.065	0.800
	5 ft	df (1, 27)	0.375	0.546	4.546	<b>0.043</b>	6.894	<b>0.014</b>
	10 ft	df (1, 27)	0.156	0.696	5.487	<b>0.027</b>	5.965	<b>0.022</b>
	15 ft	df (1, 27)	0.349	0.560	3.992	0.056	4.935	<b>0.035</b>
Diptera	2 ft	df (1, 27)	0.027	0.870	1.497	0.232	1.000	0.327
	5 ft	df (1, 27)	0.163	0.690	0.045	0.833	0.030	0.864
	10 ft	df (1, 27)	0.036	0.852	0.025	0.875	0.004	0.952
	15 ft	df (1, 27)	0.460	0.504	0.086	0.771	1.022	0.321
Chironomidae	2 ft	df (1, 27)	0.473	0.498	0.934	0.343	0.072	0.790
	5 ft	df (1, 27)	0.005	0.943	2.451	0.130	1.766	0.195
	10 ft	df (1, 27)	0.062	0.806	5.435	<b>0.028</b>	2.274	0.144
	15 ft	df (1, 27)	0.080	0.780	3.055	0.092	3.943	0.058
Mollusca	2 ft	df (1, 27)	0.314	0.580	1.621	0.214	0.519	0.478
	5 ft	df (1, 27)	0.196	0.662	1.330	0.259	0.342	0.564
	10 ft	df (1, 27)	0.154	0.697	2.776	0.108	5.033	<b>0.034</b>
	15 ft	df (1, 27)	0.049	0.826	3.757	0.064	3.010	0.095
Annelida	2 ft	df (1, 27)	1.237	0.276	1.000	0.327	0.021	0.887
	5 ft	df (1, 27)	0.762	0.391	1.068	0.311	3.922	0.058
	10 ft	df (1, 27)	0.200	0.658	2.786	0.107	0.713	0.406
	15 ft	df (1, 27)	2.665	0.115	0.098	0.757	1.619	0.214
Crustacea	2 ft	df (1, 27)	0.932	0.343	0.838	0.368	0.001	0.981
	5 ft	df (1, 27)	2.061	0.163	0.429	0.518	0.984	0.330
	10 ft	df (1, 27)	1.140	0.295	0.145	0.707	0.548	0.466
	15 ft	df (1, 27)	0.203	0.656	2.106	0.159	2.648	0.116
Other Invertebrates	2 ft	df (1, 27)	0.120	0.732	0.163	0.689	0.007	0.932
	5 ft	df (1, 27)	2.988	0.096	0.039	0.844	4.793	<b>0.038</b>
	10 ft	df (1, 27)	0.342	0.564	0.008	0.931	0.437	0.514
	15 ft	df (1, 27)	0.441	0.513	5.411	<b>0.028</b>	1.163	0.291

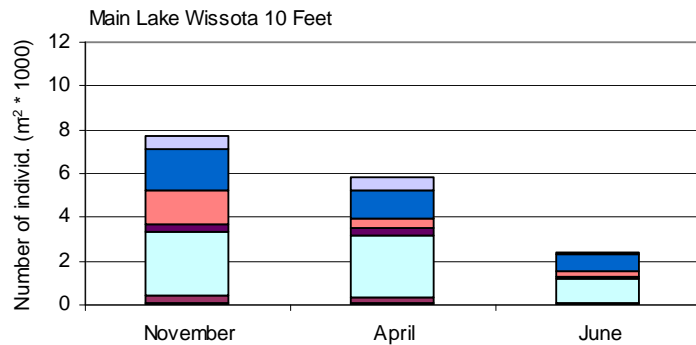
**Figure 8.** Mean number of individuals and mean number of individuals within major taxonomic groups from samples collected at 2 ft, 5 ft, 10 ft and 15 ft in November 2009, April 2010 and June 2010 from Main Lake Wissota, Wisconsin ( $m^{-2} \times 1,000$ ).



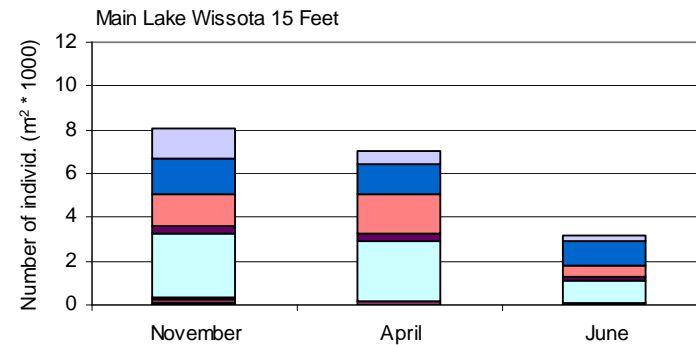
■ Ephemeroptera   
 ■ Trichoptera   
 ■ Diptera   
 ■ Chironomidae  
■ Mollusca   
 ■ Annelida   
 ■ Crustacea   
 ■ Other



■ Ephemeroptera   
 ■ Trichoptera   
 ■ Diptera   
 ■ Chironomidae  
■ Mollusca   
 ■ Annelida   
 ■ Crustacea   
 ■ Other



■ Ephemeroptera   
 ■ Trichoptera   
 ■ Diptera   
 ■ Chironomidae  
■ Mollusca   
 ■ Annelida   
 ■ Crustacea   
 ■ Other



■ Ephemeroptera   
 ■ Trichoptera   
 ■ Diptera   
 ■ Chironomidae  
■ Mollusca   
 ■ Annelida   
 ■ Crustacea   
 ■ Other

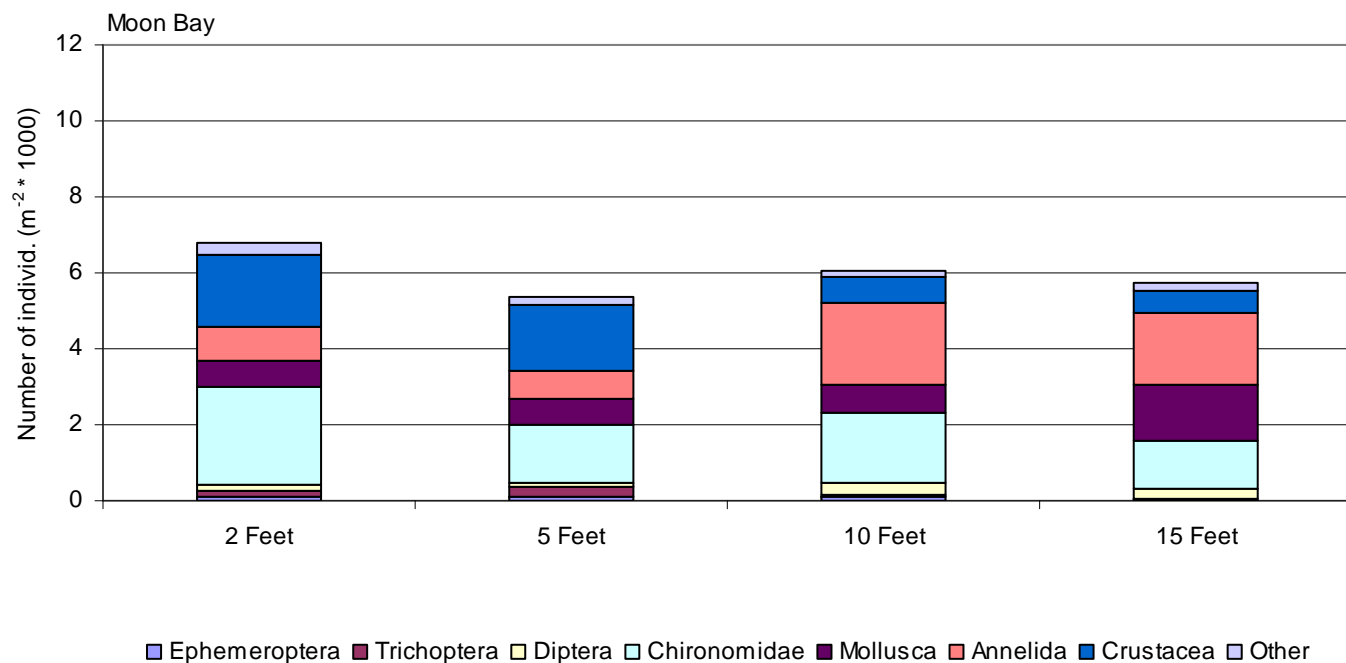
**Table 4.** Mean number of individuals within major taxonomic groups separated by depth zone, by date and by depth zone for each date from Main Lake Wissota, Wisconsin (m<sup>-2</sup>).

Main Lake Wissota	Ephemeroptera	Trichoptera	Diptera	Chironomidae	Mollusca	Annelida	Crustacea	Other
Means by Depth								
2 Feet	11.3	168.1	28.7	1962.9	394.6	205.0	1502.7	399.8
5 Feet	55.4	192.7	58.4	2866.9	400.8	836.4	1363.3	450.0
10 Feet	84.1	180.4	48.2	2269.4	266.5	724.7	1303.8	451.0
15 Feet	35.9	115.8	43.1	2232.5	254.2	1305.9	1338.7	759.5
Means by Date								
November	81.5	231.4	56.1	2932.0	360.5	1038.6	1636.7	723.4
April	50.0	179.1	45.4	2915.9	390.5	858.7	1204.6	524.3
June	8.5	82.3	32.3	1150.8	236.0	406.7	1290.0	297.5
Means by Depth * Date								
2 Feet								
November	9.2	141.5	27.7	2143.3	378.2	187.6	1187.0	396.7
April	24.6	206.0	58.4	2792.1	442.8	175.3	1153.1	347.5
June	0.0	156.8	0.0	953.3	362.9	252.2	2167.9	455.1
5 Feet								
November	129.2	304.4	76.9	3730.0	470.5	901.0	1894.2	492.0
April	27.7	209.1	36.9	3342.5	399.8	980.9	1057.8	541.2
June	9.2	64.6	61.5	1528.3	332.1	627.3	1137.8	316.7
10 Feet								
November	123.0	282.9	58.4	2918.2	292.1	1534.4	1912.7	618.1
April	116.9	187.6	46.1	2822.9	375.2	436.7	1239.2	618.1
June	12.3	70.7	40.0	1067.0	132.2	203.0	759.5	116.9
15 Feet								
November	64.6	196.8	61.5	2936.6	301.4	1531.4	1552.9	1386.8
April	30.8	113.8	40.0	2706.0	344.4	1841.9	1368.4	590.4
June	12.3	36.9	27.7	1054.7	116.9	544.3	1094.7	301.4

**Table 5.** Analysis of Variance (F statistics, *P values* and degrees of freedom) of the mean total number of taxa, mean number of individuals and mean number of individuals within major taxonomic groups from samples collected at 2 ft, 5 ft, 10 ft and 15 ft averaged over all sample dates from Moon Bay, Wisconsin.

**Figure 9.** Mean number of individuals and mean number of individuals within major taxonomic groups from samples collected at 2 ft, 5 ft, 10 ft and 15 ft averaged over all sample dates from Moon Bay, Wisconsin ( $m^{-2} \times 1,000$ ).

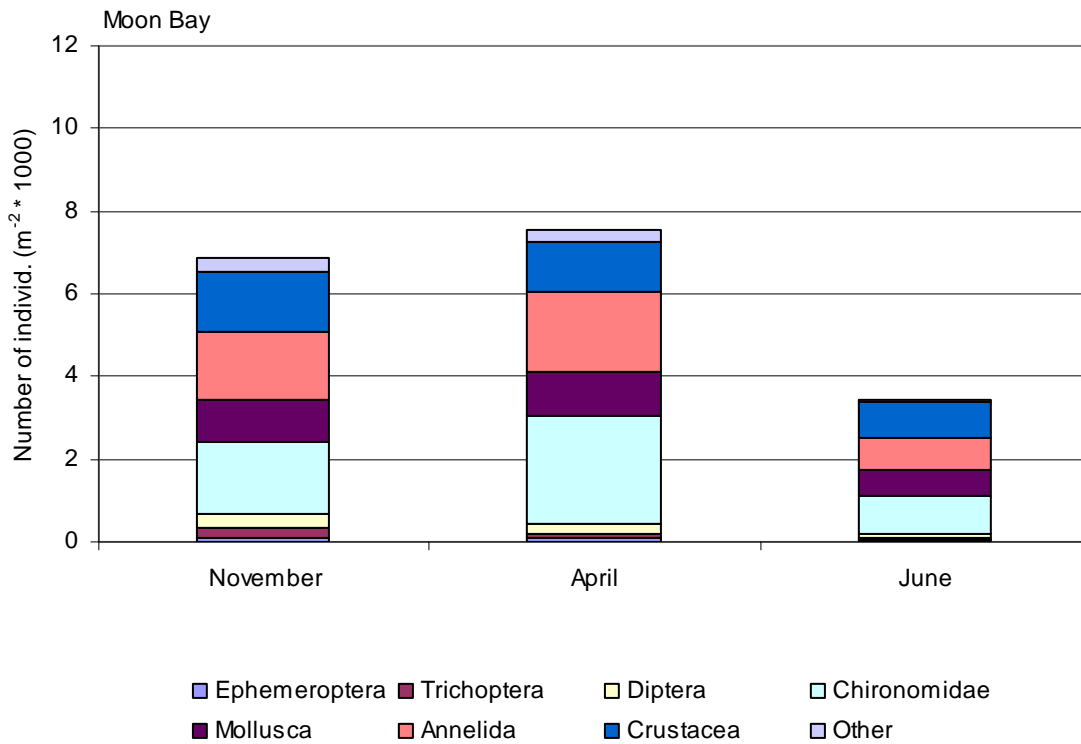
Moon Bay	2 ft vs 5 ft		2 ft vs 10 ft		2 ft vs 15 ft		5 ft vs 10 ft		5 ft vs 15 ft		10 ft vs 15 ft	
	df (1, 31)		df (1, 31)		df (1, 31)		df (1, 34)		df (1, 34)		df (1, 34)	
	F	P-value	F	P-value	F	P-value	F	P-value	F	P-value	F	P-value
Number of Taxa	0.492	0.488	2.199	0.148	7.583	<b>0.010</b>	0.513	0.479	2.976	0.094	0.942	0.339
Number of Individuals	0.070	0.793	0.018	0.895	0.146	0.705	0.180	0.674	0.592	0.447	0.050	0.824
Ephemeroptera	0.705	0.408	0.221	0.641	5.535	<b>0.025</b>	1.987	0.168	14.001	<b>0.001</b>	3.314	0.077
Trichoptera	1.068	0.309	4.820	<b>0.036</b>	32.413	<b>0.000</b>	0.796	0.379	9.991	<b>0.003</b>	6.535	<b>0.015</b>
Diptera	0.336	0.567	0.516	0.478	1.678	0.205	1.581	0.217	3.462	0.071	0.234	0.632
Chironomidae	0.177	0.677	0.105	0.748	0.342	0.563	0.005	0.941	0.048	0.827	0.070	0.792
Mollusca	0.042	0.840	0.001	0.974	1.655	0.208	0.060	0.808	1.442	0.238	1.890	0.178
Annelida	0.520	0.476	2.272	0.142	4.280	<b>0.047</b>	5.111	<b>0.030</b>	8.593	<b>0.006</b>	0.063	0.803
Crustacea	0.932	0.342	8.987	<b>0.005</b>	11.811	<b>0.002</b>	2.913	0.097	3.201	0.083	0.014	0.908
Other Invertebrates	0.038	0.847	0.439	0.512	0.095	0.760	0.228	0.636	0.012	0.914	0.150	0.701



**Table 6.** Analysis of Variance (F statistics, *P values* and degrees of freedom) of the mean total number of taxa, mean number of individuals and mean number of individuals within major taxonomic groups from samples collected in November 2009, April 2010 and June 2010 averaged over all sample depths from Moon Bay, Wisconsin.

**Figure 10.** Mean number of individuals and mean number of individuals within major taxonomic groups from samples collected in November 2009, April 2010 and June 2010 averaged over all sample depths from Moon Bay, Wisconsin ( $m^{-2} \times 1,000$ ).

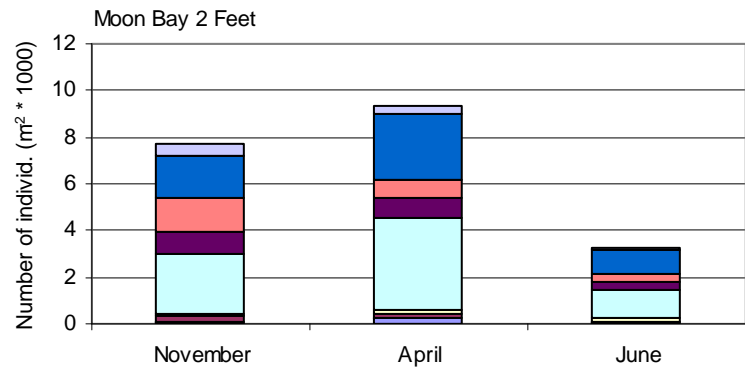
Moon Bay	November vs April		April vs June		November vs June	
	df (1, 44)		df (1, 44)		df (1, 44)	
	F	P-value	F	P-value	F	P-value
Number of Taxa	0.09	0.766	5.565	<b>0.023</b>	6.031	<b>0.018</b>
Number of Individuals	0.174	0.678	9.408	<b>0.004</b>	15.314	<b>0</b>
Ephemeroptera	0.976	0.329	9.088	<b>0.004</b>	2.233	0.142
Trichoptera	1.976	0.167	0.333	0.567	3.284	0.077
Diptera	0.013	0.91	5.163	<b>0.028</b>	3.637	0.063
Chironomidae	0.242	0.625	9.419	<b>0.004</b>	9.497	<b>0.004</b>
Mollusca	0.266	0.609	1.555	0.219	3.52	0.067
Annelida	0.009	0.927	4.539	0.039	5.866	<b>0.02</b>
Crustacea	0.198	0.659	0.22	0.641	0.858	0.359
Other Invertebrates	0.139	0.711	8.118	<b>0.007</b>	9.588	<b>0.003</b>



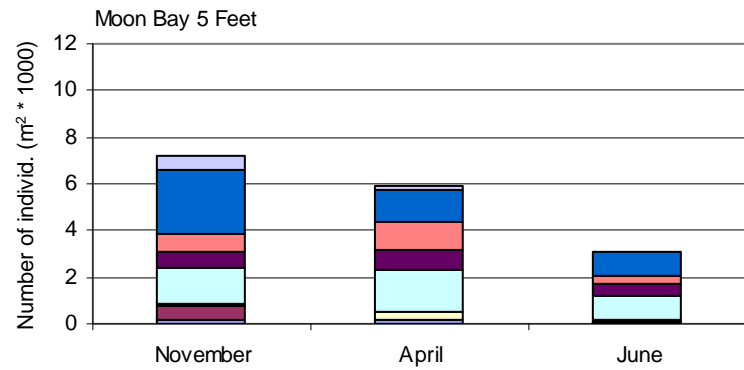
**Table 7.** Analysis of Variance (F statistics, *P values* and degrees of freedom) of the mean total number of taxa, mean number of individuals and mean number of individuals within major taxonomic groups from samples collected at 2 ft, 5 ft, 10 ft and 15 ft in November 2009, April 2010 and June 2010 from Moon Bay, Wisconsin.

Moon Bay			November vs April		April vs June		November vs June	
			F	P-value	F	P-value	F	P-value
Total Taxa	2 ft	df (1,8)	1.165	0.312	0.656	0.441	2.704	0.139
	5 ft	df (1,10)	0.890	0.368	0.029	0.868	1.942	0.194
	10 ft	df (1,10)	0.021	0.887	1.832	0.206	1.313	0.279
	15 ft	df (1,10)	6.032	<b>0.034</b>	0.068	0.799	7.951	<b>0.018</b>
Total Individuals	2 ft	df (1,8)	0.044	0.839	1.566	0.246	4.044	0.079
	5 ft	df (1,10)	0.609	0.453	2.030	0.185	4.625	0.057
	10 ft	df (1,10)	0.478	0.505	2.188	0.170	3.966	0.074
	15 ft	df (1,10)	1.369	0.269	3.479	0.092	1.472	0.253
Ephemeroptera	2 ft	df (1,8)	1.202	0.305	4.877	0.058	1.528	0.251
	5 ft	df (1,10)	0.000	0.994	5.633	<b>0.039</b>	2.262	0.164
	10 ft	df (1,10)	0.016	0.901	0.169	0.689	0.187	0.675
	15 ft	df (1,10)	4.370	0.063	2.212	0.168	1.000	0.341
Trichoptera	2 ft	df (1,8)	0.002	0.964	1.405	0.270	0.591	0.464
	5 ft	df (1,10)	4.488	0.060	0.259	0.622	5.796	<b>0.037</b>
	10 ft	df (1,10)	0.920	0.360	0.516	0.489	0.105	0.752
	15 ft	df (1,10)	0.648	0.440	0.648	0.440	0.000	1.000
Diptera	2 ft	df (1,8)	0.061	0.812	0.797	0.398	0.531	0.487
	5 ft	df (1,10)	0.264	0.618	1.103	0.318	0.413	0.535
	10 ft	df (1,10)	0.593	0.459	1.326	0.276	4.152	0.069
	15 ft	df (1,10)	0.112	0.744	2.106	0.177	0.179	0.681
Chironomidae	2 ft	df (1,8)	0.002	0.962	0.955	0.357	1.613	0.240
	5 ft	df (1,10)	0.040	0.845	1.216	0.296	1.053	0.329
	10 ft	df (1,10)	0.083	0.779	4.969	0.050	5.885	<b>0.036</b>
	15 ft	df (1,10)	0.626	0.447	2.662	0.134	1.344	0.273
Mollusca	2 ft	df (1,8)	0.134	0.724	0.517	0.492	1.649	0.235
	5 ft	df (1,10)	0.096	0.763	0.266	0.617	0.615	0.451
	10 ft	df (1,10)	1.471	0.253	0.001	0.978	1.318	0.278
	15 ft	df (1,10)	0.469	0.509	1.245	0.291	0.221	0.648
Annelida	2 ft	df (1,8)	0.513	0.494	0.062	0.810	1.529	0.251
	5 ft	df (1,10)	0.160	0.697	1.947	0.193	1.181	0.303
	10 ft	df (1,10)	0.709	0.420	1.683	0.224	4.366	0.063
	15 ft	df (1,10)	1.474	0.253	1.650	0.228	0.188	0.674
Crustacea	2 ft	df (1,8)	0.036	0.854	1.665	0.233	2.197	0.177
	5 ft	df (1,10)	0.631	0.445	0.036	0.852	1.067	0.326
	10 ft	df (1,10)	0.035	0.855	0.054	0.821	0.146	0.711
	15 ft	df (1,10)	0.158	0.700	0.021	0.889	0.048	0.831
Other Invertebrates	2 ft	df (1,8)	0.079	0.786	5.523	0.047	2.444	0.157
	5 ft	df (1,10)	0.589	0.461	6.259	<b>0.031</b>	7.145	<b>0.023</b>
	10 ft	df (1,10)	0.086	0.775	3.904	0.076	5.247	<b>0.045</b>
	15 ft	df (1,10)	0.196	0.667	0.261	0.621	0.000	0.998

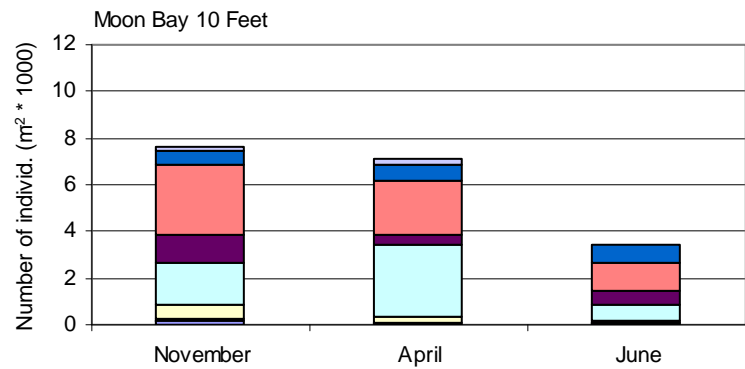
**Figure 11.** Mean number of individuals and mean number of individuals within major taxonomic groups from samples collected at 2 ft, 5 ft, 10 ft and 15 ft in November 2009, April 2010 and June 2010 from Moon Bay, Wisconsin ( $\text{m}^{-2} \times 1,000$ ).



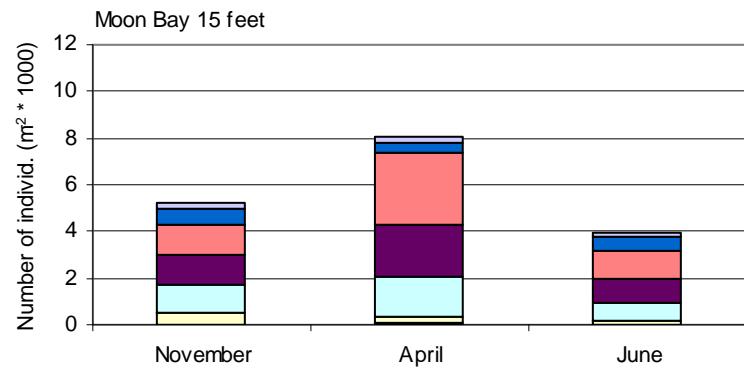
■ Ephemeroptera    ■ Trichoptera    ■ Diptera    ■ Chironomidae  
■ Mollusca    ■ Annelida    ■ Crustacea    ■ Other



■ Ephemeroptera    ■ Trichoptera    ■ Diptera    ■ Chironomidae  
■ Mollusca    ■ Annelida    ■ Crustacea    ■ Other



■ Ephemeroptera    ■ Trichoptera    ■ Diptera    ■ Chironomidae  
■ Mollusca    ■ Annelida    ■ Crustacea    ■ Other



■ Ephemeroptera    ■ Trichoptera    ■ Diptera    ■ Chironomidae  
■ Mollusca    ■ Annelida    ■ Crustacea    ■ Other

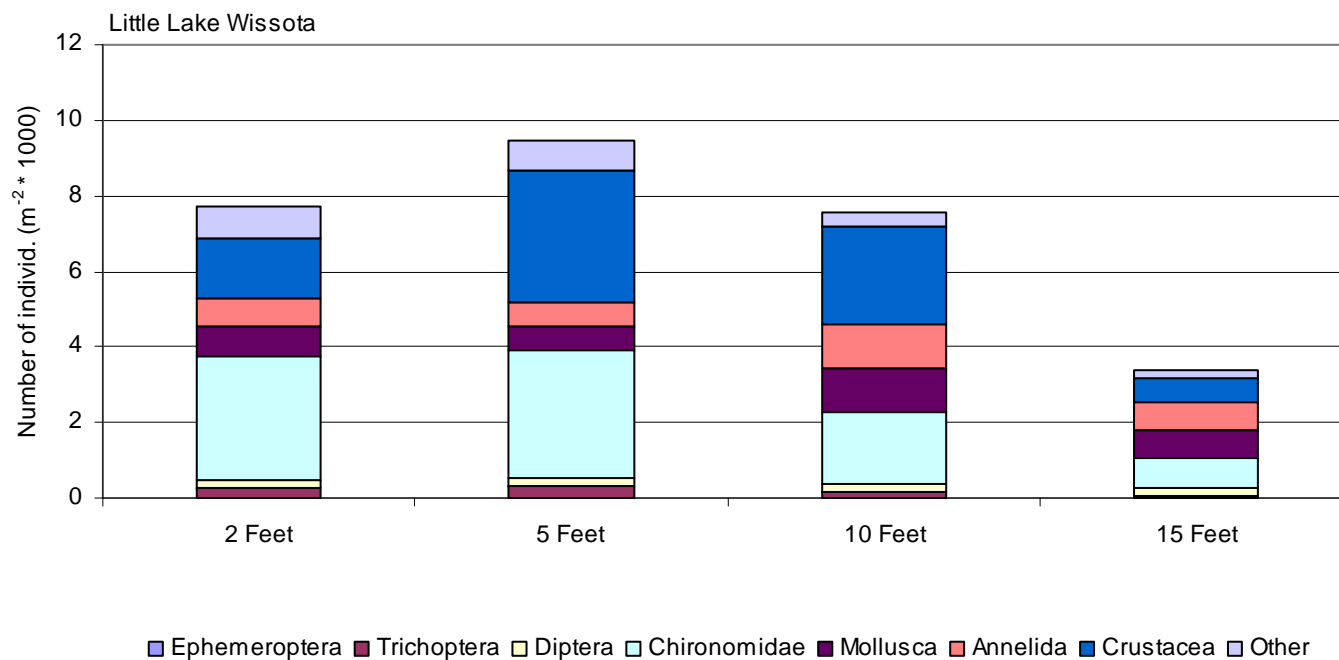
**Table 8.** Mean number of individuals within major taxonomic groups separated by depth zone, by date and by depth zone for each date from Moon Bay, Wisconsin ( $m^{-2}$ ).

Moon Bay	Ephemeroptera	Trichoptera	Diptera	Chironomidae	Mollusca	Annelida	Crustacea	Other
Means by Depth								
2 Feet	111.9	169.3	146.4	2594.5	683.1	861.0	1911.4	289.9
5 Feet	131.5	217.6	150.7	1480.4	698.4	743.8	1712.4	258.3
10 Feet	90.9	83.7	294.2	1841.6	731.9	2178.8	693.6	160.2
15 Feet	16.7	12.0	296.6	1272.4	1480.4	1855.9	590.7	198.5
Means by Date								
November	112.3	235.8	321.9	1746.3	1040.7	1606.0	1491.8	336.9
April	117.9	65.5	260.2	2609.2	1065.0	1909.2	1246.6	262.0
June	29.9	54.3	93.6	932.1	617.7	786.1	853.5	73.0
Means by Depth * Date								
2 Feet								
November	77.5	232.5	137.8	2574.4	947.1	1394.8	1877.0	0.4
April	241.1	172.2	206.6	3952.0	809.3	800.7	2824.1	0.4
June	17.2	103.3	94.7	1257.1	292.7	387.5	1033.2	0.1
5 Feet								
November	208.1	566.8	100.5	1499.6	746.2	696.0	2812.6	531.0
April	143.5	50.2	294.2	1865.5	810.8	1248.5	1298.7	215.3
June	43.1	35.9	57.4	1076.3	538.1	287.0	1026.0	28.7
10 Feet								
November	157.9	136.3	531.0	1800.9	1212.6	2999.2	631.4	157.9
April	64.6	35.9	272.7	3070.9	373.1	2346.2	681.6	287.0
June	50.2	78.9	78.9	652.9	609.9	1191.1	767.7	35.9
15 Feet								
November	0.0	7.2	487.9	1248.5	1241.3	1298.7	710.3	229.6
April	43.1	21.5	258.3	1772.2	2224.3	3056.6	444.9	193.7
June	7.2	7.2	143.5	796.4	975.8	1212.6	617.1	172.2

**Table 9.** Analysis of Variance (F statistics, *P* values and degrees of freedom) of the mean total number of taxa, mean number of individuals and mean number of individuals within major taxonomic groups from samples collected at 2 ft, 5 ft, 10 ft and 15 ft averaged over all sample dates from Little Lake Wisconsin, Wisconsin.

**Figure 12.** Mean number of individuals and mean number of individuals within major taxonomic groups from samples collected at 2 ft, 5 ft, 10 ft and 15 ft averaged over all sample dates from Little Lake Wisconsin, Wisconsin ( $m^{-2} \times 1,000$ ).

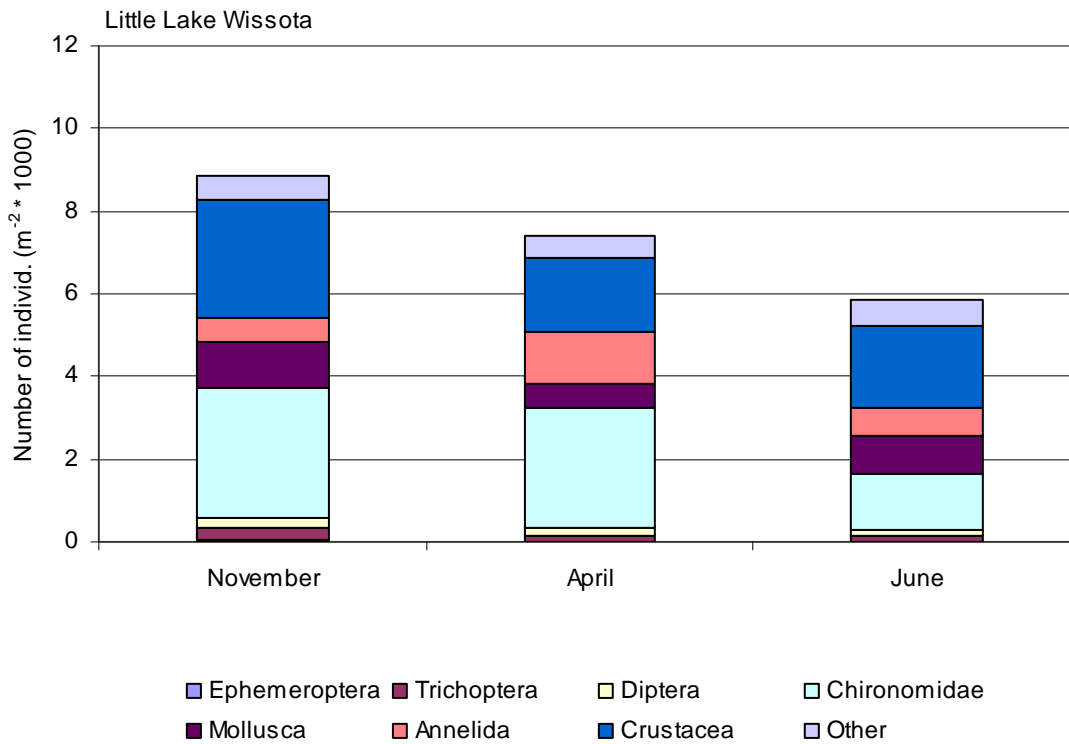
Little Lake Wissota	2 ft vs 5 ft		2 ft vs 10 ft		2 ft vs 15 ft		5 ft vs 10 ft		5 ft vs 15 ft		10 ft vs 15 ft	
	df (1,34 )		df (1,34 )		df (1,28)		df (1, 37)		df (1,28)		df (1,28)	
	F	P-value	F	P-value	F	P-value	F	P-value	F	P-value	F	P-value
Number of Taxa	1.224	0.276	0.201	0.657	7.900	<b>0.009</b>	3.004	0.092	12.500	<b>0.001</b>	11.178	<b>0.002</b>
Number of Individuals	0.067	0.797	0.119	0.732	8.124	<b>0.008</b>	0.000	0.987	6.863	<b>0.014</b>	11.171	<b>0.002</b>
Ephemeroptera	0.107	0.746	0.057	0.812	0.546	0.466	0.378	0.543	1.381	0.250	0.342	0.563
Trichoptera	0.481	0.492	1.797	0.189	5.923	<b>0.022</b>	4.301	<b>0.046</b>	9.710	<b>0.004</b>	1.690	0.204
Diptera	0.698	0.409	1.959	0.171	0.170	0.684	0.294	0.591	0.093	0.763	0.616	0.439
Chironomidae	0.567	0.457	1.498	0.229	9.665	<b>0.004</b>	0.089	0.767	4.440	<b>0.044</b>	5.494	<b>0.026</b>
Mollusca	0.210	0.650	0.613	0.439	1.802	0.190	1.277	0.266	0.816	0.374	3.191	0.085
Annelida	0.022	0.884	2.279	0.140	0.230	0.635	2.190	0.148	0.151	0.700	0.884	0.355
Crustacea	3.760	0.061	2.087	0.158	2.890	0.100	0.477	0.495	14.731	<b>0.001</b>	13.563	<b>0.001</b>
Other Invertebrates	0.558	0.460	1.168	0.287	3.320	0.079	3.894	0.057	7.765	<b>0.009</b>	0.803	0.378



**Table 10.** Analysis of Variance (F statistics, *P* values and degrees of freedom) of the mean total number of taxa, mean number of individuals and mean number of individuals within major taxonomic groups from samples collected in November 2009, April 2010 and June 2010 averaged over all sample depths from Little Lake Wissota, Wisconsin.

**Figure 13.** Mean number of individuals and mean number of individuals within major taxonomic groups from samples collected in November 2009, April 2010 and June 2010 averaged over all sample depths from Little Lake Wissota, Wisconsin ( $\text{m}^{-2} \times 1,000$ ).

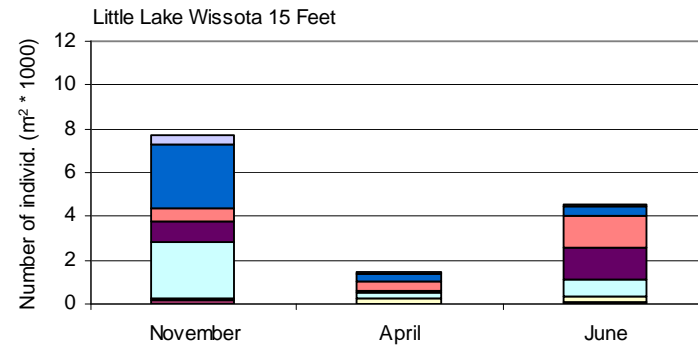
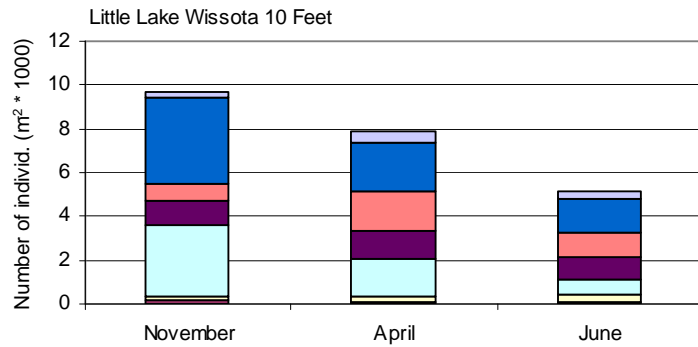
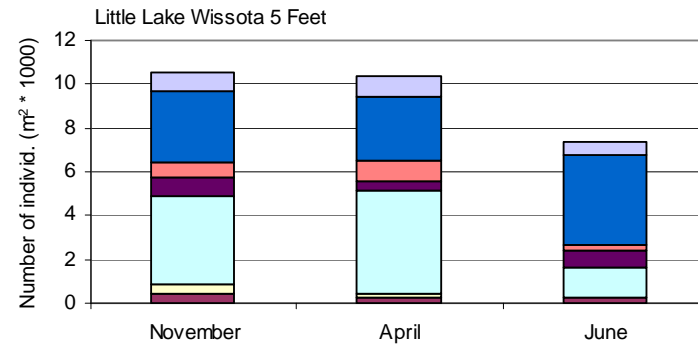
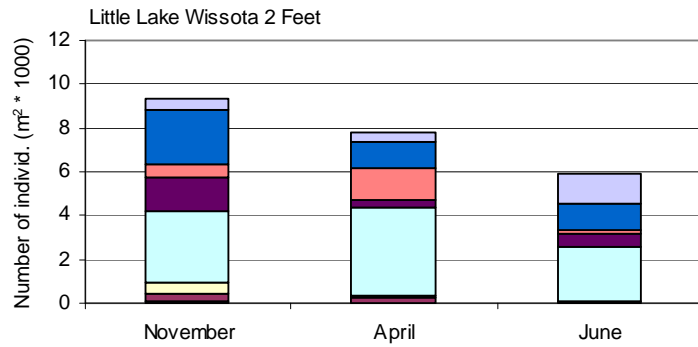
Little Lake	November vs April		April vs June		November vs June	
	df (1, 42)		df (1, 42)		df (1, 42)	
	F	P-value	F	P-value	F	P-value
Number of Taxa	0.104	0.749	0.482	0.491	0.880	0.354
Number of Individuals	0.679	0.415	0.738	0.395	2.944	0.094
Ephemeroptera	1.769	0.191	0.016	0.901	2.225	0.143
Trichoptera	2.493	0.122	0.270	0.606	4.444	<b>0.041</b>
Diptera	0.022	0.883	0.790	0.379	0.860	0.359
Chironomidae	1.362	0.250	2.149	0.150	9.449	<b>0.004</b>
Mollusca	1.117	0.297	1.657	0.205	0.035	0.852
Annelida	5.997	<b>0.019</b>	4.046	0.051	0.450	0.506
Crustacea	1.327	0.256	0.247	0.622	0.559	0.459
Other Invertebrates	0.288	0.595	0.000	0.991	0.285	0.596



**Table 11.** Analysis of Variance (F statistics, *P* values and degrees of freedom) of the mean total number of taxa, mean number of individuals and mean number of individuals within major taxonomic groups from samples collected at 2 ft, 5 ft, 12 ft and 15 ft in November 2009, April 2010 and June 2010 from Little Lake Wissota, Wisconsin.

Little Lake Wissota			November vs April		April vs June		November vs June	
			F	P-value	F	P-value	F	P-value
Total Taxa	2 ft	df (1,10)	0.024	0.879	2.189	0.170	1.010	0.339
	5 ft	df (1,10)	0.093	0.766	0.105	0.753	0.548	0.476
	10 ft	df (1,10)	0.097	0.762	2.422	0.151	2.391	0.153
	15 ft	df (1,6)	3.304	0.119	1.304	0.297	0.056	0.821
Total Individuals	2 ft	df (1,10)	0.024	0.879	2.189	0.170	1.010	0.339
	5 ft	df (1,10)	0.093	0.766	0.105	0.753	0.548	0.476
	10 ft	df (1,10)	0.097	0.762	2.422	0.151	2.391	0.153
	15 ft	df (1,6)	3.304	0.119	1.304	0.297	0.056	0.821
Ephemeroptera	2 ft	df (1,10)	2.222	0.167	1.000	0.341	4.103	0.070
	5 ft	df (1,10)	0.385	0.549	1.738	0.217	0.565	0.469
	10 ft	df (1,10)	0.172	0.687	2.143	0.174	2.500	0.145
	15 ft	df (1,6)	1.000	0.356	1.000	0.356	0.000	1.000
Trichoptera	2 ft	df (1,10)	0.039	0.848	4.235	0.067	1.516	0.246
	5 ft	df (1,10)	0.516	0.489	0.069	0.798	1.726	0.218
	10 ft	df (1,10)	1.748	0.216	0.225	0.646	2.262	0.164
	15 ft	df (1,6)	8.559	<b>0.026</b>	5.147	0.064	0.107	0.755
Diptera	2 ft	df (1,10)	0.463	0.512	3.407	0.095	3.088	0.109
	5 ft	df (1,10)	0.000	0.994	1.353	0.272	1.188	0.301
	10 ft	df (1,10)	0.046	0.834	0.000	0.983	0.026	0.876
	15 ft	df (1,6)	0.625	0.459	0.195	0.674	2.111	0.196
Chironomidae	2 ft	df (1,10)	0.000	0.984	1.080	0.323	1.331	0.275
	5 ft	df (1,10)	0.002	0.968	1.209	0.297	1.791	0.210
	10 ft	df (1,10)	0.786	0.396	2.941	0.117	6.970	<b>0.025</b>
	15 ft	df (1,6)	22.498	<b>0.003</b>	0.966	0.364	1.680	0.243
Mollusca	2 ft	df (1,10)	1.494	0.250	2.944	0.117	0.046	0.834
	5 ft	df (1,10)	0.216	0.652	0.042	0.842	0.040	0.846
	10 ft	df (1,10)	0.615	0.451	0.139	0.717	0.139	0.717
	15 ft	df (1,6)	0.573	0.478	2.889	0.140	0.536	0.492
Annelida	2 ft	df (1,10)	1.539	0.243	7.569	<b>0.020</b>	1.570	0.239
	5 ft	df (1,10)	1.334	0.275	0.906	0.364	5.776	<b>0.037</b>
	10 ft	df (1,10)	2.718	0.130	0.389	0.547	1.576	0.238
	15 ft	df (1,6)	1.280	0.301	0.098	0.765	1.040	0.347
Crustacea	2 ft	df (1,10)	0.073	0.793	0.137	0.719	0.000	0.995
	5 ft	df (1,10)	0.030	0.865	0.076	0.789	0.022	0.885
	10 ft	df (1,10)	0.735	0.411	0.054	0.821	1.380	0.267
	15 ft	df (1,6)	1.201	0.315	1.315	0.295	0.270	0.622
Other Invertebrates	2 ft	df (1,10)	0.000	0.998	0.477	0.505	0.452	0.516
	5 ft	df (1,10)	2.408	0.152	1.139	0.311	0.208	0.658
	10 ft	df (1,10)	0.084	0.778	0.190	0.672	0.034	0.857
	15 ft	df (1,6)	0.970	0.363	0.191	0.678	2.253	0.184

**Figure 14.** Mean number of individuals and mean number of individuals within major taxonomic groups from samples collected at 2 ft, 5 ft, 10 ft and 15 ft in November 2009, April 2010 and June 2010 from Little Lake Wissota, Wisconsin ( $\text{m}^{-2} \times 1,000$ ).



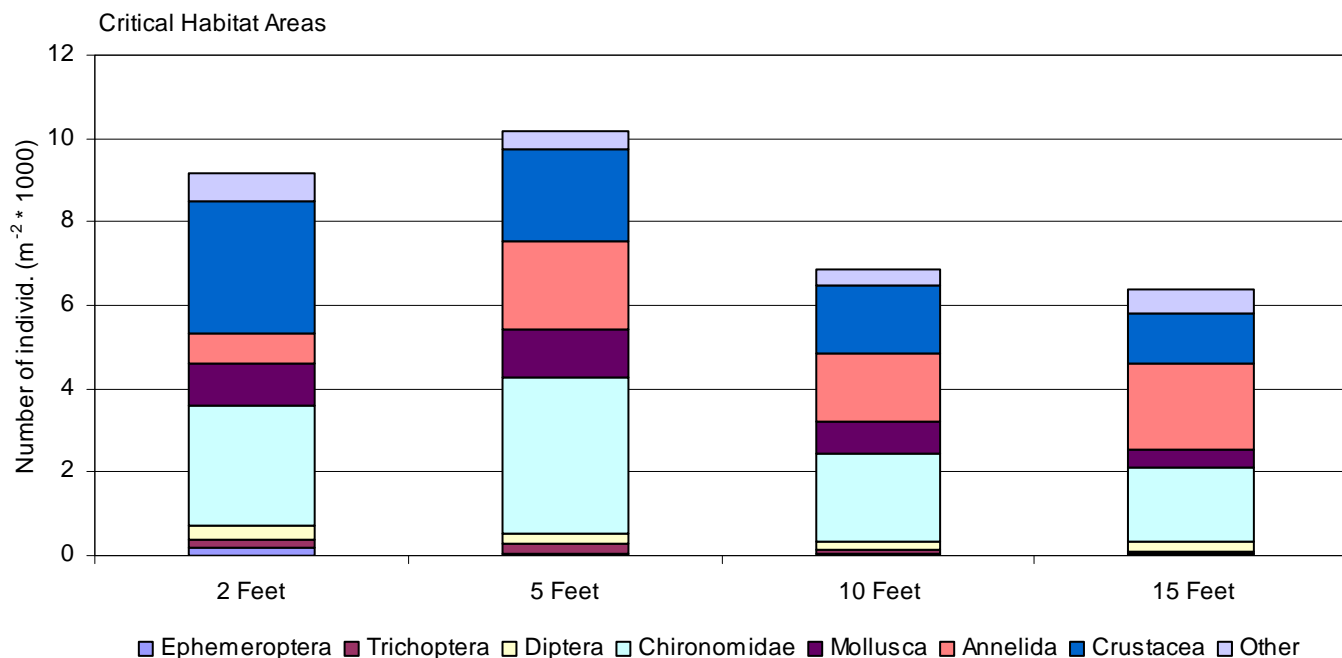
**Table 12.** Mean number of individuals within major taxonomic groups separated by depth zone, by date and by depth zone from each date from Little Lake Wissota, Wisconsin (m<sup>-2</sup>).

Little Lake Wissota	Ephemeroptera	Trichoptera	Diptera	Chironomidae	Mollusca	Annelida	Crustacea	Other
Means by Depth								
2 Feet	19.1	248.7	196.1	3267.0	839.5	705.5	1614.4	810.8
5 Feet	19.1	296.6	208.1	3365.1	662.5	633.8	3458.4	796.4
10 Feet	14.4	126.8	215.3	1901.4	1164.7	1203.0	2585.4	368.3
15 Feet	7.2	46.6	208.1	771.3	742.6	774.9	606.3	229.6
Means by Date								
November	25.4	295.5	279.8	3134.8	1080.2	618.4	2841.3	571.4
April	11.7	156.5	189.8	2890.2	587.0	1226.9	1784.6	536.2
June	9.8	123.3	150.7	1377.6	919.7	657.5	1970.5	634.0
Means by Depth * Date								
2 Feet								
November	50.2	401.8	466.4	3286.2	1578.5	581.2	2453.9	538.1
April	7.2	251.1	107.6	4039.5	322.9	1427.8	1183.9	487.9
June	0.0	93.3	14.4	2475.4	617.1	107.6	1205.4	1406.3
5 Feet								
November	21.5	444.9	373.1	4046.7	818.0	688.8	3293.3	896.9
April	7.2	244.0	186.6	4685.3	452.0	968.6	2913.1	911.2
June	28.7	200.9	64.6	1363.3	717.5	244.0	4168.7	581.2
10 Feet								
November	14.4	186.6	150.7	3257.5	1126.5	731.9	3924.7	322.9
April	28.7	78.9	215.3	1729.2	1313.0	1793.8	2253.0	480.7
June	0.0	114.8	279.8	717.5	1054.7	1083.4	1578.5	301.4
15 Feet								
November	10.8	146.1	115.5	2566.0	955.6	610.5	2904.6	389.4
April	0.0	0.0	279.8	215.3	96.9	462.8	290.6	129.2
June	10.8	64.6	290.6	742.6	1474.5	1463.7	409.0	53.8

**Table 13.** Analysis of Variance (F statistics, *P* values and degrees of freedom) of the mean total number of taxa, mean number of individuals and mean number of individuals within major taxonomic groups from samples collected at 2 ft, 5 ft, 10 ft and 15 ft averaged over all sample dates from Critical Habitat Areas of Lake Wissota, Wisconsin.

**Figure 15.** Mean number of individuals and mean number of individuals within major taxonomic groups from samples collected at 2 ft, 5 ft, 10 ft and 15 ft averaged over all sample dates from Critical Habitat Areas of Lake Wissota, Wisconsin ( $m^{-2} \times 1,000$ ).

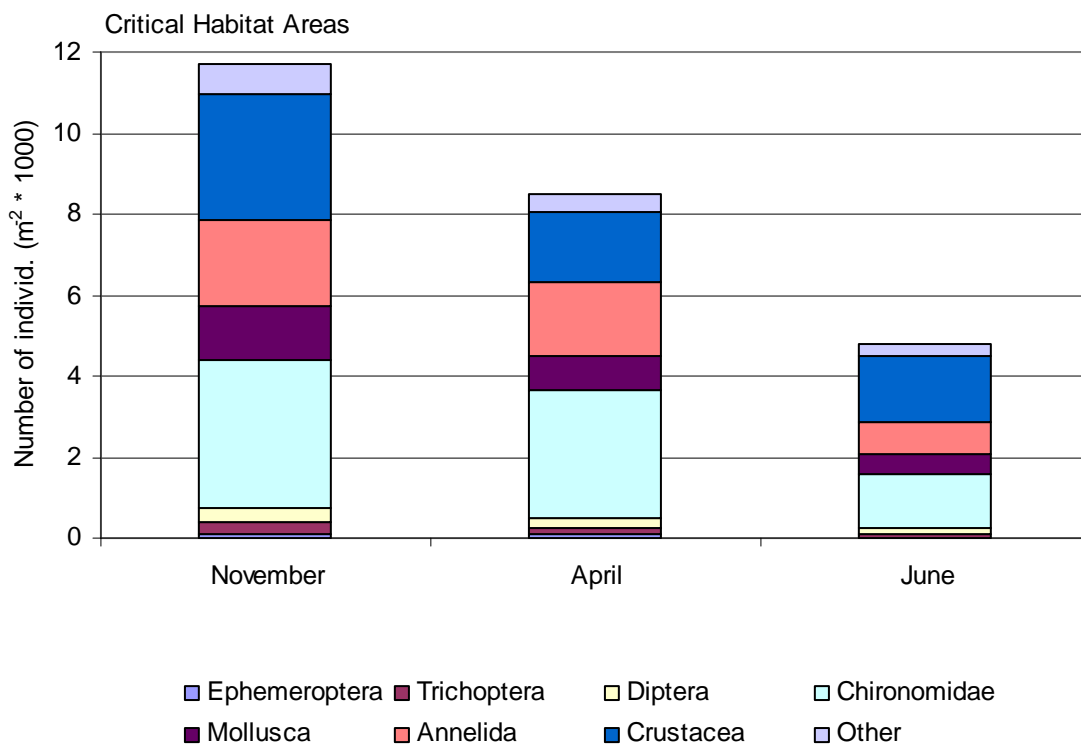
Critical Habitat Areas	2 ft vs 5 ft		2 ft vs 10 ft		2 ft vs 15 ft		5 ft vs 10 ft		5 ft vs 15 ft		10 ft vs 15 ft	
	df (1, 91)		df (1, 88)		df (1, 179)		df (1, 85)		df (1, 76)		df (1, 73)	
	F	P-value	F	P-value	F	P-value	F	P-value	F	P-value	F	P-value
Number of Taxa	0.605	0.439	0.009	0.926	1.067	0.305	0.954	0.331	2.913	0.092	1.258	0.266
Number of Individuals	0.526	0.470	6.945	<b>0.010</b>	17.160	<b>0.000</b>	4.635	<b>0.034</b>	15.672	<b>0.000</b>	3.248	0.076
Ephemeroptera	0.279	0.599	2.430	0.123	6.416	<b>0.013</b>	1.140	0.289	5.004	<b>0.028</b>	3.347	0.071
Trichoptera	0.808	0.371	7.526	<b>0.007</b>	12.457	<b>0.001</b>	4.192	<b>0.044</b>	9.582	<b>0.003</b>	2.152	0.147
Diptera	0.481	0.490	1.414	0.238	0.768	0.384	3.620	0.060	2.591	0.112	0.120	0.730
Chironomidae	0.039	0.843	2.519	0.116	12.132	<b>0.001</b>	3.561	0.063	15.355	<b>0.000</b>	5.084	<b>0.027</b>
Mollusca	0.089	0.767	0.333	0.566	1.997	0.162	0.883	0.350	3.449	0.067	0.906	0.344
Annelida	1.281	0.261	0.108	0.743	0.128	0.722	2.886	0.093	3.118	0.081	0.002	0.960
Crustacea	2.412	0.124	2.724	0.102	6.219	<b>0.015</b>	0.000	0.995	1.089	0.300	1.319	0.255
Other Invertebrates	0.464	0.497	1.319	0.254	3.196	0.078	0.206	0.651	1.380	0.244	0.670	0.416



**Table 14.** Analysis of Variance (F statistics, *P* values and degrees of freedom) of the mean total number of taxa, mean number of individuals and mean number of individuals within major taxonomic groups from samples collected in November 2009, April 2010 and June 2010 averaged over all sample depths from Critical Habitat Areas of Lake Wisconsin, Wisconsin.

**Figure 16.** Mean number of individuals and mean number of individuals within major taxonomic groups from samples collected in November 2009, April 2010 and June 2010 averaged over all sample depths from Critical Habitat Areas of Lake Wisconsin, Wisconsin ( $m^{-2} \times 1,000$ ).

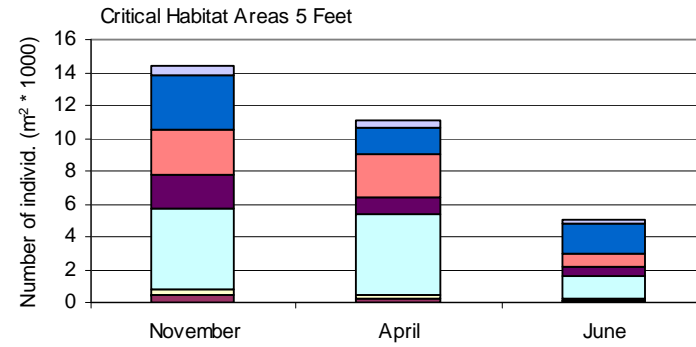
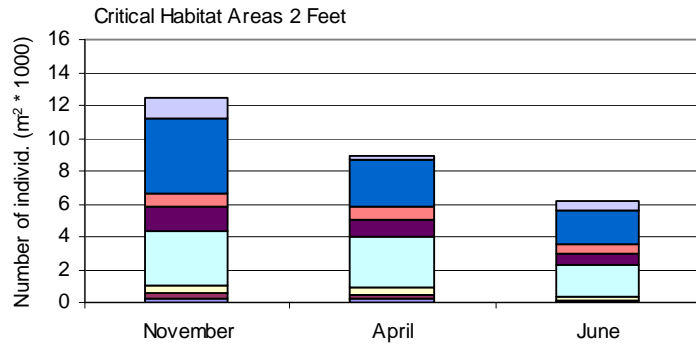
Critical Habitat Areas	November vs April		April vs June		November vs June	
	df (1, 110)		df (1, 110)		df (1, 110)	
	F	P-value	F	P-value	F	P-value
Number of Taxa	0.016	0.899	2.921	0.090	1.881	0.173
Number of Individuals	1.043	0.309	14.496	<b>0.000</b>	19.885	<b>0.000</b>
Ephemeroptera	0.013	0.909	8.850	<b>0.004</b>	6.215	<b>0.014</b>
Trichoptera	2.547	0.113	2.794	0.097	9.392	<b>0.003</b>
Diptera	0.007	0.932	4.082	<b>0.046</b>	4.040	<b>0.047</b>
Chironomidae	0.304	0.583	17.570	<b>0.000</b>	10.061	<b>0.002</b>
Mollusca	0.016	0.900	2.344	0.129	1.595	0.209
Annelida	0.787	0.377	12.708	<b>0.001</b>	4.222	<b>0.042</b>
Crustacea	2.278	0.134	0.014	0.906	2.681	0.104
Other Invertebrates	1.138	0.288	1.951	0.165	5.337	<b>0.023</b>



**Table 15.** Analysis of Variance (F statistics, *P* values and degrees of freedom) of the mean total number of taxa, mean number of individuals and mean number of individuals within major taxonomic groups from samples collected at 2 ft, 5 ft, 10 ft and 15 ft in November 2009, April 2010 and June 2010 from Critical Habitat Areas of Lake Wissota, Wisconsin.

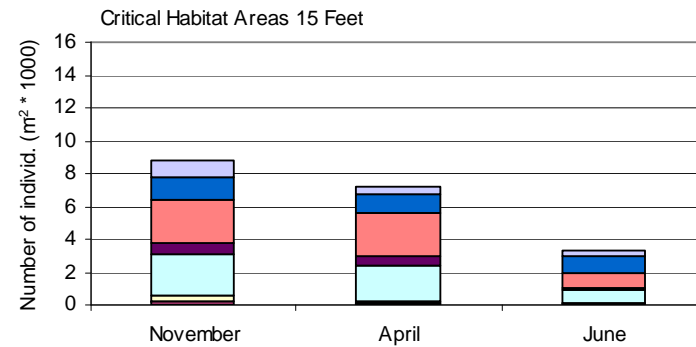
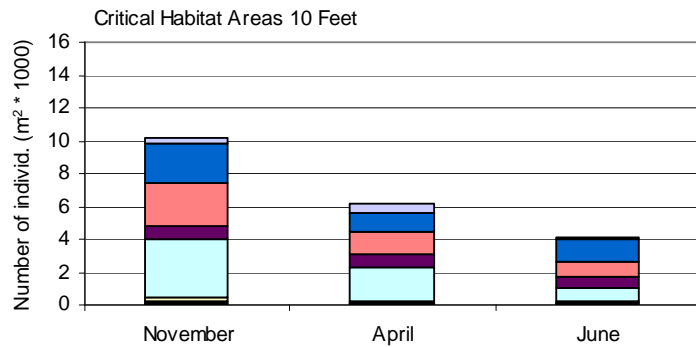
Critical Habitat Areas			November vs April		April vs June		November vs June	
			F	P-value	F	P-value	F	P-value
Total Taxa	2 ft	df (1, 30)	0.120	0.740	0.130	0.720	0.000	0.960
	5 ft	df (1, 28)	0.030	0.860	0.590	0.450	0.630	0.430
	10 ft	df (1, 26)	1.240	0.280	5.430	<b>0.030</b>	0.460	0.500
	15 ft	df (1, 20)	0.000	0.980	3.510	0.080	2.180	0.160
Total Individuals	2 ft	df (1, 30)	0.000	0.960	1.140	0.290	0.840	0.370
	5 ft	df (1, 28)	0.010	0.920	7.140	<b>0.010</b>	5.230	<b>0.030</b>
	10 ft	df (1, 26)	4.060	0.050	6.590	<b>0.020</b>	17.170	<b>0.000</b>
	15 ft	df (1, 20)	1.130	0.300	4.050	0.060	10.000	<b>0.000</b>
Ephemeroptera	2 ft	df (1, 30)	0.050	0.830	1.600	0.220	2.270	0.140
	5 ft	df (1, 28)	0.040	0.840	0.500	0.480	0.220	0.640
	10 ft	df (1, 26)	0.080	0.780	13.840	<b>0.000</b>	3.290	0.080
	15 ft	df (1, 20)	0.040	0.850	3.230	0.090	1.480	0.240
Trichoptera	2 ft	df (1, 30)	0.100	0.750	1.110	0.300	1.700	0.200
	5 ft	df (1, 28)	1.380	0.250	0.100	0.750	2.220	0.150
	10 ft	df (1, 26)	0.240	0.630	1.790	0.190	2.800	0.110
	15 ft	df (1, 20)	1.710	0.210	0.750	0.400	3.600	0.070
Diptera	2 ft	df (1, 30)	0.180	0.680	3.040	0.090	1.830	0.190
	5 ft	df (1, 28)	0.120	0.730	0.430	0.520	1.000	0.330
	10 ft	df (1, 26)	0.020	0.890	0.160	0.690	0.250	0.620
	15 ft	df (1, 20)	0.050	0.830	0.890	0.360	1.120	0.300
Chironomidae	2 ft	df (1, 30)	0.060	0.820	0.620	0.440	0.300	0.590
	5 ft	df (1, 28)	1.370	0.250	10.980	<b>0.000</b>	2.910	0.100
	10 ft	df (1, 26)	0.070	0.790	11.930	<b>0.000</b>	5.320	<b>0.030</b>
	15 ft	df (1, 20)	0.060	0.810	3.760	0.070	3.840	0.060
Mollusca	2 ft	df (1, 30)	0.510	0.480	0.000	0.980	0.680	0.420
	5 ft	df (1, 28)	0.010	0.930	2.200	0.150	1.770	0.190
	10 ft	df (1, 26)	0.240	0.630	0.140	0.710	0.020	0.880
	15 ft	df (1, 20)	0.000	0.980	5.940	<b>0.020</b>	4.990	<b>0.040</b>
Annelida	2 ft	df (1, 30)	2.540	0.120	0.480	0.490	1.000	0.330
	5 ft	df (1, 28)	1.100	0.300	9.070	<b>0.010</b>	1.790	0.190
	10 ft	df (1, 26)	2.160	0.150	2.240	0.150	6.850	<b>0.010</b>
	15 ft	df (1, 20)	0.020	0.900	6.000	<b>0.020</b>	6.010	<b>0.020</b>
Crustacea	2 ft	df (1, 30)	0.000	0.970	0.010	0.930	0.020	0.900
	5 ft	df (1, 28)	2.130	0.160	0.000	0.970	1.940	0.170
	10 ft	df (1, 26)	2.860	0.100	0.180	0.680	1.750	0.200
	15 ft	df (1, 20)	0.010	0.920	0.500	0.490	0.270	0.610
Other Invertebrates	2 ft	df (1, 30)	2.820	0.100	1.520	0.230	0.500	0.490
	5 ft	df (1, 28)	0.070	0.790	2.390	0.130	3.310	0.080
	10 ft	df (1, 26)	0.630	0.430	3.330	0.080	0.900	0.350
	15 ft	df (1, 20)	0.390	0.540	0.720	0.410	1.640	0.210

**Figure 17.** Mean number of individuals and mean number of individuals within major taxonomic groups from samples collected at 2 ft, 5 ft, 10 ft and 15 ft in November 2009, April 2010 and June 2010 from Critical Habitat Areas of Lake Wissota, Wisconsin ( $m^{-2} \times 1,000$ ).



- Ephemeroptera   ■ Trichoptera   ■ Diptera   ■ Chironomidae
- Mollusca   ■ Annelida   ■ Crustacea   ■ Other

- Ephemeroptera   ■ Trichoptera   ■ Diptera   ■ Chironomidae
- Mollusca   ■ Annelida   ■ Crustacea   ■ Other



- Ephemeroptera   ■ Trichoptera   ■ Diptera   ■ Chironomidae
- Mollusca   ■ Annelida   ■ Crustacea   ■ Other

- Ephemeroptera   ■ Trichoptera   ■ Diptera   ■ Chironomidae
- Mollusca   ■ Annelida   ■ Crustacea   ■ Other

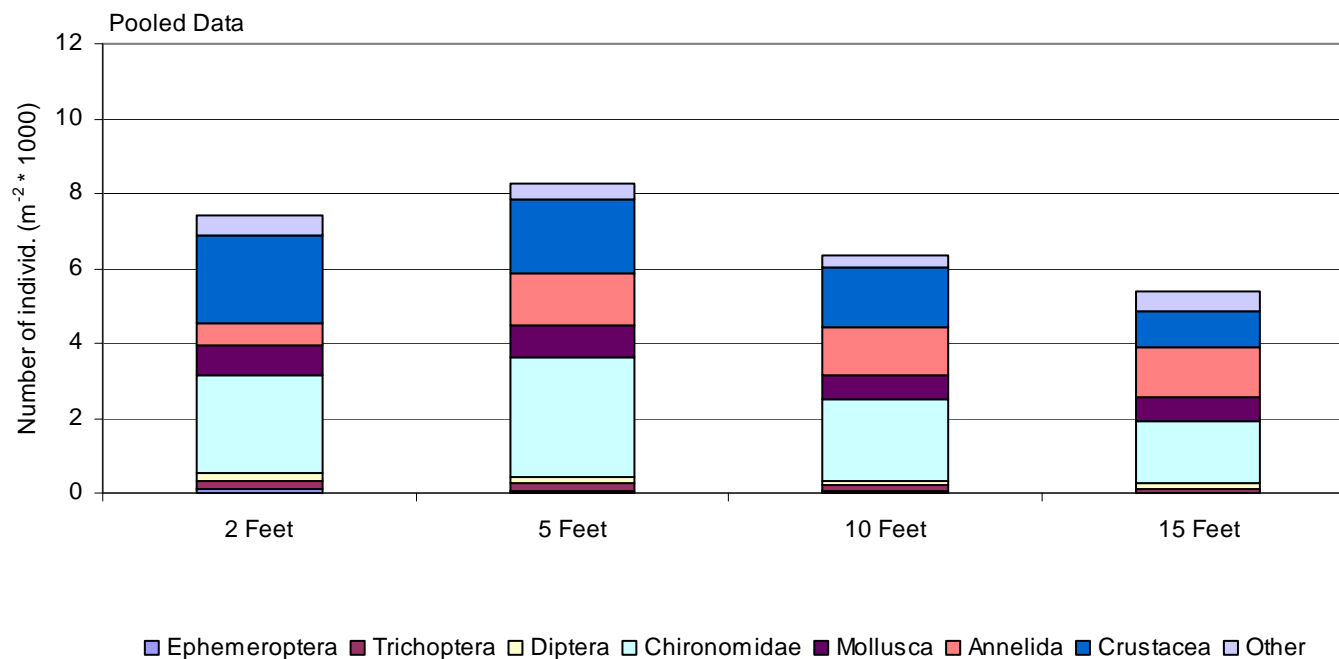
**Table 16.** Mean number of individuals within major taxonomic groups separated by depth zone, by date and by depth zone for each date from Critical Habitat Areas of Lake Wissota, Wisconsin ( $m^{-2}$ ).

Critical Habitat Areas	Ephemeroptera	Trichoptera	Diptera	Chironomidae	Mollusca	Annelida	Crustacea	Other
Means by Depth								
2 Feet	168.8	212.7	357.9	2843.0	1020.5	745.4	3157.0	661.8
5 Feet	45.7	224.2	240.4	3749.8	1181.2	2082.5	2241.3	393.7
10 Feet	43.1	97.6	188.5	2132.4	771.1	1606.2	1633.0	377.9
15 Feet	30.0	75.7	225.7	1801.6	430.5	2039.0	1221.1	579.2
Means by Date								
November	117.5	288.9	347.3	3656.3	1310.5	2115.3	3112.0	755.2
April	99.2	124.8	272.2	3168.2	840.6	1806.6	1746.1	430.5
June	16.1	69.3	155.4	1317.8	521.0	782.2	1622.8	318.9
Means by Depth * Date								
2 Feet								
November	255.8	349.5	445.7	3309.8	1478.9	815.4	4560.8	1213.0
April	230.4	195.0	435.6	3195.8	924.3	868.6	2826.1	260.8
June	20.3	93.7	192.5	2023.4	658.4	552.1	2084.1	511.5
5 Feet								
November	48.4	444.0	344.4	4896.9	2036.8	2739.1	3368.7	495.1
April	56.5	137.2	258.3	4945.4	1017.1	2666.4	1496.0	503.1
June	32.3	91.5	118.4	1407.2	489.7	842.2	1859.2	183.0
10 Feet								
November	83.2	140.6	238.2	3524.4	863.9	2545.7	2439.5	361.6
April	43.1	97.6	143.5	2043.4	766.3	1346.0	1182.4	559.7
June	2.9	54.5	183.7	829.4	683.1	927.0	1277.2	212.4
15 Feet								
November	50.9	172.2	348.3	2567.3	602.7	2630.0	1416.7	962.8
April	35.2	35.2	215.3	2074.2	555.7	2633.9	1209.3	410.9
June	3.9	19.6	113.5	763.2	133.1	853.2	1037.1	364.0

**Table 17.** Analysis of Variance (F statistics, *P* values and degrees of freedom) of the mean total number of taxa, mean number of individuals and mean number of individuals within major taxonomic groups from samples collected at 2 ft, 5 ft, 10 ft and 15 ft averaged over all sample dates from Lake Wissota, Wisconsin (pooled data).

**Figure 18.** Mean number of individuals and mean number of individuals within major taxonomic groups from samples collected at 2 ft, 5 ft, 10 ft and 15 ft averaged over all sample dates from Lake Wissota, Wisconsin (pooled data) ( $m^{-2} \times 1,000$ ).

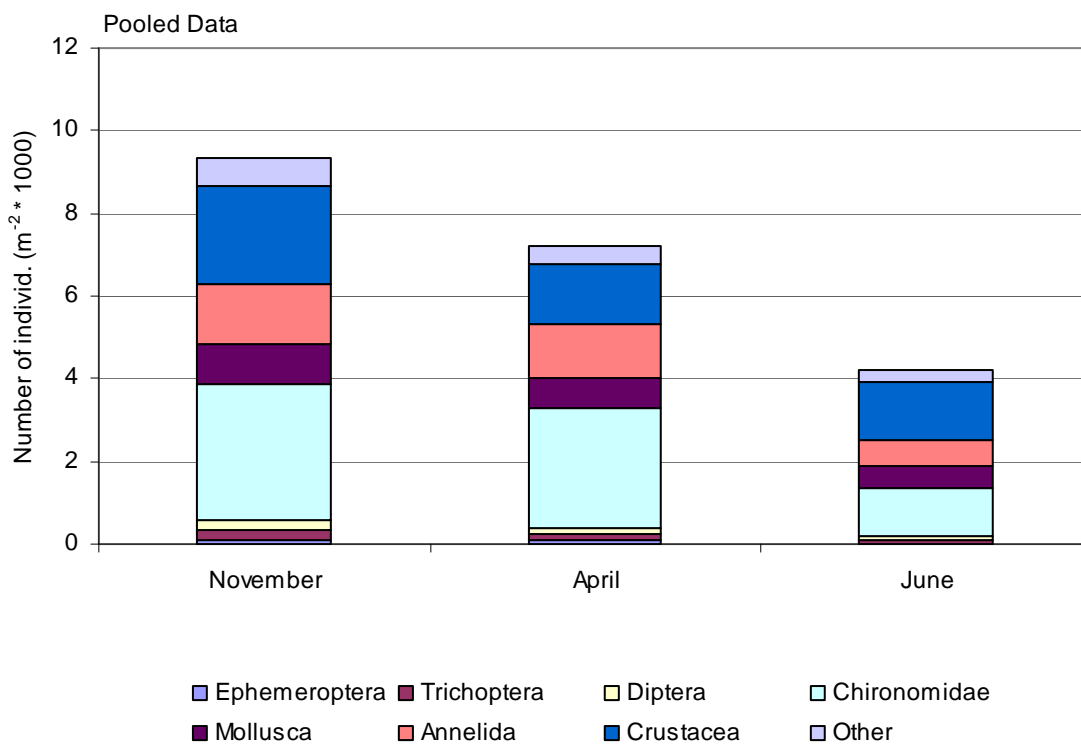
Pooled Data	2 ft vs 5 ft		2 ft vs 10 ft		2 ft vs 15 ft		5 ft vs 10 ft		5 ft vs 15 ft		10 ft vs 15 ft	
	df (1,163)		df (1,163)		df (1,157)		df (1, 166)		df (1, 160)		df (1, 160)	
	F	P-value	F	P-value	F	P-value	F	P-value	F	P-value	F	P-value
Number of Taxa	4.240	<b>0.041</b>	0.758	0.385	1.179	0.279	1.924	0.167	10.379	<b>0.002</b>	4.401	<b>0.037</b>
Number of Individuals	3.163	0.077	1.820	0.179	0.045	0.832	0.349	0.555	2.934	0.089	1.566	0.213
Ephemeroptera	4.744	<b>0.031</b>	3.788	0.053	0.012	0.913	0.021	0.886	5.602	<b>0.019</b>	4.463	<b>0.036</b>
Trichoptera	0.007	0.933	4.104	<b>0.044</b>	20.866	<b>0.000</b>	4.114	<b>0.044</b>	19.657	<b>0.000</b>	6.046	<b>0.015</b>
Diptera	2.505	0.115	6.864	<b>0.010</b>	4.884	<b>0.029</b>	1.048	0.307	0.485	0.487	0.077	0.781
Chironomidae	1.041	0.309	0.230	0.632	0.836	0.362	0.433	0.511	4.045	<b>0.046</b>	2.432	0.121
Mollusca	0.720	0.397	0.328	0.567	0.132	0.717	0.076	0.784	0.207	0.650	0.036	0.850
Annelida	9.148	<b>0.003</b>	22.227	<b>0.000</b>	27.745	<b>0.000</b>	2.440	0.120	3.973	<b>0.048</b>	0.165	0.685
Crustacea	2.339	0.128	0.001	0.971	3.427	0.066	2.511	0.115	12.971	<b>0.000</b>	4.019	<b>0.047</b>
Other Invertebrates	1.713	0.192	0.299	0.585	0.102	0.749	3.976	<b>0.048</b>	0.851	0.358	0.757	0.386



**Table 18.** Analysis of Variance (F statistics, *P* values and degrees of freedom) of the mean total number of taxa, mean number of individuals and mean number of individuals within major taxonomic groups from samples collected in November 2009, April 2010 and June 2010 averaged over all sample depths from Lake Wissota, Wisconsin (pooled data).

**Figure 19.** Mean number of individuals and mean number of individuals within major taxonomic groups from samples collected in November 2009, April 2010 and June 2010 averaged over all sample depths from Lake Wissota, Wisconsin (pooled data) ( $\text{m}^{-2} \times 1,000$ ).

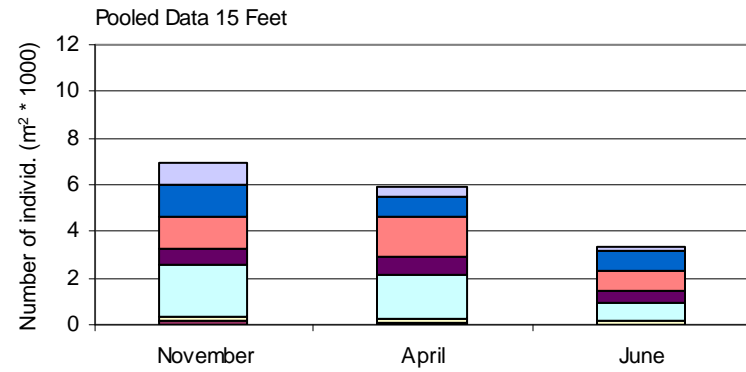
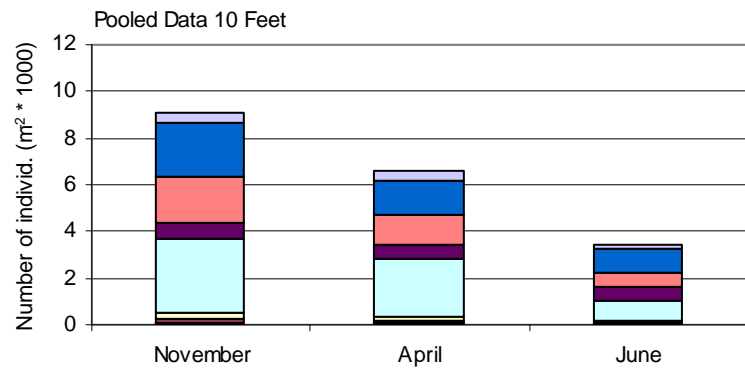
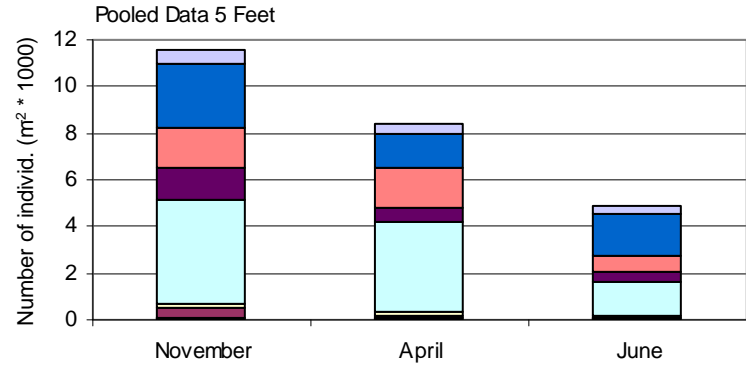
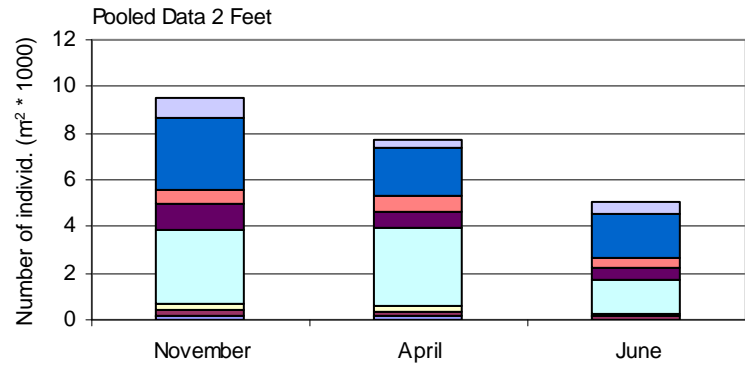
Pooled Data	November vs April		April vs June		November vs June	
	df (1, 216)		df (1, 216)		df (1, 216)	
	F	P-value	F	P-value	F	P-value
Number of Taxa	0.477	0.491	12.691	0.000	15.568	0.000
Number of Individuals	3.007	0.084	15.754	0.000	34.548	0.000
Ephemeroptera	0.298	0.586	15.689	0.000	16.522	0.000
Trichoptera	5.578	0.019	8.695	0.004	25.962	0.000
Diptera	0.095	0.758	4.994	0.026	5.841	0.016
Chironomidae	0.912	0.341	21.688	0.000	32.389	0.000
Mollusca	1.525	0.218	0.726	0.395	4.333	0.039
Annelida	2.694	0.102	13.667	0.000	2.612	0.108
Crustacea	2.362	0.126	0.001	0.975	2.358	0.126
Other Invertebrates	0.584	0.445	7.100	0.008	10.755	0.001



**Table 19.** Analysis of Variance (F statistics, *P* values and degrees of freedom) of the mean total number of taxa, mean number of individuals and mean number of individuals within major taxonomic groups from samples collected from 2 ft, 5 ft, 10 ft and 15 ft in November 2009, April 2010 and June 2010 from Lake Wissota, Wisconsin (pooled data).

Pooled Data			November vs April		April vs June		November vs June	
			F	P-value	F	P-value	F	P-value
Total Taxa	2 ft	df (1, 52)	0.073	0.787	0.766	0.385	1.219	0.275
	5 ft	df (1, 54)	0.053	0.819	2.767	0.102	2.919	0.093
	10 ft	df (1, 54)	0.000	0.993	13.653	<b>0.001</b>	10.636	<b>0.002</b>
	15 ft	df (1, 50)	0.603	0.441	2.009	0.163	4.474	<b>0.039</b>
Total Individuals	2 ft	df (1, 52)	0.067	0.797	0.816	0.371	1.584	0.214
	5 ft	df (1, 54)	0.459	0.501	3.999	0.051	6.541	<b>0.013</b>
	10 ft	df (1, 54)	1.842	0.180	13.759	<b>0.000</b>	22.944	<b>0.000</b>
	15 ft	df (1, 50)	2.587	0.114	3.471	0.068	15.717	<b>0.000</b>
Ephemeroptera	2 ft	df (1, 52)	0.090	0.765	5.744	<b>0.020</b>	6.595	<b>0.013</b>
	5 ft	df (1, 54)	1.387	0.244	2.206	0.143	5.422	<b>0.024</b>
	10 ft	df (1, 54)	0.053	0.819	5.490	<b>0.023</b>	5.566	<b>0.022</b>
	15 ft	df (1, 50)	0.087	0.769	2.659	0.109	1.038	0.313
Trichoptera	2 ft	df (1, 52)	0.039	0.845	2.083	0.155	1.274	0.264
	5 ft	df (1, 54)	5.717	<b>0.020</b>	2.200	0.144	15.488	<b>0.000</b>
	10 ft	df (1, 54)	1.442	0.235	4.036	<b>0.050</b>	8.775	<b>0.005</b>
	15 ft	df (1, 50)	2.013	0.162	1.409	0.241	6.136	<b>0.017</b>
Diptera	2 ft	df (1, 52)	0.108	0.743	5.350	<b>0.025</b>	6.590	<b>0.013</b>
	5 ft	df (1, 54)	0.012	0.912	0.720	0.400	0.784	0.380
	10 ft	df (1, 54)	0.245	0.623	0.625	0.433	1.581	0.214
	15 ft	df (1, 50)	0.093	0.761	0.538	0.467	0.135	0.715
Chironomidae	2 ft	df (1, 52)	0.114	0.737	2.255	0.139	4.019	<b>0.050</b>
	5 ft	df (1, 54)	0.000	0.987	6.903	<b>0.011</b>	6.208	<b>0.016</b>
	10 ft	df (1, 54)	0.252	0.618	14.485	<b>0.000</b>	15.221	<b>0.000</b>
	15 ft	df (1, 50)	1.430	0.237	3.673	0.061	10.480	<b>0.002</b>
Mollusca	2 ft	df (1, 52)	1.416	0.240	1.734	0.194	0.001	0.975
	5 ft	df (1, 54)	0.380	0.540	0.368	0.547	1.293	0.260
	10 ft	df (1, 54)	0.427	0.516	1.713	0.196	3.703	0.060
	15 ft	df (1, 50)	0.001	0.981	1.106	0.298	1.122	0.294
Annelida	2 ft	df (1, 52)	0.830	0.366	2.094	0.154	0.232	0.632
	5 ft	df (1, 54)	1.401	0.242	3.407	<b>0.070</b>	0.109	0.742
	10 ft	df (1, 54)	0.052	0.820	5.325	<b>0.025</b>	4.641	<b>0.036</b>
	15 ft	df (1, 50)	2.553	0.116	4.780	<b>0.033</b>	0.079	0.780
Crustacea	2 ft	df (1, 52)	0.323	0.572	0.421	0.519	1.615	0.209
	5 ft	df (1, 54)	2.512	0.119	0.066	0.798	1.605	0.211
	10 ft	df (1, 54)	1.349	0.251	0.306	0.583	3.366	0.072
	15 ft	df (1, 50)	1.440	0.236	0.133	0.716	2.141	0.150
Other Invertebrates	2 ft	df (1, 52)	0.000	0.993	0.066	0.798	0.063	0.803
	5 ft	df (1, 54)	0.099	0.754	2.761	0.102	3.518	0.066
	10 ft	df (1, 54)	0.402	0.529	8.194	<b>0.006</b>	5.036	<b>0.029</b>
	15 ft	df (1, 50)	2.859	0.097	1.892	0.175	9.376	<b>0.004</b>

**Figure 20.** Mean number of individuals and mean number of individuals within major taxonomic groups from samples collected from 2 ft, 5 ft, 10 ft and 15 ft in November 2009, April 2010 and June 2010 from Lake Wissota, Wisconsin (pooled data) ( $m^{-2} \times 1,000$ ).



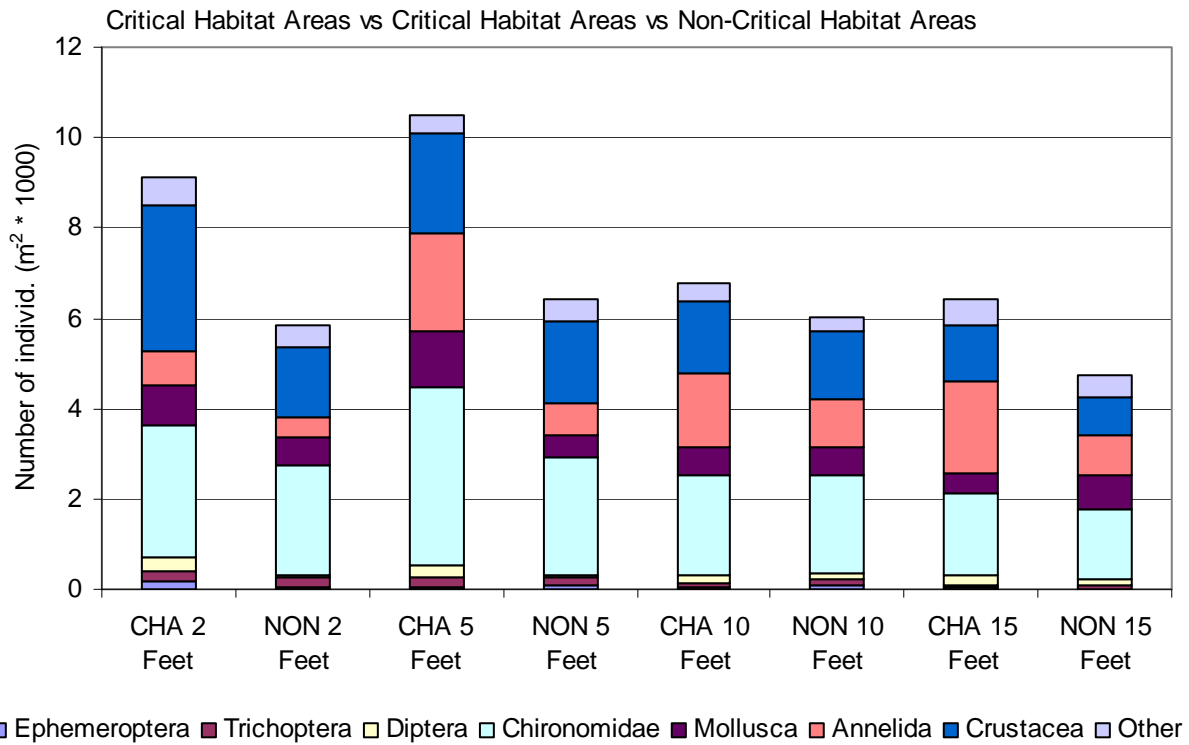
**Table 20.** Mean number of individuals within major taxonomic groups separated by depth zone, by date and by depth zone for each date from Lake Wissota, Wisconsin (pooled data)(m<sup>-2</sup> x 1,000).

Pooled Data	Ephemeroptera	Trichoptera	Diptera	Chironomidae	Mollusca	Annelida	Crustacea	Other
Means by Depth								
2 Feet	99.6	218.7	198.3	2643.9	779.2	576.6	2347.7	574.4
5 Feet	63.1	202.6	145.7	3223.5	826.2	1380.2	1981.6	449.6
10 Feet	61.4	129.6	146.6	2183.0	636.8	1291.9	1573.1	345.7
15 Feet	24.6	79.4	149.1	1655.4	627.3	1337.1	1004.5	506.9
Means by Date								
November	100.1	261.0	208.1	3293.0	973.8	1441.2	2386.5	696.7
April	75.9	143.2	171.5	2917.8	685.7	1316.1	1486.3	416.8
June	15.0	78.6	101.8	1166.1	505.3	656.0	1397.1	292.5
Means by Depth * Date								
2 Feet								
November	146.1	305.3	254.4	3115.3	1121.9	654.9	3048.7	863.6
April	142.2	230.9	237.4	3309.6	696.6	662.7	2092.5	347.0
June	10.4	120.0	103.1	1506.8	519.2	412.2	1902.0	512.7
5 Feet								
November	117.4	370.5	203.5	4451.1	1338.5	1779.4	2696.5	587.0
April	48.3	152.6	151.3	3809.3	665.3	1652.9	1455.9	476.2
June	23.5	84.8	82.2	1410.2	474.9	708.4	1792.4	285.7
10 Feet								
November	92.8	201.8	180.3	3207.2	726.5	1956.1	2316.6	414.4
April	75.3	114.4	139.9	2482.1	648.4	1261.9	1416.6	466.8
June	16.1	72.6	119.7	859.7	535.4	657.9	986.1	156.1
15 Feet								
November	33.8	147.6	190.7	2235.5	651.9	1380.7	1320.7	951.7
April	30.8	61.5	153.8	1903.4	739.5	1751.2	887.1	372.1
June	9.2	29.2	103.0	827.2	490.5	879.5	805.7	196.8

**Table 21.** Analysis of Variance (F statistics, *P* values and degrees of freedom) of the mean total number of taxa, mean number of individuals and mean number of individuals within major taxonomic groups from samples collected at 2 ft, 5 ft, 10 ft and 15 ft averaged over all sample dates between Critical Habitat Areas and Non-Critical Habitat Areas of Lake Wissota, Wisconsin.

**Figure 21.** Mean number of individuals and mean number of individuals within major taxonomic groups from samples collected at 2 ft, 5 ft, 10 ft and 15 ft averaged over all sample dates between Critical Habitat Areas and Non-Critical Habitat Areas of Lake Wissota, Wisconsin. ( $m^{-2} \times 1,000$ )

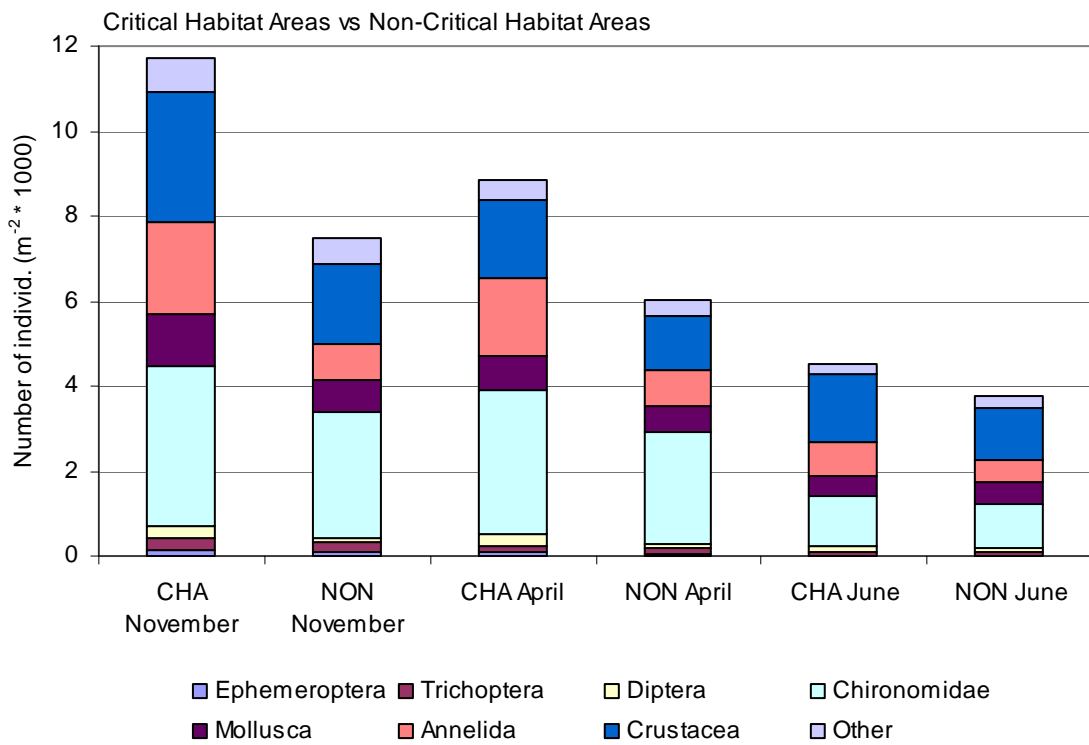
Critical Habitat Areas vs Non-Critical Habitat Areas	2 ft		5 ft		10 ft		15 ft	
	df (1, 97)		df (1, 97)		df (1,94)		df (1, 82)	
	F	P-value	F	P-value	F	P-value	F	P-value
Number of Taxa	0.084	0.772	0.047	0.828	0.024	0.877	0.655	0.421
Number of Individuals	3.359	0.070	3.516	0.064	2.037	0.157	1.560	0.215
Ephemeroptera	3.191	0.077	0.540	0.464	0.706	0.403	0.037	0.847
Trichoptera	1.733	0.191	0.457	0.501	1.053	0.307	0.396	0.531
Diptera	16.381	<b>0.000</b>	19.334	<b>0.000</b>	0.073	0.787	7.525	0.007
Chironomidae	0.530	0.469	0.388	0.535	0.012	0.914	0.009	0.924
Mollusca	2.362	0.128	1.124	0.292	1.155	0.285	0.219	0.641
Annelida	2.419	0.123	11.786	<b>0.001</b>	9.796	<b>0.002</b>	9.500	<b>0.003</b>
Crustacea	6.022	<b>0.016</b>	0.136	0.713	0.012	0.914	0.693	0.407
Other Invertebrates	2.439	0.122	2.072	0.153	2.355	0.128	0.971	0.327



**Table 22.** Analysis of Variance (F statistics, *P* values and degrees of freedom) of the mean total number of taxa, mean number of individuals and mean number of individuals within major taxonomic groups from samples collected in November 2009, April 2010 and June 2010 averaged over all sample depths between Critical Habitat Areas and Non-Critical Habitat Areas of Lake Wissota, Wisconsin.

**Figure 22.** Mean number of individuals and mean number of individuals within major taxonomic groups from samples collected in November 2009, April 2010 and June 2010 averaged over all sample depths between Critical Habitat Areas and Non-Critical Habitat Areas of Lake Wissota, Wisconsin ( $m^{-2} \times 1,000$ ).

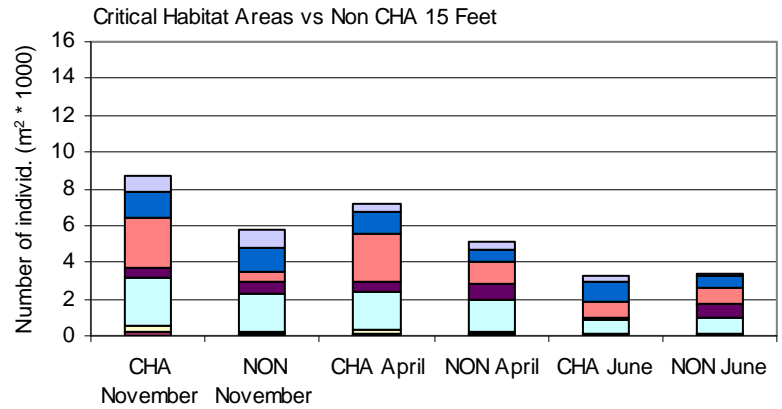
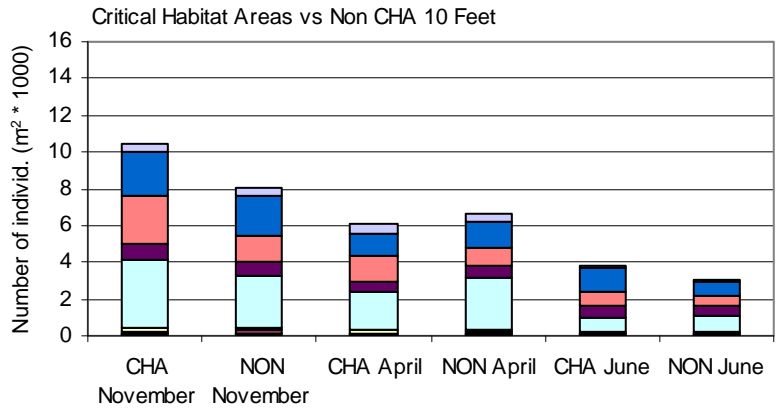
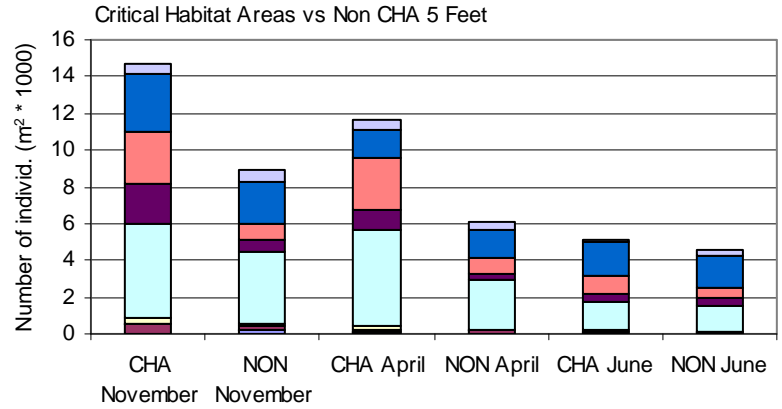
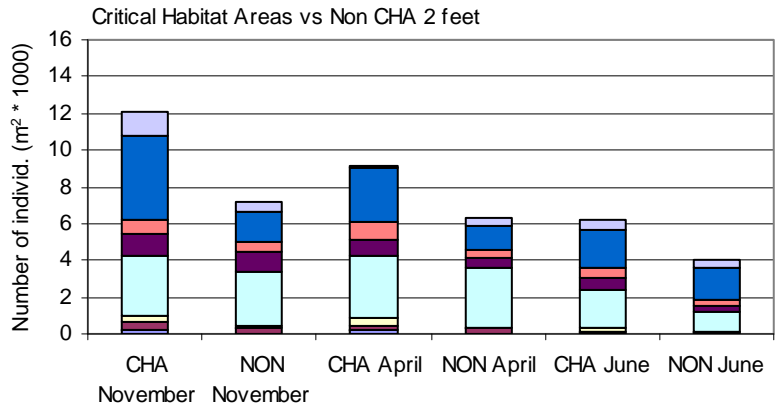
Critical Habitat Areas vs Non-Critical Habitat Areas	November		April		June	
	df (1, 124)		df (1, 124)		df (1, 124)	
	F	P-value	F	P-value	F	P-value
Number of Taxa	0.502	0.480	0.279	0.599	2.289	0.133
Number of Individuals	3.441	0.066	7.395	0.007	2.153	0.145
Ephemeroptera	0.007	0.932	0.392	0.533	0.084	0.772
Trichoptera	0.363	0.548	1.597	0.209	0.653	0.421
Diptera	10.061	<b>0.002</b>	15.656	<b>0.000</b>	7.505	0.007
Chironomidae	0.637	0.426	3.281	0.073	0.522	0.471
Mollusca	0.037	0.848	4.100	<b>0.045</b>	0.683	0.410
Annelida	9.255	<b>0.003</b>	13.327	<b>0.000</b>	4.485	0.036
Crustacea	2.358	0.127	1.303	0.256	1.103	0.296
Other Invertebrates	0.030	0.863	0.349	0.556	0.047	0.828



**Table 23.** Analysis of Variance (F statistics, *P* values and degrees of freedom) of the mean total number of taxa, mean number of individuals and mean number of individuals within major taxonomic groups from samples collected from 2 ft, 5 ft, 10 ft and 15 ft in November 2009, April 2010 and June 2010 between Critical Habitat Areas and Non-Critical Habitat Areas of Lake Wissota, Wisconsin.

Critical Habitat Areas vs Non-Critical Habitat Areas			November		April		June	
			F	P-value	F	P-value	F	P-value
Total Taxa	2 ft	df (1, 31)	0.007	0.936	0.165	0.687	1.121	0.298
	5 ft	df (1, 31)	0.248	0.622	0.056	0.815	0.082	0.777
	10 ft	df (1, 30)	2.107	0.157	0.180	0.674	1.845	0.184
	15 ft	df (1, 26)	0.036	0.851	1.524	0.228	0.001	0.981
Total Individuals	2 ft	df (1, 31)	0.455	0.505	2.000	0.167	1.187	0.284
	5 ft	df (1, 31)	0.634	0.432	6.004	<b>0.020</b>	0.130	0.721
	10 ft	df (1, 30)	1.215	0.279	0.012	0.915	2.208	0.148
	15 ft	df (1, 26)	2.987	0.096	1.340	0.258	0.030	0.863
Ephemeroptera	2 ft	df (1, 31)	1.370	0.251	0.475	0.496	4.970	<b>0.033</b>
	5 ft	df (1, 31)	2.491	0.125	0.057	0.812	0.668	0.420
	10 ft	df (1, 30)	0.104	0.749	0.031	0.861	2.297	0.140
	15 ft	df (1, 26)	0.290	0.594	0.075	0.786	1.071	0.310
Trichoptera	2 ft	df (1, 31)	0.020	0.888	1.548	0.223	1.241	0.274
	5 ft	df (1, 31)	0.394	0.535	0.535	0.470	0.096	0.759
	10 ft	df (1, 30)	0.739	0.397	0.157	0.694	0.264	0.611
	15 ft	df (1, 26)	0.030	0.863	0.513	0.480	1.077	0.309
Diptera	2 ft	df (1, 31)	3.015	0.092	11.032	<b>0.002</b>	4.776	<b>0.037</b>
	5 ft	df (1, 31)	5.102	<b>0.031</b>	6.915	<b>0.013</b>	8.302	<b>0.007</b>
	10 ft	df (1, 30)	0.027	0.871	0.037	0.848	0.010	0.920
	15 ft	df (1, 26)	4.230	0.050	2.735	0.110	0.739	0.398
Chironomidae	2 ft	df (1, 31)	0.425	0.519	0.237	0.629	2.277	0.141
	5 ft	df (1, 31)	0.340	0.564	5.550	<b>0.025</b>	0.095	0.760
	10 ft	df (1, 30)	0.014	0.908	0.000	1.000	0.158	0.693
	15 ft	df (1, 26)	0.038	0.848	0.415	0.525	0.093	0.763
Mollusca	2 ft	df (1, 31)	0.368	0.548	4.685	<b>0.038</b>	1.662	0.207
	5 ft	df (1, 31)	0.245	0.624	2.585	0.118	0.005	0.942
	10 ft	df (1, 30)	0.008	0.929	0.001	0.976	2.699	0.111
	15 ft	df (1, 26)	0.125	0.727	0.046	0.833	2.080	0.161
Annelida	2 ft	df (1, 31)	0.122	0.729	1.780	0.192	4.197	0.049
	5 ft	df (1, 31)	3.779	0.061	12.336	<b>0.001</b>	0.423	0.520
	10 ft	df (1, 30)	5.228	<b>0.029</b>	1.980	0.170	3.306	0.079
	15 ft	df (1, 26)	13.011	<b>0.001</b>	3.706	0.065	0.005	0.945
Crustacea	2 ft	df (1, 31)	3.026	0.092	2.276	0.142	0.674	0.418
	5 ft	df (1, 31)	0.392	0.536	0.009	0.925	0.005	0.947
	10 ft	df (1, 30)	0.261	0.613	0.793	0.380	0.441	0.512
	15 ft	df (1, 26)	0.066	0.799	2.180	0.152	0.177	0.677
Other Invertebrates	2 ft	df (1, 31)	0.007	0.935	7.460	<b>0.010</b>	0.406	0.529
	5 ft	df (1, 31)	0.703	0.408	0.199	0.659	1.534	0.225
	10 ft	df (1, 30)	0.211	0.649	1.008	0.323	1.812	0.188
	15 ft	df (1, 26)	0.000	0.997	0.685	0.415	1.460	0.238

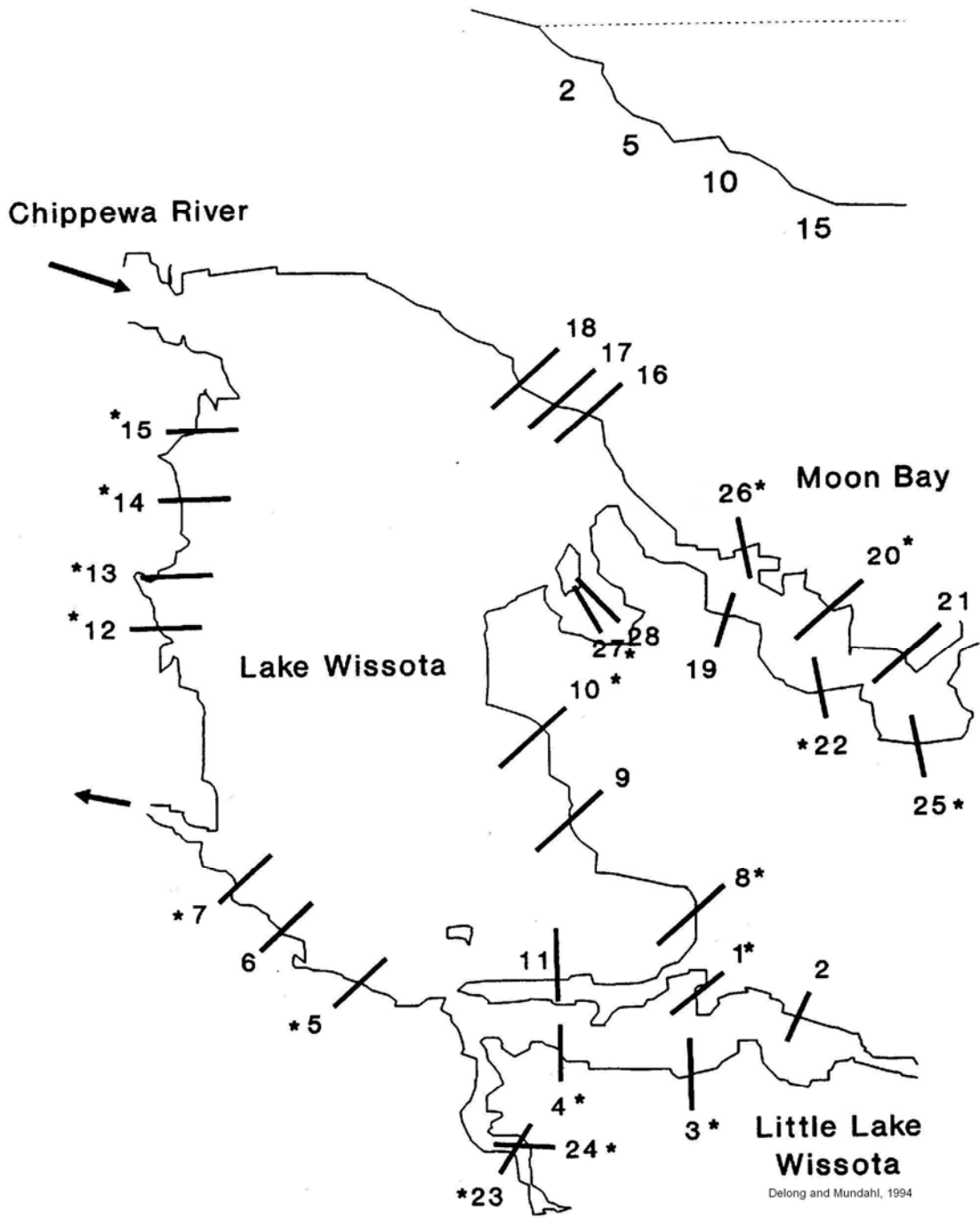
**Figure 23.** Mean number of individuals and mean number of individuals within major taxonomic groups from samples collected from 2 ft, 5 ft, 10 ft and 15 ft in November 2009, April 2010 and June 2010 between Critical Habitat Areas and Non-Critical Habitat Areas of Lake Wissota, Wisconsin ( $m^{-2} \times 1,000$ ).

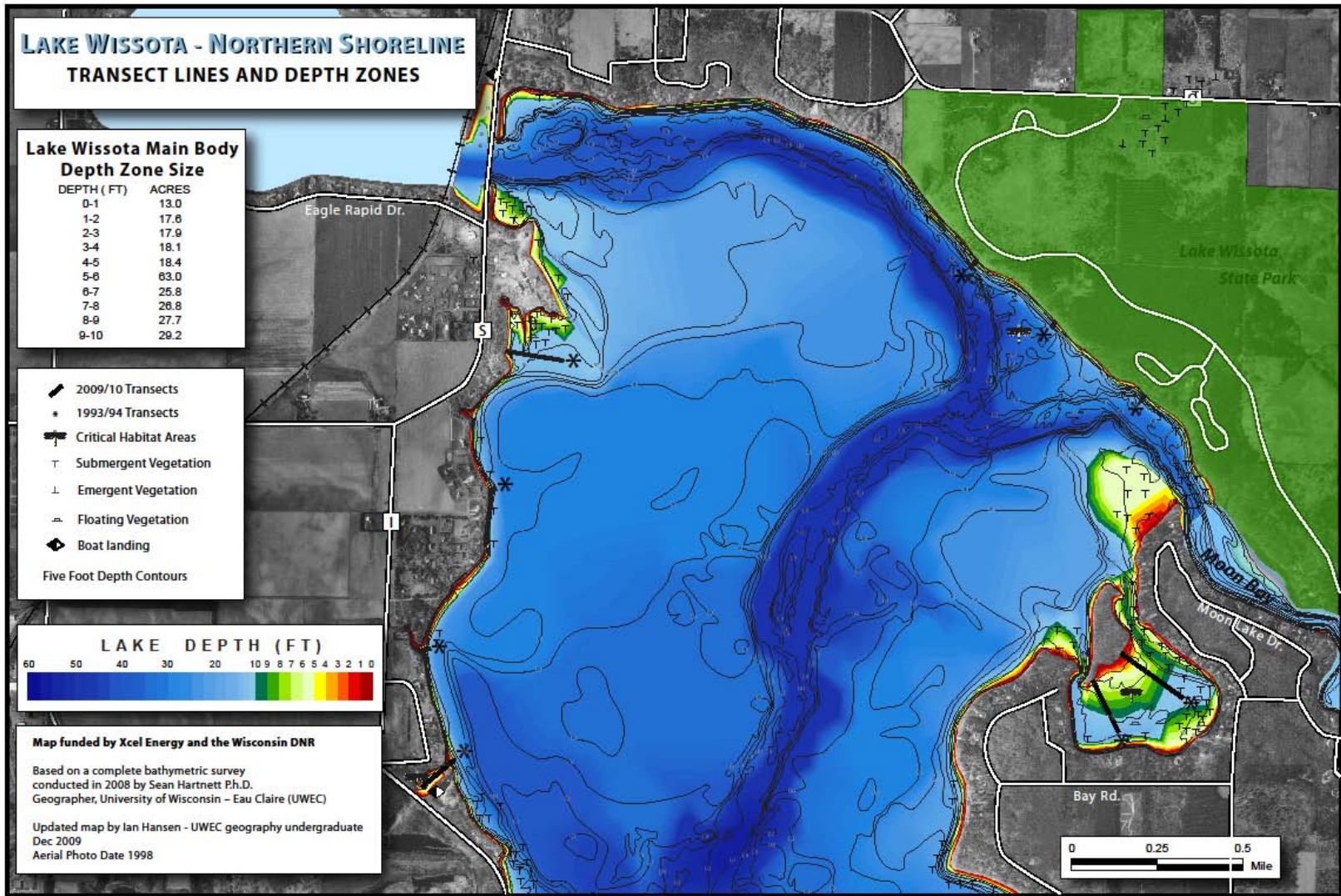


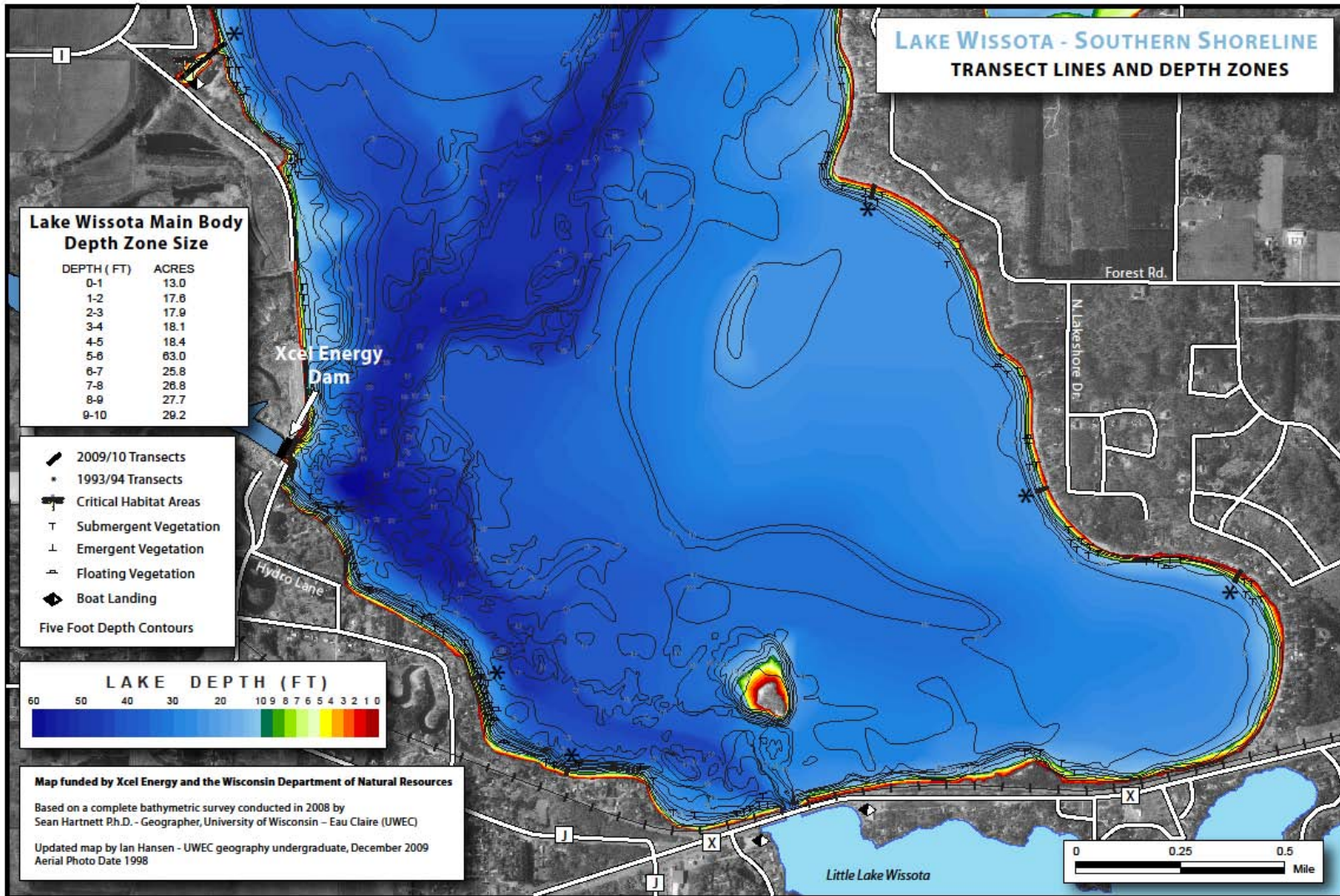
**APPENDIX D. MAPS**

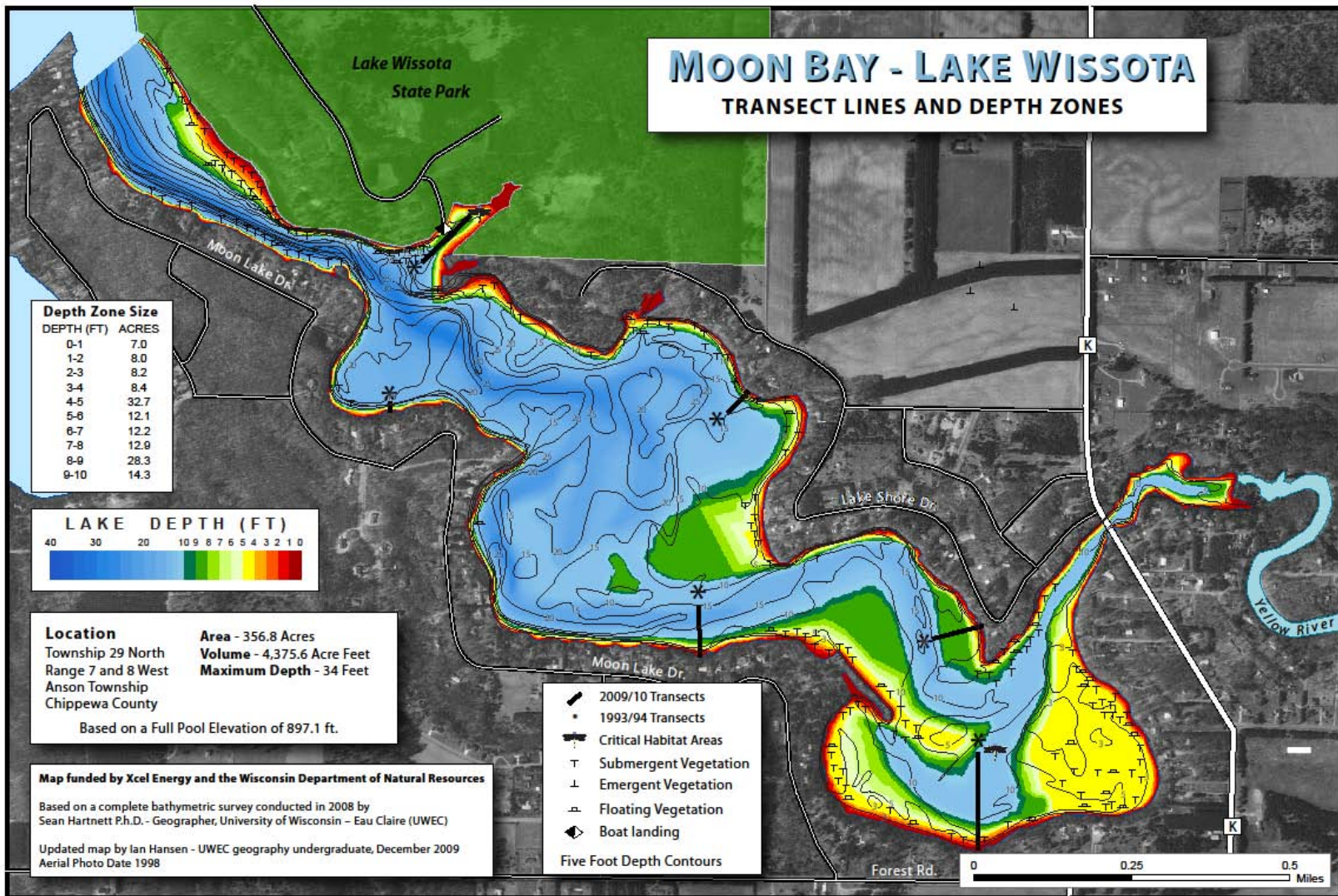
List of Maps

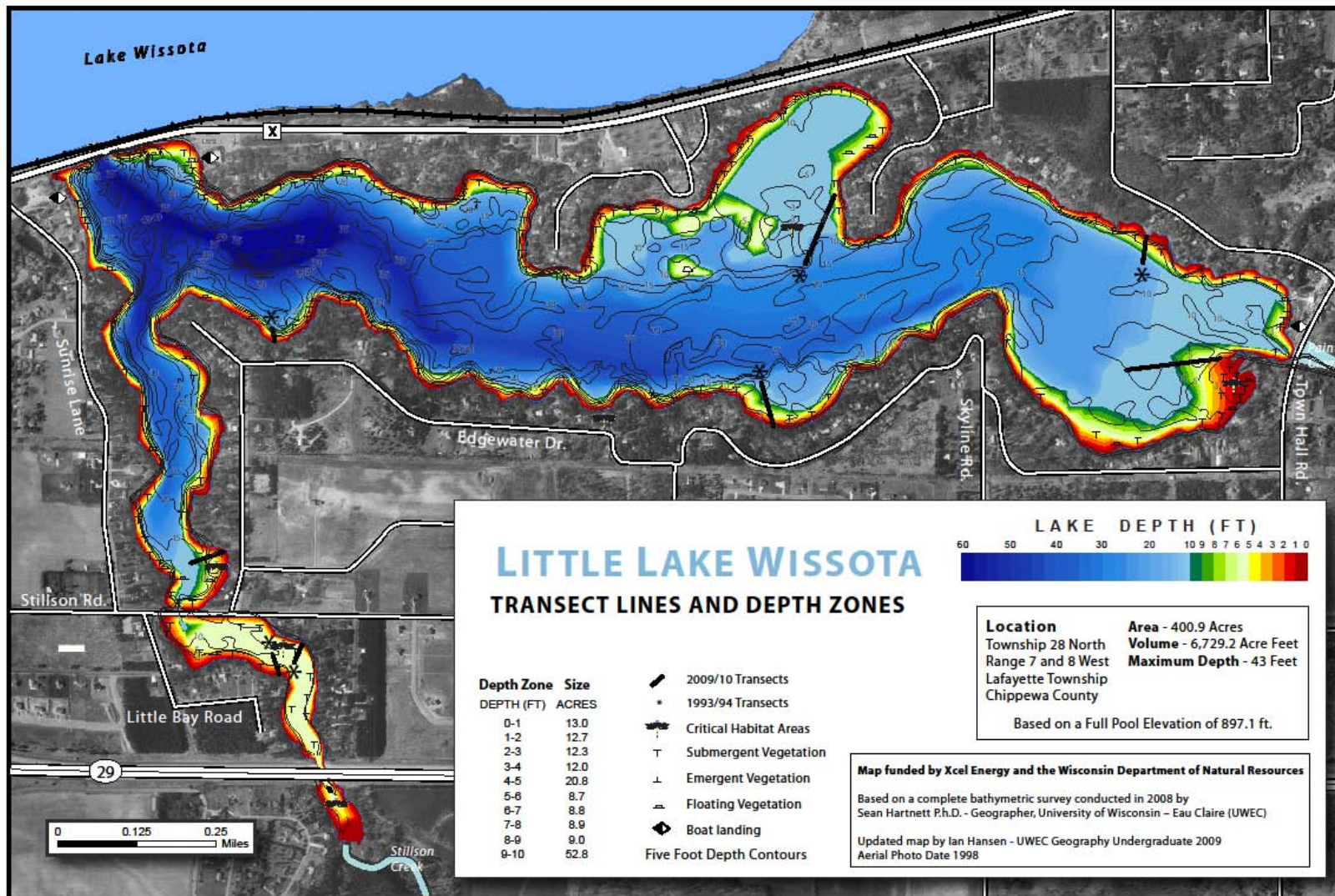
Map 1 – Delong and Mundahl transects 1993/94.....89  
Map 2 – Main Lake Wissota North.....90  
Map 3 – Main Lake Wissota South.....91  
Map 4 – Moon Bay.....92  
Map 5 – Little Lake Wissota.....93  
Map 6 – Chippewa River.....94









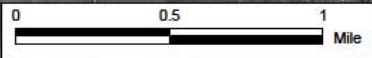
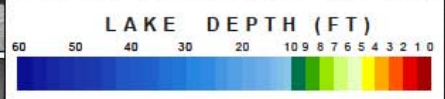


# CHIPPEWA RIVER NORTH OF LAKE WISSOTA TRANSECT LINES AND DEPTH ZONES

- 2009/10 Transects
- 1993/94 Transects
- Critical Habitat Areas
- Submergent Vegetation
- Emergent Vegetation
- Floating Vegetation
- Boat landing
- Five Foot Depth Contours

**Depth Zone Size**

DEPTH (FT)	ACRES
0-1	52.8
1-2	23.1
2-3	23.9
3-4	24.4
4-5	25.0
5-6	21.7
6-7	18.2
7-8	18.4
8-9	18.6
9-10	19.5



**Location**  
Township 29 and 30 North  
Range 8 West  
Anson and Eagle Point  
Townships  
Chippewa County

**Area** - 1,153.4 Acres  
**Volume** - 20,316.6 Acre Feet  
**Maximum Depth** - 42 Feet

Based on a Full Pool Elevation of 897.1 ft.

**Map funded by Xcel Energy and the Wisconsin Department of Natural Resources**

Based on a complete bathymetric survey conducted in 2008 by  
Sean Hartnett Ph.D. - Geographer, University of Wisconsin - Eau Claire (UWEC)

Updated map by Ian Hansen - UWEC geography undergraduate, December 2009  
Aerial Photo Date 1998