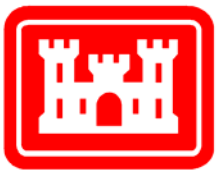


US Army Corps
of Engineers®
Memphis District

SECTION VII

Northwest Tennessee Regional Harbor

FISHERIES REPORT

April 2004

Table of Contents

List of Figures 22

INTRODUCTION

The U.S. Army Corps of Engineers, Memphis District is conducting a study to determine if it is feasible to construct a harbor in the vicinity of Cates Landing, Mississippi River Mile 900, Lake County, Tennessee (Figure 1). In order to determine potential impacts to fishery resources in the area the Tennessee Wildlife Resources Agency with assistance of Memphis District staff sampled the proposed harbor area.

Cates Landing is a seasonal backwater area. Seasonally the river fluctuates approximately 40 feet. The area was historically open for navigation purposes. However, the area has silted in with the construction of the large wing dike complex located to the north of the area. This wing dike complex protects the area from direct Mississippi River flows much of the year except at high river stages. Black willow (*Salix nigra)* at various ages make up the majority of vegetation found on Old Slough Landing. The area of Old Slough Landing is inundated when the New Madrid, Missouri river gauge reaches 20.

Within the State of Tennessee, the Mississippi River flows for approximately 167 miles and makes up the western boundary of the state. The river has undergone various alterations for the purpose of navigation and flood control but still supports a diverse and relatively productive fishery assemblage (Schramm, 2001). The Lower Mississippi River provides habitat for 139 species of fish (Fremling et al., 1989; Baker et al., 1991; Warren et al., 2000; and Scramm, 2001). A list of compiled species is provided in Table 1. Many of these species are backwater dependent at some time during their life cycle (e.g., spawning, rearing, feeding).

The Federally endangered pallid sturgeon (*Scaphirhynchus albus*) is known to occur in the vicinity of the proposed harbor. Pallid sturgeon, like shovelnose sturgeon, inhabit comparatively large flowing rivers, but pallid sturgeon occur over a narrower range of conditions. They prefer greater turbidity (Bailey and Cross, 1954; Lee, 1980a and 1980b), finer substrates, and deeper, wider channels. They are more likely than shovelnose sturgeon to occur in sinuous reaches and near long-established islands and alluvial bars (Bramblett, 1996). Pallid sturgeon typically inhabit thalwegs and channels of relatively low slope (Constant et al., 1997). Characteristic depths inhabited by pallid sturgeon vary among populations and with river morphometry, but fish typically avoid shallow waters. In the Atchafalaya River, pallid sturgeon inhabited depths of 23 to 69 feet (Constant et al., 1997).

State species deemed "in need of management" that may inhabit the proposed harbor include the alligator gar (*Lepisosteus spatula*), golden topminnow (*Fundulus chrysotus*) and the sicklefin chub (*Macrhybopsis meeki*).

Commercial fishing is permitted on the Mississippi River. Table 2 provides a list of commercially valuable species. Total catch from the Mississippi River in Tennessee ranged from 36 – 125 metric tons for the period of 1991 – 2000 (Schramm, 2001).

Buffalo and catfish make up more than 90% of the total harvest (Industrial Economics, Incorporated, 2004).

METHODS

Sampling was conducted between river miles 895 – 905 on 23 and 24 September 2003. Sampling techniques included electroshocking, seines, trawls, and gill nets. Habitat sampled included backwater areas of the proposed harbor area, dike fields, revetments, natural banks, and open river areas. Sampling was conducted during low water (New Madris, MO gauge reading of 5.0 feet).

A 20-foot bag seine was used to sample three areas in the potential harbor site. The areas included mid-channel, land side, and river side.

Electroshocking was used in six different areas. Sites included the potential harbor area (three sites), revetment area, and dike field (two sites). Each site was sampled for approximately 600 seconds. Total length (mm) and total weight (g) were measured for all fish captured.

Trawls were used in ten different areas. Sites included the potential harbor site (one site), behind the Island No. 9 Dikes north of Old Slough Landing (three sites), Donaldson Point Dikes (three sites), and Hutchkiss Bend Dikes (three sites). Total length (mm) and total weight (g) were measured for all fish captured.

Gill nets were set in seven areas in the proposed harbor. Nets were left in place over night for approximately 16 – 18 hours. Total length (mm) and total weight (g) were measured for all fish captured.

RESULTS

A total of 36 taxa was sampled from Mississippi River from river mile 895-905. Table 3 provides a list of fishes sampled for each respective sampling method.

A total of 14 species was sampled in the proposed harbor area by seine (Table 4). *Dorosoma cepedianum* was the most abundant (numerical staniding crop), followed by *Notropis atherinoides*, and *Pimephales notatus* (Figure 2).

A total of 20 species was sampled from the proposed harbor area by electroshocking (Table 5). *Dorosoma cepedianum* was the most abundant (catch per unit effort), followed by *Lepomis megalotis* and *Micropterus salmoides* (Figure 3). *Dorosoma cepedianum* made up the majority of total biomass, followed by *Ictiobus cyprinellus*, and *Micropterus salmoides* (Figure 4). Within the entire sampling area (Mississippi River Mile 895 – 905), 22 taxa was sampled by electroshocking (Table 6). *Dorsosoma cepedianum* was the most abundant (catch per unit effort) followed by *Menidia berryllina*, *Lepomis megalotis*, and *Lepisosteus platostomus* (Figure 5).

Dorosoma cepedianum made up the majority of total biomass, followed by *Ictiobus cyprinellus*, *Cyprinus carpio*, and *Aplodinotus grunniens* (Figure 6).

A total of eight species was sampled in the proposed harbor area by trawl (Table 7). *Aplodinotus grunniens* was most abundant (numerical standing crop), followed by *Lepisosteus osteus*, *Ictalurus punctatus*, and *Hiodon tergisus* (Figure 7). *Lepisosteus platostomus* made up the majority of total biomass, followed by *Aplodinotus grunniens*, and *Ictalurus punctatus* (Figure 8). Within the entire sample area (Mississippi River Mile 895 – 905), 14 taxa was sampled by trawl (Table 8). *Ictalurus punctatus* was the most abundant (numerical standing crop), followed by *Aplodinotus grunniens*, and *Dorosoma cepedianum* (Figure 9). *Lepisosteus platostomus* made up the majority of total biomass, followed by *Ictalurus punctatus*, and *Aplodinotus grunniens* (Figure 10).

A total of 14 species was sampled from the proposed harbor by gill net (Table 9). *Dorosoma cepedianum* was most abundant (numerical standing crop), followed by *Lepisosteus platostomus*, *Carpiodes carpio*, and *Aplodinotus grunniens* (Figure 11). *Cyprinus carpio* made up the majority of total biomass, followed by *Lepisosteus platostomus*, and *Dorosoma cepedianum* (Figure 10).

DISCUSSION

The recommended alternative would dredge a navigation channel to an elevation of 250-foot NGVD to maintain a nine-foot channel year round. Riprap protection would be placed on the landside of the harbor to protect the bank from prop wash.

Temporary impacts are expected to fishery resources due to an increase in turbidity and total suspended solids during construction. These variables would return to preconstruction levels once construction is complete.

Harbor construction would alter 20 acres of open water habitat by increasing depth. This represents approximately 14% of the slack water area behind the dike field. The banks within this area would be cleared of vegetation and protected with riprap. There is currently a limited amount of large woody debris habitat in this area. Impacts to fishery resources form bank clearing and armoring with riprap would be minimal.

The remaining harbor areas consist of 21 acres of non-vegetated wetlands, and 25 acres of vegetated wetlands. This represents approximately 13% of the seasonally flooded habitat of Old Slough Landing. The remaining 343 acres of black willow habitat will remain intact after construction. Construction is scheduled to commence during low water periods. Therefore, the majority of Old Slough Landing would most likely be dry. No direct impacts to fishery resources that utilize the flooded area of Old Slough Landing are anticipated. However, the area becomes flooded when the New Madrid, Missouri gauge reaches 20.0 feet. The flooded areas provide suitable habitat for a variety of fishes. Gauge data can be found in the appendix of this report.

The impact to 46 acres of seasonally flooded habitat will be mitigated by replanting bottomland hardwoods on frequently flooded farmland within the Mississippi River floodplain. Mitigation areas have not been identified. However, selection criteria would be based on willing sellers, hydrology, flood frequency, management potential, and proximity to existing management areas and/or refuges. The mitigation plan can be found in Appendix IV, Section V of the main report.

The Federally endangered pallid sturgeon was not found in any samples. A detailed description of the pallid sturgeon, avoid and minimize measures, and likely impacts can be found in the biological assessment of the main report (Appendix IV, Section 3). Construction would not take place during reported sturgeon spawning periods (12 April to 30 June). Project-related impacts from harbor construction to the pallid sturgeon population in the Lower Mississippi River are not foreseen.

The alligator gar primarily inhabits backwater areas of large rivers, feeds primarily on fishes, and most likely spawns from April to June (Robison and Buchanan, 1992). Commercial and recreational fishing has most likely led to a decrease in alligator gar populations. The State of Tennessee lists the alligator gar as "in need of management". No alligator gars were found in the study area. Harbor construction may temporarily impact alligator gar during construction. However, alligator gars are expected to utilize the harbor after construction is complete. No significant impacts are foreseen to alligator gar populations from harbor construction.

The golden topminnow primarily inhabits oxbow lakes, sluggish areas of creeks, and swampy backwater overflows of rivers; usually found in or near aquatic vegetation; and mainly feeds on insects and other aquatic invertebrates near the surface (Robison and Buchanan, 1992). Little is known on life history or reproductive biology. The State of Tennessee lists the species as "in need of management". No golden topminnows were found in the study area. Limited amounts of habitat may be impacted by harbor construction. However, ample habitat is expected to remain in the area of Old Slough Landing after construction. No significant impacts are expected to golden topminnow populations from harbor construction.

The sicklefin chub primarily inhabits fast water of large, warm, and turbid rivers over a bottom of firm sand or fine gravel; most likely spawns during spring; and presumably a benthic taste feeder (Robison and Buchanan, 1992). The State of Tennessee lists the sicklefin chub as "in need of management". No specimens were found in the study area. The U.S. Fish and Wildlife Service determined that it did not warrant listing as threatened and endangered. Impacts form harbor construction would be confined to backwater areas. The sicklefin chub is found in fast areas. Therefore, no significant impacts to sicklefin chub populations are expected.

Several commercially valuable and recreationally sought after species were sampled. These same species are expected to utilize the harbor after it is constructed. The loss of habitat from harbor construction would not impact the overall commercial and recreational fishery. No impacts to commercially valuable species or recreational

sought after species are foreseen. However, the backwater area currently is used for commercial and recreational fishing because of the proximity to a primitive boat ramp and the relative safety of the backwater area (sheltered from fast river currents and barge traffic). The majority of this area would remain after harbor construction. However, there would be an increase in barge traffic that could result in the area becoming undesirable for fishing.

CONCLUSIONS

The results of this study only show species composition in the study area during one specific low water period. The area of Old Slough Landing was not flooded at the time of the survey. Different species would most likely use the backwater areas at higher river stages. Additional species, including large numbers of juveniles, would most likely be found in flooded areas of Old Slough Landing.

No long term significant impacts to fishery resources are expected from harbor construction. Ample habitat would remain in the vicinity of the harbor to maintain the quantity and quality of the fishery resource. The unavoidable impacts to frequently flooded areas of Old Slough Landing would be mitigated by planting bottomland hardwoods on prior converted farmland found within batture areas of the Mississippi River.

LITERATURE CITED

Bailey, R. M. and B. Cross. 1954. River sturgeons of the American genus *Scaphirhynchus* characters, distribution, and synonymy. Pap. Mich. Acad. Arts Lett. 39:169-208.

Baker, J.A., K.J. Killgore, and R.L. Kasul. 1991. Aquatic habitats and fish communities in the lower Mississippi River. Reviews in Aquatic Sciences 3:313-356.

Bramblett, R. G. 1996. Habitats and movements of pallid and shovelnose sturgeon in the Yellowstone and Missouri Rivers, Montana and North Dakota. Ph.D. thesis, Montana State University, Bozeman, Montana. 210 pp.

Constant, G. C., W. E. Kelso, D. A. Rutherford, and C. F. Bryan. 1997. Habitat, movement, and reproductive status of pallid sturgeon (*Scaphirhunchus albus*) in the Mississippi and Atchafalaya Rivers. Report prepared for the U.S. Army Engineer New Orleans District. 78 pp.

Fremling, C.R., J.L Rasmussen, R.E. Sparks, S.P. Cobb, C.F. Bryan, and T.O. Claflin. 1989. Mississippi River fisheries: a case history. Pages 309 - 351 In: D.P. Dodge (editor). Proceedings of the international large river symposium. Ottawa Department of Fisheries and Oceans, Ottawa. Canadian Special Publication of Fisheries and Aquatic Sciences 106.

Industrial Economics, Incorporated. 2004. Economic profile of the lower Mississippi River region. Industrial Economics, Incorporated. Cambridge.

Lee, D. S. 1980a. *Scaphirhynchus albus* (Forbes and Richardson), Pallid Sturgeon. p. 43 in D. S. Lee, et al., Atlas of North American Freshwater Fishes, North Carolina State Museum of Natural History, Raleigh, North Carolina. 854 pp.

Lee, D. S. 1980b. *Scaphirhynchus platorynchus* (Rafinesque), Shovelnose Sturgeon. p. 44 in D. S. Lee, et al., Atlas of North American Freshwater Fishes, North Carolina State Museum of Natural History, Raleigh, North Carolina. 854 pp.

Robison, H.W.n and T.M. Buchana. 1992. Fishes of Arkansas. The University of Arkansas Press. Fayetteville. 536 pp.

Scramm, H.L. 2001. Status and management of Mississippi River fisheries, unpublished data.

Warren, M.L., Jr., B.M. Burr, S.J. Walsh, H.L. Bart, Jr., R.C. Cashner, D.A. Etnier, B.J. Freeman, B.R. Kuhajada, R.L. Mayden, H.W. Robison, S.T. Ross, and W.C. Starnes. 2000. Diversity, distribution, and conservation status of the native freshwater fishes of the southern United States. Fisheries 25(10):7-28.

TABLES

Table 1. Known occurrences of Lower Mississippi River fishes and backwater dependency (Scramm, 2001).

Family **Species**	**Backwater Dependent**
Petromyzontidae	
Chestnut lamprey, *Icthyomyzon castaneus* (Girard)	
Ascipenseridae	
Lake sturgeon, *Ascipenser fulvescens* (Rafinesque)	
Atlantic sturgeon, *Ascipenser oxyrhynchus* (Mitchill)	
Pallid sturgeon, *Scaphirhynchus albus* (Forbes and Richardson)	
Shovelnose sturgeon, *Scaphirhynchus platohynchus* (Rafinesque)	
Polyodontidae	
Paddlefish, *Polyodon spathula* (Walbaum)	
Lepisosteidae	
Spotted gar, *Lepisosteus oculatus* (Winchell)	Yes
Longnose gar, *Lepisosteus osseus* (Linnaeus)	Yes
Shotnose gar, *Lepisosteus platostomus* (Rafinesque)	Yes
Alligator gar, *Lepisosteus spatula* (Lacepede)	Yes
Amiidae	
Bowfin, *Amia calva* (Linnaeus)	Yes
Anguillidae	
American eel, *Anguilla rostrata* (Lesueur)	
Hiodontidae	
Goldeye, *Hiodon alosoides* (Rafinesque)	
Mooneye, *Hiodon tergisus* (Lesueur)	
Clupeidae	
Alabama shad, *Alosa alabamae* (Jordan and Everman)	
Skipjack herring, *Alosa chrysochloris* (Rafinesque)	
Gizzard shad, *Dorosoma petenense* (Gunther)	Yes
Esocidae	
Grass pickerel, *Esox americanus vermiculatus* (Lesueur)	Yes

Table 1. Continued.

Chain pickerel, *Esox niger* (Lesueur)	Yes
Cyprinidae	
Goldfish, *Carassius auratus* (Linnaeus)	Yes
Grass carp, *Ctenopharyngodon idella* (Valenciennes)	
Bluntface shiner, *Cyprinella camura* (Jordan and Meek)	
Red shiner, *Cyprinella lutrensis* (Baird and Girard)	Yes
Blacktail shiner, *Cyprinella venusta* (Girard)	
Steelcolor shiner, *Cyprinella whipplei* (Girard)	
Common carp, *Cyprinus carpio* (Linnaeus)	Yes
Gravel chub, *Erimystax x-punctata* (Hubbs and Crowe)	
Western silvery minnow, *Hybognathus argyritis* (Girard)	
Cypress minnow, *Hybognathus hayi* (Jordan)	Yes
Mississippi silvery minnow, *Hybognathus nuchalis* (Agassiz)	Yes
Plains minnow, *Hybognathus placitus* (Girard)	Yes
Silver carp, *Hypophthalmichthys molitrix* (Valenciennes)	
Bighead carp, *Hypophthalmichthys nobilis* (Richardson)	
Striped shiner, *Luxilus chrysocephalus* (Rafinesque)	
Ribbon shiner, *Lythrurus fumeus* (Evermann)	
Redfin shiner, *Lythrurus umbratilis* (Girard)	
Speckled chub, *Macrhybopsis aestivalis* (Girard)	
Sturgeon chub, *Macrhybopsis gelida* (Girard)	
Sicklefin chub, *Macrhybopsis meeki* (Jordan and Evermann)	
Silver chub, *Macrhybopsis storeriana* (Kirtland)	
Golden shiner, *Notemigonus crysoleucas* (Mitchill)	Yes
Pallid shiner, *Notropis amnis* (Hubbs and Greene)	
Emerald shiner, *Notropis atherinoides* (Rafinesque)	
River shiner, *Notropis blennius*, (Girard)	Yes
Bigeye shiner, *Notropis boops* (Gilbert)	
Ghost shiner, *Notropis buchanani* (Meek)	

Table 1. Continued

Spottail shiner, *Notropis hudsonius* (Clinton)	
Longnose shiner, *Notropis longirostris* (Hay)	
Taillight shiner, *Notropis maculatus* (Hay)	
Chub shiner, *Notropis potteri* (Hubbs and Bonham)	
Silverband shiner, *Notropis shumardi* (Girard)	
Weed shiner, *Notropis texanus* (Girard)	Yes
Mimic shiner, *Notropis volucellus* (Cope)	
Channel shiner, *Notropis wickliffi* (Trautman)	
Clear chub, *Notropis winchelli* (Girard)	
Pugnose minnow, *Opsopoeodus emiliae* (Hay)	
Suckermouth minnow, *Phenacobius mirabilis* (Girard)	
Southern redbelly dace, *Phoxinus erythrogaster* (Rafinesque)	
Bluntnose minnow, *Pimephales notatus* (Rafinesque)	Yes
Fathead minnow, *Pimephales promelas* (Rafinesque)	Yes
Bullhead minnow, *Pimephales vigilax* (Baird and Girard)	Yes
Flathead chub, *Platygobio gracilis gracilis* (Richardson)	
Catostomidae	
River carpsucker, *Carpiodes carpio* (Rafinesque)	
Quillback, *Carpiodes cyprinus* (Lesueur)	
Highfin carpsucker, *Carpiodes vellifer* (Rafinesque)	
White sucker, *Catostomus commersoni* (Lacepede)	
Blue sucker, *Cycleptus elongatus* (Lesueur)	
Creek chubsucker, *Erimyzon oblongus* (Mitchill)	
Lake chubsucker, *Erimyzon succetta* (Lacepede)	
Northern hog sucker, *Hypentelium nigricans* (Lesueur)	
Smallmouth buffalo, *Ictiobus bubalus* (Rafinesque)	Yes
Bigmouth buffalo, *Ictiobus cyprinellus* (Valenciennes)	Yes
Black buffalo, *Ictiobus niger* (Rafinesque)	Yes
Spotted sucker, *Minytrema melanops* (Rafinesque)	
Silver redhorse, *Moxostoma macrolepidotum* (Leseur)	

Table 1. Continued

River redhorse, *Moxostoma carinatum* (Cope)	
Shorthead redhorse, *Moxostoma macrolepidotum* (Lesueur)	
Ictaluridae	
White catfish, *Ameiurus catus* (Linnaeus)	
Black bullhead, *Ameiurus melas* (Rafinesque)	Yes
Yellow bullhead, *Ameiurus natalis* (Lesueur)	Yes
Brown bullhead, *Ameiurus nebulosus* (Lesueur)	Yes
Blue catfish, *Ictalurus furcatus* (Lesueur)	
Channel catfish, *Ictalurus punctatus* (Lesueur)	
Mountain madtom, *Notururs eleutherus* (Jordan)	
Stonecat, *Noturus flavus* (Rafinesque)	
Tadpole madtom, *Noturus gyrinus* (Mitchill)	
Freckled madtom, *Noturus nocturnus* (Jordan and Gilbert)	
Northern madtom, *Noturus stigmosus* (Taylor)	
Flathead catfish, *Pylodictus olivaris* (Rafinesque)	
Aphredoderidae	
Western pirate perch, *Apherdoderus sayanus* (Gilliams)	Yes
Percopsidae	
Trout-perch, *Percopsis omiscomayus* (Walbaum)	
Cyprinodontidae	
Golden topminnow, *Fundulus chrysotus* (Gunther)	Yes
Starhead topminnow, *Fundulus dispar* (Agassiz)	
Blackstripe topminnow, *Fundulus notatus* (Rafinesque)	
Blackspotted topminnow, *Fundulus olivaceus* (Storer)	
Rainwater killfish, *Lucania parva* (Baird and Girard)	
Poeciliidae	
Western mosquitofish, *Gambusia affinis* (Baird and Girard)	Yes
Least killfish, *Heterandria formosa* (Aggasiz)	
Atherinidae	

Table 1. Continued

Brook silverside, *Labisesthes sicculus* (Cope)	
Inland silverside, *Menidia beryllina* (Cope)	
Perichthyidae	
White bass, *Monroe chrysops* (Rafinesque)	
Yellow bass, *Monroe mississippiensis* (Jordan and Everman)	
Striped bass, *Monroe saxatils* (Walbaum)[4]	
Centrarchidae	
Flier, *Centrarchus macropterus* (Lacepede)	
Banded pygmy sunfish, *Elassoma zonatum* (Jordan)	
Green sunfish, *Lepomis cyanellus* (Rafinesque)	Yes
Warmouth, *Lepomis gulosus* (Cuvier)	Yes
Orangespotted sunfish, *Lepomis humilis* (Girard)	Yes
Bluegill, *Lepomis macrochirus* (Rafinesque)	Yes
Longear sunfish, *Lepomis megalotis* (Rafinesque)	Yes
Redear sunfish, *Lepomis microlophus* (Gunther)	Yes
Spotted sunfish, *Lepomis punctatus* (Valenciennes)	Yes
Bantam sunfish, *Lepomis symmetricus* (Forbes)	Yes
Spotted bass, *Micropterus punctulatus* (Rafinesque)	
Largemouth bass, *Micropterus salmoides* (Lacepede)	Yes
White crappie, *Pomoxis annularis* (Rafinesque)	Yes
Black crappie, *Pomoxis nigromaculatus* (Lesueur)	Yes
Percidae	
Western sand darter, *Ammocypta clara* (Jordan and Meek)	
Mud darter, *Etheostoma asprigene* (Forbes)	
Bluntnose darter, *Etheostoma chlorosoma* (Hay)	
Swamp darter, *Etheostoma fusiforme* (Girard)	Yes
Slough darter, *Etheostoma gracile* (Girard)	
Cypress darter, *Etheostoma proeliare* (Hay)	
Log perch, *Percina caprodes* (Rafinesque)	Yes

Table 1. Continued

Saddleback darter, *Percina vigil* (Hay)	
River darter, *Percina shumardi* (Girard)	
Sauger, *Stizostedion canadense* (Smith)	
Walleye, *Stizostedion vitreum* (Mitchill)	
Sciaenidae	
Freshwater drum, *Aplodinotus grunniens* (Rafinesque)	
Mugilidae	
Striped mullet, *Mugil cephalus* (Linnaeus)	

Table 2. State of Tennessee commercially harvestable species.

Common Name	**Scientific Name**
Shovelnose sturgeon	*Scaphirhynchus platorynchus*
Paddlefish	*Polyodon spathula*
Spotted gar	*Lepisosteus oculatus*
Longnose gar	*Lepisosteus osseus*
Shortnose gar	*Lepisosteus platostomus*
Bowfin	*Amia calva*
Skipjack herring	*Alosa chrysochloris*
Gizzard shad	*Dorosoma cepedianum*
Threadfin shad	*Dorosoma petenense*
Grass carp	*Ctenopharyngodon idella*
Common carp	*Cyprinus carpio*
Silver carp	*Hypophthalmichthys molitrix*
Bighead carp	*Hypophthalmichthys nobilis*
River carpsucker	*Carpiodes carpio*
Quillback	*Carpiodes cyprinus*
White sucker	*Catostomus commersoni*
Smallmouth buffalo	*Ictiobus bubalus*
Bigmouth buffalo	*Ictiobus cyprinellus*
Black buffalo	*Ictiobus niger*
Spotted sucker	*Minytrema melanops*
Silver redhorse	*Mosostoma anisurum*
Golden redhorse	*Moxostoma erythrurum*
Black bullhead	*Ameiurus melas*
Yellow bullhead	*Ameiurus natalis*
Brown bullhead	*Ameiurus nebulosus*
Blue catfish	*Ictalurus furcatus*
Channel catfish	*Ictalurus punctatus*
Flathead catfish	*Pylodictis olivaris*
Yellow bass	*Morone mississippiensis*
Freshwater drum	*Aplodinotus grunniens*

Table 3. Fish sampling results, Mississippi River (RM 895 – 905), 23 – 24 September 2003.

Species	Seine	Electroshocking	Trawl	Gill Net
Scaphirhynchus spp.			X	
Scaphirhynchus platorynchus				X
Lepisosteus platostomus		X	X	X
Hiodon alosoides				X
Hiodon tergisus			X	X
Alosoa chryochloris				X
Dorosoma cepedianum	X	X	X	X
Dorosoma petenese	X	X		
Cyprinus carpio		X		
Carpiodes carpio		X		
Hybognathus nuchalis	X			
Macrhybopsis storeiana			X	X
Notropis stherinoides	X			
Notropis wickliffi	X			
Pimephales notatus	X			
Pimephales vigilax	X			
Ictiobus bubalus		X		
Ictiobus cyprinellus		X		
Moxostoma spp.		X	X	X
Ictalurus furcatus				X
Ictalurus punctatus	X	X	X	X
Pylodictus olivaris		X	X	X
Aphredoderus sayanus			X	X
Gambusia affinins	X			
Labidesthes sicculus		X		
Menidia beryllina	X			
Morone chrysops	X	X	X	X
Morone saxatilis		X		
Lepomis macrochirus	X	X	X	X
Lepomis megalotis		X	X	X
Micropterus punctatus		X		
Micropterus salmoides		X		
Pomoxis annularis	X	X	X	X
Pomoxis nigromaculatus		X		
Percina caprodes		X		
Aplodinotus grunniens	X	X	X	X

Table 4. Seine results from the proposed harbor area, 23 September 2003, Mississippi River Mile 900, Cates Landing, Lake County, Tennessee.

Species	**Number**
Dorosoma cepedianum	19
Dorosoma petenese	2
Hybognathus nuchalis	4
Notropis atherinoides	8
Notropis wickliffi	2
Pimephales notatus	5
Pimephales vigilax	3
Ictalurus punctatus	1
Gambusia affinis	3
Menidia beryllina	4
Morone chrysops	1
Lepomis macrochirus	3
Pomoxis annularis	1
Aplodinotus grunniens	1

2 unknown

Table 5. Composite results of electrofishing sample within the proposed harbor area, 23 – 24 September 2003, Mississippi River Mile 900, Cates Landing, Lake County, Tennessee.

Species	Number	CPUE (#/hr)	Mean Length (mm)	Length Range (mm)	Mean Weight (g)	Weight Range (g)
Lepisosteus platostomus	5	10	549	529 - 573	619	529 - 769
Dorosoma cepedianum	76	152	200.5	90 - 554	257.6	11 - 2495
Dorosoma petenese	1	2	108	-	22	-
Cyprinus carpio	1	2	587	-	2984	-
Carpiodes carpio	1	2	351	-	552	-
Ictiobus bubalus	2	4	369	343 - 395	709	538 - 880
Ictiobus cyprinellus	5	10	473.4	415 - 588	1627	777 - 2970
Moxostoma spp.	1	2	42	-	T	-
Ictalurus punctatus	6	12	381.7	233 - 486	573	81 - 2113
Pylodictus olivaris	2	4	271	250 - 292	207.5	150 - 265
Labidesthes sicculus	1	2	68	-	T	-
Morone chrysops	1	2	230	-	129	-
Lepomis macrochirus	2	4	52.5	39 - 66	2.5	T - 5
Lepomis megalotis	15	30	118.8	52 - 157	46.8	T - 94
Micropterus punctatus	1	2	101	-	13	-
Micropterus salmoides	13	26	287.5	128 - 420	369.5	22 - 1150
Pomoxis annularis	2	4	289.5	282 - 297	342	329 - 355
Pomoxis nigromaculatus	1	2	264	-	286	-
Percina caprodes	1	2	87	-	10	-
Aplodinotus grunniens	2	4	392.5	338 - 447	927	502 - 1352

T = Trace

Table 6. Overall electroshocking results, Mississippi River Mile 895 – 905.

Species	Number	CPUE (#/hr)	Mean Length (mm)	Length Range (mm)	Mean Weight (g)	Weight Range (g)
Lepisosteus platostomus	15	15.6	573.5	515 - 736	698.5	435 - 1601
Dorosoma cepedianum	104	108.16	189.0	81 - 554	203.7	9 - 2495
Dorosoma petenese	1	1.04	108	-	22	-
Cyprinus carpio	4	4.16	545	523 - 587	2147.5	1763 – 2984
Carpiodes carpio	2	2.08	378	351 - 405	692.5	552 – 833
Ictiobus bubalus	3	9.36	354.7	326 - 395	645.7	519 – 880
Ictiobus cyprinellus	6	6.24	497.8	415 - 620	1966.5	777 – 3664
Moxostoma spp.	1	1.04	42	-	T	-
Ictalurus punctatus	12	12.48	399.8	233 - 486	609.9	81 – 1113
Pylodictus olivaris	3	9.36	262.7	246 - 292	186.3	144 – 265
Labidesthes sicculus	1	1.04	68	-	T	-
Menidia beryllina	16	16.64	75.9	65 - 101	T	-
Morone chrysops	9	9.36	318.9	223 - 468	458.7	109 - 1432
Morone saxatlis	1	1.04	316	-	277	-
Lepomis macrochirus	2	2.08	52.5	39 - 66	2.5	T – 5
Lepomis megalotis	15	15.6	118.8	52 - 157	46.8	T - 94
Micropterus punctatus	1	1.04	101	-	13	-
Micropterus salmoides	13	13.52	287.5	128 - 420	369.5	22 – 1150
Pomoxis annularis	2	2.08	289.5	282 - 297	342	329 – 355
Pomoxis nigromaculatus	1	1.04	264	-	286	-
Percina caprodes	1	1.04	87	-	10	-
Aplodinotus grunniens	18	18.72	318.11	224 - 455	471	119 - 1352

T = Trace

Table 7. Results of trawl sample within the proposed harbor area, 24 September 2003, Mississippi River Mile 900, Cates Landing, Lake County, Tennessee.

Species	**Number**	**Mean Length (mm)**	**Length Range (mm)**	**Mean Weight (g)**	**Weight Range (g)**
Lepisosteus platostomus	4	549	527 - 578	577.3	463 – 665
Hiodon tergisus	2	143	138 - 148	23.5	22 – 25
Ictalurus punctatus	2	206	169 - 243	66	34 - 98
Aphredoderus sayanus	1	72	-	4	-
Morone chrysops	1	124	-	21	-
Lepomis macrochirus	1	140	-	63	-
Lepomis magalotis	1	125	-	43	-
Aplodinotus grunniens	14	186.9	36 - 304	108.1	1 - 224

Table 8. Results of trawl sample within the study area (Mississippi River Mile 895 – 905), 23 - 24 September 2003.

Species	**Number**	**Mean Length (mm)**	**Length Range (mm)**	**Mean Weight (g)**	**Weight Range (g)**
Scaphirhynchus spp.	2	396	344 - 448	80.5	58 – 103
Lepisosteus platostomus	9	539.1	212 - 674	603.9	67 – 1101
Hiodon tergisus	4	130	114 - 148	18	10 – 25
Dorosoma cepedianum	27	97.4	61 - 282	15.6	2 – 229
Macrhybopsis storeiana	5	59	39 - 78	1.8	1 – 4
Moxostoma spp.	4	48.8	26 - 97	2	T – 6
Ictalurus punctatus	145	93.1	38 – 253	11.1	1 – 138
Pylodictus olivarus	1	463	-	971	-
Aphredoderus sayanus	1	72	-	4	-
Morone chrysops	2	130.5	124 - 137	24.5	21 - 28
Lepomis macrochirus	1	140	-	63	-
Lepomis magalotis	1	125	-	43	-
Pomoxis annularis	1	70	-	3	-
Aplodinotus grunniens	45	100.2	29 - 304	35.7	1 - 224

Table 9. Composite results of gill net sampling in the proposed harbor area, 23 – 24 September, Mississippi River Mile 900, Cates Landing, Lake County, Tennessee.

Species	**Number**	**Mean Length (mm)**	**Length Range (mm)**	**Mean Weight (g)**	**Weight Range (g)**
Scaphirhynchus platorynchus	1	679	-	1450	-
Lepisosteus osseus	1	590	-	438	-
Lepisosteus platostomus	15	601.8	477 - 726	749.6	384 – 1184
Hiodon alosoides	2	263.5	257 - 270	145.5	141 – 150
Alosa chrysochloris	5	350.2	250 - 399	355.8	102 - 509
Dorosoma cepedianum	53	249.5	173 - 373	169.5	43 - 440
Cyprinus carpio	5	556.2	382 - 675	2482.6	790 – 4150
Carpiodes carpio	10	351.3	279 - 481	651.5	247 – 1463
Ictobus bubalus	2	308	271 - 345	447.5	281 – 614
Ictalurus furcatus	6	383.3	307 - 585	635.3	221 – 2058
Ictalurus punctatus	1	256	-	108	-
Pylodictus olivarus	4	430.5	365 - 502	906	470 – 1279
Stizostedium canadense	1	397	-	489	-
Aplodinotus grunniens	10	286.4	173 - 525	462.5	48 - 228

FIGURES

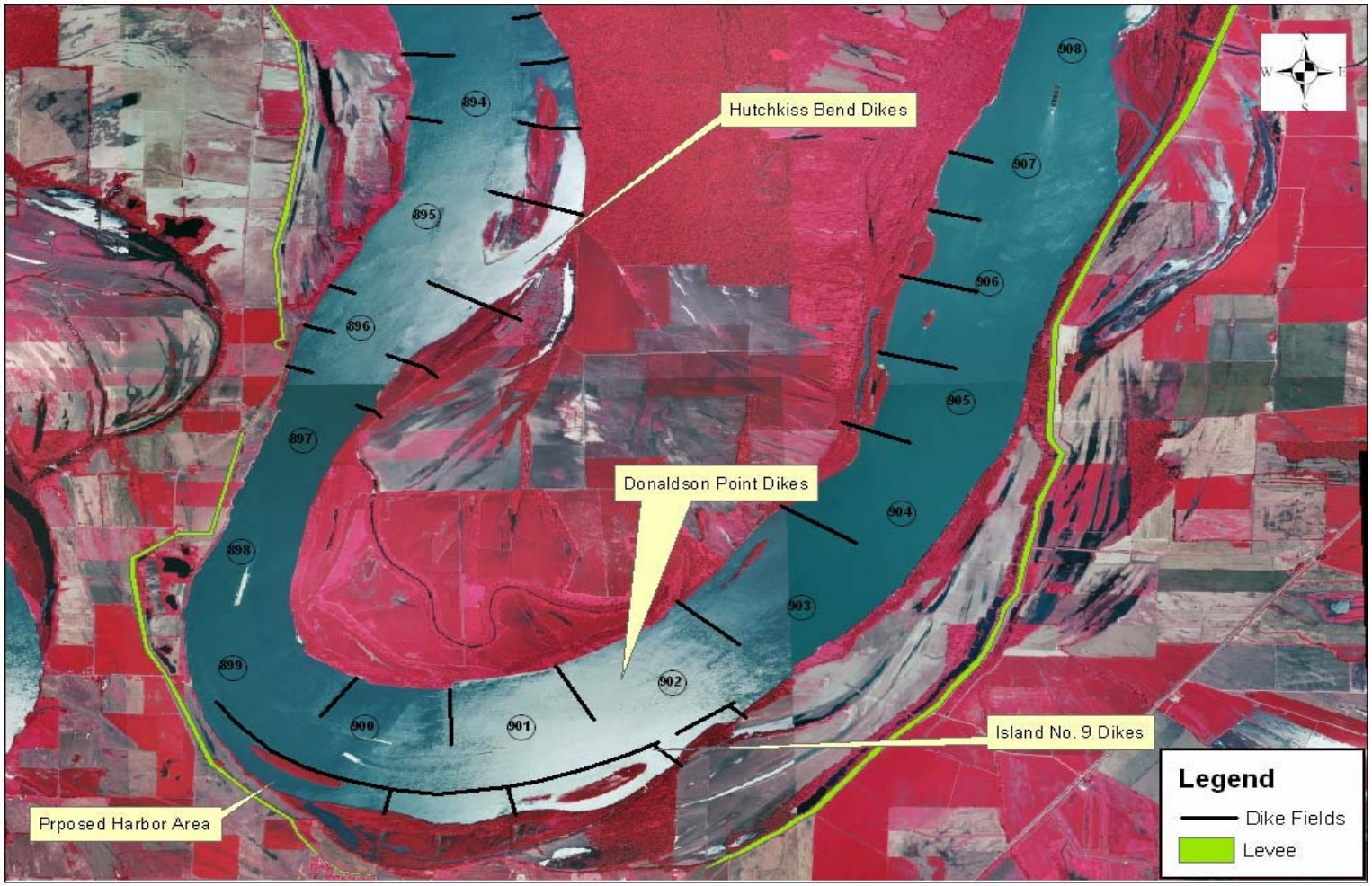


Figure 1. Survey areas, NW TN Regional Harbor Fishery Study, 23 – 24 September, 2004, Misssissippi River Mile 895 – 905.

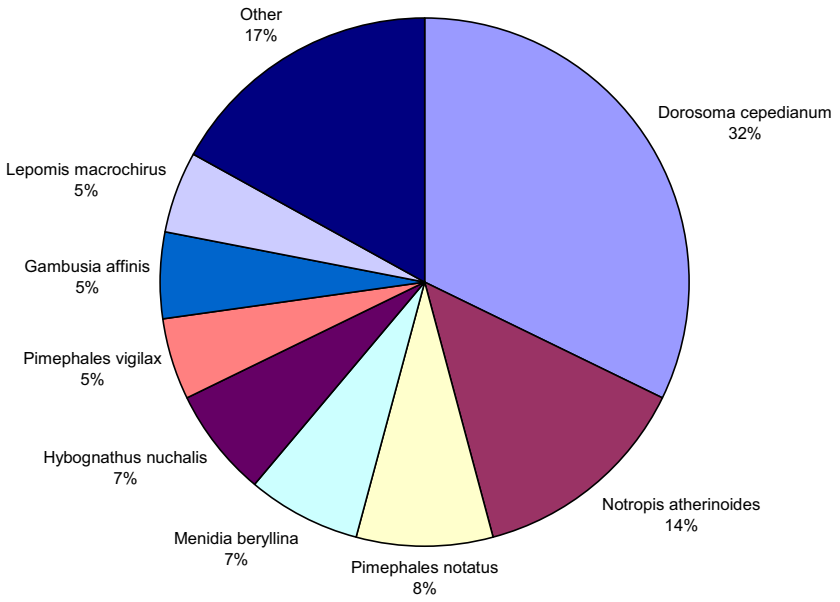


Figure 2. Numerical standing crop results, seine survey, NW TN Harbor Fishery Survey.

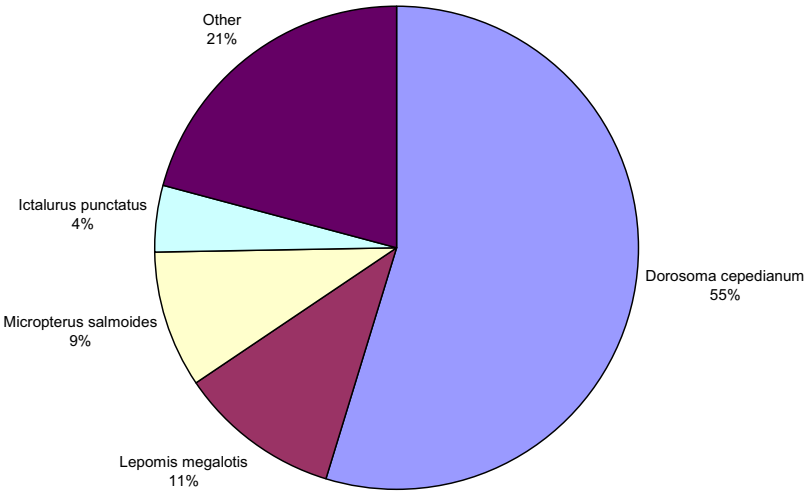


Figure 3. Numerical standing crop results from proposed harbor area, electrofishing survey, NW TN Harbor Fishery Survey, 23 – 24 September 2004.

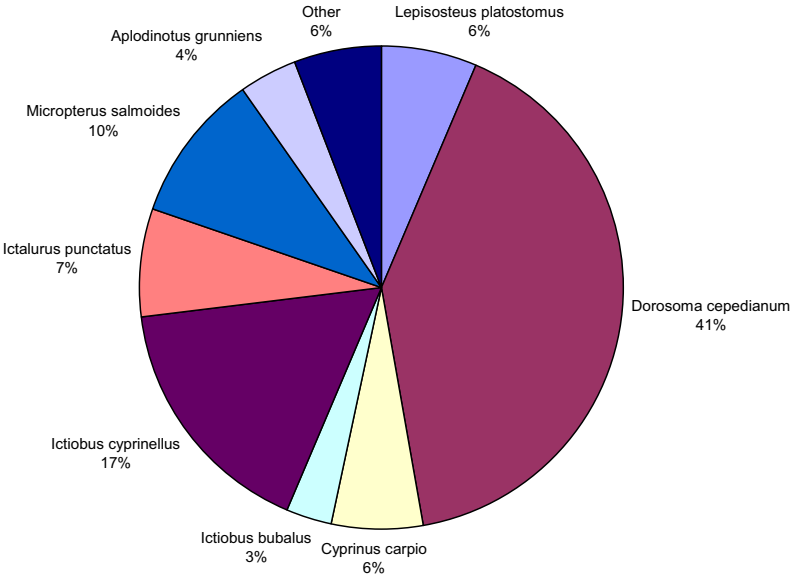


Figure 4. Total biomass results from proposed harbor area, electrofishing survey, NW TN Harbor Fishery Survey, 23 – 24 September 2004.

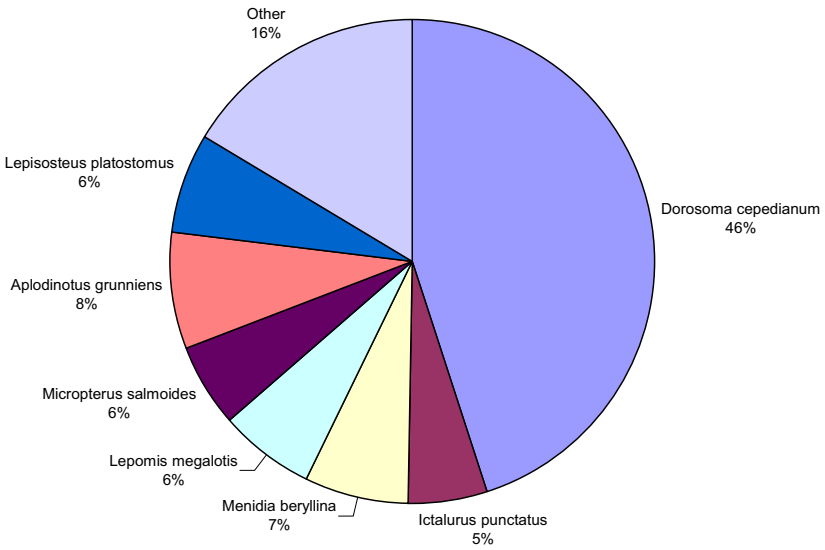


Figure 5. Numerical standing crop results from entire sample area, electrofishing survey, NW TN Harbor Fishery Survey, 23 – 24 September 2004.

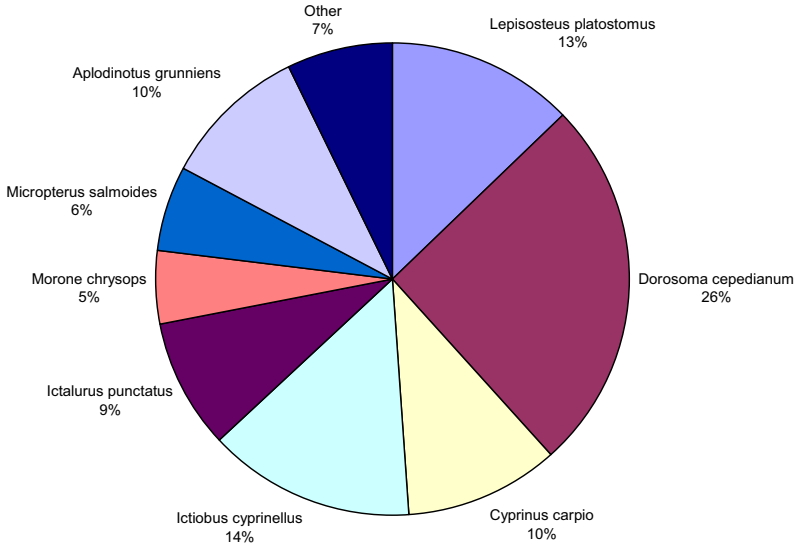


Figure 6. Total biomass results from entire sample area, electrofishing survey, NW TN Harbor Fishery Survey, 23 – 24 September 2004.

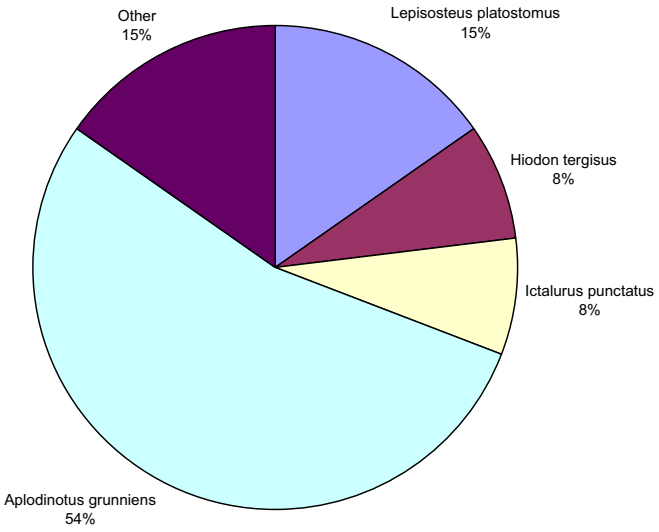


Figure 7. Numerical standing crop results from proposed harbor area, trawl survey, NW TN Harbor Fishery Survey, 23 – 24 September 2004.

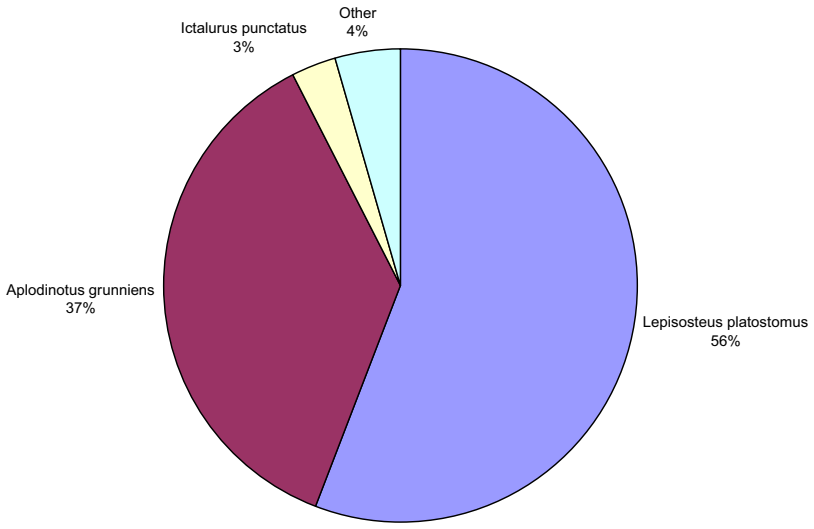


Figure 8. Total biomass results from proposed harbor area, trawl survey, NW TN Harbor Fishery Survey, 23 – 24 September 2004.

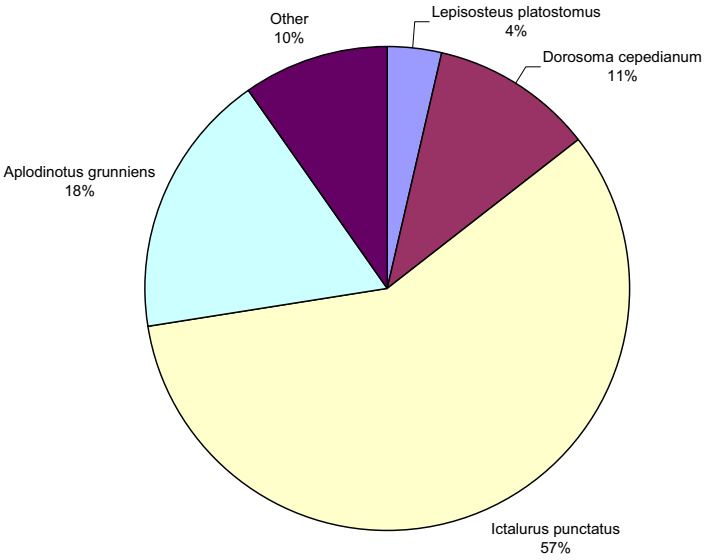


Figure 9. Numerical standing crop results from entire sample area, trawl survey, NW TN Harbor Fishery Survey, 23 – 24 September 2004.

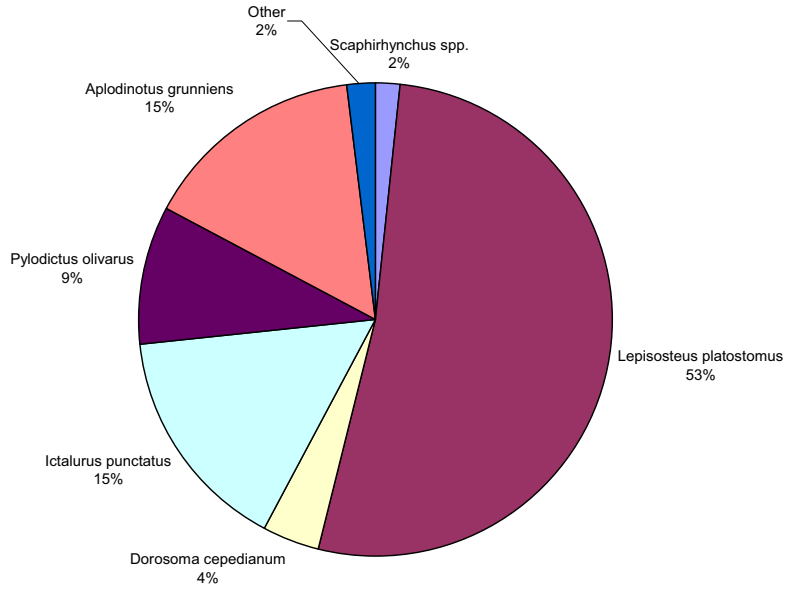


Figure 10. Total biomass results from entire sample area, trawl survey, NW TN Harbor Fishery Survey, 23 – 24 September 2004.

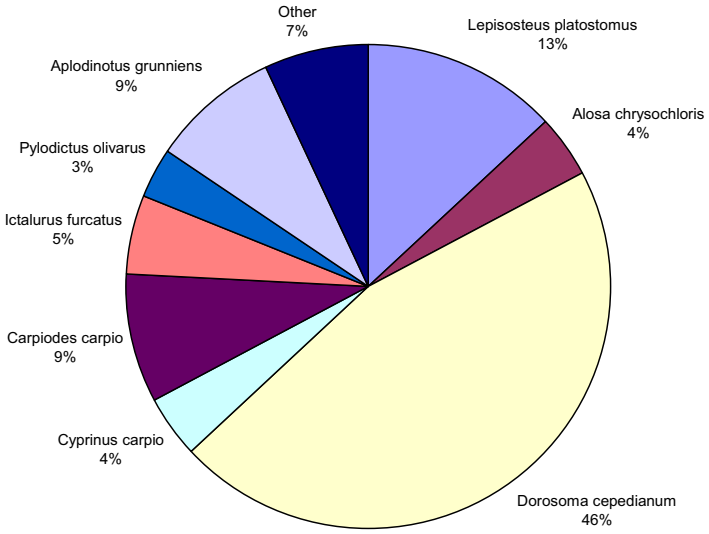


Figure 11. Numerical standing crop results from harbor area, gillnet survey, NW TN Harbor Fishery Survey, 23 – 24 September 2004.

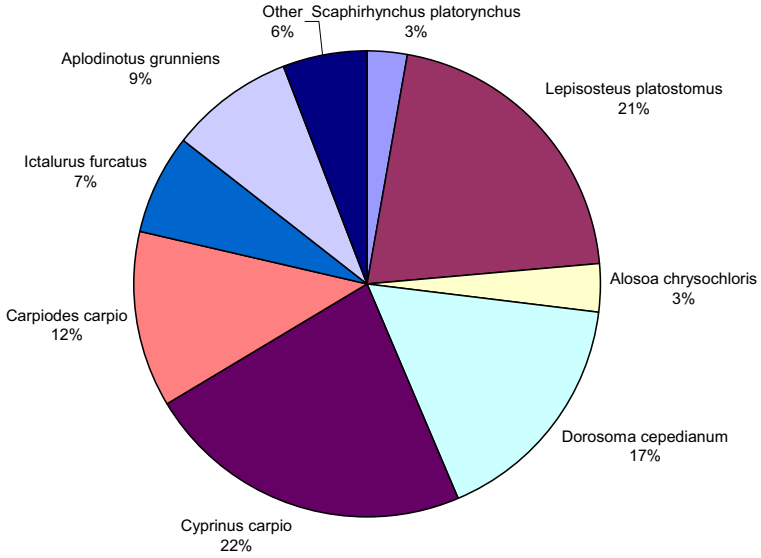
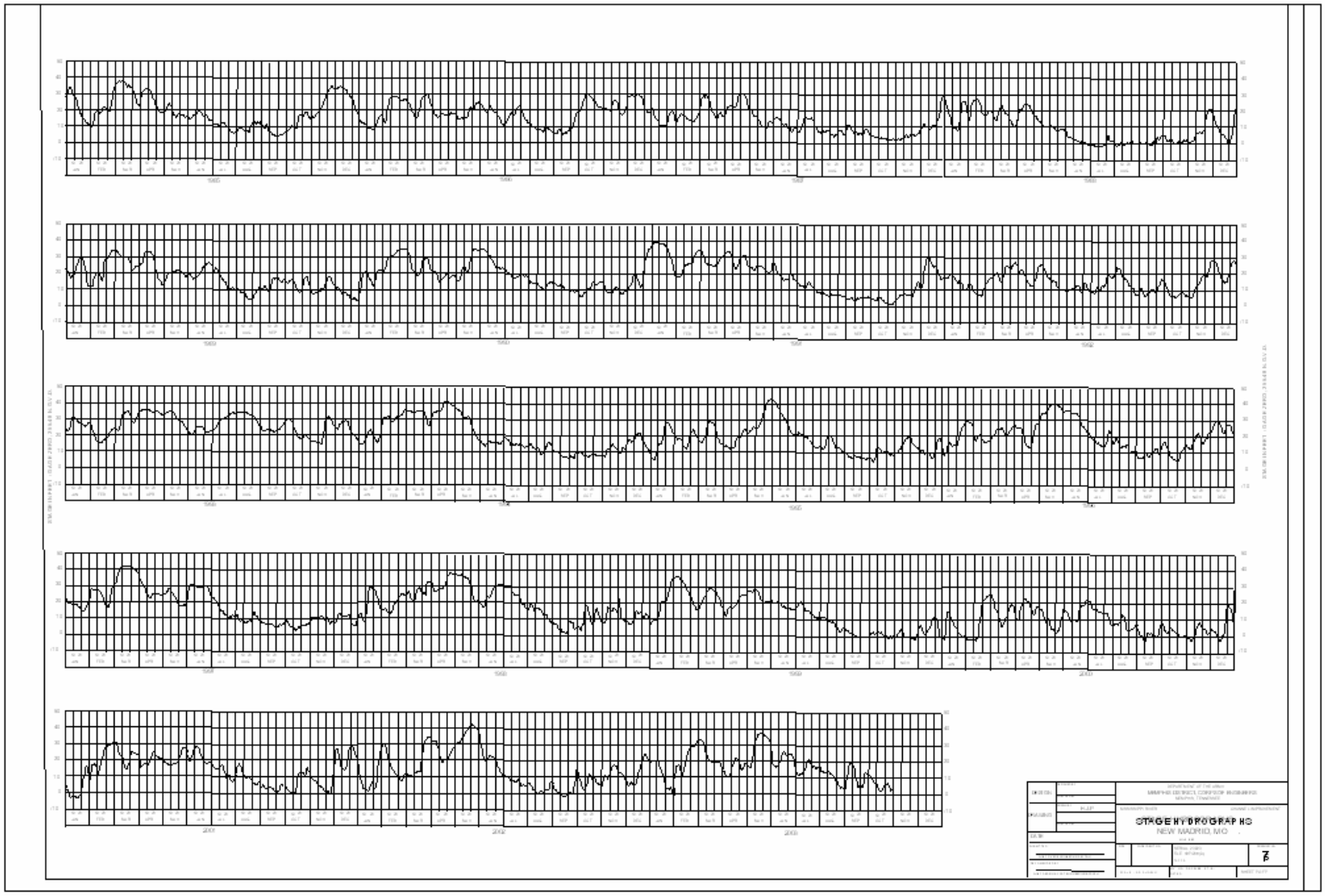


Figure 12. Total biomass results from harbor area, gillnet survey, NW TN Harbor Fishery Survey, 23 – 24 September 2004.

Appendix

Mississippi River Gauge Data


STAGE HYDROGRAPHS
NEW MADRID, MO