Fish in Waterfowl Habitat:

Managing National Wildlife Refuges for Multiple Purposes using

Mattamuskeet National Wildlife Refuge as a Model

by

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May 2020

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Anadromous river herring (including Blueback Herring *Alosa aestivalis* and Alewife *Alosa pseudoharengus*) spend most of their lives at sea but migrate to freshwater systems during the spring to spawn. The spawning success of the two species is impacted by barriers to upstream spawning sites as well as nursery habitat quality. At Mattamuskeet National Wildlife Refuge (MNWR), the effectiveness of side-opening versus top-hinged gates in low-head water control structures in Lake Mattamuskeet for diadromous fish passage is unknown. Additionally, water control structure design and the focus of refuge resource management on waterfowl habitat

has potentially limited fishing opportunities and/or fishery habitat, creating feelings of mismanagement among the public based on anecdotal information collected. The MNWR founding documents leave much of the exact natural resource management requirements open to interpretation, although historical and current refuge management have focused resources and staffing to provide optimal habitat for migratory birds, especially wintering waterfowl. Results of a textual analysis of MNWR and four nearby National Wildlife Refuge founding documents and Comprehensive Conservation Plans (CCPs, a more-updated guiding document currently used by the refuges) indicated that none of the subsampled NWRs had close associations between the founding documents and the Comprehensive Conservation Plans. This suggests that NWRs in coastal North Carolina are not being managed in accordance with founding documents. For fish management and passage at MNWR, I compared two flapgate designs: a new side-opening gate and the existing top-hinged design. The side-opening gate passed significantly more fish of all species and significantly more Alewife compared to the top-hinged flapgate design. The spawning run for adult Alewife through Waupoppin Canal into Lake Mattamuskeet is still present but small. Four push net surveys designed to determine Alewife spawning success within Lake Mattamuskeet showed that Alewife spawning occurs in lake habitats but none of the surveys indicated that juvenile Alewife were abundant in lake habitats.

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A Dissertation

Presented to the Faculty of the Department of Coastal Studies

East Carolina University

In Partial Fulfillment of the Requirements for the Degree

Doctor of Philosophy

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Introduction

Water management plays a major role in meeting modern human needs, including protection of property, powering homes and businesses, and providing water for drinking and agricultural purposes. Water management also impacts the status of fish, wildlife, plants, and their associated habitats in areas of active and passive water management. It is often used as a tool to provide optimal habitat conditions for species of interest, such as migratory waterfowl, mammals, and aquatic species, such as fish. Water management can include the creation of new habitat, such as a new reservoir, mitigation site, canal, or borrow pit; the conservation of existing habitats, such as threatened fresh and saltwater marshes, swamps, and pocosins; and the restoration of past habitats, such as wetlands that had been previously drained for agricultural purposes or pest control. Finally, water management can serve as a destructive force to fish, wildlife, plants, and their associated habitats when focused solely on human needs, such as draining of wetlands, diverting of streams, or creation of high- and low-head water control structures (WCSs) and dams.

It is known that fragmentation of stream networks is a major threat to aquatic species in terms of population persistence, abundance, and diversity (Bourne et al. 2011). Aquatic species are significantly impacted by stream fragmentation via the creation of large dams and low-head WCSs. The resultant levels of stream alteration impede necessary life cycle processes, such as migrations between salt and freshwater of diadromous fishes [a collective term encompassing both anadromous fishes (salmon, river herring, striped bass, etc.) that spend most of their lives in saltwater except to spawn and catadromous fishes (most of the eels) that spend the majority of their lives in freshwater except to spawn]. Low-head WCSs and dams (defined as <7.6 m high) are used throughout the United States, and over 2,000,000 low-head dams fragment U.S. rivers (Fencl et al. 2015). These and other forms of stream alteration can result in fragmentation, sedimentation, channelization, temperature changes, or flooding and can significantly change whole ecological communities through alteration of foodwebs, loss of biodiversity, and whole species extirpation or decline depending on the level of passability through a structure by aquatic species (Hall et al. 2011). In the case of diadromous fish, passability of a WCS is critical in completing the life cycle. It is therefore important to look at water management from both a human- and ecological-needs standpoint, especially for diadromous fish.

Examples of efforts to facilitate fish passage have been documented across the globe. In the United States, passage of salmon upstream for spawning purposes on both the West and East Coast are perhaps the most well-known examples of human effort to facilitate life cycle completion by migratory fishes that may migrate hundreds of miles upstream to find suitable spawning habitat, such as the efforts by the Army Corps of Engineers to restore salmon populations in the Pacific Northwest (Mighetto 1994). In the Northeast United States, fish passage often occurs through medium to high-head dams with passage facilitated by fish passage structures. such as fish ladders (step-like pools of water that allow fish to bypass a dam). In the Southeast United States, the fall line demarcating the shift from upland to coastal plain rock is often hundreds of miles upstream, causing issues with more traditional fish passage methods, such as fish ladders, which require medium to high-head, so in coastal areas low-head WCSs (often equipped with bottom-release gates to allow for water flow and fish passage) dominate the southeastern coastal landscape (Zigler et al. 2004).

Low-lying areas and wetlands of the Southeast United States include many publicly owned gamelands, refuges, and preserves as well as privately owned properties often managed for hunting, fishing, or other recreational purposes. Many of these public and private lands are managed as man-made impoundments, which are gradually drained in the spring to allow vegetation to grow and then flooded in the fall to attract waterfowl, shorebirds, and other wildlife. Other private and public lands are managed naturally or passively, allowing water levels of impounded areas to regulate themselves through evaporation, wind tides, or other means. This passive management typically produces low water in the spring and summer to allow submerged and emergent vegetation growth and spawning habitat for fishes, and generally higher water in the fall and winter to provide resting and foraging areas for migratory waterfowl.

The importance of these wintering areas for migratory waterfowl is evidenced by the abundance of publicly owned low-lying and wetland areas of the Southeast United States that are managed either actively or passively depending on system needs. Many of these public lands also provide spawning habitat for diadromous fishes and public use opportunities in addition to waterfowl habitat, showcasing the need for a multi-faceted approach to public lands management to encompass social and biological needs of a given gameland, refuge, preserve, or other publicly owned land.

National Wildlife Refuges (NWRs), which are managed federally by the United States Fish and Wildlife Service (USFWS), are examples of publicly owned lands generally managed for public use opportunities, as well as habitat for fish, wildlife, plants, and their associated habitats. National Wildlife Refuges exist across the Nation but are particularly abundant in coastal, low-lying, and wetland areas of the Southeast United States. Many of these National Wildlife Refuges in the Southeast were established to provide wintering habitat for migratory waterfowl utilizing the Atlantic Flyway, which is one of the major North-South flyways for migratory birds in North America. One example of a National Wildlife Refuge in a low-lying coastal area that was established for wintering migratory waterfowl includes the largest natural lake in the state of North Carolina: Lake Mattamuskeet. Mattamuskeet National Wildlife Refuge is a premier stop for wintering waterfowl along the Atlantic Flyway, a spring and fall destination for neotropical migratory birds, and a historically important spawning area utilized by diadromous fishes (USFWS "Mattamuskeet NWR: Wildlife and Habitat," n.d.).

History of Lake Mattamuskeet, Hyde County North Carolina

Mattamuskeet National Wildlife Refuge (MNWR) is located on the Albemarle-Pamlico Peninsula in Hyde County, North Carolina. The refuge totals 50,180 acres and includes the 40,100-acre Lake Mattamuskeet (USFWS "Mattamuskeet NWR: About the Refuge," n.d.). MNWR provides refuge for hundreds of thousands of wintering waterfowl each year, as well as habitat for many fish species and other wildlife. In addition, the refuge provides varying degrees of recreational activities often referred to as the National Wildlife Refuge System 'Big 6', which includes hunting, fishing, wildlife observation/viewing, interpretation, photography, and environmental education (USFWS "Welcome to the National Wildlife Refuge System," 2011).

The refuge was founded in accordance with the Migratory Bird Conservation Act of 1929 "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." (Migratory Bird Conservation Act: 16 U.S.C. § 715d 1929). President Franklin D. Roosevelt officially created MNWR on December 18, 1934 by Presidential Executive Order 6924 "…as a refuge and breeding ground for birds and wild animals, and (2) that such portion as the Secretary of Agriculture [Interior] may deem proper be reserved for use as a shooting area, to be operated under a cooperative agreement or lease .... Regarding the waters ... the Secretary of Agriculture [Interior] ... may enter into a cooperative agreement or lease ... said waters may be used for fishing purposes ..." (Presidential Executive Order 6924 1934). These founding documents leave much of the exact natural resource management requirements open ended, although historical and current management have interpreted this as providing optimal wintering habitat for migratory birds, especially waterfowl.

This purpose of protecting and conserving migratory birds while allowing waters to be used for fishing purposes brings multiple user groups to one area. Refuge management strategies have centered on the founding documents, which list protection and conservation of birds (as interpreted) before other wildlife and recreational uses, such as fishing (Migratory Bird Conservation Act: 16 U.S.C. § 715d 1929; Presidential Executive Order 6924 1934).

Lake Mattamuskeet is the centerpiece of MNWR and is connected to Pamlico Sound by four man-made canals that were created to facilitate lake drainage for farming by private investors in the early 1900s (Figure 1.1). Prior to the ditching and draining efforts of the early 1900s, much of the ecology of the lake is unknown and many species now found in Lake Mattamuskeet may not have always been present, including species identified as priority management species by MNWR. The original lakebed encompassed approximately 120,000 acres and averaged 6 to 9 feet in depth. Early settlers originally found Lake Mattamuskeet by following a natural creek from Wysocking Bay to the lakeshore, indicating at least some level of connectivity and potential for movement of aquatic species between the low-lying Lake Mattamuskeet and Pamlico Sound prior to any ditching (The Mattamuskeet Foundation, Inc "History: Native Americans," 2001). After it was turned over to the federal government in 1934, the lake was returned to a semi-natural state by equipping each drainage canal with a concrete WCS containing multiple embayments. Each embayment was outfitted with gates to prevent saltwater intrusion from Pamlico Sound while allowing discharge when flooded or from strong wind tides (Rulifson and Wall 2006).

The passive water management of Lake Mattamuskeet is achieved via outflow (seaward) flapgates in each of the four canal WCSs. The gates allow for rainfall inputs to the system and outflow from the lake to Pamlico Sound during high water and/or wind-tide events but prevent saltwater inputs from Pamlico Sound via the canals. Often this passive strategy leaves lake levels lower in the summer and fall due to evaporation, and higher in winter and spring due to rainwater input (Zohary and Ostrovsky 2011). The shallow waters of the summer and fall allow growth of submerged aquatic vegetation and emergent vegetation within and around the lake edge, both important food sources for wintering migratory waterfowl, as well as habitat for fish within the lake.

Low-head water control structures and fish passage issues

In low-lying coastal areas, low-head WCSs are often used to facilitate drainage of agricultural and personal property. Low-head WCSs are also used in swamps, marshes, and impoundments to regulate water flow. They are often used in coastal canals in the form of flapgates to reduce saltwater intrusion into freshwater areas. Low-head dams and WCSs are also used in shallow freshwater coastal lakes to reduce both saltwater intrusion and to diminish localized flooding of the surrounding area by these lakes in times of high water. Unlike large dams (>7.6 m high) that have been largely studied and assessed as to their impacts on their surrounding aquatic and terrestrial environments, low-head dams and WCSs have not been thoroughly examined, and little is known about the level of impact low-head structures have on the surrounding environment (Fencl et al. 2015).

Tide gates or flap gates are a form of low-head WCS and are known to create a temporal barrier to fish migration, opening only during the ebb tide and closing during the flood tide to prevent saltwater intrusion (Bourne et al. 2011). These types of structures open and close with tides, wind, or water pressure and create limited opportunities for fish migration and potentially unfavorable passage conditions. This limited connectivity poses a substantial threat to migratory fish species, especially those that are already in a depleted or declining state. Low flow conditions are associated with closed tide gates, which likely impede movement of fishes. Improved tide gate designs have the potential to further minimize upstream flow to prevent saltwater intrusion, thus limiting access to and from necessary habitats for migratory species based on flow reduction (Walsh et al. 2005).

Anadromous river herring (including Blueback Herring *Alosa aestivalis* and Alewife *Alosa pseudoharengus*) are directly impacted by barriers to passage, especially in the Southeast. Blueback Herring use both lotic (moving-water) and lentic (still-water) habitats, while Alewives are most abundant in lentic habitats (Loesch 1987, Walsh et al. 2005). Walsh et al. (2005) also found that fluctuations in river flow affected habitat use: moderate to high discharge rates increased the use of spawning and nursery habitat while low discharge reduced the spawning habitat. Stream discharge, volume of water, transparency, pH, trophic effects, and system size among other attributes contribute to heterogeneity across systems and may influence the abundance of river herring during freshwater residence (Kosa and Mather 2001). These species are often passed successfully through medium to high-head dams in the Northeast with the assistance of fish passage structures. Without a fall line close to the ocean, the low-lying Southeast coast must use low-head WCSs and less successful methods for fish passage, especially for River herring and other migratory species.

History and current state of water control structures at Lake Mattamuskeet

Water control structures were installed to regulate flow between Lake Mattamuskeet and Pamlico Sound through the action of flapgates. Since construction, several flapgate designs have been used to allow outflow of lake water toward Pamlico Sound in times of high water (to prevent flooding of adjacent farmland) and during wind-tide events. The original flapgate design was a top-hinged wooden door covering the entire embayment (Rulifson and Wall 2006; Figure

1.2). This flapgate design opened when pressure on the upstream (lake) side was great enough to force the door to swing upward, causing the bottom of the embayment to open first as the door moved upward. The opening increased in size with greater lake-head pressure from rain events or wind-driven lake elevation. These wooden gates deteriorated over time, allowing saltwater intrusion into the lake. The original wooden flapgates were eventually replaced in 1989 with vertical wooden stop blocks inserted into slots within each concrete embayment of the WCS (Rulifson and Wall, 2006). These stop blocks were equipped with top-hinged stainless steel flapgates mounted near the bottom of each stop block; these heavy flapgates required greater lakeside pressure to open and had a much smaller opening compared to the original wooden full-embayment flapgates (Figure 1.3). In 1996, slotted weirs were installed at the top of some of the wooden stop blocks to enhance fish and blue crab passage at the canal surface. The slotted weirs were installed into those stop blocks outfitted with the stainless steel flapgates (Figure 1.4).

Currently, two forms of flapgates are in place: full-embayment, top-hinged stainless steel flapgates emulating the action of the original wooden flapgates but lighter in weight and with better structural integrity, and newly-developed side-opening aluminum gates, which open with much less upstream pressure than the top-hinged flapgate design and open like a regular door (hinged on the side). One reason for implementing the new side-opening aluminum gates was to hopefully facilitate fish passage into and from Lake Mattamuskeet. Of special concern were the anadromous River herring and the catadromous American eel *Anguilla rostrata* (Wall and Rulifson 1999, Godwin and Rulifson 2002, Wall 2003, Cudney 2004, Godwin 2004, Rulifson et al. 2004, Rulifson and Wall 2006).

What was once a thriving fishery and source of income for local fishers in North Carolina, including Lake Mattamuskeet, river herring and American eel populations have declined range wide, including within North Carolina and the lake (down from 12.6 million pounds harvested in 1955 to 250,000 pounds harvested in 2005 in North Carolina) (Wildlife in North Carolina "Fish of Yesterday, Fish of Tomorrow," 2007). River herring population declines have led to a no-harvest provision for both commercial and recreational fisheries in joint and coastal waters of North Carolina as of 2007 (NCDMF 2017). Additionally, no river herring greater than 6 inches may be taken from inland waters. According to NCDMF (2017), recruitment and juvenile abundance of river herring are still below targets for rebuilding despite the imposed fishing moratorium. Current regulations for American eel include a minimum total fish length of 9 inches for both the commercial and recreational fisheries, as well as a new recreational bag limit of 25 eel per person per day in North Carolina (NCDMF 2015).

Water control structure design may have a limiting effect on the passage of aquatic species to and from Lake Mattamuskeet through the four manmade canals (Wall and Rulifson 1999, Godwin and Rulifson 2002). New WCS designs (including the tightening and replacement of seals to prevent leaks from the sound side to the lake side, total replacement of top-hinged stainless steel gates, and/or installation of side-opening aluminum gates) in these canals has better minimized upstream flow from the sound side of the WCSs to the lake side, thus limiting access to and from the lake for these species based on flow reduction (Walsh et al. 2005). Water control structure design impacts on the ecological community have been studied previously at this site, including those by Godwin and Rulifson (2002), Godwin (2004), Rulifson et al. (2004), and Rulifson and Wall (2006). The two current WCS designs (top-hinged stainless-steel gates and side-opening aluminum gates) and their influences on fish passage in this unique aquatic system have not been assessed and merit further study.

Project statement

This chapter (Chapter One) serves as an introduction to general water management and water management structures (often referred to as WCSs) and their functions and uses. Issues associated with WCSs, especially as related to barriers to fish passage in the Southeastern United States are also discussed. Chapter Two reviews the National Wildlife Refuge System and the attempts of refuge planning to minimize public use conflicts while conserving natural resources using one National Wildlife Refuge in the Southeastern United States -- Mattamuskeet National Wildlife Refuge, Hyde County North Carolina -- as a case study investigating similarity among refuge management documents. Chapter Three includes the utilization and effectiveness of side-opening versus top-hinged gates in low-head WCSs in a coastal impounded lake in the Southeastern United States (Lake Mattamuskeet of Mattamuskeet National Wildlife Refuge) for diadromous fish passage. Chapter Four discusses the relative spawning success and lake habitat use by juvenile diadromous fishes in Lake Mattamuskeet. Chapter Five will summarize the findings of the previous chapters and make recommendations to the United States Fish and Wildlife Service for management of National Wildlife Refuges for a balance of both biodiversity and recreational use opportunities for visitors.

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Figures

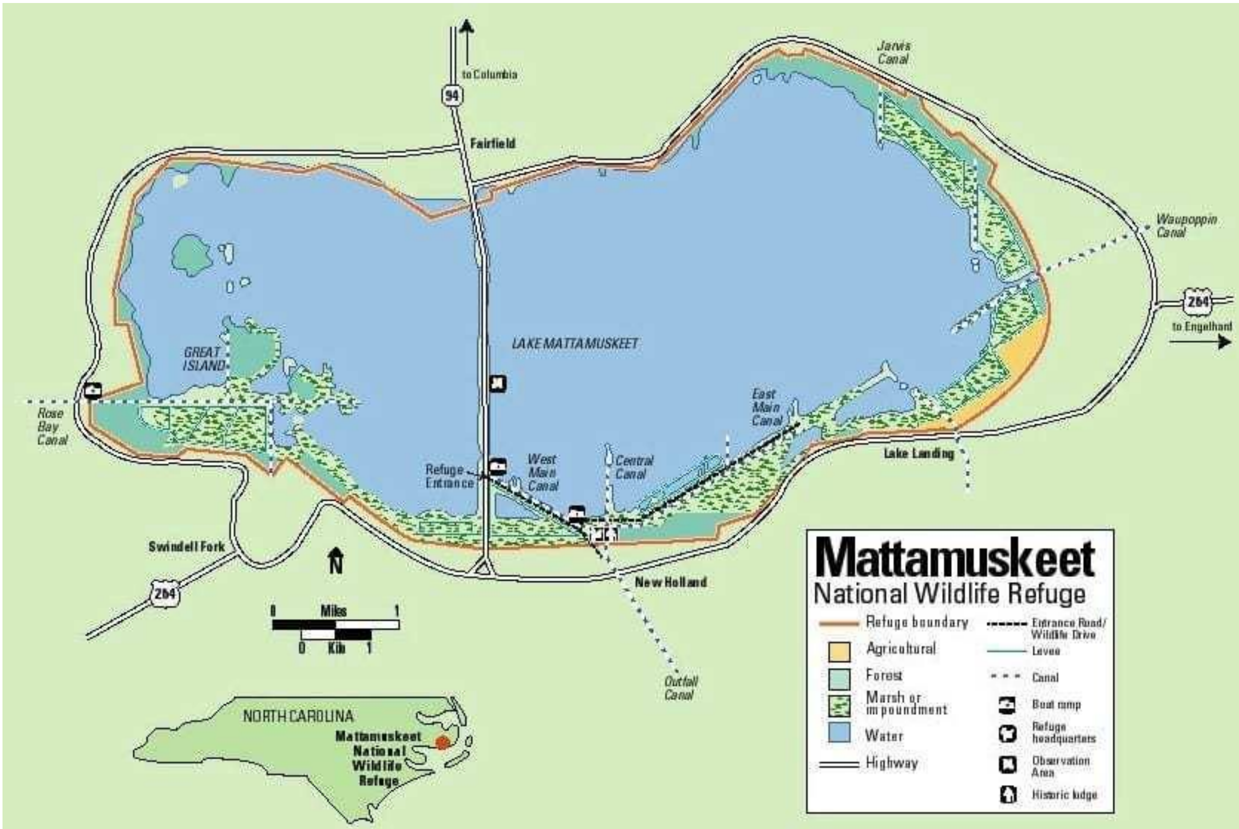

Figure 1.1. Map of the Mattamuskeet National Wildlife Refuge showing Lake Mattamuskeet, location of the four man-made canals (Rose Bay, Outfall/Central, Lake Landing, and Waupoppin), adjacent farmlands/wetland areas, and boundary road system (USFWS).

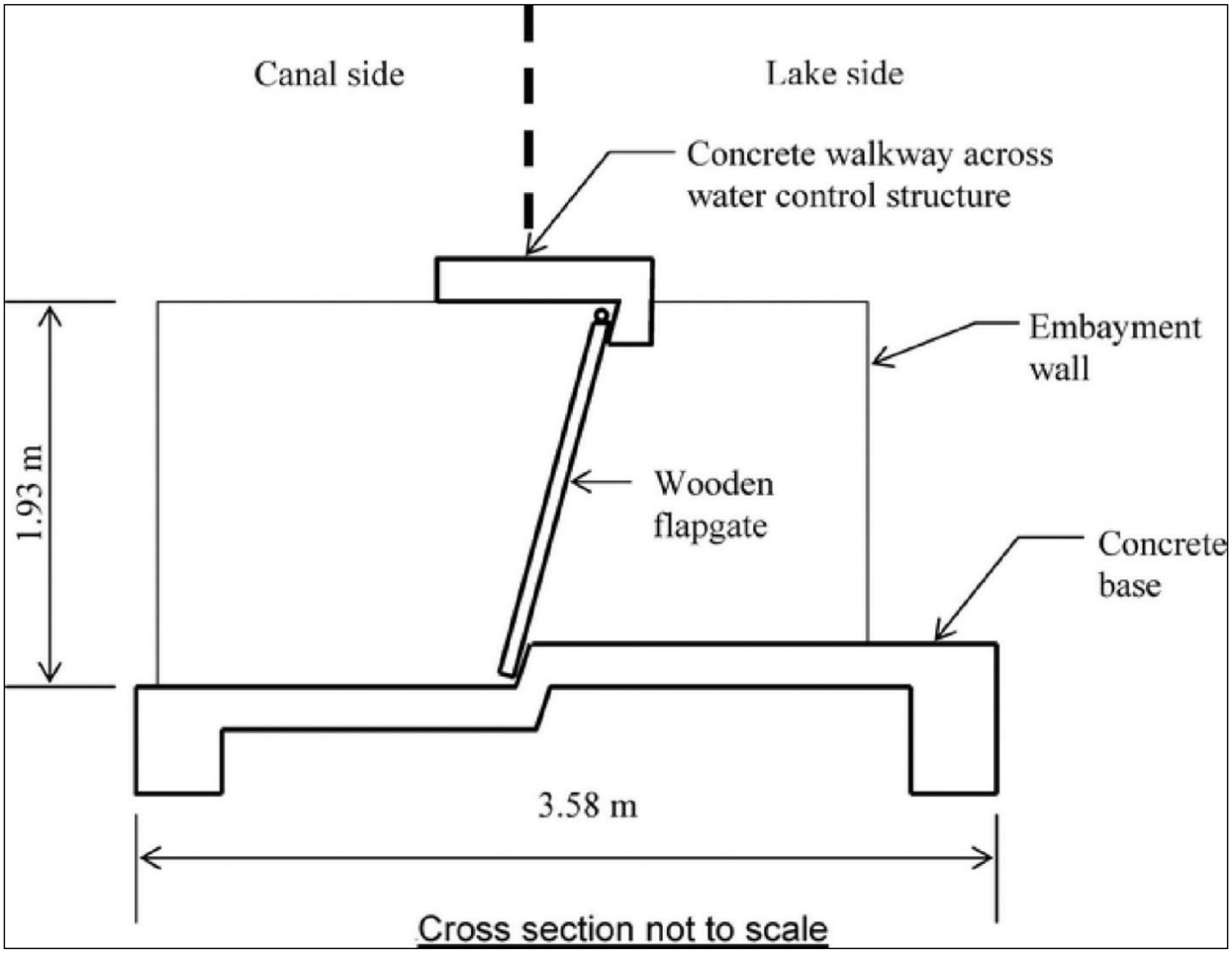

Figure 1.2. Line drawing of the original wooden flapgate (redrawn from a U.S. Fish and Wildlife Service drawing by the regional engineer, Atlanta, 1950; Rulifson and Wall 2006).

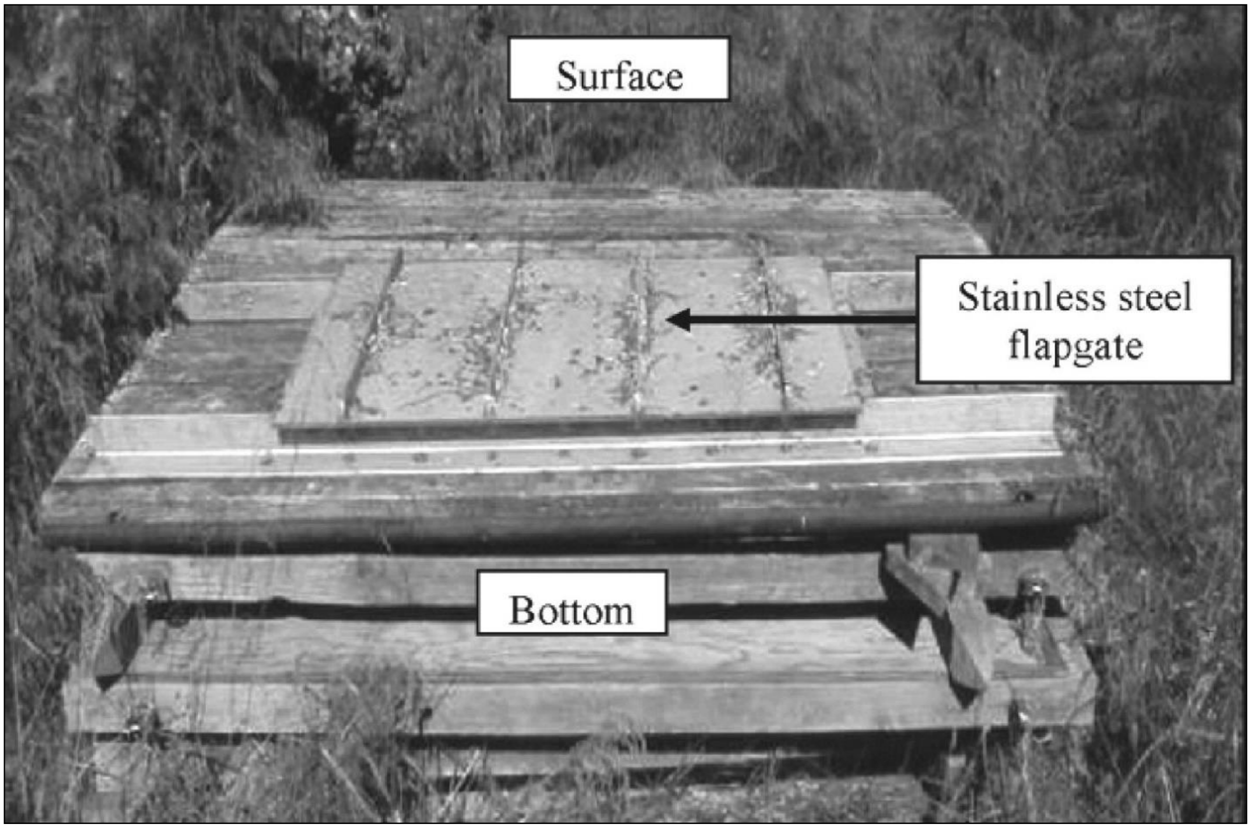

Figure 1.3. Photograph of a wooden stop block with stainless steel flapgate which were installed in 1989 (Rulifson and Wall 2006).

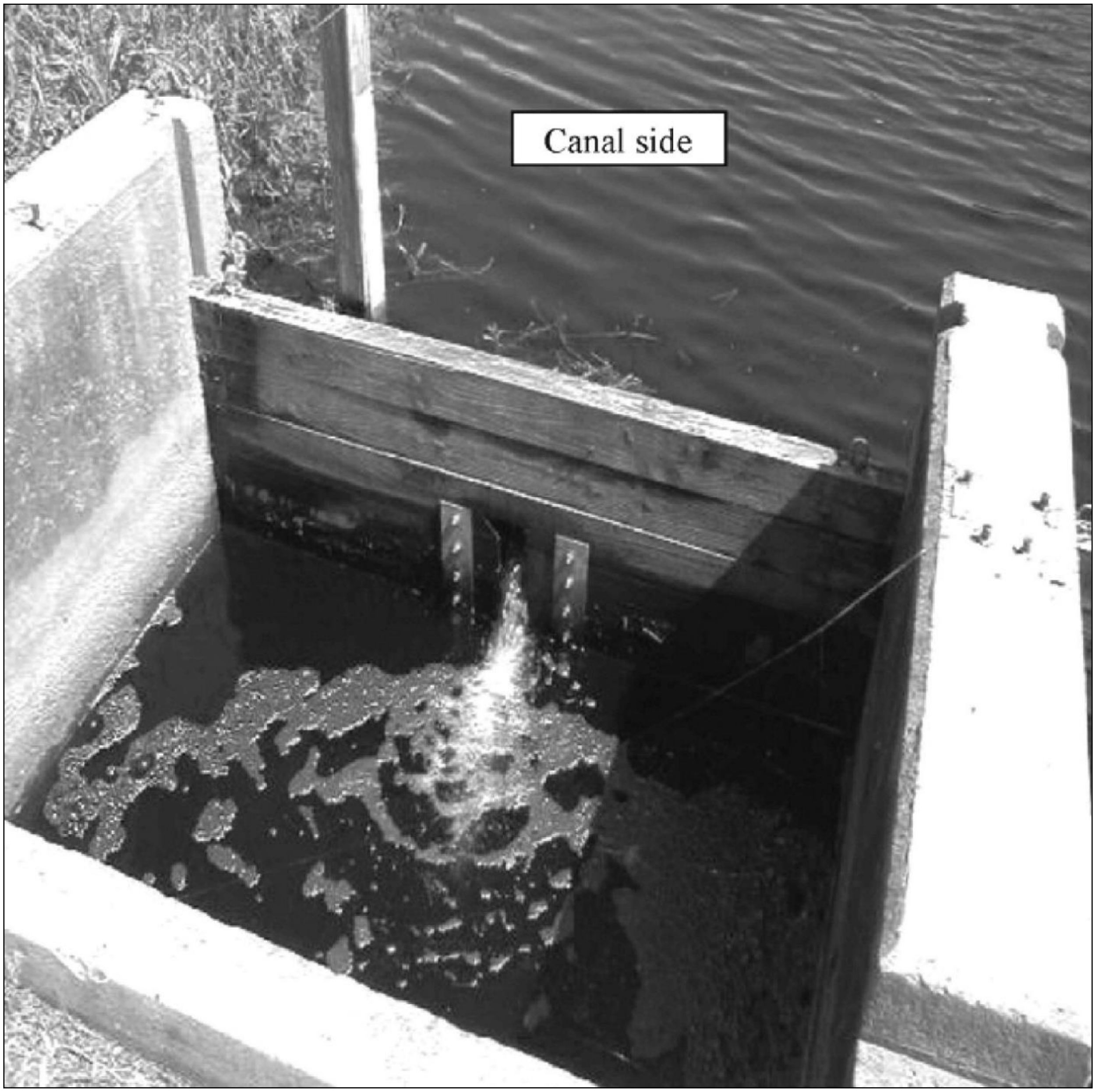

Figure 1.4. Photograph of one of the fish passage slotted weirs that were installed in 1996 in existing wooden stop blocks in an effort to enhance fish and blue crab passage (Rulifson and Wall 2006).

Chapter Two: National Wildlife Refuge Planning and Potential for Public Use Conflict

Introduction

Refuge concept

President Theodore Roosevelt established the first National Wildlife Refuge (NWR) through Executive Order on March 14, 1903 (USFWS "The Early Years," n.d.). The Bureau of Biological Survey was established in 1905 to oversee the management of new refuges, and through the Migratory Bird Act of 1913 was able to effectively give control of the management of migratory birds and their habitats to the federal government (USFWS "The Early Years," n.d.). In 1929, the National Wildlife Refuge System was established under the Migratory Bird Conservation Act (USFWS "Organization and Growth," n.d.). In 1934, the Migratory Bird Hunting and Conservation Stamp Act (Duck Stamp Act), as well as the Fish and Wildlife Coordination Act, provided for growth and expansion of the National Wildlife Refuge System and allowed for agencies to acquire lands for the use of fish and wildlife habitat (USFWS "Organization and Growth," n.d.). The National Wildlife Refuge System has grown to include over 560 refuges since that time.

Mattamuskeet NWR as a model for USFWS Southeast Region refuges

Mattamuskeet National Wildlife Refuge (MNWR) is located on the Albemarle-Pamlico Peninsula in Hyde County, North Carolina. The refuge totals 50,180 acres, including the 40,100-acre Lake Mattamuskeet, the largest natural lake in North Carolina (Figure 2.1).

Lake Mattamuskeet is connected to Pamlico Sound by four man-made canals that were dug to facilitate lake drainage by private investors in the early 1900s. The refuge was sold to the federal government in 1934, and since that time the lake has been managed with water control structure (WCS) flapgates on each of the four canals to allow outflow in times of high water (to prevent flooding of adjacent farmland) and wind-tide events. The MNWR provides refuge for hundreds of thousands of wintering waterfowl each year and habitat for salt and freshwater fish species and other wildlife. The refuge also provides varying degrees of recreational activities, including birding, nature photography opportunities, waterfowl hunting, and fishing for salt and freshwater species.

Mattamuskeet National Wildlife Refuge was founded in accordance with the Migratory Bird Conservation Act of 1929 "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." (Migratory Bird Conservation Act: 16 U.S.C. § 715d, 1929). President Franklin D. Roosevelt officially created MNWR on December 18, 1934 by Executive Order 6924 "…as a refuge and breeding ground for birds and wild animals, and (2) that such portion as the Secretary of Agriculture [Interior] may deem proper be reserved for use as a shooting area, to be operated under a cooperative agreement or lease .... With regard to the waters ... the Secretary of Agriculture [Interior] ... may enter into a cooperative agreement or lease ... said waters may be used for fishing purposes ..." (Presidential Executive Order 6924, 1934). These founding documents leave much of the exact natural resource management requirements open to interpretation, although historical and current management has interpreted this as providing optimal habitat for migratory birds, especially wintering waterfowl.

One management strategy is the use of 14 man-made wetland impoundments totaling approximately 2,500 acres. These impoundments are managed for natural emergent vegetation and are flooded in the fall to provide resting and feeding areas for waterfowl and wading birds. In addition to these impoundments and as mentioned above, passive water management of Lake Mattamuskeet is employed via outflow (seaward) flapgates in each of the four canals. This passive management allows for rainfall (natural) inflow and outflow during high water or wind-tide events. This passive management system typically leaves lake levels lower in the summer and fall due to evaporation and higher in winter and spring due to rainwater inputs. The shallow waters of the summer and fall allow for submerged aquatic vegetation and associated macroinvertebrates, as well as emergent vegetation growth within and around the lake. Both of these vegetation types are winter food sources and/or resting habitat for migratory waterfowl (Krull 1970).

This focus of resource management on waterfowl habitat has limited fishing opportunities and/or fishery habitat. Shallow lake levels create navigational issues for motorized boat users who intend to fish on the lake. Boats are only allowed on the lake from March 1st – October 31st each year to prevent disturbance to waterfowl on the lake and in the managed impoundments in the fall and winter (November 1st – February 28th each year). Shallow lake levels also tend to be warmer, pushing fish into the deeper, cooler, and slightly more saline canals adjacent to the lake during the summer months thereby limiting the fishing opportunities in the lake itself. Shallow lake levels also potentially limit the spawning success of species desired for recreational sport fishing resulting from the inability to access spawning beds near the lake shore due to water level itself or due to the high temperatures of the shallow water. Anecdotal local fishing reports indicate a decline in the recreational sport fishing in Lake Mattamuskeet from its peak in the 1970s and 1980s. The knowledge of what “once was” leaves many recreational users with hope to obtain such a peak once more. Water quality and clarity in the lake has also decreased over time, which the public has often attributed to inputs to the Mattamuskeet watershed from surrounding nutrient-rich agricultural land and managed waterfowl impoundments that have deeded drainage rights into Lake Mattamuskeet (Howell and Moorman 2016).

By focusing primary management strategies on providing wintering waterfowl habitat, the refuge has inherently created enhanced opportunities for recreational user groups that focus on activities directly related to migratory birds including waterfowl hunting, birding, and photography. Based on anecdotal comments at public meetings from local fishers regarding the decline of fishing opportunities and quality of fishing at the lake, it can be inferred that specialized fishers at Lake Mattamuskeet are experiencing feelings of group-based fraternal deprivation when compared to other recreational use groups at Lake Mattamuskeet.

Theory of Recreation Specialization and MNWR

The Theory of Recreation Specialization was first published and then expanded by Bryan (1977, 1979), who first introduced the theory in response to the low correlation between leisure activity variables and standard sociological values. The concept for this conflict theory came from his study of trout fishermen (catch-and-release only versus catch-and-keep, for example); there were different levels of specialization within broad user groups. Bryan's theory of outdoor recreation specialization refers to a continuum of behavior from general interest and low involvement to specialized interest and high involvement as reflected by one's experience, skill, equipment utilization, and value orientation and activity setting preferences. Bryan (1977,1979) refined this theory to show that recreation specialists share similar beliefs, attitudes, and values about their sport. Bryan (1977,1979) also hypothesized that recreationist preferences and attitudes toward specific environmental settings will change with specialization.

Preferences and attitudes toward specific environmental settings bridge into natural resource management preferences. Bryan (2000) states "Managerial applications of specialization are another matter. Large numbers of recreationists define the mid-to-lower-end of the specialization curve. They may have low to medium knowledge and sensitivity about resource management issues. Managers are cross-pressured between the majority public opinion of license holders and political clout of specialists advocating different actions." However, popular opinion may not be the best management strategy, leaving managers with the choice of perhaps unwise policy or catering to elite constituencies (Bryan 2000). The theory of recreation specialization can be applied to the outdoor recreationists at MNWR and other public lands. Lake Mattamuskeet brings fishers of all specialization levels to one fishing area, as evidenced by creel survey data collected by the North Carolina Wildlife Resources Commission (NCWRC) in 2014 (NCWRC "Lake Mattamuskeet Creel Survey, 2014," 2015). Considering the wide array of fresh and saltwater species, as well as locations and fishing methods, opportunities for multiple specialization groups are certainly possible. Less specialized fishers could include those who are willing to fish by wading in the lake, from the canal bank or lake shore, from kayaks/canoes or other non-motorized boats, or fish from a motorized boat. Less specialized fishers could also include those who are willing to fish both in Lake Mattamuskeet itself and in the deeper canals that are connected to it, as well as those individuals who are not targeting any species or are there to catch “anything that bites.” Based on Bryan’s (1977,1979) hypothesis, less specialized fishers (those who are not specialized in one method of fishing or for one specific fish species) are less likely to have strong preferences and attitudes toward any specific environmental settings in the fishing area.

Following some of the preferences listed by Bryan (1977,1979), Lake Mattamuskeet also provides opportunities for highly specialized recreational fishers. These highly specialized recreational fishers could include any combination of the options for specialization that were mentioned in relation to less specialized users as was mentioned above (such as those fishing only for a specific species, only from a motor boat, etc), as well specific levels of experience or history in the area of recreation. Based on Bryan’s hypothesis that recreation specialists share similar beliefs, attitudes, and values about their sport, it can be inferred that highly specialized recreational fishers most likely have similar preferences and attitudes toward resource management practices at the MNWR and are defined as a user group. By using the attitudes and preferences of a specific user group and using it to define the “group” in group-based fraternal deprivation, feelings of deprivation and potential ways to acknowledge these feelings of deprivation can be better understood.

The Relative Deprivation Theory and MNWR

The Relative Deprivation Theory was first developed by Stouffer et al. (1949) based on research performed on American soldiers during World War II. Stouffer et al. (1949) introduced the theory to explain the relationships between soldiers' objective situations and their feelings of satisfaction. The two focus groups of the study were highly-promoted military airmen and rarely-promoted military policemen. The researchers compared satisfaction with the promotion rate of those in similar positions (airmen comparing to airmen and policemen comparing to policemen) rather than comparing one job position to other job positions. Dissatisfaction can be related to issues of fairness when allocating resources, or in the case of Stouffer et al. (1949), promotion rate. Comparing what you are given (e.g., a raise or some other good or opportunity) to those around you, or to what you had in the past or could have in the future, is the basis for potential feelings of deprivation at either the individual or group level. Tyler et al. (1997) listed options for comparison targets both at the individual and group level. For the purpose of relating this concept to the situation occurring at the MNWR, the group comparisons are key.

Stouffer's Relative Deprivation Theory was described as a series of five factors for an individual or group to feel relatively deprived, in which relative deprivation should be seen as an emotional-psychological state produced by these factors (Crosby, 1976). Individuals or groups must (1) want the good or service, (2) see another person that has the good or service, (3) feel that they are entitled to the good or service, (4) believe that it is possible and feasible to obtain the good or service, and (5) lack a sense of responsibility for failure to possess the good or intended service (Crosby 1976).

The concept of individual (egoistic) versus group-based fraternal deprivation was first introduced by Runciman (1966). Individual deprivation derives from interpersonal comparisons, while group-based fraternal deprivation derives from intergroup comparisons (comparisons with one's group to other groups). Individuals may think they are personally deprived, or their identified group is deprived because of some shared characteristic (Runciman 1966). In the case of the MNWR, the sportfisher group could feel deprived because their recreational activity goals and desires are not being met. The group-based association has been found to lead to two consequences that are not as prevalent in individual associations (Tyler et al. 1997). Tyler et al. (1997) describes the first consequence as the increased likelihood that people will acknowledge the existence of injustice when used at the group level. The second consequence is that people are more likely to engage in active attempts to change the system when the injustice is viewed at the group level. These ideas, coupled with Crosby's (1976) notion that resentment, anger, and dissatisfaction are the emotional results of relative deprivation, can lead to tense situations revolving around the perceived injustice.

The concept of feasibility in relation to deprivation has been studied over the past few decades. Ellemers (1993) found that feasibility of an activity influences both level of anger and judgments about what actions should be taken. There is a relationship between low feasibility and high anger, or high feasibility and low anger, as well as low feasibility and low action or high feasibility and high action (Ellemers 1993). In general, people are more likely to become enraged when the possibility of an activity they want happening is very low. Ellemers (1993) combines the overarching themes of Crosby's (1976) factors for deprivation with feasibility to show the sequence of actions taken against a perceived injustice. This is beneficial in determining how likely an individual or group will be to act in the instance of perceived injustice based on the feasibility of attaining their goals or desires in order to demand change.

Loomis and Ditton (1993) summarized that (1) managers should better anticipate reactions to resource allocations that could potentially cause anger or dissatisfaction. They also stated that (2) managers need to employ social investigations to estimate potential impacts. Additionally, (3) managers should promote educational efforts to correct perceptions of fairness, and (4) use the implications from studies of fairness and justice in educating future professionals (Loomis and Ditton, 1993).

Managing National Wildlife Refuges for multiple uses and MNWR

Based on anecdotal comments made by local fishers at public meetings, through non-profit interest groups ("Save Mattamuskeet Lake," for example), and on the internet, some highly specialized recreational fishers at Mattamuskeet National Wildlife Refuge may be experiencing or have experienced group-based fraternal deprivation due to differing opinions on proper management of the lake. Although feelings of group-based fraternal deprivation may be in place and the user groups believe it feasible to obtain changes in resource management at the MNWR, the refuge is responsible for upholding the founding documents from which it was created. As mentioned previously, these founding documents leave much of the exact natural resource management requirements open for interpretation, but historical and current management at both the regional USFWS level and MNWR local level have interpreted this as providing optimal habitat for migratory birds (particularly wintering waterfowl) by directing staff effort and funding toward projects to improve waterfowl habitat and enhance waterfowl-related recreational activities (managing impoundments for native vegetation favorable to wintering waterfowl, non-native invasive vegetation removal, submerged aquatic vegetation surveys, weekly ground surveys in winter, monthly aerial surveys in winter, holding a yearly Swan Days festival with waterfowl viewing tours, permitted waterfowl hunts each year, etc). Directing resource management efforts toward strategies that have proven favorable for waterfowl habitat is likely perceived by refuge management as providing optimal habitat.

Despite founding documents, all recreational uses must be included in management actions for the land to serve the public good. Public consensus and understanding of recreation specialization and feelings of group-based fraternal deprivation must play a role in management strategies to retain overall management approval, especially in coastal areas with limited resources such as a fishery. Lake Mattamuskeet has a very unique aquatic ecosystem, with fishers often targeting largemouth bass, black crappie, white perch, striped bass, and Atlantic blue crab. Few other locations within the commuting area offer opportunities to target both fresh and saltwater fish species. NWR Comprehensive Conservation Plans (CCPs) have been implemented by the National Wildlife Refuge System to better conserve NWR floral and faunal resources for the continued benefit of the American people (USFWS “System Planning –

Overview," n.d.). Such plans utilize public input and scientific data to determine areas of priority for management of each individual refuge. CCPs are useful in addressing the concerns of stakeholders while also holding true to the primary mission and founding documents of an individual refuge.

National Wildlife Refuge Comprehensive Conservation Plans

In 1997, the National Wildlife Refuge System Improvement Act was passed, and with it the requirement for each refuge to develop a CCP to more effectively manage their floral and faunal resources (USFWS "System Planning – Overview," n.d.). The Act also realigned the central mission of the National Wildlife Refuge System to be devoted to conserving wildlife and maintaining the biological integrity of ecosystems, with the primary mission of the US Fish and Wildlife Service stated as "working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continued benefit of the American people" (USFWS "System Planning – Overview," n.d.).

Comprehensive Conservation Plans are established through a planning process with three integral components: a logical rationale, a thorough analysis, and public involvement. There are eight steps in the CCP planning process to which each refuge must adhere (Figure 2.2). First, a preplanning stage is initiated in which the refuge "plans to make a plan." Second, the refuge must initiate public involvement and scoping in order to understand the needs and wants of the public and all interested parties. Third, a draft vision statement and goals is developed by the refuge and partners in order to determine the major issues. Fourth, alternatives to management practices are developed and analyzed. Fifth, a draft plan (including either an environmental assessment (EA) or environmental impact statement (EIS) meeting the requirements of the National Environmental Policy Act (NEPA) is prepared and submitted. Sixth, the final plan is prepared and adopted under the approval of the National Wildlife Refuge System. Seventh, the CCP is implemented, monitored, and evaluated over time. Eighth and finally, the plan is reviewed and revised as necessary. In addition to the actual CCP, there are also stepdown plans detailing specific projects to be carried out by the refuge staff for meeting the needs of the CCP (USFWS "System Planning – Overview," n.d.).

Each refuge is managed in accordance with their founding documents and primary mission, and every refuge differs in ecology, biodiversity, and public interest. With a multi-region National Wildlife Refuge System, each region values and therefore manages the fish, wildlife, plants, and their habitats in slightly different ways. A Comprehensive Conservation Plan is a useful tool when seeking to understand the missions, goals, and ideals of refuges on the local, state, regional, and national level. Evaluating CCPs against founding documents achieves greater knowledge of the public and managerial interests of each refuge based on their diverse needs and wants.

Mattamuskeet National Wildlife Refuge's current CCP was implemented in 2008 (USFWS "National Wildlife Refuges Planning," n.d.). and a new CCP for this refuge (and all others) is mandated at a rate of once every 15 years. The 2023 MNWR plan (once developed and implemented) may serve as an extremely important tool in understanding how refuge and public management goals have evolved over time when compared to the 2008 plan as well as for interpreting how involved the public are currently, and will be in the continuing management of the refuge.

Analysis of Comprehensive Conservation Plans as they relate to National Wildlife Refuge priorities and mandates

Word frequency analysis is an emerging research tool and is often seen in popular culture to show how often certain keywords are being used. The use of tag and word clouds compiles frequently used keywords into a graphic with the most-used words in large font size and the least-used words in a small font size. Tag and word clouds aggregate key words and tags in order to describe an area of interest (Park et al. 2009). This text-based visual depiction is used to display relative tag frequency, importance, or popularity. Tag and word clouds can be used as a tool for the task of searching and exploring database or document content (Torres-Parejo et al. 2013). Using this technology on lengthy CCPs allows for a greater understanding of the issues, missions, and goals of refuges on the local, state, regional, and national level. For example, refuges managed primarily for waterfowl conservation should have high use of the word "waterfowl." This analysis may also be applicable when comparing across agencies, such as with the greater visitor use associated with the National Park Service.

Overall, this textual analysis of CCPs is useful in determining the priorities in the management of our federal lands. As the second evolution of CCPs are implemented in the near future, shifts in management priorities through comparisons of past and present CCPs will provide information on how our federal lands management is changing in response to climate and human stressors. Word frequency analysis and word clouds are a useful tool in comparing how a document may evolve over time (in this case against future CCPs). Where information-seeking tasks are more general, individuals have been found to prefer word or tag clouds over a search interface.

Methods

A word frequency and relationship cluster analysis of a subset of National Wildlife Refuge (NWR) CCPs and founding documents were conducted using NVivo Pro 12 (2015). These refuges are in Eastern North Carolina and included Mattamuskeet NWR, Swanquarter NWR, Cedar Island NWR, Pocosin Lakes NWR, and Alligator River NWR. Mattamuskeet and Pocosin Lakes NWRs are similar in that the refuge habitats are primarily lake-based. Swanquarter and Cedar Island refuges are similar in that they are largely shoreline emergent grasses bordered by open waters of Pamlico Sound. Alligator River NWR is a wide embayment-like river with extensive shoreline emergent grass habitats.

Each CCP and founding document for every National Wildlife Refuge listed were compiled into word clouds for visual representation of word frequency within each document. Additionally, a cluster analysis of document similarity was conducted between each listed National Wildlife Refuge CCP and founding document using NVivo Pro 12 cluster analysis tool using the Pearson correlation coefficient (-1 = least similar, 1 = most similar). Comparisons between the listed National Wildlife Refuges were also conducted with NVivo Pro 12 cluster analysis tool using the same text parameters. Common words such as "the" and "of" and all words with three letters or fewer were excluded from the frequency analysis. The sample size of the word frequency analysis was the top 100 most frequently used words in each document analyzed. Word clouds were created by a word frequency query to depict the 100 words most frequently used in the CCPs and founding documents: large font represents the most frequently used words and small font represents the least frequently used words (Figures 2.2-2.12).

Results

Results indicated that none of the refuges examined here had close associations between the founding documents and the CCPs: Pearson correlation coefficient values remained near 0.55 or lower. The Alligator River NWR CCP versus its founding documents had a Pearson correlation coefficient r= 0.405 while a similar comparison with Cedar Island NWR documents was 0.507. The Mattamuskeet NWR CCP versus its founding documents had a Pearson correlation coefficient of 0.426 while Pocosin Lakes NWR documents resulted in a value of 0.544. Swanquarter NWR CCP versus its founding documents resulted in a correlation of r= 0.545 (Table 2.1).

Even though CCPs and founding documents were not very similar, results showed that all compared CCPs were similar to each other (Table 2.2). The Swanquarter NWR CCP compared to that for Cedar Island NWR had a Pearson correlation coefficient of 0.919; Swanquarter's CCP versus Mattamuskeet NWR CCP was 0.914 and versus Pocosin Lakes was 0.898. The comparison of the Swanquarter NWR CCP versus Alligator River NWR CCP was lowest at 0.877. Comparing the Pocosin Lakes NWR CCP to the Cedar Island NWR CCP yielded a Pearson correlation coefficient of 0.905. Pocosin Lakes NWR compared with Alligator River resulted in a coefficient of 0.892. The comparison of Pocosin Lakes versus Mattamuskeet NWR CCPs was the lowest at 0.884. Cedar Island NWR CCP versus Alligator River NWR CCP had a Pearson correlation coefficient of 0.887. The Mattamuskeet NWR CCP -- Cedar Island NWR CCP comparison had a Pearson correlation coefficient of 0.884. The Mattamuskeet NWR CCP and Alligator River NWR CCP had a Pearson correlation coefficient of 0.857 (Table 2.2).

All founding documents for the sampled National Wildlife Refuges were also similar with one another but Pearson correlation values never exceeded 0.733 (Table 2.3). The founding documents of Cedar Island NWR versus Alligator River NWR had a Pearson correlation coefficient of 0.733 while the Cedar Island -- Mattamuskeet founding document comparison was 0.690. Founding documents for Pocosin Lakes NWR compared to Cedar Island NWR had a Pearson correlation coefficient of 0.658. The Pearson correlation coefficient for Swanquarter NWR versus Cedar Island NWR founding documents was 0.645. Mattamuskeet NWR versus Alligator River NWR founding documents was 0.589 while the correlation of founding documents for Pocosin Lakes NWR and Alligator River NWR was 0.572. Correlation coefficients for comparing founding documents for Swanquarter NWR versus Alligator River NWR was 0.572 and was slightly lower for the Swanquarter NWR -- Mattamuskeet NWR comparison at 0.521. Swanquarter NWR founding documents versus Pocosin Lakes NWR founding documents had a Pearson correlation coefficient of 0.399 (Table 2.3).

Table 2.4 shows the relative rank (1-10) and number of occurrences of 10 selected keywords in each CCP of the 5 selected refuges in this study. The keywords (including their associated root/base/stem words) include "conservation," "fish," "habitat," "hunting," "public," "recreation," "vegetation," "water," "waterfowl," and "wetland." These keywords were selected either based on their assumed ecological associations with each of the refuges studied or based on keywords associated with the USFWS National Wildlife Refuge System as a whole. Some potential for confirmation bias exists in that the 10 keywords are assumed to be frequently used in each of the refuge CCPs studied. The top 5 keywords appearing for all 5 refuges included "conservation" "fish" "habitat" and "public" (Table 2.4). The word "habitat" was the top-ranked word for Alligator River and Cedar Island NWRs, and was number 2 for Mattamuskeet NWR, which was the only refuge for which the word "fish" ranked number 1. The term "public" was ranked number 1 for Swanquarter and Pocosin Lakes NWRs, number 2 for Cedar Island NWR, and number 3 for both Alligator River and Mattamuskeet NWRs (Table 2.4).

Discussion

None of the refuges examined had close associations (correlation coefficient "r" being close to either +1 or -1 which few data points showing variation away from the line of best fit, with this study defining that small strength of associations exist between 0.1 – 0.3 or -0.1 – -0.3, medium strength of associations between 0.3 – 0.5 or -0.3 – -0.5, and large strength of associations between 0.5 – 1.0 or -0.5 – -1.0) between their founding documents and CCPs.

Mattamuskeet National Wildlife Refuge, which this study used as a model, was middle-of-the-road in terms of similarity between its CCP and founding documents, signaling that differences between the two documents are not necessarily unusual when compared to CCP and founding document similarity at the other National Wildlife Refuges used in this study. It was expected and confirmed that all CCPs would have close associations to one another and all founding documents would also be similar to one another. The National Wildlife Refuges selected are managed for similar purposes based on founding documents and may even be complexed with one another (with the same management staff overseeing multiple refuges, including the drafting and implementation of planning documents). While their founding documents varied slightly more, there is still a level of similarity most likely associated with the close geographical locations of the selected refuges exhibiting similar ecological conditions and needs, as well as public interests and needs. The close geographic proximities and likenesses found in the founding documents and CCPs of the selected refuges could be linked to the relative similarity in ecological communities found within the 5 studied refuges. Additionally, overlap in staffing among the reviewed refuges could also be cause for similarities within CCPs, as the same staff likely aided in developing sections of multiple CCPs. Overall, this word frequency analysis portrays that Mattamuskeet National Wildlife Refuge is not unusual in its level of similarity between CCPs and founding documents when compared to other refuges in Eastern North Carolina. While the five Eastern North Carolina NWRs selected for this study were similar in their CCPs and founding documents within and between each refuge, it would be relevant to conduct another study to determine if these similarities increase, decrease, or remain the same when compared to other regions with differing priorities.

Similarities between refuge planning documents were expected between some of the refuges based on similar habitat types and uses associated with the selected refuges. Mattamuskeet and Pocosin Lakes NWRs both encompass closed water bodies exhibiting similar characteristics of shallow coastal lakes managed primarily for wintering waterfowl habitat, with Pocosin Lakes NWR also including many additional habitat types. Alligator River NWR borders the Alligator River and Albemarle, Croatan, and Pamlico Sounds and includes many diverse habitat types. Cedar Island and Swanquarter NWRs are both mostly marsh-estuarine habitats that are located across Pamlico Sound from one another and house similar ecological communities. It is not surprising and not necessarily a negative implication having the 5 studied refuges be similar with one another in terms of founding documents and CCPs, as in general the 5 refuges have similar ecological communities and public use needs based on their close geographical proximities to one another. It thus becomes a question of how similar is too similar – when does a founding document or CCP become boilerplate or fluff language, too broad to really guide individual management of these refuges? Additional research comparing similarities amongst founding documents and CCPs across the entire National Wildlife Refuge System may be merited in the future to determine the level of overlap or possible overgeneralizations of management prescriptions that may be occurring across the National Wildlife Refuge System and not solely within the selected refuges for this study. Understandably, there is likely some degree of planning overlap across the country, as the National Wildlife Refuge System focuses management strategies for public use on the 'Big Six', which include hunting, fishing, wildlife observation, photography, environmental education, and interpretation (USFWS "Welcome to the National Wildlife Refuge System," 2011). Many of the planning strategies, especially for visitor use opportunities, could justifiably overlap among refuges based on standard practices.

The keywords (including their associated root/base/stem words) compared in Table 2.3 include "conservation," "fish," "habitat," "hunting," "public," "recreation," "vegetation," "water," "waterfowl," and "wetland." This table more easily compares keywords among the selected refuges than looking at the individual word clouds of each refuge, which are mainly used as a visual tool depicting overall priorities and/or language frequently used in a CCP. Of interest to this study was the practical application of relating word frequency to evidence of management of frequently used keywords in actual refuge management practices. For example, "fish" being a top 5 word in each of the studied refuges does not necessarily translate to fishing, fisheries management, fish habitat, etc. being a priority in actual refuge management techniques. However, Mattamuskeet NWR's word frequency analysis shows "fish" as its #1 most frequently used word, which seems on track with identified goals in Mattamuskeet NWR's CCP for fisheries enhancement, including that of diadromous fish passage. Other refuges in this study are not as well known for their current fisheries management practices or historical value of fisheries as Mattamuskeet NWR is. According to the word frequency analysis, "fish" (fisheries, fishing), "habitat," "public" (use/input/access), "conservation," and "water" are among the most important keywords associated with Mattamuskeet NWR's CCP. Considering that the majority of Mattamuskeet NWR's acreage is comprised of the largest natural lake in North Carolina (Lake Mattamuskeet), "fish" and "water" being top-used words is not surprising and should in fact be looked at in positive regard in that the two keywords are of utmost use in refuge planning. The other frequently used keywords are more general and could be related to the overarching mission and goals of the National Wildlife Refuge System (public use, conservation, and habitat management).

With ever-increasing public use and visitation on National Wildlife Refuges, it is imperative that future CCPs continue to focus planning strategies in a multi-disciplinary manner, including the balance of conservation practices with increasing public use. From fiscal year 2010 – 2015, refuge visitation rates across the nation increased from 44.48 million visitors to 48.48 million visitors (USFWS "Annual Performance Report FY15," 2016). The yearly increase in public use serves as evidence for the management of National Wildlife Refuges to be geared toward the continued benefit of the American people, including the benefit of public use and visitation opportunities. While public use continues to increase, one of the priority recreational use opportunities on National Wildlife Refuges (fishing) has decreased yearly from fiscal year 2010 (7.16 million fishing visits) to 2015 (6.77 million fishing visits). The United States Fish and Wildlife Service partially contributes this decline to fewer staff and curtailed hours of fishing opportunity (USFWS "Annual Performance Report FY15," 2016). At least at Mattamuskeet NWR, other factors such as decreased access to fishing locations, poor water quality, or lack of acceptable spawning habitat to maintain healthy fish populations and encourage fishers through high success rates may be additional limiting factors in fishing visits and cause for the theorized presence of group-based fraternal deprivation among specialized fishers at Lake Mattamuskeet. Additionally, lack of staffing and funding at MNWR has likely reduced the refuge's ability to focus management on each of the "Big Six."

When looking to future versions of National Wildlife Refuge CCPs, current needs must be considered. Environmental and public use conditions at some locations across the nation and especially at Mattamuskeet NWR have changed dramatically since the first editions of CCPs were introduced into the National Wildlife Refuge System planning process. These differences include ecological community changes due to sea level rise, climate change, and other environmental factors, changes in public use activities and trends, and changes in refuge management capabilities due to differences in number of staff or size of budgets. These considerations will likely significantly change many of the second-generation CCPs and will hopefully serve as an updated vision to guide adaptive resource management for the following 15 years. In addition to guiding adaptive resource management, the second-generation CCPs will also serve as a useful tool when determining shifting goals and priorities of refuges by comparison with first-generation CCPs.

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Tables

Table 2.1. NVivo Pro 12 table output of cluster analysis Pearson correlation coefficient between listed National Wildlife Refuges CCPs and founding documents.

File A	**File B**	**Pearson r**
Files\\AlligatorRiverFinalCCPSigsBlocked	Files\\alligator river founding documents	0.405
Files\\Swanquarter Final CCP edited	Files\\swanquarter founding documents	0.545
Files\\Pocosin Lakes NWR CCP	Files\\pocosin founding documents	0.544
Files\\Edited Mattamuskeet Final CCP	Files\\mnwr founding documents	0.426
Files\\cedar island draft ccp edited	Files\\cedar island founding documents	0.507

Table 2.2. NVivo Pro 12 table output of cluster analysis Pearson correlation coefficient between listed National Wildlife Refuges CCPs.

File A	**File B**	**Pearson r**
Files\\Swanquarter Final CCP edited	Files\\cedar island draft ccp edited	0.919
Files\\Swanquarter Final CCP edited	Files\\Edited Mattamuskeet Final CCP	0.914
Files\\Pocosin Lakes NWR CCP	Files\\cedar island draft ccp edited	0.905
Files\\Swanquarter Final CCP edited	Files\\Pocosin Lakes NWR CCP	0.898
Files\\Pocosin Lakes NWR CCP	Files\\AlligatorRiverFinalCCPSigsBlocked	0.892
Files\\cedar island draft ccp edited	Files\\AlligatorRiverFinalCCPSigsBlocked	0.887
Files\\Pocosin Lakes NWR CCP	Files\\Edited Mattamuskeet Final CCP	0.885
Files\\Edited Mattamuskeet Final CCP	Files\\cedar island draft ccp edited	0.884
Files\\Swanquarter Final CCP edited	Files\\AlligatorRiverFinalCCPSigsBlocked	0.877
Files\\Edited Mattamuskeet Final CCP	Files\\AlligatorRiverFinalCCPSigsBlocked	0.857

Table 2.3. NVivo Pro 12 table output of cluster analysis Pearson correlation coefficient between listed National Wildlife Refuges founding documents.

File A	**File B**	**Pearson r**
Files\\cedar island founding documents	Files\\alligator river founding documents	0.733
Files\\mnwr founding documents	Files\\cedar island founding documents	0.690
Files\\mnwr founding documents	Files\\alligator river founding documents	0.589
Files\\pocosin founding documents	Files\\cedar island founding documents	0.658
Files\\pocosin founding documents	Files\\alligator river founding documents	0.572
Files\\pocosin founding documents	Files\\mnwr founding documents	0.379
Files\\swanquarter founding documents	Files\\cedar island founding documents	0.645
Files\\swanquarter founding documents	Files\\alligator river founding documents	0.572
Files\\swanquarter founding documents	Files\\mnwr founding documents	0.522
Files\\swanquarter founding documents	Files\\pocosin founding documents	0.399

Table 2.4. Relative rank (1-10) and number of occurrences of 10 selected keywords in each CCP (NVivo Pro 12).

Keyword	Alligator River NWR	Cedar Island NWR	Mattamuskeet NWR	Pocosin Lakes NWR	Swanquarter NWR
Conservation	(2) 298	(5) 199	(4) 298	(3) 290	(3) 280
Fish	(4) 284	(3) 251	(1) 359	(4) 271	(2) 287
Habitat	(1) 421	(1) 381	(2) 341	(2) 401	(4) 279
Hunting	(6) 190	(6) 173	(6) 246	(6) 205	(5) 204
Public	(3) 291	(2) 289	(3) 337	(1) 452	(1) 301
Recreation	(7) 120	(9) 87	(8) 117	(9) 162	(8) 113
Vegetation	(10) 103	(10) 83	(10) 84	(10) 94	(10) 69
Water	(5) 276	(4) 214	(5) 296	(5) 256	(6) 164
Waterfowl	(9) 106	(7) 168	(7) 211	(7) 190	(7) 119
Wetland	(8) 114	(8) 110	(9) 104	(8) 166	(9) 76

Figures

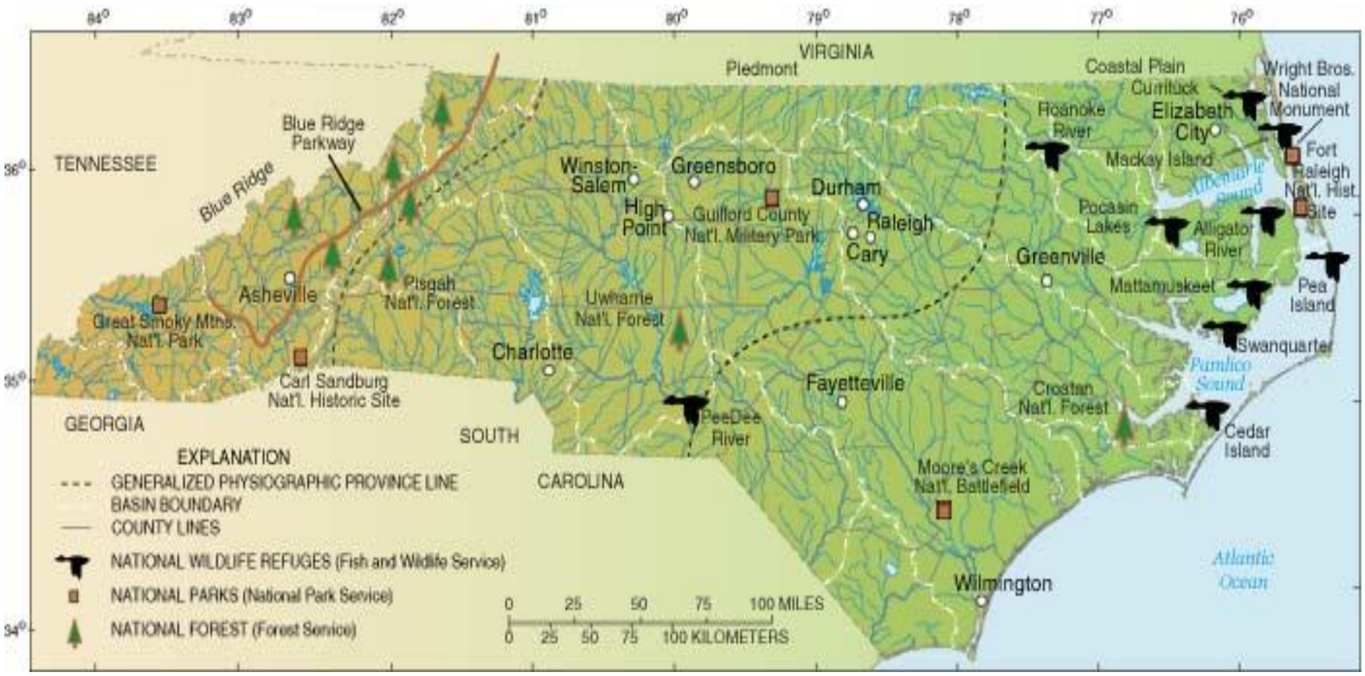

Figure 2.1. Map of Mattamuskeet NWR and adjacent NWRs sampled in this study (USGS).

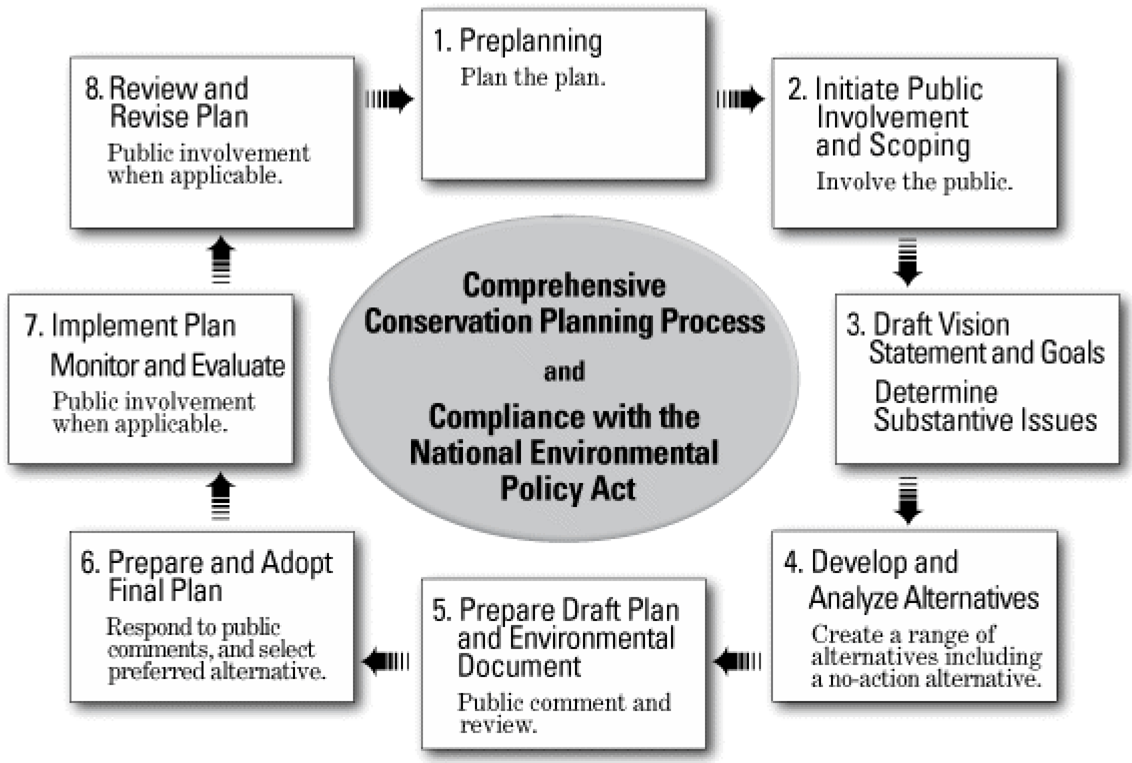

Figure 2.2. Organizational chart for Comprehensive Conservation Plan development and implementation by the National Wildlife Refuge System. US Fish and Wildlife Service.

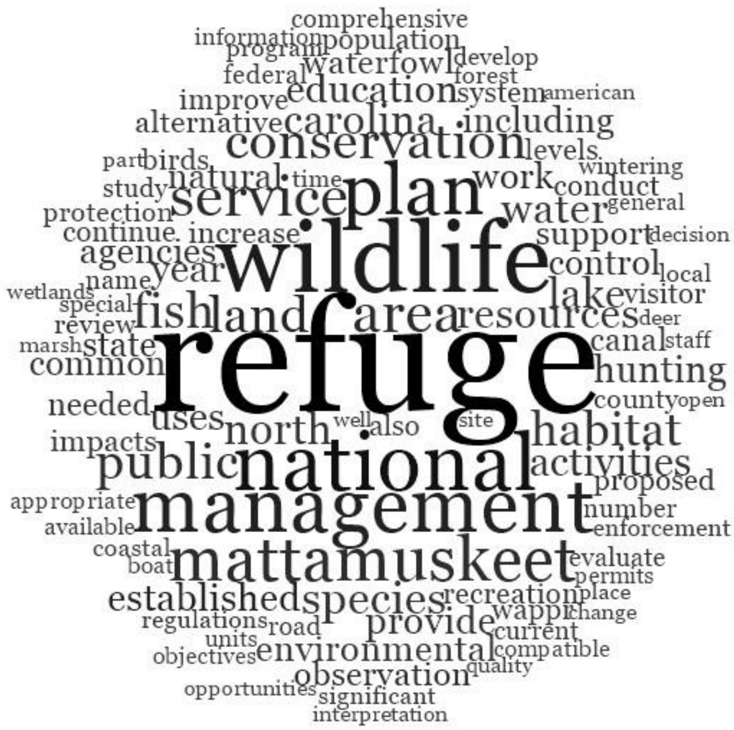

Figure 2.3. Word cloud graphic from Mattamuskeet NWR CCP word frequency query. NVivo Pro 12.

Figure 2.4. Word cloud graphic from Mattamuskeet NWR Founding Documents word frequency query. NVivo Pro 12.

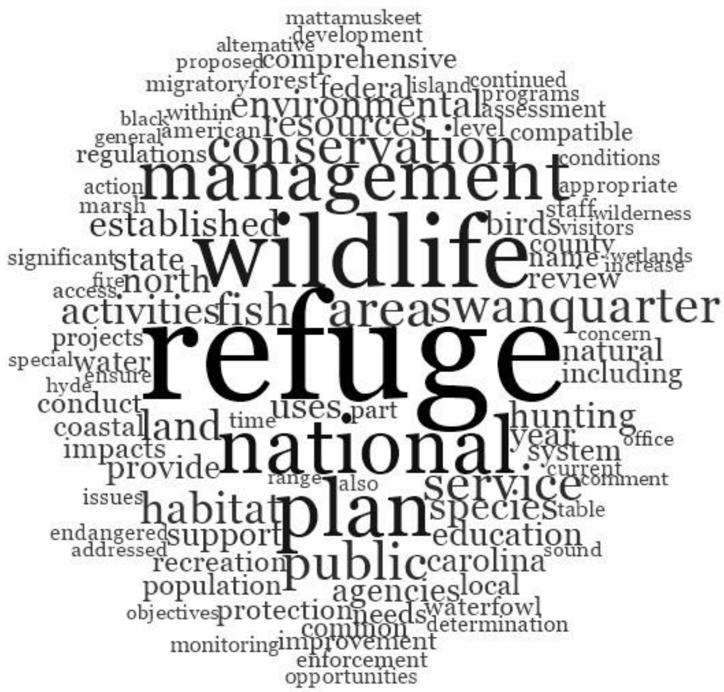

Figure 2.5. Word cloud graphic from Swanquarter NWR CCP word frequency query. NVivo Pro 12.

Figure2.6. Word cloud graphic from Swanquarter NWR Founding Documents word frequency query. NVivo Pro 12.

Figure 2.7. Word cloud graphic from Alligator River NWR CCP word frequency query. NVivo Pro 12.

Figure 2.8. Word cloud graphic from Alligator River NWR Founding Documents word frequency query. NVivo Pro 12.

Figure 2.9. Word cloud graphic from Cedar Island NWR CCP word frequency query. NVivo Pro 12.

Figure 2.10. Word cloud graphic from Cedar Island NWR Founding Documents word frequency query. NVivo Pro 12.

Figure 2.11. Word cloud graphic from Pocosin Lakes NWR CCP word frequency query. NVivo Pro 12.

Figure 2.12. Word cloud graphic from Pocosin Lakes NWR Founding Documents word frequency query.

Chapter Three: Effectiveness of Two Water Control Structure Designs in Passing Fish to a Coastal Lake

Introduction

Lake Mattamuskeet, North Carolina's largest natural lake that is located in Hyde County, is the centerpiece of Mattamuskeet National Wildlife Refuge (MNWR) and is connected to Pamlico Sound by four man-made canals that were created to facilitate lake drainage for farming by private investors in the early 1900s. After it was turned over to the federal government in 1934, the lake was returned to a semi-natural state by equipping each drainage canal with a concrete water control structure (WCS) containing multiple embayments. Each embayment was outfitted with tide/flap gates to prevent saltwater intrusion from Pamlico Sound while allowing discharge from the lake. This passive water management of Lake Mattamuskeet is achieved via outflow (seaward) flapgates in each of the four canal WCSs and allows for rainfall inputs to the system and outflow from the lake to Pamlico Sound during high water and/or wind-tide events. Often this passive strategy leaves lake levels lower in the summer and fall due to evaporation, and higher in winter and spring due to rainwater inputs. The shallow waters of the summer and fall allow for growth of submerged and emergent aquatic vegetation within and around the lake edge, which are important food sources for wintering migratory waterfowl and habitat for fish in Lake Mattamuskeet.

Since WCS construction, several flapgate designs have been used to allow outflow of lake water toward Pamlico Sound in times of high water (to prevent flooding of adjacent farmland) and during wind-tide events. The original flapgate design was a top-hinged wooden door covering each entire embayment (Figure 3.1). This flapgate design opened when pressure on the upstream (lake) side was great enough to force the door to swing upward, causing the bottom of the embayment to open first. The opening increased in size with greater lake-head pressure (from rain events or wind-driven lake elevation). These wooden gates deteriorated over time, causing saltwater intrusion into the lake through leaks. The original wooden flapgates were eventually replaced in 1989 with vertical wooden stop blocks inserted into slots within the concrete embayments of each WCS (Rulifson and Wall 2006). These stop blocks were equipped with small, top-hinged stainless steel flapgates positioned within the lower half of the stop block and were designed to open with increased lake-side pressure (Figure 3.2). In 1996, slotted weirs were installed at the top of some of the wooden stop blocks in an effort to enhance fish and Atlantic Blue Crab *Callinectes sapidus* passage. These slotted weirs were installed into the same stop blocks outfitted with the stainless steel flapgates (Figure 3.3).

Currently, two forms of flapgates are in place: full-sized top-hinged stainless steel flapgates similar to the original wooden flapgates but lighter in weight and with better structural integrity (Figure 3.4), and newly-developed side-opening aluminum gates, which open with much less pressure than the top-hinged flapgate design. One reason for installing the new side-opening aluminum gates was the hope of improving fish passage into and from Lake Mattamuskeet because the passage area spans the entire water column, unlike the top-hinged flapgate design that exposes only the bottom waters to passing fish. Species with passage concerns into Lake Mattamuskeet include the anadromous Blueback Herring *Alosa aestivalis* and Alewife *Alosa pseudoharengus,* and the catadromous American eel *Anguilla rostrata* (Wall and Rulifson 1999, Godwin and Rulifson 2002, Wall 2003, Cudney 2004, Godwin 2004, Rulifson et al. 2004, Rulifson and Wall 2006).

Alewife population declines led to a no harvest provision in 2007 for both commercial and recreational fisheries in joint and coastal waters of North Carolina (NCDMF 2017). Additionally, no Alewife greater than 6 inches may be taken from inland waters. According to NCDMF (2017), recruitment and juvenile abundance of Alewife are still below targets for rebuilding despite the imposed fishing moratorium. Current regulations for American eel include a minimum total fish length of 9 inches for both the commercial and recreational fisheries, as well as a new recreational bag limit of 25 eel per person per day in North Carolina (NCDMF 2015).

Water control structure design may have a limiting effect on the passage of aquatic species to and from Lake Mattamuskeet through the four manmade canals (Wall and Rulifson 1999, Godwin and Rulifson 2002). Tide gates (in this case WCSs) are known to create a temporal barrier to fish migration, opening only during the ebb tide and closing during the flood tide (Bourne et al. 2011). At Mattamuskeet, new WCS designs (including the tightening and replacement of seals to prevent leaks from the sound side to the lake side, total replacement of top-hinged stainless steel gates, and/or installation of side-opening aluminum gates) in these canals has minimized upstream flow from the sound side of the WCSs to the lake side, potentially limiting access to and from the lake for these species. The purpose of this chapter was to compare the newly implemented side-opening gates to a standard top-hinged gates for fish passage into and from the lake.

Past relevant studies

Tyus (1974) captured adult Alewife during the spring spawning runs of 1969, 1970, and 1971. The objectives of the study included estimation of total numbers and weights of Alewife attempting to enter Lake Mattamuskeet, determination of fish movements, and estimation of fishing pressure. Based on catch reports in comparison with stock assessments, Tyus (1974) determined that Alewife at Lake Mattamuskeet were heavily fished and recommended catch restrictions to avoid stock depletion.

Rulifson and Wall (2006) assessed the movements of fish through WCSs and described the spawning populations of Alewife and White Perch (*Morone americana*) at Lake Mattamuskeet during 1997 and 1998. The study assessed fish passage through small stainless steel flapgates near the bottom of each embayment compared to slotted fish weirs at the surface. They also surveyed for juvenile river herring within Lake Mattamuskeet using a beach seine. They observed that water quality in the canals was higher when water was flowing out of Lake Mattamuskeet than during closure events. Their findings indicated a state of collapse for the Alewife population of Lake Mattamuskeet.

A three-year study from 2001-2003 assessed efficiency of retrofitted WCS flapgates in relation to water level management, fish passage, and fish stock recovery (Godwin and Rulifson 2002, Godwin 2004). The study focused on the comparison of efficiencies between wooden and stainless steel top-hinged flapgates at Waupoppin WCS at Lake Mattamuskeet. They found that full-sized stainless steel flapgates opened wider and passed significantly more fish than wooden flapgates. They also studied the effects of manually opening flapgates during drought periods on saltwater intrusion into the lake as well as on fish passage. They found no significant increase in salinity within the lake during manual flapgate openings. The authors also assessed the Alewife spawning run into Lake Mattamuskeet during 2001 and 2003. They found the spawning runs to be significantly lower than the ones documented in 1970 and 1971 but higher than those documented in 1997 and 1998. (Godwin and Rulifson 2002, Godwin 2004).

Objectives of study

The main objective of this chapter was to determine fish passage ability of both resident and diadromous fishes through side-opening gates into Lake Mattamuskeet. If fish were able to use the side-opening gates, then a second objective was to compare the number and type of fish using the side-opening gates to the number passing through the full-sized stainless steel flapgates.

There were three aspects of this study: 1) to compare the number of fish passing through a top-hinged gate versus a side-opening gate within a sampling year; 2) to compare numbers of fish immigrating and emigrating through a top-hinged gate and side-opening gate indicating fish passage; and 3) to determine differences in fish passage through a side-opening gate between two sampling years.

Methods

Study location

This study was conducted at Lake Mattamuskeet in Hyde County, North Carolina. The study location is the largest natural lake in North Carolina and is located on the Albemarle-

Pamlico Peninsula adjacent to the Pamlico Sound of the Albemarle-Pamlico Sound System, the second largest estuary system in the United States. Lake Mattamuskeet is a shallow coastal lake of approximately 40,000 acres and an average depth of 2-3 feet based on personal observations as well as USGS stream gage data. The lake is connected to Pamlico Sound by four man-made canals that were originally dug to facilitate lake drainage by private investors between 1911 and 1934 for the purpose of farming the nutrient-rich lakebed (Forrest 1999). Once the lake and surrounding acreage were acquired by the federal government in 1934 and converted into what is now Mattamuskeet National Wildlife Refuge, passive water management of the lake was employed via the installation of WCSs on each of the four man-made canals connecting the lake to Pamlico Sound. These four canals include Rose Bay (Hodges) to the west side of the lake, Central (New Holland) to the south, Lake Landing (Great Ditch) roughly to the southeast, and Waupoppin roughly to the east.

Historically, the greatest Alewife passage into Lake Mattamuskeet occurred through Lake Landing and Waupoppin canals. Previous Alewife studies at the lake focused mainly on these two locations. Waupoppin Canal was used in my study to assess the utilization of WCS gates for fish passage into and out of Lake Mattamuskeet. In 2015, the study focused on fish passage through the sole side-opening gate installed at Waupoppin WCS. Based on the presence of Alewife passing through the side-opening gate in 2015, additional funding was secured and another year of sampling was conducted in 2016 to determine differences in passage between two gate types. In 2016, the study focused on fish passage through the sole side-opening gate and a top-hinged gate located directly beside the side-opening gate at Waupoppin WCS. Because passage results would likely differ between canals, no estimates of passage were estimated in the other canals using Waupoppin WCS's results.

Field sampling

Two custom-built, dual-sided aluminum fish traps were constructed to assess the utilization and effectiveness of the side-opening gate and the side-opening stainless steel flapgate design for fish passage (Figure 3.5, Figure 3.6). During the 2015 Alewife spawning run, only the side-opening gate was tested as a pilot study to ascertain the effectiveness of the trap design in catching both immigrating and emigrating fish. In 2016, both gate designs were tested using two custom-built traps, which were positioned upstream of the WCS embayments to avoid the outward (downstream) movements of the gates. An electric winch and boom system enabled picking up the trap from the top of the WCS, swinging it into place on top of the concrete bridge structure, and then lowering it into position. Each trap was emptied via trap door openings on each side of each trap. The gear type used in this study was modeled after those used in previous studies at Lake Mattamuskeet (Wall and Rulifson 1999, Godwin and Rulifson 2004).

Fish attempting to leave the lake (emigrating) through the embayments were funneled into one side of each trap, while fish attempting to enter the lake (immigrating) through the side opening gate or top-hinged gate were funneled into the other side of each trap.

Traps were fished as a pair in 2016 (in 2015 only one trap in side-opening gate) continuously for approximately 48 hours each week during both the day and night, and the catch of each trap was worked up after approximately 10-hour soak times. Each catch was enumerated by species and a subset of Alewife was collected for laboratory examination. Traps were deployed throughout the spring from approximately late February through late April in accordance with the Alewife spring spawning run. Catch per unit effort (CPUE) was calculated based on trap catch per sampling period, and population estimates for each year's spawning run was calculated using the determined CPUE (Hightower et al. 1996) and multiplying the CPUE of each gate sampled by number of hours in a week and then adding each week of the sampling period together. Total lengths (mm), weights (g), and sex when possible were recorded in the field for all target and non-target species.

Additionally, American eel sampling pots were placed at 10 locations within Waupoppin Canal (five locations on the lake side (upstream) side of the canal and five locations on the sound side (downstream) side of the canal). This supplemental sampling effort was required because the ¾ inch square metal mesh size used in the traps to reduce flow restrictions through the traps allowed small fish and eel to escape and thus could not be quantified with the stationary traps (Figure 3.7).

Hypotheses

1. There will be no significant difference in catches of Alewife and individuals of all fish species between the sampled top-hinged flapgate and the sampled side-opening gate. The alternative hypothesis is that significantly more Alewife and individuals of all species will be captured in the side-opening gate than in the top-hinged gate.

The comparison equation for Hypothesis 1 is:

Number of individuals (H0 = FP#SOG = FP#THG),

where FP# = Fish passage; SOG = Side-opening gate; and THG = Top-hinged gate.

The catch per unit effort (CPUE) in each trap for each week of the sampling period was compared using paired t-tests in SPSS. The one-tailed p ((sig. 2 tailed)/2) for each test was used in the reporting.

2. There will be no significant differences in number of fish passed between the immigrating and emigrating sections within and between each trap type for Alewife as well as for individuals of all species. The alternative hypothesis is that significantly more Alewife and individuals of all species will be captured in the immigrating side of the side-opening gate and the top-hinged gate versus the emigrating side as well as in the side-opening gate on the immigrating and emigrating sides versus the top-hinged gate immigrating and emigrating sides.

The comparison equation for Hypothesis 2 is:

Number of individuals (H0 = FP#SOGI = FP#SOGE, H0 = FP#THGI = FP#THGE, H0 = FP#SOGI = FP#THGI, H0 = FP#SOGE = FP#THGE), where

SOGI = Side-opening gate immigrating; SOGE = Side-opening gate emigrating; THGI = Top-hinged gate immigrating; THGE = Top-hinged gate emigrating.

Paired t-tests in SPSS were used to compare number of individuals passed between the sampled top-hinged and side-opening gates between the immigrating and emigrating sections within and between each trap type for the 2016 sampling period. The one-tailed p ((sig. 2 tailed)/2) for each test was used in the reporting.

3. There will be no significant differences in number of fish passed between the 2015 and 2016 sampling years in the side-opening gate for Alewife and for individuals of all species immigrating. The alternative hypothesis is that significantly more Alewife and individuals of all species will be captured in the side-opening gate in 2016 versus 2015.

The comparison equation for Hypothesis 3 is:

Number of individuals (H0 = FP#2015 = FP#2016).

The catch per unit effort (CPUE) for each week of the sampling periods was analyzed using paired t-tests in SPSS comparing the CPUE for each week in each sampling year. The one-tailed p ((sig. 2 tailed)/2) for each test was used in the reporting.

Water quality and water velocity sampling

Water quality parameters were monitored during fish trapping in the canal both upstream and downstream of Waupoppin WCS with a YSI 2030 water quality meter, recording dissolved oxygen (mg/L), conductivity (uS), salinity (ppt), and water temperature (ºC). Velocity measurements in feet per second (fps) within each WCS flapgate embayment were measured using a Marsh-McBirney water velocity meter at the beginning and end of each trap soak period (approximately every 10 hours) taking measurements at the bottom center of the top-hinged flapgate and side-opening gate embayments at Waupoppin WCS.

Laboratory analyses of adult Alewife

Adult Alewife age was determined by placing sagittal otoliths under a dissecting scope, taking a digital image, and counting bands as yearly annuli or marks (Figure 3.8). These ages were used to define the age classes migrating through Waupoppin WCS over the course of the study. Two independent readers were used to age the otoliths. When readers did not agree on assigned age, the readers would re-age the fish without access to previously assigned age and would assign a final age. If the readers could not agree on a final age, the fish was excluded from analysis.

Alewife gonads were removed and weighed to calculate the Gonadosomatic Index (GSI) of each fish by the dividing the gonad weight by total body weight (GSI=ovary or teste weight/total body weight) (Figure 3.9). Fish fork length (FL) and total length (TL, mm), total weight (g), gonad weight (g), and sex were recorded to provide biological reference material for future analysis or study comparisons.

Alewife spawning population estimation

In 2015, immigrating Alewife were collected only by a trap positioned on the upstream side of the embayment containing the side-opening gate. This was the pilot study to determine the efficacy of sampling in this manner; no top-hinged gates were sampled during the 2015 sampling period. The total run estimate for the sampling period through the sampled side-opening gate was calculated using catch per unit effort (CPUE, calculated from sampling hours and catch for each sampling week).

In 2016, immigrating Alewife were captured in the sampled side-opening gate and in one sampled top-hinged gate. The estimated Alewife spawning run through Waupoppin WCS during the spring of 2016 was based on individual trap totals. The total run estimate during the sampling period through the sampled side-opening was calculated using CPUE. The total run estimate during the sampling period through the sampled top-hinged gate was also calculated. Because there are 5 additional top-hinged gates at Waupoppin WCS and assuming equal distribution of immigrating Alewife between all top-hinged gates, the top-hinged gate total estimate was multiplied by all 6 top-hinged gates to represent the total size of the Alewife run through top-hinged gates. The estimated spawning run sizes of the 2016 Alewife spawning run through the side-opening gate and all top-hinged gates were then combined to represent the total size of the 2016 Alewife spawning run immigrating through Waupoppin WCS during the sampling period.

Results

Replication was not possible in this study (there being only one side-opening gate and only one top-hinged gate able to be sampled); thus it was not possible to make a determination of fish presence between the side-opening gate and top-hinged gates. However, the traps were operated concurrently and resultant captures from each sampling period were compared. It was not possible to sample the remaining embayments due to limitations of staffing and funding.

Field sampling for 2015

Adult Alewife **--** The trap was fished for a total of 247 hours from March 26 to May 7, 2015. A total of 47 Alewife were captured immigrating through the side-opening gate. No top-hinged gates were sampled during the 2015 sampling period. The spawning run estimate for the 6-week sampling period through the side-opening gate was 186 $\pm$ 18 individuals (Table 3.1).

All species – In 2015, 328 emigrating and 604 immigrating individuals (932 individuals total) representing 13 different species comprised the total catch from March 26 to May 7. The three most abundant species captured were White Perch *Morone Americana* (33.48% of total catch), Gizzard Shad *Dorosoma cepedianum* (31.87%), and Alewife *Alosa pseudoharengus* (9.55%) (Table 3.2). The three most abundant immigrating species were Gizzard Shad (45.70% of total catch), White Perch (18.38%), and Black Crappie *Poxomis nigromaculatus* (9.11%) (Table 3.3). The three most abundant emigrating species were White Perch (61.28% of total catch), Atlantic Blue Crab *Callinectes sapidus* (14.94%), and Alewife (11.89%) (Table 3.4).

Sampling was grouped into two temporal classifications (crepuscular/diurnal/crepuscular, 0700-1900 hours, and crepuscular/nocturnal/crepuscular, 1900-0700 hours). The 0700-1900 daytime period resulted in capturing 347 individuals of all species while the 1900-0700 nighttime period resulted in capturing 585 individuals of all species (Table 3.5). The 604 immigrating individuals through the side-opening gate was expanded by the 6-week sampling period for a total immigration estimate of 2,391 $\pm$ 137 individuals of the 13 documented species (Table 3.6).

Field sampling for 2016

Adult Alewife -- The custom-built dual-sided fish traps were deployed for a total of 425 hours (side-opening gate) and 429 hours (top-hinged gate) during the 10-week sampling period from February 25 to May 1, 2016. A total of 107 immigrating Alewife were captured in the side-opening gate trap compared to 84 immigrating Alewife captured in the top-hinged gate trap. The estimated number of Alewife in the 2016 spawning run through the side-opening gate of Waupoppin WCS during the 10-week period was 429 $\pm$ 38 individuals compared to an estimated 325 $\pm$ 37 Alewife through the top-hinged gate. Because there are 5 additional top-hinged gates at Waupoppin WCS, and assuming equal distribution of immigrating Alewife between all top-hinged gates, the top-hinged gate total estimate was multiplied to represent all 6 top-hinged gates, totaling 1951 $\pm$ 223 individuals. Therefore, the 2016 Alewife spawning run size entering the lake through Waupoppin Canal from February 25 to May 1 was estimated at 2,380 $\pm$ 261 fish (Table 3.7). As a caveat, although equal distribution among all top-hinged gates at Waupoppin

Canal was assumed for the purpose of estimating a spawning run population, this assumption is not likely accurate due to differences in each top-hinged gate's position within the canal (center, by canal bank, etc.), their varying velocities and gap openings, and other factors.

All species – In 2016 more than twice as many fish were collected in the side-mounted gate trap compared to the top-hinged gate trap. A total of 724 emigrating and 815 immigrating individuals of all species (total n =1539 individuals) were captured in the side-opening gate trap compared to the top-hinged gate trap, which captured 50 emigrating and 570 immigrating individuals (n = 620) (Table 3.8). A total of 18 different species were caught during the sampling period. The three most abundant species were White Perch (54.56% of total catch), Alewife (12.32%), and Striped Mullet *Mugil cephalus* (9.31%; Table 3.9).

The three most abundant species immigrating through the Waupoppin WCS were White Perch (46.79%), Alewife (13.79%) and Gizzard Shad (13.00%). The three most abundant emigrating species were White Perch (68.48%), Alewife (9.69%), and Atlantic Blue Crab (8.14%) (Table 3.10). The daytime (0700-1900 hours) catch was 555 individuals but the nocturnal (1900-0700 hours) catches (1604 individuals) were more than twice the daytime numbers (Table 3.11).

In 2016, total numbers immigrating through the Waupoppin WCS was based on the 815 individuals captured in the side-opening gate trap and the 570 individuals captured in the sampled top-hinged gate trap. The total estimate of immigrating fishes into Waupoppin Water Control Structure for the 10-week period during spring 2016 was 3,267 $\pm$ 259 individuals through the side-opening gate compared to 2,300 $\pm$ 377 individuals through the top-hinged gate.

Because there are 5 additional top-hinged gates at Waupoppin Water Control Structure and assuming equal distribution of immigrating individuals between all top-hinged gates, the top-hinged gate total estimate was multiplied to represent all 6 top-hinged gates, totaling 13,798 ± 2,264 individuals. Therefore, the total estimate of immigrating fishes representing 18 species from February 25 to May 1 2016 was estimated as 17,065 ± 2,523 individuals (Table 3.12).

As a caveat, although equal distribution among all top-hinged gates at Waupoppin Canal was assumed for the purpose of estimating passage by individuals of all species, this assumption is not likely accurate due to differences in each top-hinged gate's position within the canal (center, by canal bank, etc), their varying velocities and gap openings, and other factors.

American eel sampling

American eel sampling pots were placed at 10 locations within Waupoppin Canal (5 locations on the lake side (upstream) side of the canal and 5 locations on the sound side (downstream) side of the canal and were fished each week of the 2015 and 2016 sampling periods for the same total weekly hours as the fish traps. Sampling pots were baited with chopped Striped Mullet. In 2015, no American eel were captured in the sampling pots from March 26 to May 7. During the February 25 to May 1, 2016 sampling period, 9 American eel were captured in the sampling pots: 6 from the sound side of Waupoppin WCS and 3 from the lake side of the WCS (Table 3.13). The total estimate of American eel in Waupoppin Canal for the 2016 sampling period using the weekly catch per unit effort was 37 $\pm$ 5 individuals (Table 3.14).

Hypotheses

Hypothesis 1

In 2016 there were significantly less fish captured passing through the top-hinged flapgate (n=620) versus the side-opening gate (n=1539) during the 10-week period (Table 3.15) using a paired t-test (df=9, t=2.659, p=0.013); the null hypothesis H0 = FP#SOG = FP#THG was therefore rejected for all species captured based on CPUE. In addition, a higher number of Alewife were captured in the side-opening gate trap (n=175 individuals) compared to 74 individuals captured in the top-hinged gate trap during the same period (Table 3.16). A paired t-test showed significant differences in CPUE between the two gate types (df=9, t=3.437, p=0.004); the null hypothesis H0 = FP#SOG = FP#THG was therefore rejected for Alewife captured based on CPUE.

Hypothesis 2

In the 10-week 2016 sampling period, there was a statistically different number of individuals of all species (n=815) moving upstream through the side-opening gate compared to those entering the lake through the sampled top-hinged gate (n=570) (Table 3.15). A paired t-test comparing the 2016 immigration CPUE for each sampling week between the sampled side-opening gate and top-hinged gate show significance (df=9, t=-2.659, p=0.013); the null hypothesis H0 = FP#SOGI = FP#THGI was therefore rejected for immigrating individuals of all species captured based on CPUE.

During the 10-week 2016 sampling period, there were more fish of all species moving downstream through the side-opening gate (n=724) compared to 50 individuals moving downstream through the sampled top-hinged gate (Table 3.17). A paired t-test comparing the 2016 emigration CPUE for each sampling week were significantly different (df=9, t=-2.761, p=0.012); the null hypothesis H0 = FP#SOGE = FP#THGE was therefore rejected for emigrating individuals of all species captured based on CPUE.

Comparing fish movements through the side-opening gate for the 10-week 2016 sampling period, there was no statistical difference between individuals of all species moving upstream (n=815) compared to those moving downstream (n=724) (Table 3.18). An paired t-test comparing the 2016 CPUE for each sampling week between the immigrating and emigrating catch in the sampled side-opening gate show no significant difference (df=9, t=-0.234, p=0.41); the null hypothesis H0 = FP#SOGI = FP#SOGE was therefore accepted for immigrating versus emigrating individuals of all species captured in the sampled side-opening gate based on CPUE.

During the 2016 10-week sampling period, there was no statistical difference between individuals of all species moving upstream through the sampled top-hinged gate (n=570) compared to 50 emigrating individuals (Table 3.19). A paired t-test comparing the 2016 CPUE for each sampling week between the immigrating and emigrating catch in the sampled top-hinged gate show no significant difference (df=9, t=-1.67, p=0.067); the null hypothesis H0 = FP#THGI = FP#THGE was therefore accepted for immigrating versus emigrating individuals of all species captured in the sampled top-hinged gate based on CPUE.

During the 10-week 2016 sampling period, Alewife immigrating through the side-opening gate totaled 107 individuals compared to 84 individuals in the sampled top-hinged gate was not statistically significant (Table 3.20). A paired t-test comparing the 2016 CPUE for each sampling week between the sampled side-opening gate and top-hinged gate show no significant difference (df=9, t=1.822, p=0.051); the null hypothesis H0 = FP#SOGI = FP#THGI was therefore accepted for immigrating Alewife captured based on CPUE.

The number of emigrating Alewife through the side-opening gate totaled 68 individuals compared to 3 emigrating individuals captured in the sampled top-hinged gate during the 2016 10-week sampling period, which was statistically significant (Table 3.21). A paired t-test comparing the 2016 CPUE for each sampling week between the sampled side-opening gate and top-hinged gate show significant difference (df=9, t=-3.364, p=0.004); the null hypothesis H0 = FP#SOGE = FP#THGE was therefore rejected for emigrating Alewife captured based on CPUE.

During the 10-week 2016 sampling period, Alewife immigrating through the side-opening gate totaled 103 individuals compared to 68 emigrating individuals was not statistically significant (Table 3.22). A paired t-test comparing the 2016 CPUE for each sampling week between the immigrating and emigrating catch in the sampled side-opening gate show no significant difference (df=9, t=-0.713, p=0.247); the null hypothesis H0 = FP#SOGI = FP#SOGE was therefore accepted for immigrating versus emigrating Alewife captured in the sampled side-opening gate based on CPUE.

Alewife immigrating through the sampled top-hinged gate totaled 84 individuals compared to 3 emigrating individuals, the difference being statistically significant (Table 3.23). A paired t-test comparing the 2016 CPUE for each sampling week between the immigrating and emigrating catch in the sampled top-hinged gate shows significant difference (df=9, t=-2.418, p=0.019); the null hypothesis H0 = FP#THGI = FP#THGE was therefore rejected for immigrating versus emigrating Alewife captured in the sampled top-hinged gate based on CPUE.

Hypothesis 3

During the 2015 6-week sampling period, the total number of individuals of all species immigrating through the side-opening gate totaled 604 individuals compared to 815 individuals during the 2016 10-week sampling period was not statistically significant (Table 3.24). A paired t-test comparing the 2015 CPUE for each sampling week and the 2016 CPUE for each sampling week shows no significant difference in CPUE between the two years (df=4, t=1.521, p=0.102); the null hypothesis H0 = FP#2015 = FP#2016 was therefore accepted.

A comparison of the number of Alewife immigrating through the side-opening gate during the 6-week 2015 sampling period (n=47) to the 107 individuals captured during the 2016

10-week sampling period was not statistically significant (Table 3.25). A paired t-test comparing the 2015 CPUE for each sampling week and the 2016 CPUE for each sampling week shows no significant difference (df=4, t=1.232, p=0.143); the null hypothesis H0 = FP#2015 = FP#2016 was therefore accepted.

Water quality and water velocity

Water quality 2015

During the March 26 to May 7 2015 sampling period at Waupoppin WCS, water temperature C, dissolved oxygen mg/L, salinity ppt, and conductivity uS were measured on both the lake side and sound side of the WCS (N=50). Water temperatures averaged 19.5 ºC, ranging from 10.2 to 23.8 ºC. The greatest number of Alewife were captured at 19.3 ºC during the first week of the 2015 sampling period (Figure 3.10). Dissolved oxygen averaged 11.14 mg/L, with a minimum of 3.47 mg/L and a maximum of 18.81 mg/L. Salinity averaged 0.6 ppt, with a minimum of 0.3 ppt and a maximum of 0.7 ppt. Conductivity averaged 1094 uS, with a minimum of 573 uS and a maximum of 1349 uS (Table 3.26).

Water quality 2016

During the February 25 to May 1 2016 sampling period at Waupoppin WCS, water temperature, dissolved oxygen, salinity, and conductivity were recorded on both the lake side and sound side of the WCS (N=58). Water temperatures averaged 16.92 ºC, with a minimum of 9.0 ºC and a maximum of 25.5 ºC. The greatest number of Alewife *Alosa pseudoharengus* were captured at 13.0 ºC and occurred during the second week of the 2016 sampling period (Figure 3.11). Dissolved oxygen averaged 11.13 mg/L, with a minimum of 6.58 mg/L and a maximum of 19.5 mg/L. Salinity averaged 0.37 ppt, with a minimum of 0.2 ppt and a maximum of 0.4 ppt. Conductivity averaged 657 uS, with a minimum of 399 uS and a maximum of 877 uS (Table 3.27).

Water velocity 2015

During the March 26 to May 7, 2015 sampling period at Waupoppin Water Control Structure, water velocity (fps) readings were taken at bottom depth in both a side-opening gate and a top-hinged gate. Readings were averaged for a weekly mean for each gate type. A paired t-test comparing the 2015 mean velocities for each sampling week between the sampled side-opening gate and top-hinged gate show significant difference in velocity between the two gate types (df=5, t=-3.253, p=0.012) (Table 3.28).

Water velocity 2016

During the February 25 to May 1, 2016 sampling period at Waupoppin Water Control Structure, water velocity (fps) readings were taken at bottom depth in both a side-opening gate and a top-hinged gate. Readings were averaged for a weekly mean for each gate type. A paired t-test comparing the 2016 mean velocities for each sampling week between the sampled side-opening gate and top-hinged gate show significant difference in velocity between the two gate types (df=9, t=-2.409, p=0.019) (Table 3.29).

Laboratory

Alewife age class structure 2015

Ages of 2015 Alewife were obtained from 82 digital otolith images comprised of 46 female otolith readings and 36 male otolith readings. The age composition of Alewife consisted of fish between 4 and 9 years with a mean age of 5.4 years.

The most frequent female age was 5 years old (47.8% of total observed ages). The second and third most frequent female ages were tied at 6 and 7 years old (each 17.4% of total observed ages) (Figure 3.12). The most frequent male age was 5 years old (51.4% of total observed ages). The second most frequent male age was 6 years old (22.9%). The third most frequent male age was 4 years old (20.0%) (Figure 3.13).

Alewife age class structure 2016

Ages of 2016 Alewife *Alosa pseudoharengus* were obtained from 254 digital otolith images comprised of 132 female otolith readings and 122 male otolith readings. The age classes of Alewife consisted of fish between 3 and 8 years of age with a mean age of 5.2 years old.

The most frequent female age was 5 years old (45.4% of total observed ages). The second most frequent female age was 4 years old (25.0%). The third most frequent female age was 6 years old (15.9%) (Figure 3.14). The most frequent male age was 5 years old (37.7%). The second most frequent male age was 4 years old (27.0%). The third most frequent male age was 6 years old (21.3%) (Figure 3.15).

Alewife Gonadosomatic Index 2015 and 2016

The Gonadosomatic Index (GSI) of 2015 Alewife was calculated by sampling week of the 5-week calculated sampling period. Female GSI (N=46) ranged from 2.01 to 6.77 with a mean GSI of 3.90. Male GSI (N=36) ranged from 0.45 to 4.26 with a mean GSI of 1.80. The mean GSI of females increased in weeks 4-5 (4.52) compared to weeks 1-3 (3.68). The mean GSI of males decreased in weeks 4-5 (0.92) compared to weeks 1-3 (2.41) (Figure 3.16).

The Gonadosomatic Index (GSI) of 2016 Alewife was calculated by sampling week of the 10 week sampling period. Female GSI (N=134) ranged from 3.11 to 11.76 with a mean GSI of 6.90. Male GSI (N=123) ranged from 0.85 to 5.64 with a mean GSI of 3.52. The mean GSI of both males and females decreased in weeks 6-10 (4.82 for females, 2.08 for males) compared to weeks 1-5 (8.97 for females, 4.95 for males) (Figure 3.17).

Discussion

Adult Alewife 2015

The 2015 sampling of the sole side-opening gate at Waupoppin Canal, Lake Mattamuskeet, North Carolina, was performed to determine the occurrence of any fish passage. There are few studies involving side-opening configuration in flapgates related to fish passage, and none were found to be related to river herring passage. The 2015 sampling season was used as a pilot study to determine if the side-opening gate was being utilized for fish passage at Waupoppin Canal. Additionally, no study of Alewife passage at Lake Mattamuskeet had been conducted in 12 years to determine the present use and passage of adult Alewife at Lake Mattamuskeet. The most recent study by Godwin (2004) of Alewife movement through Waupoppin Canal was conducted prior to the installation of the side-opening gate, which was installed in hopes of facilitating greater fish passage.

In 2015, 47 immigrating and 39 emigrating Alewife were captured in the sampled side-opening gate. No top-hinged gates were sampled during the 2015 sampling period, reducing the accuracy of the spawning estimate due to spawning run estimate totals being calculated solely from the side-opening gate. The total run estimate for the 6-week sampling period through the sampled side-opening gate totaled 186 individuals.

Due to differing methodology for each of the previous studies conducted at Lake Mattamuskeet on river herring, it is difficult to compare the 2015 Waupoppin Canal spawning run estimate to the other studies. The 2015 total catch of 47 immigrating Alewife in 247.5

sampling hours (CPUE=0.19) is lower than the 2003 estimate (CPUE=1.113) (Godwin 2004). Lake Landing Canal is located to the south of Waupoppin Canal and was sampled for Alewife presence in 1997 and 1998 (Wall 2003). The Alewife sampling in 1997 and 1998 at Lake Landing Canal resulted in captures of 93 Alewife in 1997 (CPUE=0.033) and 61 Alewife in 1998 (CPUE=0.036). The results of the 2015 Waupoppin Canal sampling season (CPUE=0.19) are somewhat similar to the results of the 1997 and 1998 Lake Landing Canal sampling seasons.

These results show a very small but persistent immigrating population of adult Alewife that continue to access Lake Mattamuskeet for spawning purposes. These results also show that adult Alewife are utilizing the side-opening gate at Waupoppin Canal for spawning run purposes. Based on these two conclusions, the decision to sample the traditional top-hinged gate located directly beside the sampled side-opening gate at Waupoppin Canal in 2016 was made in order to determine differences in preference of passage method among immigrating adult Alewife entering Lake Mattamuskeet via Waupoppin Canal.

The 2015 sampling effort did not begin until the week of March 22, 2015 and likely missed the beginning of the Alewife spawning run. The peak of the Alewife spawning run at Waupoppin Canal coincided with the first week of sampling from March 22-29, 2015. This is nearly even with the peak spawning run timing in 2003 (March 23-29, 2003) (Godwin 2004), and earlier than the peak spawning run timing in 1970 (April 5-12, 1970) and 1971 (April 2-9, 1971) at Lake Landing Canal (Tyus 1974). During the 2015 sampling period, diurnal rhythms of adult Alewife were not significantly different between the periods of 0700-1900 and 1900-0700.

A total of 57% of Alewife movement occurred from 0700-1900 hours, while 43% of Alewife movement occurred from 1900-0700 hours.

All species 2015

In 2015, 328 emigrating and 604 immigrating individuals of all species (932 individuals total) were captured in the sampled side-opening gate during the sampling period (Table 3.2). The total passage estimate for the 6 week sampling period through the sampled side-opening gate totaled 2,391 $\pm$ 137 individuals.

These results show a persistent multi-species contingency of adult fishes that access Lake Mattamuskeet. These results also show that adult fishes are utilizing the side-opening gate at Waupoppin Canal for passage purposes. Based on these two conclusions and combined with the findings from the Alewife portion of the 2015 study, the decision to sample the traditional top-hinged gate located directly beside the sampled side-opening gate at Waupoppin Canal in 2016 was made in order to determine differences in preference of passage method among all fishes accessing Lake Mattamuskeet via Waupoppin Canal. A total of 13 different species were represented in the total catch. The three most abundant species captured were White Perch (33.48% of total catch), Gizzard Shad (31.87% of total catch), and Alewife (9.55% of total catch) (Table 3.3). A slight difference in the diurnal rhythms of all captured fishes existed between the periods of 0700-1900 and 1900-0700. A total of 37% of all fish movement occurred from 0700-1900 hours, while 63% of all fish movement occurred from 1900-0700 hours. A total of 28% of

White Perch movement occurred from 0700-1900 hours, while 72% of White Perch movement occurred from 1900-0700 hours. A total of 38% of Gizzard Shad movement occurred from 0700-1900 hours, while 62% of Gizzard Shad movement occurred from 1900-0700 hours. A total of 57% of Alewife movement occurred from 0700-1900 hours, while 43% of Alewife movement occurred from 1900-0700 hours.

Adult Alewife 2016

In 2016, a custom-built dual-sided fish trap was deployed in the sole side-opening gate at Waupoppin Canal as well as in a top-hinged gate directly beside the side-opening gate for comparison of fish passage through the two flapgate designs during the 2016 Alewife spring spawning run. The 2016 sampling season was used to determine differences in Alewife passage between the side-opening gate and the sampled top-hinged gate at Waupoppin Canal into Lake Mattamuskeet.

In 2016, 107 immigrating and 72 emigrating Alewife were captured in the sampled side-opening gate. In 2016, 84 immigrating and 3 emigrating Alewife were captured in the sampled top-hinged gate. The estimated Alewife spawning run through Waupoppin Water Control Structure during the spring of 2016 is based on individual trap totals. The total run estimate during the 10-week sampling period through the sampled side-opening gate totaled 429 $\pm$ 38 individuals. The total run estimate during the 10-week sampling period through the sampled top-hinged gate totaled 325 $\pm$ 38 individuals. Because there are 5 additional top-hinged gates at

Waupoppin Water Control Structure and assuming equal distribution of immigrating Alewife between all top-hinged gates, the top-hinged gate total estimate was multiplied to represent all 6 top-hinged gates, totaling 1,951 $\pm$ 223 individuals. Therefore, the total size of the 2016 Alewife spawning run from February 25 to May 1 is estimated at 2,380 $\pm$ 261 immigrating individuals (Table 3.7). As a caveat, although equal distribution among all top-hinged gates at Waupoppin Canal was assumed for the purpose of estimating a spawning run population, this assumption is not likely accurate due to differences in each top-hinged gate's position within the canal (center, by canal bank, etc.), their varying velocities and gap openings, and other factors.

The 2016 total catch of 191 immigrating Alewife in 855 sampling hours (CPUE=0.225) are lower than the 2003 estimate (CPUE=1.113). The Alewife sampling in 1997 and 1998 at Lake Landing Canal resulted in captures of 93 Alewife in 1997 (CPUE=0.033) and 61 Alewife in 1998 (CPUE=0.036). The results of the 2015 Waupoppin Canal sampling season (CPUE=0.225) are somewhat like the results of the 1997 and 1998 Lake Landing Canal sampling seasons. These results show a very small but persistent immigrating population of adult Alewife that continue to access Lake Mattamuskeet for spawning purposes. These results also show that adult Alewife are utilizing both the side-opening gate and the sampled top-hinged gate at Waupoppin Canal for spawning run purposes.

Differences in passage method (side-opening gate versus top-hinged gate) among adult Alewife entering Lake Mattamuskeet via Waupoppin Canal were observed throughout the 2016 sampling season. In 425.5 hours, the side-opening gate captured 107 immigrating Alewife (CPUE=0.25). In 429.5 hours, the sampled top-hinged gate captured 84 immigrating Alewife

(CPUE=0.20). These results indicate a slight preference in passage through the side-opening gate versus the sampled top-hinged gate into Lake Mattamuskeet. In 425.5 hours, the side-opening gate captured 68 emigrating Alewife (CPUE=0.16). In 429.5 hours, the sampled top-hinged gate captured 3 emigrating Alewife (CPUE=0.01). These results indicate a strong preference in passage through the side-opening gate versus the sampled top-hinged gate out of Lake Mattamuskeet. Since Alewife return to saltwater after spawning, the exit strategy from Lake Mattamuskeet is an important consideration in addition to the entrance strategy when considering management of WCSs for optimal fish passability.

The Alewife spawning run at Waupoppin Canal peaked during the week of February 28-March 6, 2016. This is slightly earlier than the peak spawning run timing in 2015 (March 22-29, 2015). This is also earlier than the peak spawning run timing in 2003 (March 23-29, 2003) (Godwin 2004), and even earlier than the peak spawning run timing in 1970 (April 5-12, 1970) and 1971 (April 2-9, 1971) at Lake Landing Canal (Tyus 1974). During the 2016 sampling period, diurnal rhythms of adult Alewife were not significantly different between the periods of 0700-1900 and 1900-0700. A total of 42% of Alewife movement occurred from 0700-1900 hours, while 58% of Alewife movement occurred from 1900-0700 hours.

All species 2016

In 2016, 724 emigrating and 815 immigrating individuals of all species (1539 individuals total) were captured during the sampling period in the side-opening gate. The sampled top-hinged gate captured 50 emigrating and 570 immigrating individuals of all species (620 individuals total) (Table 3.8). The total estimate during the 10-week sampling period through the sampled side-opening gate totaled 3,267 ± 259 individuals. The total passage estimate during the 10 week sampling period through the sampled top-hinged gate totaled 2,300 ± 377 individuals. Because there are 5 additional top-hinged gates at Waupoppin Water Control Structure and assuming equal distribution of immigrating individuals between all top-hinged gates, the top-hinged gate total estimate was multiplied to represent all 6 top-hinged gates, totaling 13,798 individuals ± 2,264. Therefore, the total estimate of immigrating fishes of all species from February 25 to May 1 2016 is estimated at 17,065 ± 2,523 immigrating individuals (Table 3.12).

As a caveat, although equal distribution among all top-hinged gates at Waupoppin Canal was assumed for the purpose of estimating total passage, this assumption is not likely accurate due to differences in each top-hinged gate's position within the canal (center, by canal bank, etc.), their varying velocities and gap openings, and other factors.

These results show a persistent multi-species contingency of adult fishes that access Lake Mattamuskeet. These results also show that adult fishes are utilizing both the side-opening gate and the sampled top-hinged gate at Waupoppin Canal for passage purposes. Differences in passage method (side-opening gate versus top-hinged gate) among fishes of all species entering Lake Mattamuskeet via Waupoppin Canal were observed throughout the 2016 sampling season. In 425.5 hours, the side-opening gate captured 815 immigrating individuals (CPUE=1.92). In 429.5 hours, the sampled top-hinged gate captured 570 immigrating individuals (CPUE=1.33). These results indicate a slight preference in passage through the side-opening gate versus the sampled top-hinged gate into Lake Mattamuskeet. In 425.5 hours, the side-opening gate captured 724 emigrating individuals (CPUE=1.74). In 429.5 hours, the sampled top-hinged gate captured 50 emigrating individuals (CPUE=0.11). These results indicate a strong preference in passage through the side-opening gate versus the sampled top-hinged gate out of Lake Mattamuskeet, which may be indicative of differences in the environment of the side-opening embayment versus the top-hinged embayment (access to entire water column, reduced velocity, etc). A total of 18 different species were represented in the total catch. The three most abundant species captured were White Perch (54.56% of total catch), Alewife (12.32% of total catch), and Striped Mullet (9.31% of total catch) (Table 3.9).

A slight difference in the diurnal rhythms of all captured fishes existed between the periods of 0700-1900 and 1900-0700. A total of 26% of all fish movement occurred from 0700-1900 hours, while 74% of all fish movement occurred from 1900-0700 hours. A total of 20% of White Perch movement occurred from 0700-1900 hours, while 80% of White Perch movement occurred from 1900-0700 hours. A total of 42% of Alewife movement occurred from 0700-1900 hours, while 58% of Alewife movement occurred from 1900-0700 hours. A total of 1% of Striped Mullet movement occurred from 0700-1900 hours, while 99% of Striped Mullet movement occurred from 1900-0700 hours.

American eel sampling 2015 and 2016

American eel *Anguilla rostrata* sampling pots were placed at 10 locations within Waupoppin Canal (5 locations on the lake side (upstream) side of the canal and 5 locations on the sound side (downstream) side of the canal). This supplemental sampling effort was performed to obtain additional American eel data due to the custom-built fish traps having a mesh size that would likely allow passage without capture of small fishes, including American eel.

No American eel were captured in the sampling pots during the March 26 to May 7, 2015 sampling period. During the February 25 to May 1 2016 sampling period, 9 American eel were captured in the sampling pots. Of the 9 captured American eel, 6 were collected from sampling pots on the sound side (downstream) side of Waupoppin Water Control Structure and 3 were collected from sampling pots on the lake side (upstream) side of Waupoppin Water Control Structure (Table 3.13). The total weekly estimate of American eel in Waupoppin Canal for the 2016 sampling period was estimated using the weekly catch per unit effort and totaled 37 $\pm$ 5 individuals (Table 3.14).

There is likely sampling error associated with the extremely low (2016) or non-existent (2015) catch from sampling pots for American eel. Several pots were lost, stolen, and/or broken during the course of both the 2015 and 2016 sampling periods. Since the sampling pots were used as supplemental information to the custom-built trap study conducted at Waupoppin WCS and sampling error high, the conclusions that can be drawn from the results are very limited. The 2016 weekly estimate is likely an underestimate based on likely sampling error. Because of the labor-intensive and more broad-scale sampling involved with the custom-built traps to estimate all-species use of the two flapgate types, a more intensive American eel-only study is recommended to bridge the gap of information associated with the small sampling mesh (or other sampling method) needed to sufficiently survey a smaller-sized species such as the American eel.

Hypothesis 1

To determine if there was significant difference in the number of fish captured passing through the top-hinged flapgate versus the side-opening gate during the 2016 sampling period, the catch per unit effort (CPUE) for each week of the sampling period was compared for individuals of all species. The results of this hypothesis test indicate that significantly more fish of all species are passing through the side-opening gate versus the sampled top-hinged gate. This preference for side-opening gate passage (where the entire water column is exposed when the flapgate opens due to head pressure instead of the traditional top-hinged configuration where fishes are required to swim lower in the water column to enter/exit the flapgate through the opening of the gate at the base of the embayment) indicates that fishes of all species are utilizing the side-opening gate configuration at a higher rate than the top-hinged gate configuration. With 620 individuals passing through the top-hinged gate, that particular configuration is not specifically preventing passage of individuals but is not being utilized to the same extent as the side-opening configuration. This is an important consideration when weighing the pros and cons of gate configuration as replacement gates become necessary due to time and wear on existing structures.

The results of this hypothesis test indicate that significantly more adult Alewife are passing through the side-opening gate versus the sampled top-hinged gate. This preference for side-opening gate passage indicates that adult Alewife are utilizing the side-opening gate configuration at a higher rate than the top-hinged gate configuration. With 74 individuals passing through the top-hinged gate, that particular configuration is not specifically preventing passage of adult Alewife but is not being utilized to the same extent as the side-opening configuration. This is an important consideration when weighing the pros and cons of gate configuration as replacement gates become necessary due to time and wear on existing structures. This is also a consideration when determining best management practices in facilitating diadromous fish passage into and out of Lake Mattamuskeet, North Carolina.

Hypothesis 2

Side-opening gate versus top-hinged gate immigrating and emigrating individuals of all species 2016

Upon review of both the immigrating and emigrating only passage as well as passage for individuals of all species, there is a significant difference in passage as a whole between the side-opening gate and top-hinged gate. While there is not significant difference between the two for immigrating fishes only, there is a significant difference between the two for emigrating fishes. Since both immigration into and emigration from Lake Mattamuskeet are imperative aspects of diadromous fish life cycles, the continued use of side-opening gates to facilitate greater fish passage is recommended.

Side-opening gate immigrating versus emigrating individuals of all species 2016

The total number of immigrating side-opening gate individuals of all species captured in the calculated 2016 10-week sampling period totaled 815 individuals versus 724 emigrating individuals (Table 3.18). This lack of significance in the paired t-test indicates that individuals of all species are utilizing the side-opening gate for both immigration and emigration at a fairy even rate.

Top-hinged gate immigrating versus emigrating individuals of all species 2016

The total number of immigrating top-hinged gate individuals of all species captured in the calculated 2016 10-week sampling period totaled 570 individuals versus 50 emigrating individuals (Table 3.19). While not statistically significant, there is a visible preference toward immigration in the top-hinged gate (570 individuals) versus emigration (50 individuals), especially when compared to the passage differences in the side-opening gate (815 immigrating and 724 emigrating individuals). This preference indicates that fishes may struggle in exiting through the top-hinged configuration compared to the side-opening configuration.

Side-opening gate versus top-hinged gate immigrating and emigrating Alewife 2016

Upon review of both the immigrating and emigrating only passage as well as passage as a whole for adult Alewife, there is a significant difference in passage as a whole between the side-opening gate and top-hinged gate. While there is not significant difference between the two for immigrating Alewife only, there is a significant difference between the two for emigrating Alewife. Since both immigration into and emigration from Lake Mattamuskeet are imperative aspects of diadromous fish life cycles, the continued use of side-opening gates to facilitate greater fish passage is recommended, particularly for Alewife passage.

Side-opening gate immigrating versus emigrating Alewife 2016

The total number of immigrating side-opening gate Alewife captured in the calculated 2016 10-week sampling period totaled 103 individuals versus 68 emigrating individuals (Table 3.22). A paired t-test comparing the 2016 CPUE for each sampling week between the immigrating and emigrating catch in the sampled side-opening gate show no significant difference in CPUE between the immigrating and emigrating Alewife within the sampled side-opening gate. This lack of significance indicates that adult Alewife are utilizing the side-opening gate for both immigration and emigration at a fairy even rate.

Top-hinged gate immigrating versus emigrating Alewife 2016

The total number of immigrating top-hinged gate Alewife captured in the calculated 2016 10-week sampling period totaled 84 individuals versus 3 emigrating individuals (Table 3.23). A paired t-test comparing the 2016 CPUE for each sampling week between the immigrating and emigrating catch in the sampled top-hinged gate show significant difference in CPUE between the immigrating and emigrating Alewife within the sampled top-hinged gate.

The results of this hypothesis test indicate that significantly more adult Alewife are immigrating versus emigrating through the sampled top-hinged gate. This preference toward immigration in the top-hinged gate (84 individuals) versus emigration (3 individuals) is evident, especially when compared to the passage differences in the side-opening gate (103 immigrating and 68 emigrating adult Alewife). This preference indicates that adult Alewife may struggle in exiting through the top-hinged configuration compared to the side-opening configuration. Since both immigration into and emigration from Lake Mattamuskeet are imperative aspects of diadromous fish life cycles, the continued use of side-opening gates to facilitate greater fish passage is recommended, particularly for Alewife passage.

Hypothesis 3

To determine if there was significant difference in the number of individuals of all species captured between the 2015 and 2016 sampling seasons immigrating in the side-opening gate, the catch per unit effort (CPUE) for each week of the sampling periods was analyzed. A paired t-test comparing the CPUE for each week in each sampling year was performed to compare CPUE between the two years.

Side-opening gate immigrating individuals of all species 2015 versus 2016

The total number of side-opening gate immigrating individuals of all species captured in the 2015 6-week sampling period totaled 604 individuals versus 815 individuals captured during the 2016 10-week sampling period (Table 3.24). A paired t-test comparing the 2015 CPUE for each sampling week and the 2016 CPUE for each sampling week show no significant difference in CPUE between the two years. These results indicate that no significant change has occurred from 2015 to 2016 in the number of individuals of all species immigrating into Lake Mattamuskeet through the side-opening gate at Waupoppin Canal.

Side-opening gate immigrating Alewife 2015 versus 2016

The total number of side-opening gate immigrating Alewife captured in the 2015 6-week sampling period totaled 47 individuals versus 107 individuals captured during the 2016 10-week sampling period (Table 3.25). A paired t-test comparing the 2015 CPUE for each sampling week and the 2016 CPUE for each sampling week show no significant difference in CPUE between the two years. These results indicate that no significant change has occurred from 2015 to 2016 in the number of adult Alewife immigrating into Lake Mattamuskeet through the side-opening gate at Waupoppin Canal. These results further indicate that a small contingency of adult Alewife are continuing to access Lake Mattamuskeet for spawning purposes from 2015 to 2016. This further reiterates the need for continued use of side-opening gate configurations in WCS design in order to facilitate continued passage of diadromous fishes into and out of Lake Mattamuskeet, North Carolina.

Water quality 2015 and 2016

Water temperatures during the 2015 sampling season averaged 19.5 degrees Celsius. The lowest water temperature was recorded at 10.2 degrees Celsius. The highest water temperature was recorded at 23.8 degrees Celsius. The greatest numbers of Alewife *Alosa pseudoharengus* captured during the sampling season were captured when the water temperature averaged 19.3 degrees Celsius and occurred during the first week of the 2015 sampling period (Figure 3.10). The 2016 sampling season water temperatures averaged 16.92 degrees Celsius. The lowest water temperature was recorded at 9.0 degrees Celsius. The highest water temperature was recorded at 25.5 degrees Celsius. The highest number of Alewife *Alosa pseudoharengus* captured during the sampling season were captured when the water temperature averaged 13.0 degrees Celsius and occurred during the second week of the 2016 sampling period (Figure 3.11). The 2003 study at Waupoppin Canal resulted in average temperatures during the peak week of Alewife catch of 18.4 degrees Celsius, slightly cooler than the 2015 results and slightly warmer than the 2016 results (Godwin 2004). Additionally, the peak catch weeks in the 1970 and 1971 studies had even cooler average temperatures of 12.9 degrees Celsius and 13.1 degrees Celsius, respectively (Tyus 1974).

In 2015, dissolved oxygen averaged 11.14 mg/L, with a minimum of 3.47 mg/L and a maximum of 18.81 mg/L. In 2016, dissolved oxygen averaged 11.13 mg/L, with a minimum of 6.58 mg/L and a maximum of 19.5 mg/L. The 2003 study found that dissolved oxygen rarely dropped below 4.00 mg/L and was normally above 7.00mg/L, indicating little to no change in dissolved oxygen over time (Godwin 2004).

In 2015, salinity averaged 0.6 ppt, with a minimum of 0.3 ppt and a maximum of 0.7 ppt. In 2016, salinity averaged 0.4 ppt, with a minimum of 0.2 ppt and a maximum of 0.4 ppt. The 2003 study recorded that under normal rainfall conditions in 2003, salinity never exceeded 1.0 ppt in the western half of Lake Mattamuskeet (Godwin 2004). The current salinity levels are very low and are associated with replacement of flapgate seals and installation of trash racks to prevent jamming of flapgates with debris, allowing better prevention of saltwater intrusion.

Additionally, conductivity was very low as expected throughout 2015 and averaged 1094 uS, with a minimum of 573 uS and a maximum of 1349 uS (Table 3.26). In 2016, conductivity averaged 657 uS, with a minimum of 399 uS and a maximum of 877 uS (Table 3.27).

Water velocity 2015 and 2016

In 2015, the results indicated that the sampled top-hinged gate was allowing for greater water velocity through the structure at 0.94 fps than the side-opening gate is allowing through the structure at 0.40 fps. In 2016, the results also indicated that the sampled top-hinged gate was allowing for greater water velocity through the structure at 0.28 fps than the side-opening gate is allowing through the structure at 0.16 fps. When comparing the two flapgate designs, the top-hinged configuration allows for a much smaller opening for water movement when compared to the side-opening configuration that exposes the entire water column when open. Blueback Herring use both lotic (moving water) and lentic (fairly still water) habitats, while Alewife are most abundant in lentic habitats (Loesch 1987, Walsh et al. 2005). Walsh et al. (2005) also found that fluctuations in river flow affected habitat use: moderate to high discharge rates increased the use of spawning and nursery habitat while low discharge reduced the spawning habitat. While the majority of the Lake Mattamuskeet spawning and nursery habitat is lentic by definition, the water moving through the four man-made canals that connect Lake Mattamuskeet to Pamlico Sound at their WCS junctures is funneled through embayments and can be restricted by flapgate presence, causing higher velocity of water through the smaller area which could prevent passage of weaker-swimming fishes.

Alewife age class structure 2015 and 2016

In 2003, Alewife ages ranged from 4 to 8 years at Waupoppin Canal (Godwin 2004). Wall (2003) reported an age range of 2 to 4 years at Lake Landing Canal. Tyus (1974) also reported an age range of 2 to 4 years at Lake Landing Canal. Godwin (2004) theorized that this shift in age composition could be attributed to poor recruitment, a different population entirely than the Lake Landing populations documented by Wall (2003) and Tyus (1974), or difference in aging techniques (otoliths versus scales). The 2015 age composition was extremely similar to the age structure from 2003, indicating little to no change in age structure (Godwin 2004). The 2016 age composition was also very similar to the age structures from both 2015 and 2003.

Alewife Gonadosomatic Index 2015 and 2016

Female mean GSI was higher than male mean GSI in both the Godwin (2004) and Wall (2003) studies as well as in the 2015 and 2016 results. When comparing the 2015 and 2016 mean GSI results for male and female Alewife, both male and female mean GSI increased from 2015 to 2016. There were more than twice the samples of 2015 in 2016 that these calculations were based on for both male and female mean GSI. Additionally, the 2016 sampling season began earlier than the 2015 sampling season, with the beginning of the Alewife spawning run likely undocumented in 2015 due to the late start date of sampling.

Impacts and recommendations

To our knowledge, there are very few published studies in which side-opening flapgates were used in WCSs to aid fish passage in low-head conditions. Perhaps the most applicable to our study was a Master's thesis conducted by Bass (2010), which found that 48% of PIT tagged Coho Salmon *Oncorhynchus kisutch* smolts passed through non-gated channels, 28% passed through side-opening gates, and 3% passed through top-hinged gates in three streams in tidal marshlands within Coos Bay (an Oregon estuary). More common flapgate designs used across the country include traditional top-hinged aluminum, stainless steel, cast iron, wooden, or lighter and concave radial (gator) doors hung over the opening of a round or rectangular culvert, top- or bottom-hinged pet doors (a small doored opening inset into a larger lid for fish passage), self-regulating tide gates with a buoyant lid that floats until water rises in a culvert and forces the gate to shut, or combination flap/sluice gates that allows the flapgate to be raised out of the way of the culvert when needed (Charland 1998).

Side-opening flapgates require little force to open and open wide due to the small angle off the vertical, allowing passage opportunity for migrating fishes. Giannico and Souder (2004) determined that water velocities through side-opening gates were lower than through top-hinged gates because of the reduction in force required to keep side-opening gates open. They also documented based on observations that side-opening flapgate water turbulence appeared to be lower and thus "fish friendlier" when compared with top-hinged gates, and also open wider and for longer periods of time (opening earlier and closing later than top-hinged gates of similar sizing), providing significant improvement to fish passage when considering width of opening (Giannico and Souder 2004).

This study found side-opening flapgates to be superior to top-hinged gates when considering the reduction in water flow (turbulence), as well as availability of the entire water column for fish of all behavior types. Especially for top-swimming or weaker-swimming species, less turbulence and the availability of the entire water column provide enhanced opportunity for successful passage through the WCS. We found that not only did adult Alewives prefer passing through the side-opening gate versus the top-hinged gate, but individuals of all species when totaled also preferred the side-opening gate to the top-hinged gate. This indicates that side-opening gates allow Lake Mattamuskeet's unique fish community the opportunity to pass into and out of the lake's canal systems more successfully than through top-hinged gates alone. The side-opening gate successfully passed 18 different species in 2016, while the top-hinged gate passed 14 different species (most noticeably absent being Largemouth Bass and Longnose Gar), but neither gate type precluded or provided enhanced opportunity for passage of undesirable species such as Common Carp. The side-opening gate design is clearly functioning as designed – to provide enhanced fish passage (especially for diadromous species) while maintaining the core function of WCSs in passively managing Lake Mattamuskeet's unique system.

Based on our findings, we recommend the continued utilization of side-opening gates in WCSs for enhanced fish passage opportunities for individuals of all species and especially for Alewife and other diadromous fishes at Lake Mattamuskeet as well as in comparable environments both locally and globally. The evidence of enhanced fish passage through side-opening gates versus top-hinged gates is obvious while still allowing the WCS to function as designed to prevent salt-water intrusion and allow for controlled drainage from the system. We also recommend investigation into the installation of additional side-opening gates as older top-hinged gates become due for replacement in order to provide additional enhanced fish passage opportunities. However, consideration of unintended hydrological effects associated with additional side-hinged gates must also be considered in terms of impact on width and timing of gate openings. Finally, we recommend considering the manual opening of flapgates as needed to allow for fish passage opportunities, especially during the spring spawning run of adult Alewife into Lake Mattamuskeet and fall emigration of juvenile Alewife out of Lake Mattamuskeet if flapgates remain closed during these times due to environmental factors.

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Tables

Table 3.1. Weekly immigrating catches, soak time (hours), catch per unit effort (CPUE), weekly total run estimate for the sampled side-opening gate, and weekly total run estimate including the other 6 gates for Alewife *Alosa pseudoharengus* during the 2015 sampling period at Waupoppin Water Control Structure, Lake Mattamuskeet, North Carolina.

Week	Hours	Catch	CPUE	Weekly Run Estimate
3/26/15-3/28/15	46.25	15	0.32	54
4/4/15-4/5/15	42.50	10	0.24	40
4/10/15-4/11/15	43.50	6	0.14	23
4/16/15-4/18/15	42.25	5	0.12	20
4/23/15-4/24/15	38.00	10	0.26	44
5/6/15-5/7/15	35.00	1	0.03	5
Totals	247.50	47	0.19	186

Table 3.2. Species captured at Waupoppin Water Control Structure during the March 26 through May 7, 2015 sampling period, Lake Mattamuskeet, North Carolina.

Side-Opening Gate				
Species	Scientific name	Emigrating	Immigrating	Total Collected
Alewife	*Alosa pseudoharengus*	39	50	89
Black Crappie	*Pomoxis nigromaculatus*	5	55	60
Atlantic Blue Crab	*Callinectes sapidus*	49	21	70
Bluegill	*Lepomis macrochirus*	0	3	3
Bowfin	*Amia calva*	3	2	5
Common Carp	*Cyprinus carpio*	1	7	8
Channel Catfish	*Ictalurus punctatus*	0	1	1
Longnose Gar	*Lepisosteus osseus*	3	47	50
Gizzard Shad	*Dorosoma cepedianum*	21	276	297
Largemouth Bass	*Micropterus salmoides*	2	27	29
Redear Sunfish	*Lepomis microlophus*	1	4	5
Striped Mullet	*Mugil cephalus*	3	0	3
White Perch	*Morone americana*	201	111	312
Grand Total		328	604	932

Table 3.3. Six most abundant species collected at Waupoppin Water Control Structure, Lake Mattamuskeet, North Carolina. Sampling was conducted from March 26 through May 7, 2015.

Species	Total Captured	Percent of Total Catch
White Perch *Morone americana*	312	33.48
Gizzard Shad *Dorosoma cepedianum*	297	31.87
Alewife *Alosa pseudoharengus*	89	9.55
Atlantic Blue Crab *Callinectes sapidus*	70	7.51
Black Crappie *Pomoxis nigromaculatus*	60	6.44
Longnose Gar *Lepisosteus osseus*	50	5.36
Top Six Species	878	94.21

Table 3.4. Six most abundant species collected in the Sound side versus Lake side of Waupoppin Water Control Structure, Lake Mattamuskeet, North Carolina. Sampling was conducted from March 26 through May 7, 2015.

Species	Total Captured	Percent of Total Catch
Sound side		
Gizzard Shad *Dorosoma cepedianum*	276	45.70
White Perch *Morone americana*	111	18.38
Black Crappie *Pomoxis nigromaculatus*	55	9.11
Alewife *Alosa pseudoharengus*	50	8.28
Longnose Gar *Lepisosteus osseus*	47	7.78
Largemouth Bass *Micropterus salmoides*	27	4.47
Top Six Species Sound Side	566	93.71
Lake side		
White Perch *Morone americana*	201	61.28
Atlantic Blue Crab *Callinectes sapidus*	49	14.94
Alewife *Alosa pseudoharengus*	39	11.89
Gizzard Shad *Dorosoma cepedianum*	21	6.40
Black Crappie *Pomoxis nigromaculatus*	5	1.52
Striped Mullet *Mugil cephalus*	3	0.91
Top Six Species Lake Side	318	97

Table 3.5. Species captured passing through the sampled side-opening gate at Waupoppin Water Control Structure during the March 26 through May 7, 2015 sampling period, Lake Mattamuskeet, North Carolina. Samples are grouped into two classifications: Crepuscular/Diurnal/Crepuscular (0700-1900) and Crepuscular/Nocturnal/Crepuscular (1900-0700).

Species	0700-1900	1900-0700	Total Collected
Alewife *Alosa pseudoharengus*	51	38	89
Black Crappie *Pomoxis nigromaculatus*	34	26	60
Atlantic Blue Crab *Callinectes sapidus*	25	45	70
Bluegill *Lepomis macrochirus*	0	3	3
Bowfin *Amia calva*	3	2	5
Common Carp *Cyprinus carpio*	2	6	8
Channel Catfish *Ictalurus punctatus*	0	1	1
Longnose Gar *Lepisosteus osseus*	10	40	50
Gizzard Shad *Dorosoma cepedianum*	112	185	297
Largemouth Bass *Micropterus salmoides*	17	12	29
Redear Sunfish *Lepomis microlophus*	5	0	5
Striped Mullet *Mugil cephalus*	1	2	3

White Perch *Morone americana*	87	225	312
Total	347	585	932

Table 3.6. Weekly catches, soak time (hours), catch per unit effort (CPUE), weekly total estimate of all immigrating individuals for the sampled side-opening gate, and weekly total estimate including the other 6 gates for the March 26 through May 7, 2015 sampling period at Waupoppin Water Control Structure, Lake Mattamuskeet.

2015				
Week	Hours	Catch	CPUE	Weekly Total Estimate
3/26/15-3/28/15	46.25	170	3.68	618
4/4/15-4/5/15	42.5	123	2.89	486
4/10/15-4/11/15	43.5	114	2.62	440
4/16/15-4/18/15	42.25	87	2.06	346
4/23/15-4/24/15	38	71	1.87	314
5/6/15-5/7/15	35	39	1.11	187
Totals	247.5	604	2.44	2391

Table 3.7. Comparison of weekly Alewife catches, soak time (hours), catch per unit effort (CPUE), and weekly total run estimate for the side-opening gate, the top-hinged gate, and the estimated totals for 6 top-hinged gates of during the 2016 sampling period at Waupoppin Water Control Structure, Lake Mattamuskeet, North Carolina.

2016 Side-Opening Gate					2016 Top-Hinged Gate					
Week	Hours	Catch	CPUE	Weekly run estimate	Week	Hours	Catch	CPUE	Weekly Run Estimate	Weekly Run Estimate for 6 Top-Hinged Gates
2/25/16-2/27/16	40.75	22	0.54	91	2/25/16-2/27/16	40.25	13	0.32	54	326
3/2/16-3/3/16	40	29	0.73	122	3/2/16-3/3/16	43	25	0.58	98	586
3/10/16-3/11/16	44.25	17	0.38	65	3/10/16-3/11/16	45	20	0.44	75	448
3/18/16-3/20/16	37.5	4	0.11	18	3/18/16-3/20/16	38.5	2	0.05	9	52
3/24/16-3/25/16	43.75	15	0.34	58	3/24/16-3/25/16	45	21	0.47	78	470
4/1/16-4/2/16	41.5	5	0.12	20	4/1/16-4/2/16	44.25	2	0.05	8	46
4/6/16-4/7/16	46	9	0.2	33	4/6/16-4/7/16	37.75	0	0	0	0
4/14/16-4/16/16	44.5	3	0.07	11	4/14/16-4/16/16	46.5	0	0	0	0
4/22/16-4/24/16	41	3	0.07	12	4/22/16-4/24/16	43	1	0.02	4	23
4/29/16-5/1/16	46.25	0	0	0	4/29/16-5/1/16	46.25	0	0	0	0
Totals	425.5	107	0.25	429	Totals	429.5	84	0.20	325	1951

Table 3.8. Species captured emigrating (EM) and immigrating (IM) at Waupoppin Water Control Structure during the February 25 through April 30, 2016 sampling period, Lake Mattamuskeet, North Carolina.

	Side-Opening Gate			Top-Hinged Gate		
Species	EM	IM	Total	EM	IM	Total
Alewife *Alosa pseudoharengus*	72	107	179	3	84	87
American Eel *Anguilla rostrate*	2	1	3	1	0	1
Black Crappie *Pomoxis nigromaculatus*	9	69	78	3	13	16
Atlantic Blue Crab *Callinectes sapidus*	59	14	73	4	14	18
Bluegill *Lepomis macrochirus*	9	17	26	6	3	9
Bowfin *Amia calva*	5	1	6	1	3	4
Common Carp *Cyprinus carpio*	8	4	12	0	10	10
Channel Catfish *Ictalurus punctatus*	0	1	1	0	1	1
Longnose Gar *Lepisosteus osseus*	4	14	18	0	0	0
Gizzard Shad *Dorosoma cepedianum*	12	132	144	2	48	50
Golden Shiner *Notemigonus crysoleucas*	0	3	3	0	0	0
Largemouth Bass *Micropterus salmoides*	2	18	20	0	0	0
Pumpkinseed *Lepomis gibbosus*	1	2	3	1	0	1
Redear Sunfish *Lepomis microlophus*	6	4	10	1	4	5
Striped Mullet *Mugil cephalus*	11	54	65	20	116	136
Threadfin Shad *Dorosoma petenense*	1	0	1	0	0	0
White Perch *Morone americana*	523	374	897	7	274	281

Yellow Perch *Perca flavescens*	0	0	0	1	0	1
Totals	724	815	1539	50	570	620
Sum of all species						2159

Table 3.9. Six most abundant species collected at Waupoppin Water Control Structure, Lake Mattamuskeet, North Carolina. Sampling was conducted from February 25 through April 30, 2016.

Species	Total Captured	Percent of Total Catch
White Perch *Morone americana*	1178	54.56
Alewife *Alosa pseudoharengus*	266	12.32
Striped Mullet *Mugil cephalus*	201	9.31
Gizzard Shad *Dorosoma cepedianum*	194	8.99
Black Crappie *Pomoxis nigromaculatus*	94	4.35
Atlantic Blue Crab *Callinectes sapidus*	91	4.21
Top Six Species	2024	93.75

Table 3.10. Six most abundant species collected in the Sound side versus Lake side of Waupoppin Water Control Structure, Lake Mattamuskeet, North Carolina. Sampling was conducted from February 25 through April 30, 2016.

Species	Total Captured	Percent of Total Catch
Sound side		
White Perch *Morone americana*	648	46.79%
Alewife *Alosa pseudoharengus*	191	13.79%
Gizzard Shad *Dorosoma cepedianum*	180	13.00%
Striped Mullet *Mugil cephalus*	170	12.27%
Black Crappie *Pomoxis nigromaculatus*	82	5.92%
Atlantic Blue Crab *Callinectes sapidus*	28	2.02%
Top Six Species Sound Side	1385	93.79%
Lake side		
White Perch *Morone americana*	530	68.48%
Alewife *Alosa pseudoharengus*	75	9.69%
Atlantic Blue Crab *Callinectes sapidus*	63	8.14%
Striped Mullet *Mugil cephalus*	31	4.01%
Bluegill *Lepomis macrochirus*	15	1.94%
Gizzard Shad *Dorosoma cepedianum*	14	1.81%
Top Six Species Lake Side	774	94.06%

Table 3.11. Species caught passing through the sampled side-opening and top-hinged gates at Waupoppin Water Control Structure during the February 25 through April 30, 2016 sampling period, Lake Mattamuskeet, North Carolina. Samples are grouped into two classifications: Crepuscular/Diurnal/Crepuscular (0700-1900 hours) and Crepuscular/Nocturnal/Crepuscular (1900-0700 hours).

Species	0700-1900	1900-0700	Total Collected
Alewife *Alosa pseudoharengus*	111	155	266
American Eel *Anguilla rostrate*	2	2	4
Black Crappie *Pomoxis nigromaculatus*	29	65	94
Atlantic Blue Crab *Callinectes sapidus*	45	46	91
Bluegill *Lepomis macrochirus*	16	19	35
Bowfin *Amia calva*	5	5	10
Common Carp *Cyprinus carpio*	12	10	22
Channel Catfish *Ictalurus punctatus*	0	2	2
Longnose Gar *Lepisosteus osseus*	5	13	18
Gizzard Shad *Dorosoma cepedianum*	68	126	194
Golden Shiner *Notemigonus crysoleucas*	2	1	3
Largemouth Bass *Micropterus salmoides*	16	4	20
Pumpkinseed *Lepomis gibbosus*	1	3	4
Redear Sunfish *Lepomis microlophus*	8	7	15
Striped Mullet *Mugil cephalus*	3	198	201
Threadfin Shad *Dorosoma petenense*	1	0	1
White Perch *Morone americana*	230	948	1178

Yellow Perch *Perca flavescens*	1	0	1
Totals	555	1604	2159

Table 3.12. Comparison of weekly catches, soak time (hours), catch per unit effort (CPUE), weekly total estimate of all immigrating individuals for the sampled top-hinged gate and side-opening gate, and weekly total estimate of all immigrating individuals through the 6 top-hinged gates during the 2016 sampling period at Waupoppin Water Control Structure, Lake Mattamuskeet.

Top-Hinged Gate						Side-Opening Gate				
Week	Hours	Catch	CPUE	Weekly Total Estimate	Weekly Total Estimate of 6 Gates	Week	Hours	Catch	CPUE	Weekly Total Estimate
2/25/16-2/27/16	40.25	318	7.90	1327	7964	2/25/16-2/27/16	40.75	223	5.47	919
3/2/16-3/3/16	43	74	1.72	289	1735	3/2/16-3/3/16	40	140	3.50	588
3/10/16-3/11/16	45	70	1.56	261	1568	3/10/16-3/11/16	44.25	44	0.99	167
3/18/16-3/20/16	38.5	7	0.18	31	183	3/18/16-3/20/16	37.5	37	0.99	166
3/24/16-3/25/16	45	38	0.84	142	851	3/24/16-3/25/16	43.75	37	0.85	142
4/1/16-4/2/16	44.25	25	0.56	95	569	4/1/16-4/2/16	41.5	40	0.96	162
4/6/16-4/7/16	37.75	15	0.40	67	401	4/6/16-4/7/16	46	138	3.00	504
4/14/16-4/16/16	46.5	5	0.11	18	108	4/14/16-4/16/16	44.5	42	0.94	159
4/22/16-4/24/16	43	16	0.37	63	375	4/22/16-4/24/16	41	99	2.41	406
4/29/16-5/1/16	46.25	2	0.04	7	44	4/29/16-5/1/16	46.25	15	0.32	55
Totals	429.5	570	1.33	2300	13798	Totals	425.5	815	1.92	3267

Table 3.13. American eel *Anguilla rostrata* captured in sampling pots during the 2015 and 2016 sampling periods at Waupoppin Canal, Lake Mattamuskeet, North Carolina.

Date	Location	Eel Pot Number	Total Length (mm)	Weight (g)
20160319	Downstream	1	530	340
20160319	Downstream	2	400	142
20160319	Upstream	1	480	227
20160325	Downstream	1	490	227
20160325	Downstream	1	382	57
20160325	Downstream	1	306	57
20160325	Upstream	3	648	567
20160407	Downstream	1	340	
20160424	Upstream	3	540	425

Table 3.14. Comparison of weekly catches, soak time (hours), catch per unit effort (CPUE), and weekly total estimate of American eel from eelpots during the 2015 and 2016 sampling periods at Waupoppin Canal, Lake Mattamuskeet, North Carolina.

2015					2016				
Week	Hours	Catch	CPUE	Weekly Total Estimate	Week	Hours	Catch	CPUE	Weekly Total Estimate
					2/25/16-2/27/16	40.75	0.00	0.00	0.00
					3/2/16-3/3/16	40.00	0.00	0.00	0.00
					3/10/16-3/11/16	44.25	0.00	0.00	0.00
					3/18/16-3/20/16	37.50	3.00	0.08	13.44
3/26/15-3/28/15	46.25	0.00	0.00	0.00	3/24/16-3/25/16	43.75	4.00	0.09	15.36
4/4/15-4/5/15	42.50	0.00	0.00	0.00	4/1/16-4/2/16	41.50	0.00	0.00	0.00
4/10/15-4/11/15	43.50	0.00	0.00	0.00	4/6/16-4/7/16	46.00	1.00	0.02	3.65
4/16/15-4/18/15	42.25	0.00	0.00	0.00	4/14/16-4/16/16	44.50	0.00	0.00	0.00
4/23/15-4/24/15	38.00	0.00	0.00	0.00	4/22/16-4/24/16	41.00	1.00	0.02	4.10
					4/29/16-5/1/16	46.25	0.00	0.00	0.00
5/6/15-5/7/15	35.00	0.00	0.00	0.00					
Totals	247.50	0.00	0.00	0.00	Totals	425.50	9.00	0.02	36.55

Table 3.15. Comparison of weekly catches, soak time (hours), catch per unit effort (CPUE), weekly total estimate of all individuals for the sampled top-hinged gate and side-opening gate during the 2016 sampling period at Waupoppin Water Control Structure, Lake Mattamuskeet, North Carolina.

Top-Hinged Gate					Side-Opening Gate				
Week	Hours	Catch	CPUE	Weekly Total Estimate	Week	Hours	Catch	CPUE	Weekly Total Estimate
2/25/16-2/27/16	40.25	320	7.95	1335.65	2/25/16-2/27/16	40.75	241	5.91	993.57
3/2/16-3/3/16	43	77	1.79	300.84	3/2/16-3/3/16	40	148	3.70	621.60
3/10/16-3/11/16	45	73	1.62	272.53	3/10/16-3/11/16	44.25	58	1.31	220.20
3/18/16-3/20/16	38.5	14	0.36	61.09	3/18/16-3/20/16	37.5	156	4.16	698.88
3/24/16-3/25/16	45	39	0.87	145.60	3/24/16-3/25/16	43.75	106	2.42	407.04
4/1/16-4/2/16	44.25	28	0.63	106.31	4/1/16-4/2/16	41.5	291	7.01	1178.02
4/6/16-4/7/16	37.75	16	0.42	71.21	4/6/16-4/7/16	46	236	5.13	861.91
4/14/16-4/16/16	46.5	9	0.19	32.52	4/14/16-4/16/16	44.5	72	1.62	271.82
4/22/16-4/24/16	43	21	0.49	82.05	4/22/16-4/24/16	41	205	5.00	840.00
4/29/16-5/1/16	46.25	23	0.50	83.55	4/29/16-5/1/16	46.25	26	0.56	94.44
Totals	429.5	620	1.48	2491.33	Totals	425.5	1539	3.68	6187.49

Table 3.16. Comparison of weekly catches, soak time (hours), catch per unit effort (CPUE), and weekly total estimate of Alewife *Alosa pseudoharengus* for the sampled side-opening gate and the sampled top-hinged gate for the 2016 sampling period at Waupoppin Water Control Structure, Lake Mattamuskeet, North Carolina.

2016 Side-Opening Gate					2016 Top-Hinged Gate				
Week	Hours	Catch	CPUE	Weekly Run Estimate	Week	Hours	Catch	CPUE	Weekly Run Estimate
2/25/16-2/27/16	40.75	22	0.54	90.70	2/25/16-2/27/16	40.25	13	0.32	54.26
3/2/16-3/3/16	40	29	0.73	121.80	3/2/16-3/3/16	43	25	0.58	97.67
3/10/16-3/11/16	44.25	17	0.38	64.54	3/10/16-3/11/16	45	20	0.44	74.67
3/18/16-3/20/16	37.5	17	0.45	76.16	3/18/16-3/20/16	38.5	5	0.13	21.82
3/24/16-3/25/16	43.75	17	0.39	65.28	3/24/16-3/25/16	45	21	0.47	78.40
4/1/16-4/2/16	41.5	19	0.46	76.92	4/1/16-4/2/16	44.25	2	0.05	7.59
4/6/16-4/7/16	46	25	0.54	91.30	4/6/16-4/7/16	37.75	0	0.00	0.00
4/14/16-4/16/16	44.5	10	0.22	37.75	4/14/16-4/16/16	46.5	0	0.00	0.00
4/22/16-4/24/16	41	15	0.37	61.46	4/22/16-4/24/16	43	1	0.02	3.91
4/29/16-5/1/16	46.25	4	0.09	14.53	4/29/16-5/1/16	46.25	0	0.00	0.00
Totals	425.5	175	0.42	700.45	Totals	429.5	87	0.20	338.32

Table 3.17. Comparison of weekly catches, soak time (hours), catch per unit effort (CPUE), weekly total estimate of emigrating individuals of all species for the sampled top-hinged gate and side-opening gate during the 2016 sampling period at Waupoppin Water Control Structure, Lake Mattamuskeet, North Carolina.

Top-Hinged Gate					Side-Opening Gate				
Week	Hours	Catch	CPUE	Weekly Total Estimate	Week	Hours	Catch	CPUE	Weekly Total Estimate
2/25/16-2/27/16	40.25	2	0.05	8.35	2/25/16-2/27/16	40.75	18	0.44	74.21
3/2/16-3/3/16	43	3	0.07	11.72	3/2/16-3/3/16	40	8	0.20	33.60
3/10/16-3/11/16	45	3	0.07	11.20	3/10/16-3/11/16	44.25	14	0.32	53.15
3/18/16-3/20/16	38.5	7	0.18	30.55	3/18/16-3/20/16	37.5	119	3.17	533.12
3/24/16-3/25/16	45	1	0.02	3.73	3/24/16-3/25/16	43.75	69	1.58	264.96
4/1/16-4/2/16	44.25	3	0.07	11.39	4/1/16-4/2/16	41.5	251	6.05	1016.10
4/6/16-4/7/16	37.75	1	0.03	4.45	4/6/16-4/7/16	46	98	2.13	357.91
4/14/16-4/16/16	46.5	4	0.09	14.45	4/14/16-4/16/16	44.5	30	0.67	113.26
4/22/16-4/24/16	43	5	0.12	19.53	4/22/16-4/24/16	41	106	2.59	434.34
4/29/16-5/1/16	46.25	21	0.45	76.28	4/29/16-5/1/16	46.25	11	0.24	39.96
Totals	429.5	50	0.11	191.66	Totals	425.5	724	1.74	2920.61

Table 3.18. Comparison of weekly catches, soak time (hours), catch per unit effort (CPUE), weekly total estimate of immigrating and emigrating individuals of all species for the sampled side-opening gate during the 2016 sampling period at Waupoppin Water Control Structure, Lake Mattamuskeet, North Carolina.

Side-Opening Gate Emigrating					Side-Opening Gate Immigrating				
Week	Hours	Catch	CPUE	Weekly Total Estimate	Week	Hours	Catch	CPUE	Weekly Total Estimate
2/25/16-2/27/16	40.75	18	0.44	74.21	2/25/16-2/27/16	40.75	223	5.47	919.36
3/2/16-3/3/16	40	8	0.20	33.60	3/2/16-3/3/16	40	140	3.5	588
3/10/16-3/11/16	44.25	14	0.32	53.15	3/10/16-3/11/16	44.25	44	0.99	167.05
3/18/16-3/20/16	37.5	119	3.17	533.12	3/18/16-3/20/16	37.5	37	0.99	165.76
3/24/16-3/25/16	43.75	69	1.58	264.96	3/24/16-3/25/16	43.75	37	0.85	142.08
4/1/16-4/2/16	41.5	251	6.05	1016.10	4/1/16-4/2/16	41.5	40	0.96	161.93
4/6/16-4/7/16	46	98	2.13	357.91	4/6/16-4/7/16	46	138	3	504
4/14/16-4/16/16	44.5	30	0.67	113.26	4/14/16-4/16/16	44.5	42	0.94	158.56
4/22/16-4/24/16	41	106	2.59	434.34	4/22/16-4/24/16	41	99	2.41	405.66
4/29/16-5/1/16	46.25	11	0.24	39.96	4/29/16-5/1/16	46.25	15	0.32	54.49
Totals	425.5	724	1.74	2920.61	Totals	425.5	815	1.943	3266.89

Table 3.19. Comparison of weekly catches, soak time (hours), catch per unit effort (CPUE), weekly total estimate of immigrating and emigrating individuals of all species for the sampled top-hinged gate during the 2016 sampling period at Waupoppin Water Control Structure, Lake Mattamuskeet, North Carolina.

Top-Hinged Gate Emigrating					Top-Hinged Gate Immigrating				
Week	Hours	Catch	CPUE	Weekly Total Estimate	Week	Hours	Catch	CPUE	Weekly Total Estimate
2/25/16-2/27/16	40.25	2	0.05	8.35	2/25/16-2/27/16	40.25	318.00	7.90	1327.30
3/2/16-3/3/16	43	3	0.07	11.72	3/2/16-3/3/16	43.00	74.00	1.72	289.12
3/10/16-3/11/16	45	3	0.07	11.20	3/10/16-3/11/16	45.00	70.00	1.56	261.33
3/18/16-3/20/16	38.5	7	0.18	30.55	3/18/16-3/20/16	38.50	7.00	0.18	30.55
3/24/16-3/25/16	45	1	0.02	3.73	3/24/16-3/25/16	45.00	38.00	0.84	141.87
4/1/16-4/2/16	44.25	3	0.07	11.39	4/1/16-4/2/16	44.25	25.00	0.56	94.92
4/6/16-4/7/16	37.75	1	0.03	4.45	4/6/16-4/7/16	37.75	15.00	0.40	66.75
4/14/16-4/16/16	46.5	4	0.09	14.45	4/14/16-4/16/16	46.50	5.00	0.11	18.06
4/22/16-4/24/16	43	5	0.12	19.53	4/22/16-4/24/16	43.00	16.00	0.37	62.51
4/29/16-5/1/16	46.25	21	0.45	76.28	4/29/16-5/1/16	46.25	2.00	0.04	7.26
Totals	429.5	50	0.11	191.66	Totals	429.50	570.00	1.37	2299.68

Table 3.20. Comparison of weekly catches, soak time (hours), catch per unit effort (CPUE), and weekly total weekly estimate of Alewife *Alosa pseudoharengus* for the sampled side-opening gate and top-hinged gate for the 2016 sampling period at Waupoppin Water Control Structure, Lake Mattamuskeet, North Carolina.

2016 Side-Opening Gate					2016 Top-Hinged Gate				
Week	Hours	Catch	CPUE	Weekly Run Estimate	Week	Hours	Catch	CPUE	Weekly Run Estimate
2/25/16-2/27/16	40.75	22	0.54	90.7	2/25/16-2/27/16	40.25	13	0.32	54.26
3/2/16-3/3/16	40	29	0.73	121.8	3/2/16-3/3/16	43	25	0.58	97.67
3/10/16-3/11/16	44.25	17	0.38	64.54	3/10/16-3/11/16	45	20	0.44	74.67
3/18/16-3/20/16	37.5	4	0.11	17.92	3/18/16-3/20/16	38.5	2	0.05	8.73
3/24/16-3/25/16	43.75	15	0.34	57.6	3/24/16-3/25/16	45	21	0.47	78.4
4/1/16-4/2/16	41.5	5	0.12	20.24	4/1/16-4/2/16	44.25	2	0.05	7.59
4/6/16-4/7/16	46	9	0.2	32.87	4/6/16-4/7/16	37.75	0	0	0
4/14/16-4/16/16	44.5	3	0.07	11.33	4/14/16-4/16/16	46.5	0	0	0
4/22/16-4/24/16	41	3	0.07	12.29	4/22/16-4/24/16	43	1	0.02	3.91
4/29/16-5/1/16	46.25	0	0	0	4/29/16-5/1/16	46.25	0	0	0
Totals	425.5	107	0.25	429.29	Totals	429.5	84	0.2	325.23

Table 3.21. Comparison of weekly catches, soak time (hours), catch per unit effort (CPUE), weekly total estimate of emigrating Alewife *Alosa pseudoharengus* for the sampled top-hinged gate and side-opening gate during the 2016 sampling period at Waupoppin Water Control Structure, Lake Mattamuskeet, North Carolina.

Top-Hinged Gate					Side-Opening Gate				
Week	Hours	Catch	CPUE	Weekly Total Estimate	Week	Hours	Catch	CPUE	Weekly Total Estimate
2/25/16-2/27/16	40.25	0	0.00	0.00	2/25/16-2/27/16	40.75	0	0.00	0.00
3/2/16-3/3/16	43	0	0.00	0.00	3/2/16-3/3/16	40	0	0.00	0.00
3/10/16-3/11/16	45	0	0.00	0.00	3/10/16-3/11/16	44.25	0	0.00	0.00
3/18/16-3/20/16	38.5	3	0.08	13.09	3/18/16-3/20/16	37.5	13	0.35	58.24
3/24/16-3/25/16	45	0	0.00	0.00	3/24/16-3/25/16	43.75	2	0.05	7.68
4/1/16-4/2/16	44.25	0	0.00	0.00	4/1/16-4/2/16	41.5	14	0.34	56.67
4/6/16-4/7/16	37.75	0	0.00	0.00	4/6/16-4/7/16	46	16	0.35	58.43
4/14/16-4/16/16	46.5	0	0.00	0.00	4/14/16-4/16/16	44.5	7	0.16	26.43
4/22/16-4/24/16	43	0	0.00	0.00	4/22/16-4/24/16	41	12	0.29	49.17
4/29/16-5/1/16	46.25	0	0.00	0.00	4/29/16-5/1/16	46.25	4	0.09	14.53
Totals	429.5	3	0.01	13.09	Totals	425.5	68	0.16	271.16

Table 3.22. Comparison of weekly catches, soak time (hours), catch per unit effort (CPUE), weekly total estimate of immigrating and emigrating Alewife *Alosa pseudoharengus* for the sampled side-opening gate during the 2016 sampling period at Waupoppin Water Control Structure, Lake Mattamuskeet, North Carolina.

Side-Opening Gate Emigrating					Side-Opening Gate Immigrating				
Week	Hours	Catch	CPUE	Weekly Total Estimate	Week	Hours	Catch	CPUE	Weekly Total Estimate
2/25/16-2/27/16	40.25	0	0.00	0.00	2/25/16-2/27/16	40.75	22	0.54	90.70
3/2/16-3/3/16	43	0	0.00	0.00	3/2/16-3/3/16	40	29	0.73	121.80
3/10/16-3/11/16	45	0	0.00	0.00	3/10/16-3/11/16	44.25	14	0.32	53.15
3/18/16-3/20/16	38.5	13	0.34	56.73	3/18/16-3/20/16	37.5	4	0.11	17.92
3/24/16-3/25/16	45	2	0.04	7.47	3/24/16-3/25/16	43.75	15	0.34	57.60
4/1/16-4/2/16	44.25	14	0.32	53.15	4/1/16-4/2/16	41.5	5	0.12	20.24
4/6/16-4/7/16	37.75	16	0.42	71.21	4/6/16-4/7/16	46	8	0.17	29.22
4/14/16-4/16/16	46.5	7	0.15	25.29	4/14/16-4/16/16	44.5	3	0.07	11.33
4/22/16-4/24/16	43	12	0.28	46.88	4/22/16-4/24/16	41	0	0.00	0.00
4/29/16-5/1/16	46.25	4	0.09	14.53	4/29/16-5/1/16	46.25	3	0.06	10.90
Totals	429.5	68	0.16	275.25	Totals	425.5	103	0.25	412.85

Table 3.23. Comparison of weekly catches, soak time (hours), catch per unit effort (CPUE), weekly total estimate of immigrating and emigrating Alewife *Alosa pseudoharengus* for the sampled top-hinged gate during the 2016 sampling period at Waupoppin Water Control Structure, Lake Mattamuskeet, North Carolina.

Top-Hinged Gate Emigrating					Top-Hinged Gate Immigrating				
Week	Hours	Catch	CPUE	Weekly Total Estimate	Week	Hours	Catch	CPUE	Weekly Total Estimate
2/25/16-2/27/16	40.25	0.00	0.00	0.00	2/25/16-2/27/16	40.75	13.00	0.32	53.60
3/2/16-3/3/16	43.00	0.00	0.00	0.00	3/2/16-3/3/16	40.00	25.00	0.63	105.00
3/10/16-3/11/16	45.00	0.00	0.00	0.00	3/10/16-3/11/16	44.25	20.00	0.45	75.93
3/18/16-3/20/16	38.50	3.00	0.08	13.09	3/18/16-3/20/16	37.50	2.00	0.05	8.96
3/24/16-3/25/16	45.00	0.00	0.00	0.00	3/24/16-3/25/16	43.75	21.00	0.48	80.64
4/1/16-4/2/16	44.25	0.00	0.00	0.00	4/1/16-4/2/16	41.50	2.00	0.05	8.10
4/6/16-4/7/16	37.75	0.00	0.00	0.00	4/6/16-4/7/16	46.00	0.00	0.00	0.00
4/14/16-4/16/16	46.50	0.00	0.00	0.00	4/14/16-4/16/16	44.50	0.00	0.00	0.00
4/22/16-4/24/16	43.00	0.00	0.00	0.00	4/22/16-4/24/16	41.00	1.00	0.02	4.10
4/29/16-5/1/16	46.25	0.00	0.00	0.00	4/29/16-5/1/16	46.25	0.00	0.00	0.00
Totals	429.50	3.00	0.01	13.09	Totals	425.50	84.00	0.20	336.32

Table 3.24. Comparison of weekly catches, soak time (hours), catch per unit effort (CPUE), and weekly total estimate of all immigrating individuals for the sampled side-opening gate for the 2015 and 2016 sampling periods at Waupoppin Water Control Structure, Lake Mattamuskeet.

2015					2016				
Week	Hours	Catch	CPUE	Weekly Total Estimate	Week	Hours	Catch	CPUE	Weekly Total Estimate
					2/25/16-2/27/16	40.75	223	5.47	919
					3/2/16-3/3/16	40	140	3.50	588
					3/10/16-3/11/16	44.25	44	0.99	167
					3/18/16-3/20/16	37.5	37	0.99	166
3/26/15-3/28/15	46.25	170	3.68	618	3/24/16-3/25/16	43.75	37	0.85	142
4/4/15-4/5/15	42.5	123	2.89	486	4/1/16-4/2/16	41.5	40	0.96	162
4/10/15-4/11/15	43.5	114	2.62	440	4/6/16-4/7/16	46	138	3.00	504
4/16/15-4/18/15	42.25	87	2.06	346	4/14/16-4/16/16	44.5	42	0.94	159
4/23/15-4/24/15	38	71	1.87	314	4/22/16-4/24/16	41	99	2.41	406
					4/29/16-5/1/16	46.25	15	0.32	55
5/6/15-5/7/15	35	39	1.11	187					
Totals	247.5	604	2.44	2391	Totals	425.5	815	1.92	3267

Table 3.25. Comparison of weekly catches, soak time (hours), catch per unit effort (CPUE), and weekly total run estimate of immigrating individuals for the sampled side-opening gate for the 2015 and 2016 Alewife *Alosa pseudoharengus* run at Waupoppin Water Control Structure, Lake Mattamuskeet, North Carolina.

2015					2016				
Week	Hours	Catch	CPUE	Weekly Run Estimate	Week	Hours	Catch	CPUE	Weekly Run Estimate
					2/25/16-2/27/16	40.75	22	0.54	91
					3/2/16-3/3/16	40	29	0.73	122
					3/10/16-3/11/16	44.25	17	0.38	65
					3/18/16-3/20/16	37.5	4	0.11	18
3/26/15-3/28/15	46.25	15	0.32	54	3/24/16-3/25/16	43.75	15	0.34	58
4/4/15-4/5/15	42.5	10	0.24	40	4/1/16-4/2/16	41.5	5	0.12	20
4/10/15-4/11/15	43.5	6	0.14	23	4/6/16-4/7/16	46	9	0.2	33
4/16/15-4/18/15	42.25	5	0.12	20	4/14/16-4/16/16	44.5	3	0.07	11
4/23/15-4/24/15	38	10	0.26	44	4/22/16-4/24/16	41	3	0.07	12
					4/29/16-5/1/16	46.25	0	0	0
5/6/15-5/7/15	35	1	0.03	5					
Totals	247.5	47	0.19	186	Totals	425.5	107	0.25	430

Table 3.26. Water quality data collected at Waupoppin Water Control Structure March 26 to May 7, 2015, Lake Mattamuskeet, North Carolina. Number of samples (N), mean, minimum, and maximum values for water temperature C, dissolved oxygen mg/L, salinity ppt, and conductivity uS.

2015 Waupoppin Water Control Structure Water Quality				
Variable	N	Mean	Minimum	Maximum
Water Temperature (º C)	50	19.48	10.2	23.8
Dissolved Oxygen (mg/L)	50	11.14	3.47	18.81
Salinity (ppt)	50	0.6	0.3	0.7
Conductivity (uS)	50	1094.3	573	1349

Table 3.27. Water quality data collected at Waupoppin Water Control Structure February 25 to May 1, 2016, Lake Mattamuskeet, North Carolina. Number of samples (N), mean, minimum, and maximum values for water temperature C, dissolved oxygen mg/L, salinity ppt, and conductivity uS.

2016 Waupoppin Water Control Structure Water Quality				
Variable	N	Mean	Minimum	Maximum
Water Temperature °C	58	16.92	9	25.5
Dissolved Oxygen mg/L	58	11.13	6.58	19.5
Salinity ppt	58	0.37	0.2	0.4
Conductivity uS	58	656.78	399	877

Table 3.28. Comparison of average water velocity (fps) at the bottom center of the sampled side-opening and top-hinged gate at Waupoppin Water Control Structure during the March 26 through May 7, 2015 sampling period, Lake Mattamuskeet, North Carolina.

Week	Side-Opening Gate	Top-Hinged Gate	Average
3/26/15-3/28/15	0.49	0.62	0.55
4/4/15-4/5/15	0.10	1.29	0.70
4/10/15-4/11/15	0.52	1.06	0.79
4/16/15-4/18/15	0.48	1.10	0.79
4/23/15-4/24/15	0.45	0.89	0.67
5/6/15-5/7/15	0.42	0.58	0.50
Totals	0.40	0.94	0.67

Table 3.29. Comparison of average water velocity (fps) at the bottom center of the sampled side-opening and top-hinged gate at Waupoppin Water Control Structure during the February 25 through April 30, 2016 sampling period, Lake Mattamuskeet, North Carolina.

Week	Side-Opening Gate	Top-Hinged Gate	Average
2/25/16-2/27/16	0.10	0.63	0.36
3/2/16-3/3/16	0.33	0.31	0.32
3/10/16-3/11/16	0.33	0.58	0.46
3/18/16-3/20/16	0.08	0.08	0.08
3/24/16-3/25/16	0.09	0.09	0.09
4/1/16-4/2/16	0.16	0.44	0.30
4/6/16-4/7/16	0.19	0.44	0.32
4/14/16-4/16/16	0.08	0.17	0.12
4/22/16-4/24/16	0.17	0.18	0.17
4/29/16-5/1/16	0.00	0.00	0.00
Totals	0.16	0.28	0.22

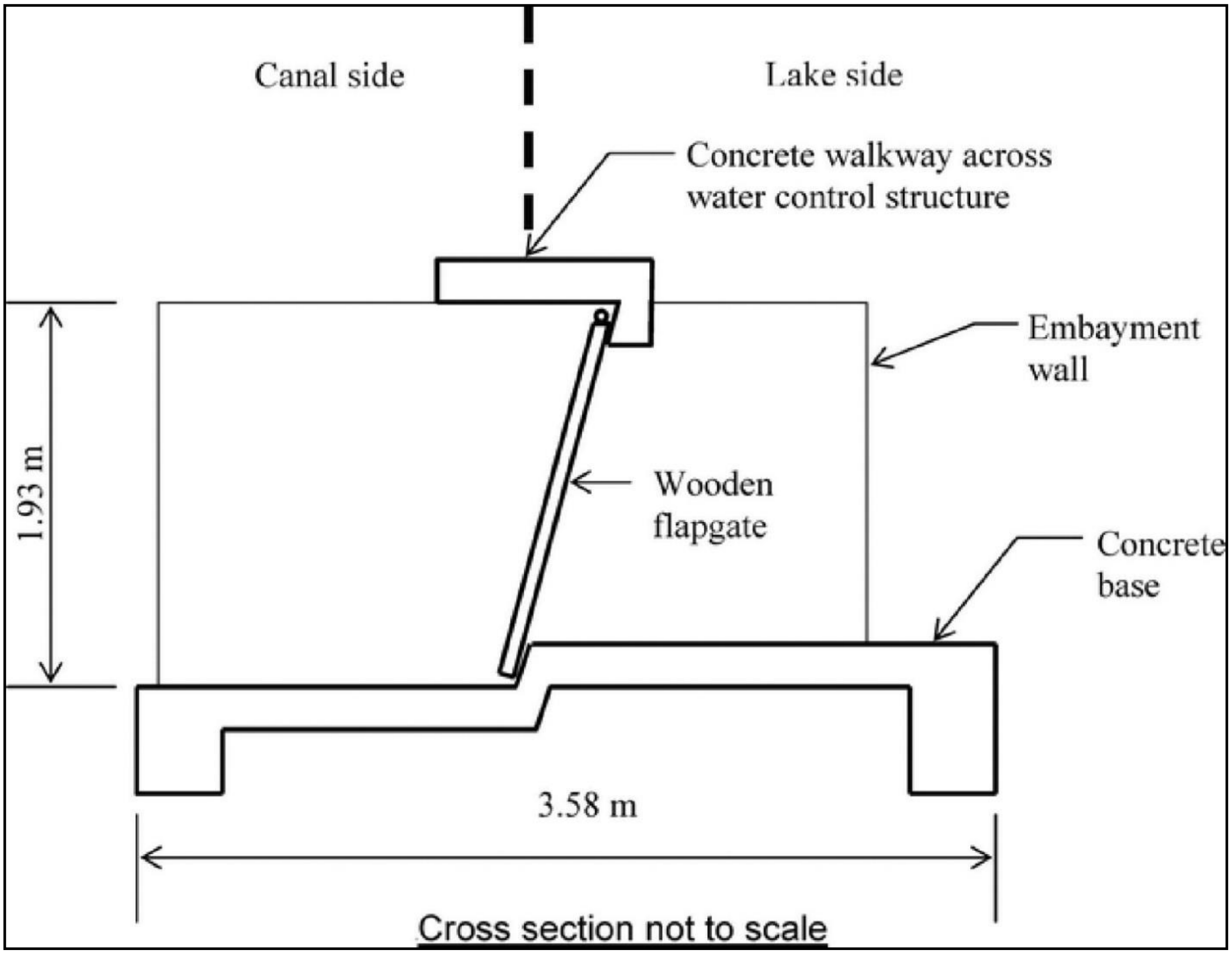

Figure 3.1. Line drawing of the original wooden flapgate (redrawn from a U.S. Fish and Wildlife Service drawing by the regional engineer, Atlanta, 1950), Lake Mattamuskeet, North Carolina. Rulifson and Wall 2006.

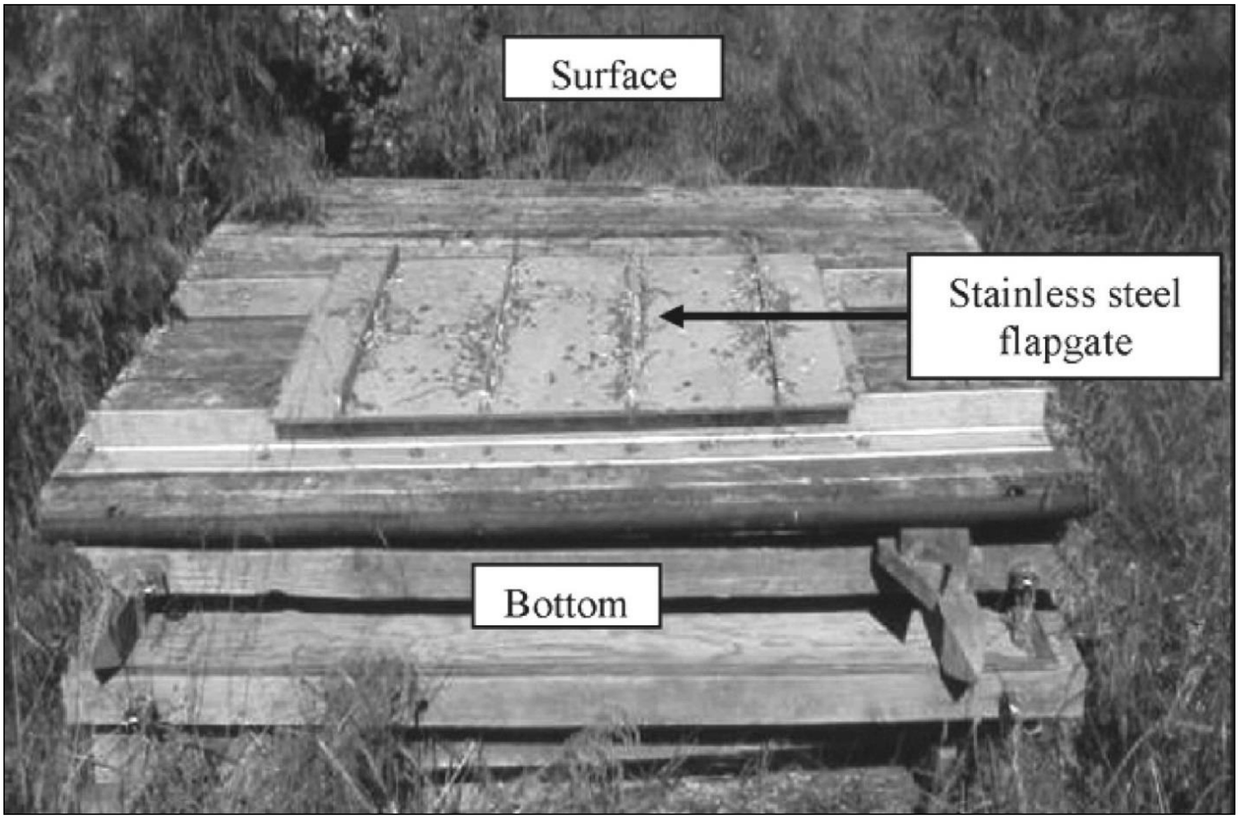

Figure 3.2. Photograph of a wooden stop block with stainless steel flapgate which were installed in 1989, Lake Mattamuskeet, North Carolina. Rulifson and Wall (2006).

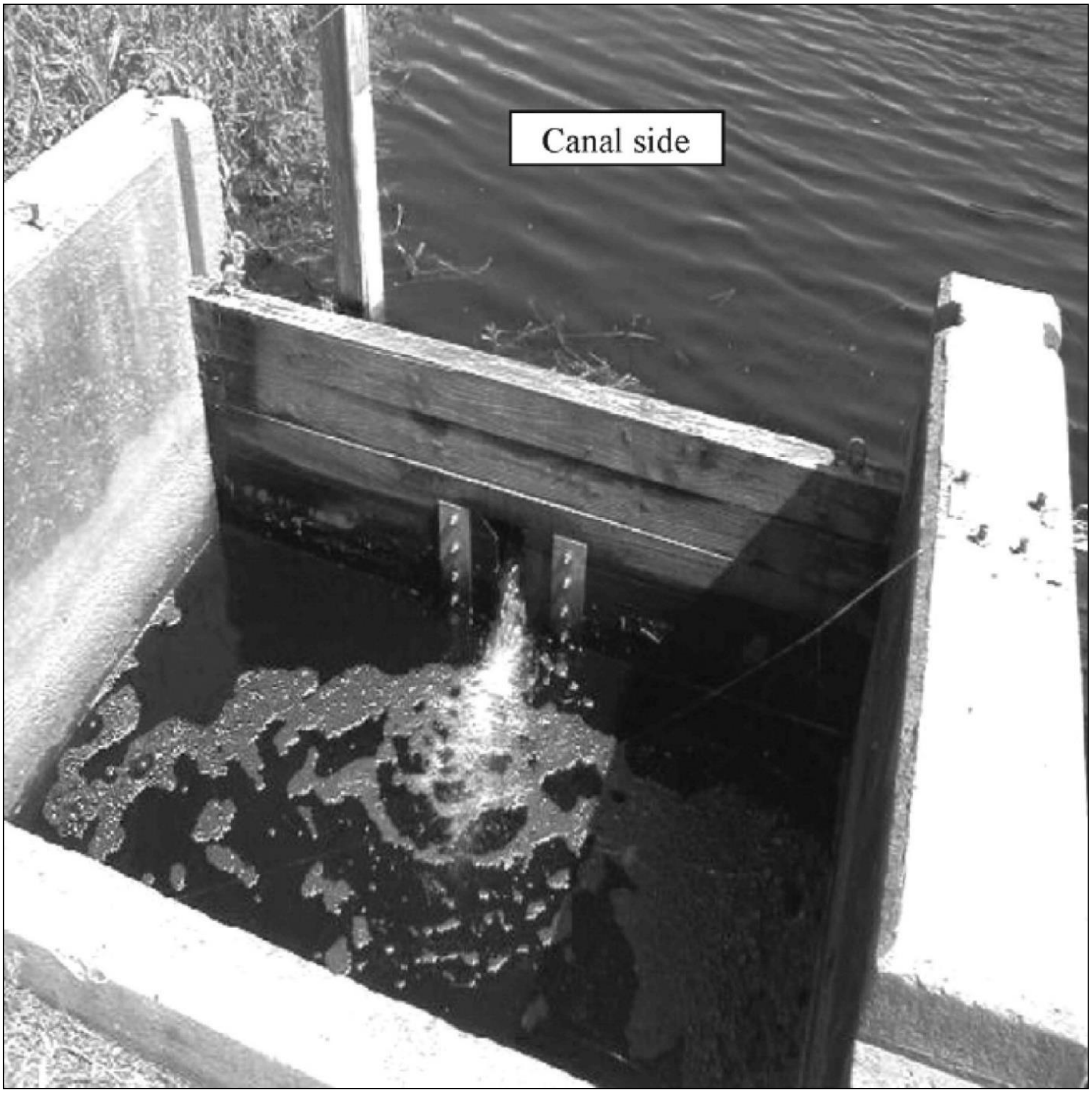

Figure 3.3. Photograph of one of the fish passage slotted weirs that were installed in 1996 in existing wooden stop blocks to enhance fish and blue crab passage, Lake Mattamuskeet, North Carolina. Rulifson and Wall (2006).

Figure 3.4. Photograph of one of the current top-hinged flapgates in place at Waupoppin Water Control Structure, Lake Mattamuskeet, North Carolina. Godwin (2004).

Figure 3.5. Author with lift system, electric winch, and custom-built dual-sided fish trap deployed in the side-opening gate during the 2015 and 2016 sampling periods at Waupoppin Water Control Structure, Lake Mattamuskeet, North Carolina.

Figure 3.6. Lift system, electric winch, and custom-built dual-sided fish trap deployed in the top-hinged gate during the 2016 sampling period at Waupoppin Water Control Structure, Lake Mattamuskeet, North Carolina.

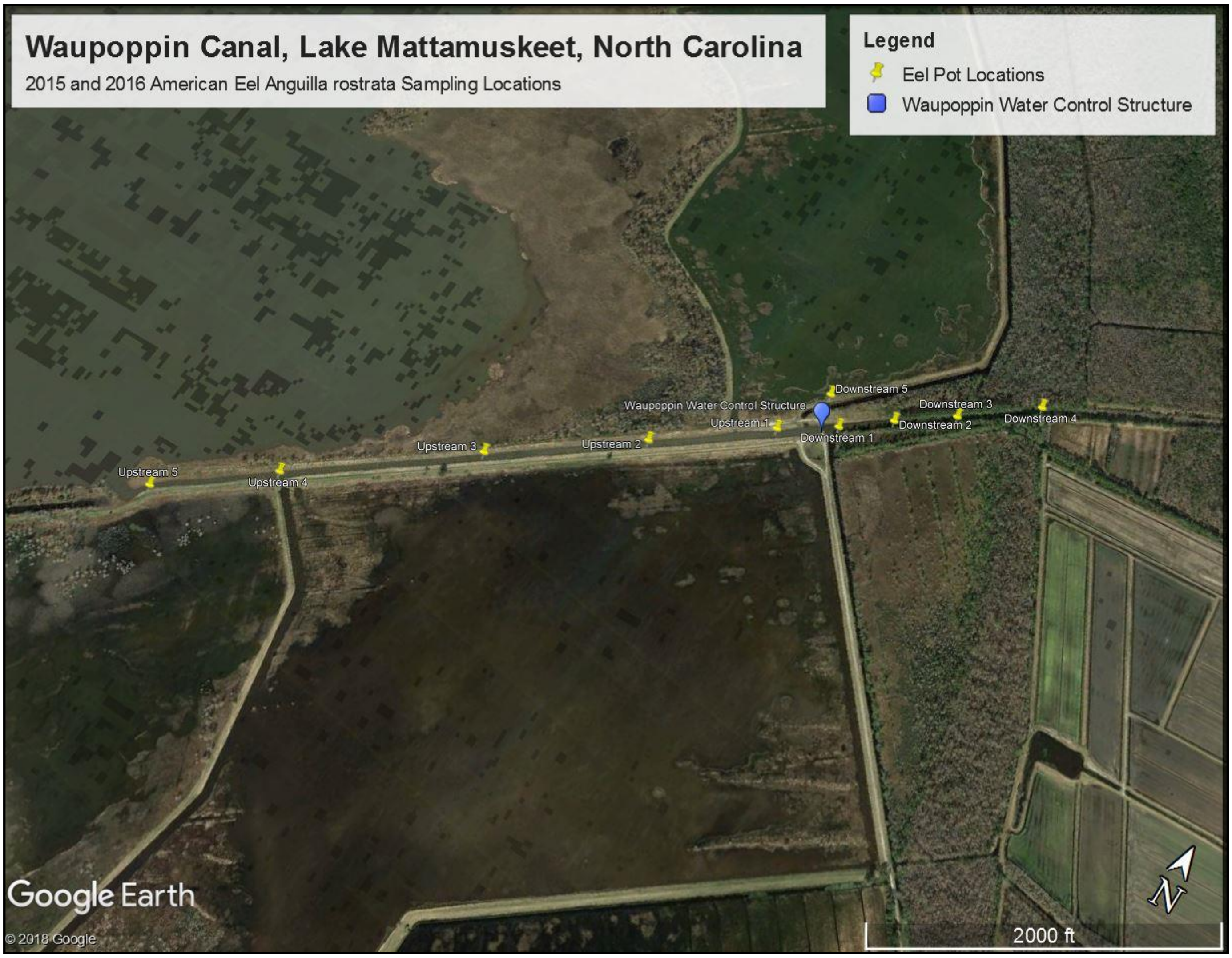

Figure 3.7. Locations of supplemental eel pot locations during the 2015 and 2016 sampling periods at Waupoppin Water Control Structure, Lake Mattamuskeet, North Carolina.

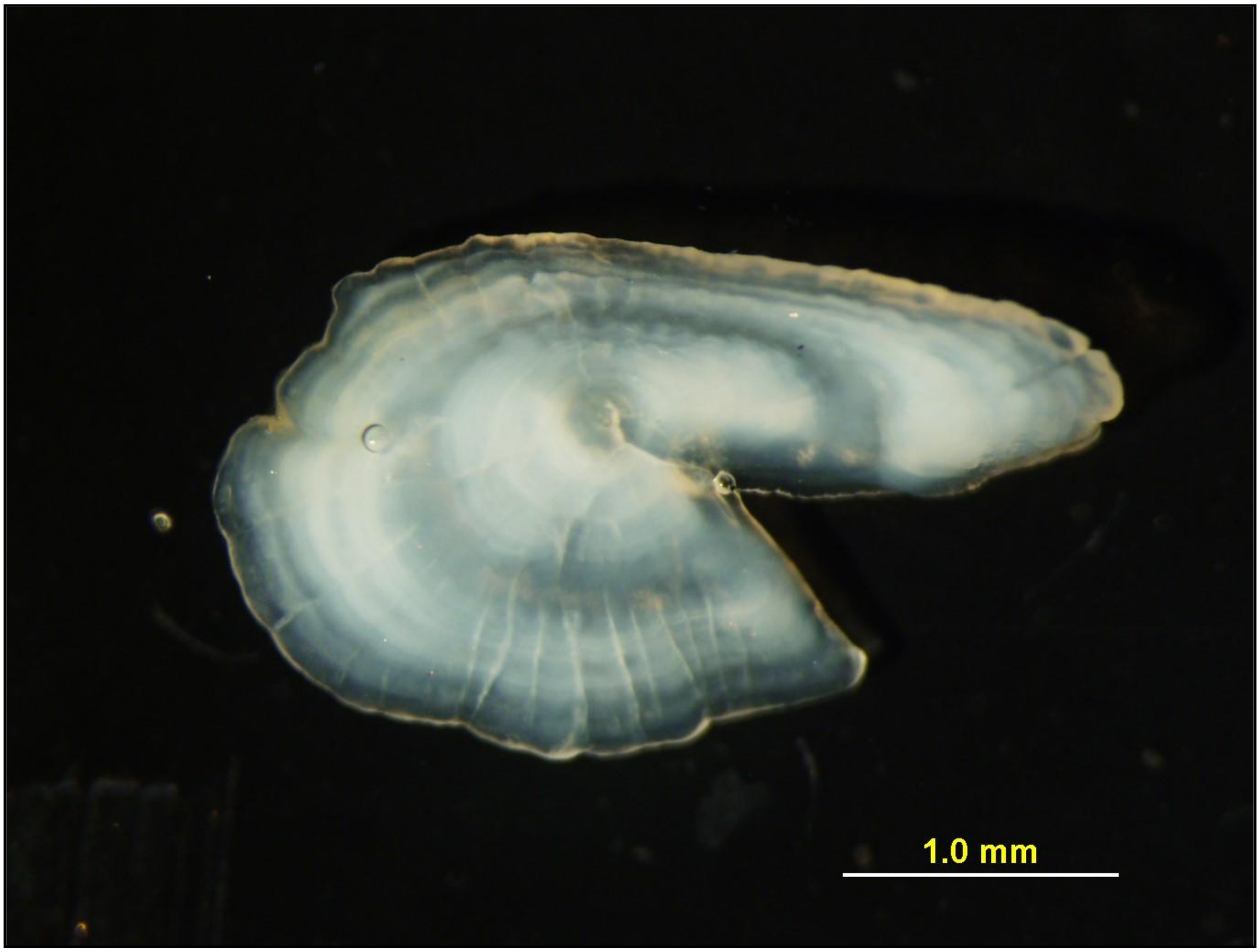

Figure 3.8. Example of a sagittal otolith that has been digitally photographed for use in aging of adult Alewife *Alosa pseudoharengus* by counting bands as yearly annuli or marks.

Figure 3.9. Adult female Alewife *Alosa pseudoharengus* shown with removed gonads.

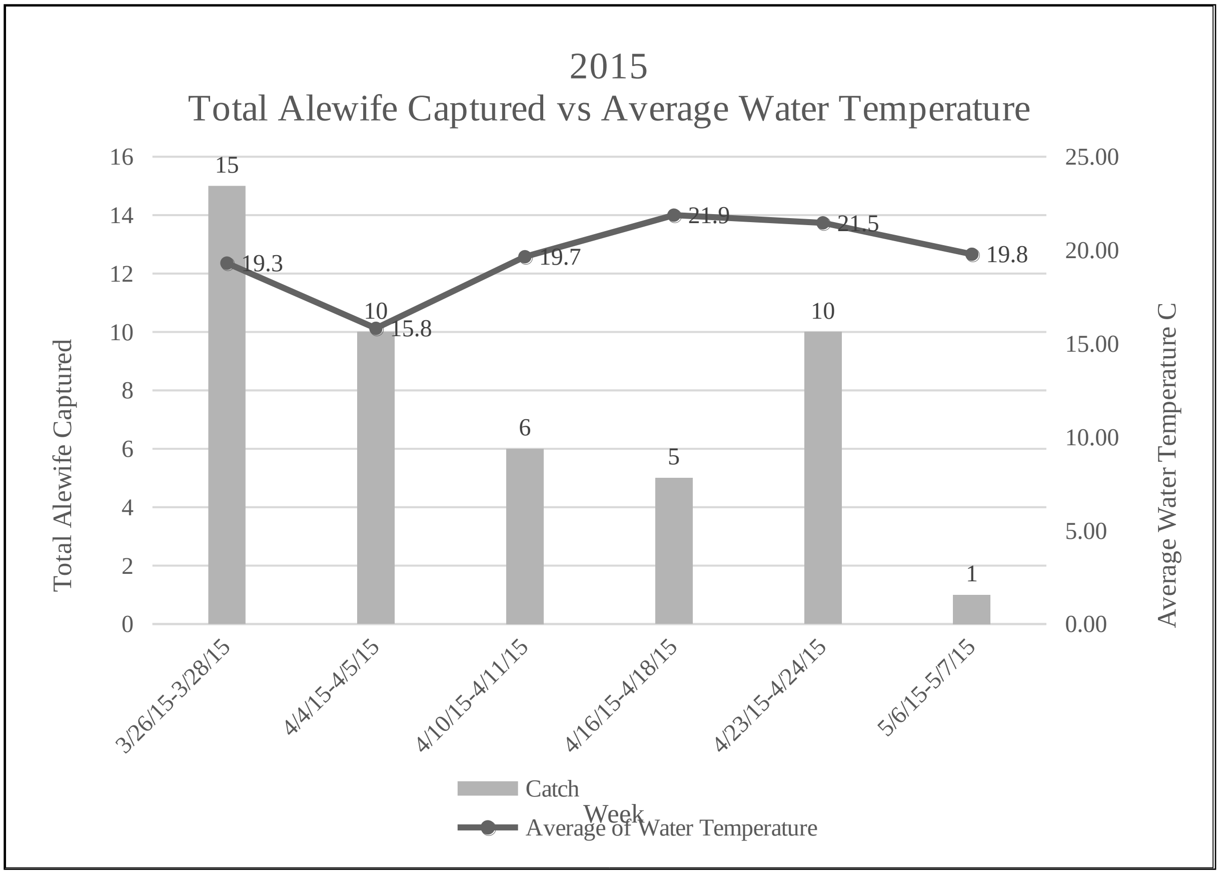

Figure 3.10. Total Alewife captured and average water temperature C by week for the 2015 spawning run at Waupoppin Water Control Structure, Lake Mattamuskeet, North Carolina.

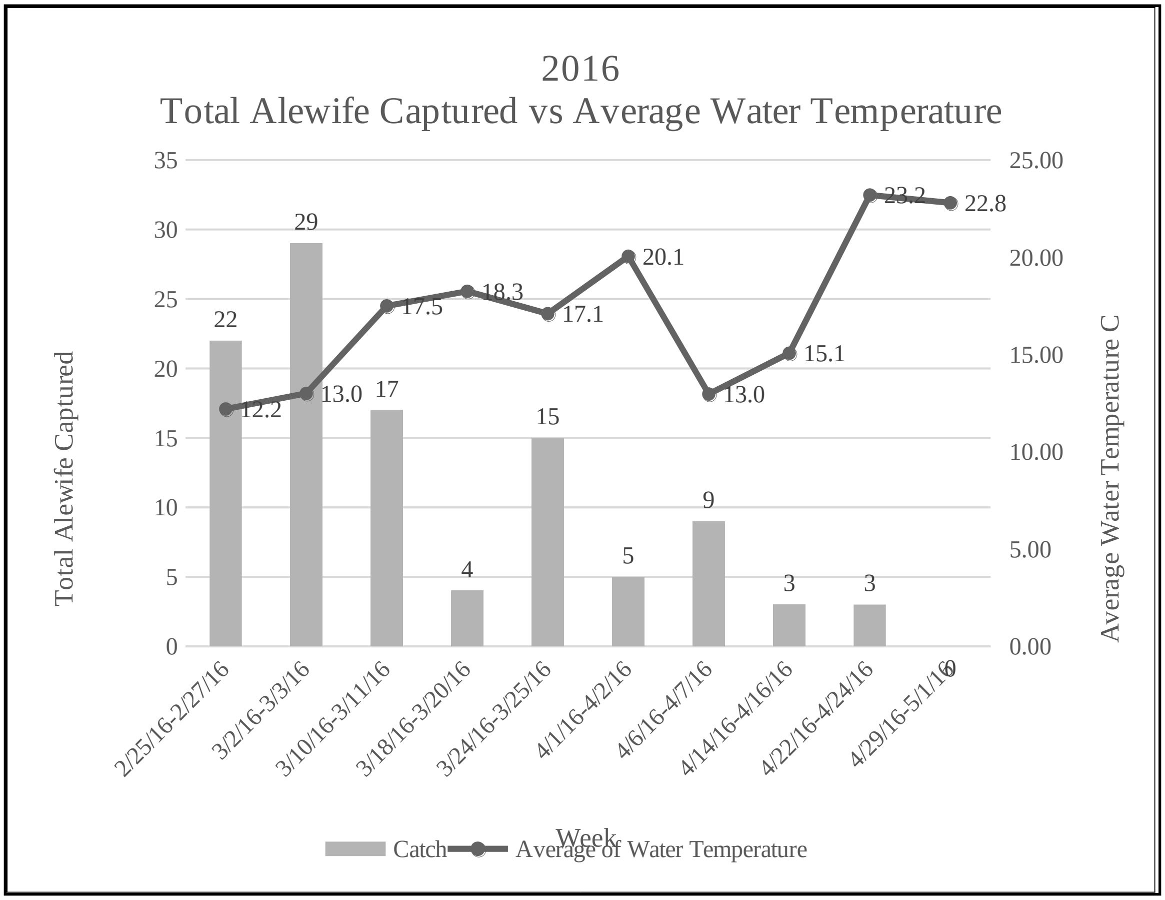

Figure 3.11. Total Alewife *Alosa pseudoharengus* captured and average water temperature C by week for the 2016 spawning run at Waupoppin Water Control Structure, Lake Mattamuskeet, North Carolina.

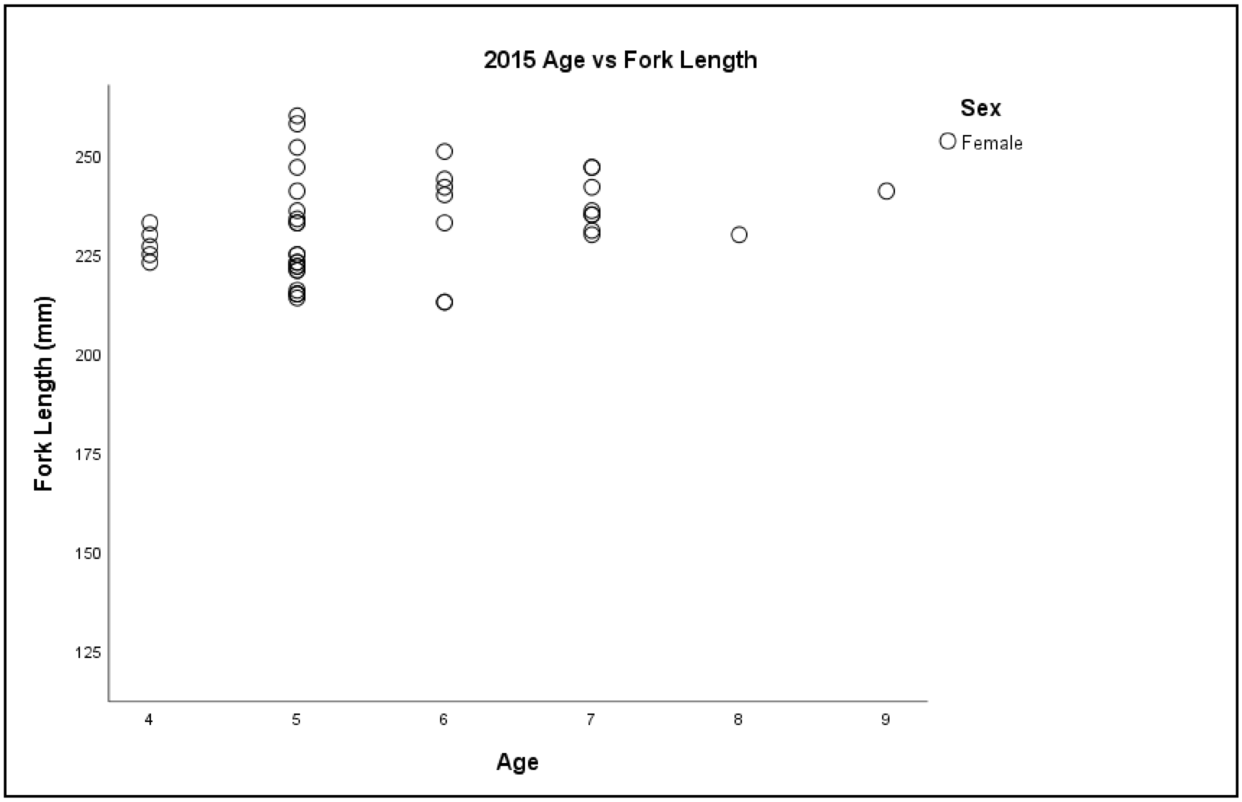

Figure 3.12. Age classes of adult female Alewife captured during the 2015 sampling period at Waupoppin Water Control Structure, Lake Mattamuskeet, North Carolina.

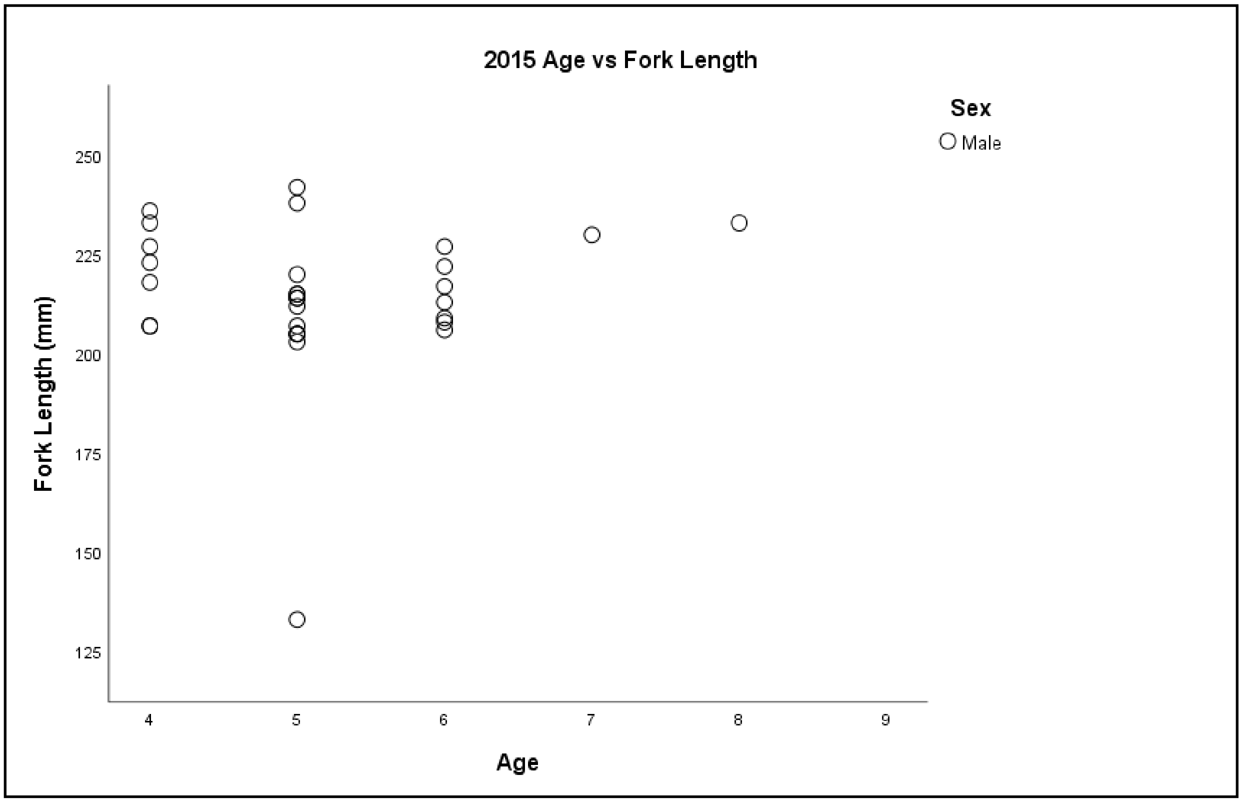

Figure 3.13. Age classes of adult male Alewife captured during the 2015 sampling period at Waupoppin Water Control Structure, Lake Mattamuskeet, North Carolina.

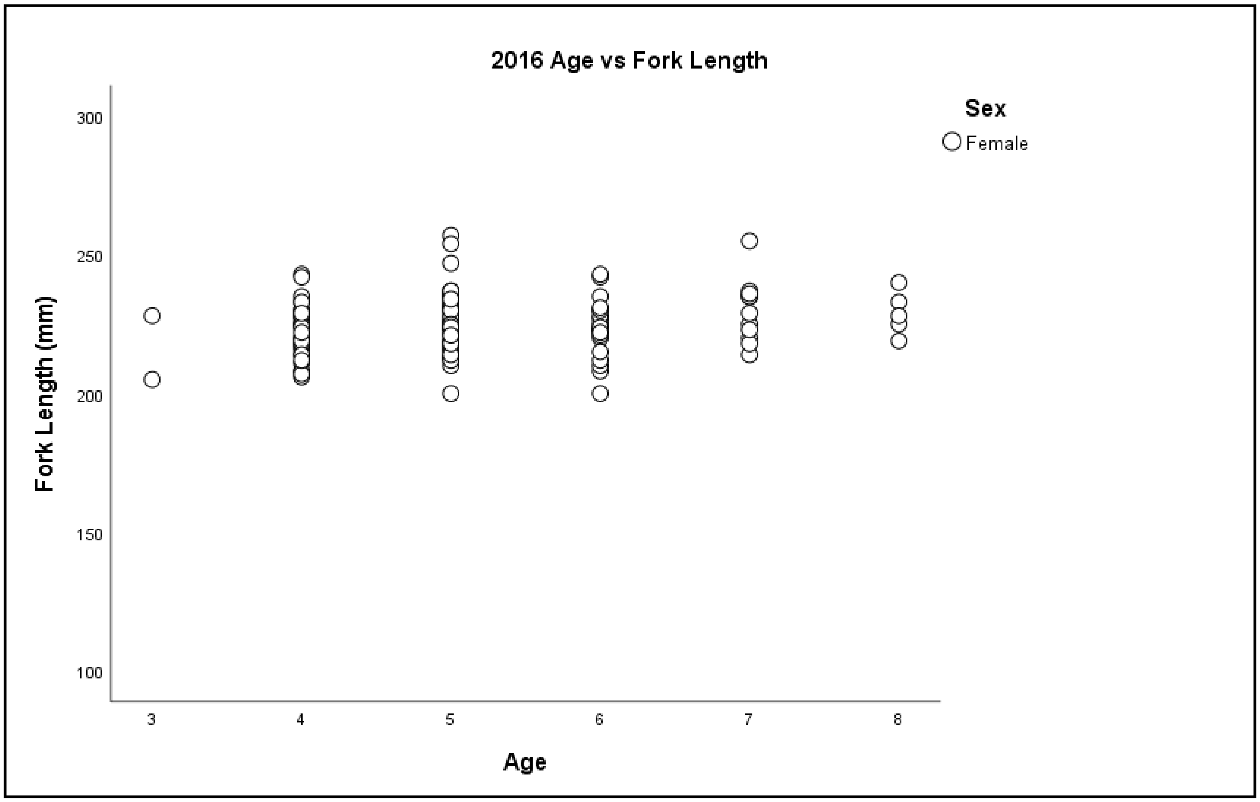

Figure 3.14. Age classes of adult female Alewife captured during the 2016 sampling period at Waupoppin Water Control Structure, Lake Mattamuskeet, North Carolina.

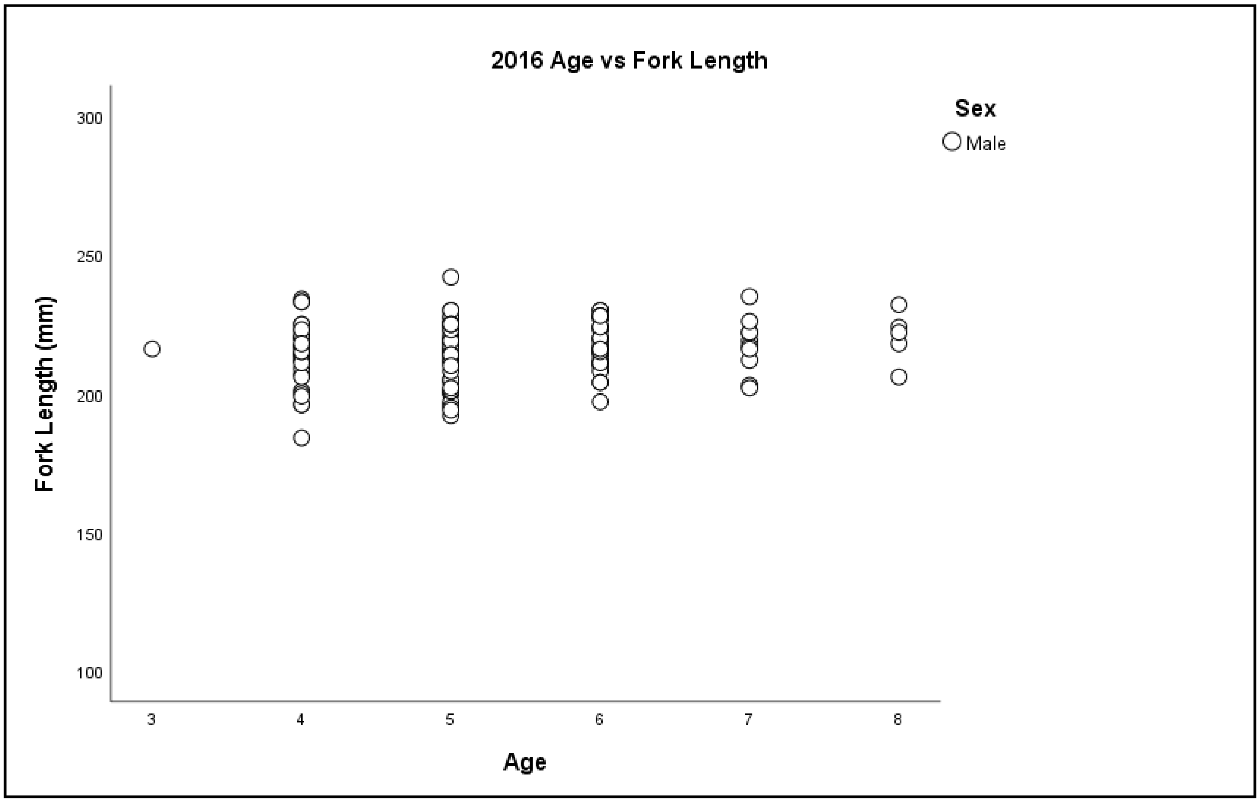

Figure 3.15. Age classes of adult male Alewife captured during the 2016 sampling period at Waupoppin Water Control Structure, Lake Mattamuskeet, North Carolina.

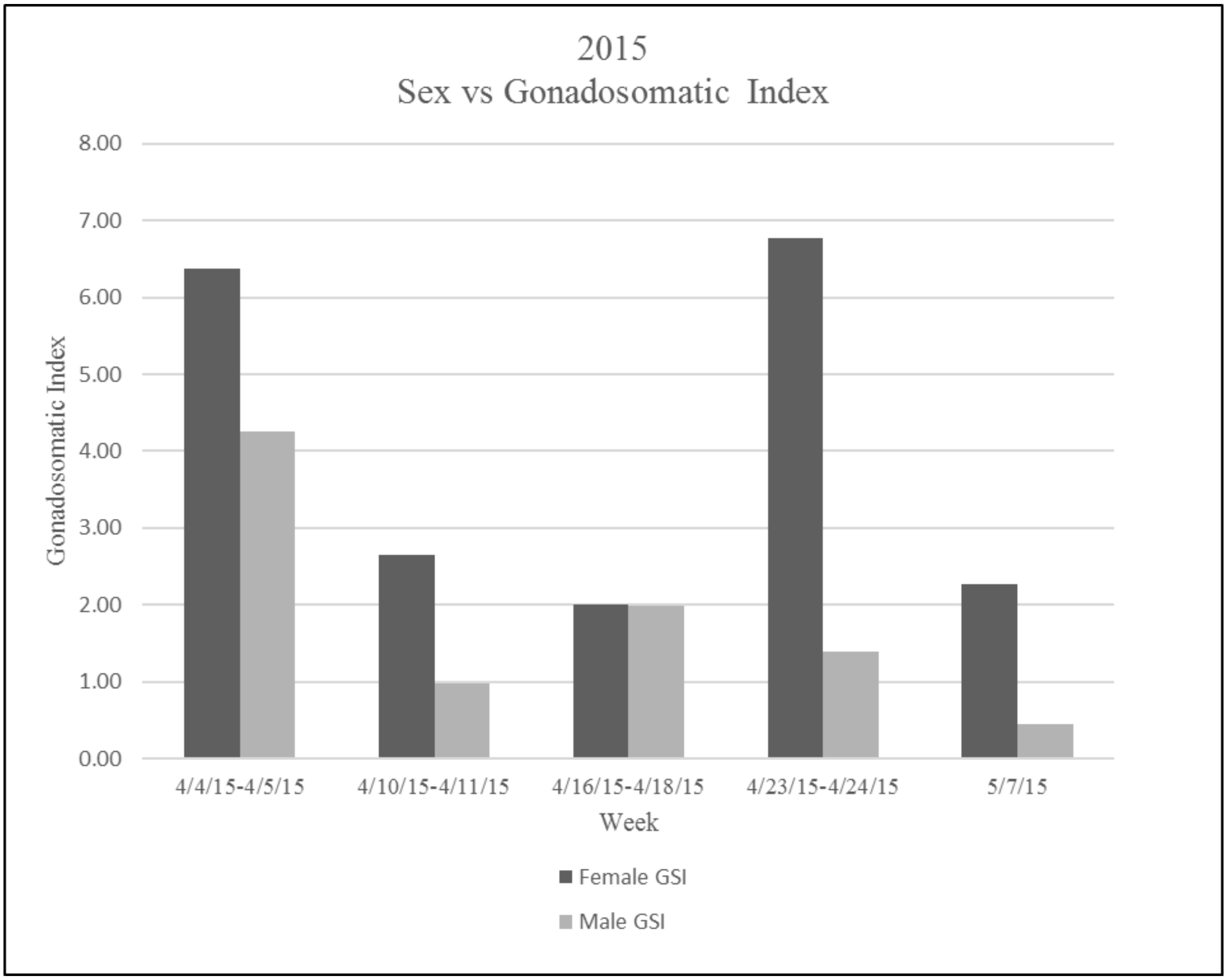

Figure 3.16. Clustered bar graph of adult male and female Alewife Gonadosomatic Index by sampling week during the 2015 sampling period at Waupoppin Water Control Structure, Lake Mattamuskeet, North Carolina.

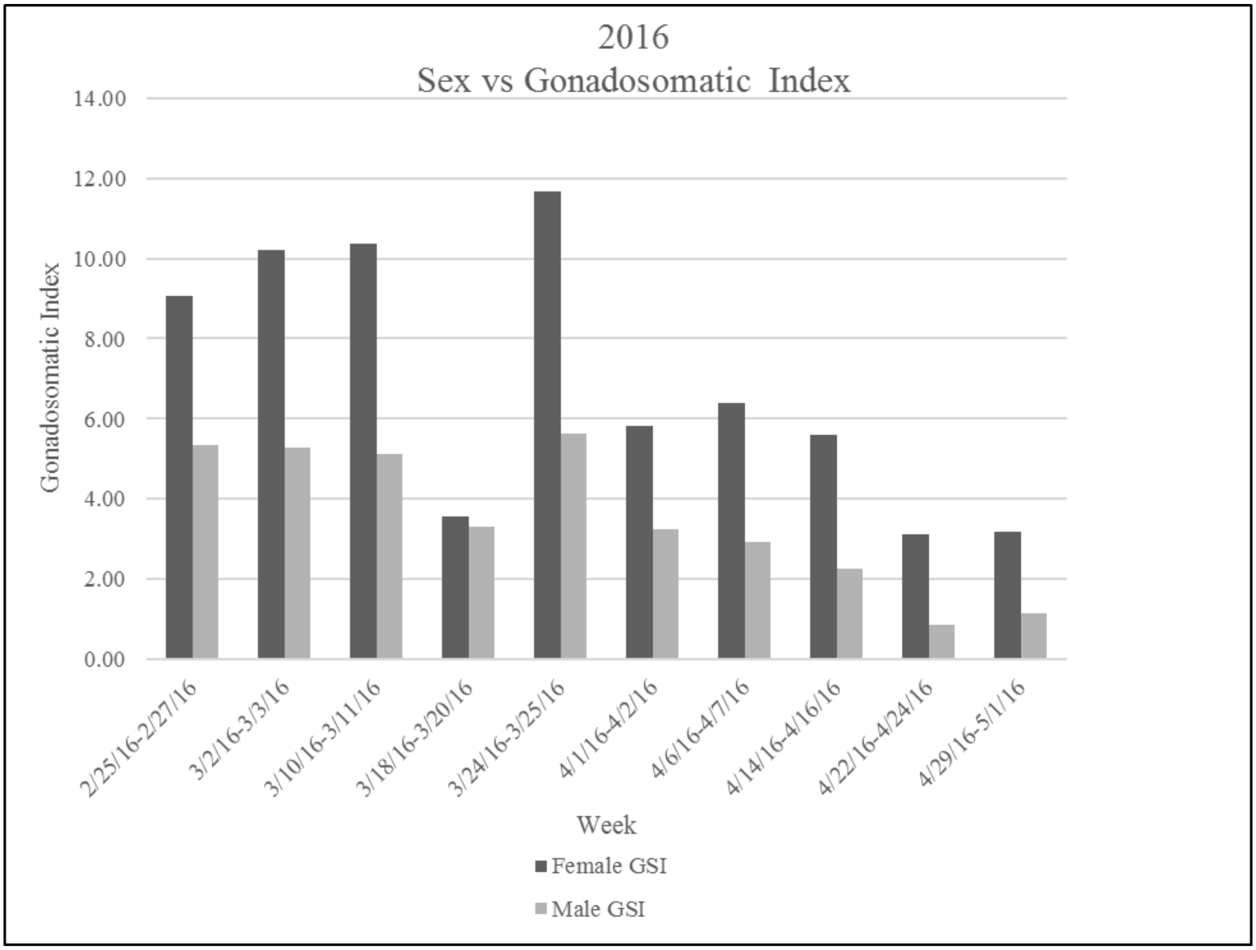

Figure 3.17. Clustered bar graph of adult male and female Alewife Gonadosomatic Index by sampling week during the 2016 sampling period at Waupoppin Water Control Structure, Lake Mattamuskeet, North Carolina.

Chapter Four: Spawning Success of Alewife *Alosa pseudoharengus* Migrating into a Large Coastal Lake

Introduction

Anadromous river herring (including Blueback Herring *Alosa aestivalis* and Alewife *Alosa pseudoharengus*) spend most of their lives at sea but migrate to freshwater systems during the spring to spawn. The spawning success of the two species are impacted by barriers to upstream spawning sites (as discussed in Chapter 3 of this dissertation) as well as nursery habitat quality for developing eggs, embryos, and postlarval young. Walsh et al. (2005) found that fluctuations in river flow affected habitat use: moderate to high discharge rates increased the use of spawning and nursery habitats while low discharge reduced the spawning habitat. Stream discharge, volume of water, transparency, pH, trophic effects, and system size among other attributes contribute to heterogeneity across systems and may influence the abundance of fish during freshwater residence (Kosa and Mather 2001). The relationship between abiotic (precipitation, water temperature, lunar phase) and biotic (age, growth rate, hatch date, size) factors also influence the timing of juvenile migration to the ocean from freshwater (Iafrate and Oliveira 2006).

Because of the similarity between the two species, differentiation can be difficult without laboratory examination. The two species have similar anadromy requirements and spawn in many of the same freshwater systems in the spring. Alewife spawning runs typically occur earlier in the spring when the water temperature is between 8-18º C, versus 14-25º C for Blueback Herring (Klauda et al. 1991). Typically, Blueback Herring use both lotic (moving water) and lentic (fairly still water) habitats, while Alewives are most abundant in lentic habitats (Loesch 1987, Walsh et al. 2005). Habitat requirements for both species vary depending on life history stage. Alewife eggs prefer temperatures ranging from 16-21 º C with suitable temperatures ranging from 10-28 º C, 0-2 ppt salinity, and dissolved oxygen > 5.0 mg/L. Blueback Herring eggs prefer temperatures ranging from 20-24 º C, 0-22 ppt salinity, and dissolved oxygen 6.0-8.0 mg/L. Early juvenile Alewives prefer temperatures ranging from 17-24 º C, salinity 0-5 ppt, and dissolved oxygen >3.6 mg/L. Early juvenile Blueback Herring prefer temperatures ranging from 20-28º C with suitable temperatures ranging from 10-30 º C, 0-5 ppt salinity, and dissolved oxygen >4.0 mg/L (Klauda et al. 1991). Juveniles of both species inhabit freshwater for 3-7 months before migrating to the ocean (Iafrate and Oliveira 2006).

The objective of this chapter was to document whether river herring (with a specific focus on Alewives) spawn after migrating through low-head coastal water control structures (WCSs) into Lake Mattamuskeet from Pamlico Sound. Because of the large size and shallow depth of Lake Mattamuskeet, success in spawning was determined by documenting the presence of young-of-year (Age 0) fish during multiple summer sampling events from 2015 to 2017. Historically, Alewives are the more abundant of the two species of river herring found in Lake Mattamuskeet and the target species of this study, Blueback Herring are also a species of concern and are found in the same geographic range as Alewives.

Most of Lake Mattamuskeet spawning and nursery habitat is lentic by definition, except for water exiting the lake through the four man-made canals and associated WCSs. The canals connecting the lake to Pamlico Sound were created to facilitate lake drainage for farming by private investors in the early 1900s (Figure 4.1). After it was turned over to the federal government in 1934, the lake was returned to a semi-natural state by equipping each drainage canal with a concrete WCS containing multiple embayments. Each embayment was outfitted with a gate to prevent saltwater intrusion from Pamlico Sound while allowing discharge from the lake at certain times (Rulifson and Wall 2006).

This passive water management of Lake Mattamuskeet is achieved via outflow (seaward) flapgates in each of the four canal WCSs, which allow for lake discharge to Pamlico Sound during high water and/or wind-tide events. Often, this passive strategy leaves lake levels lower in the summer and fall due to evaporation, and higher in winter and spring due to rainwater input (Zohary and Ostrovsky 2011). The shallow waters of the summer and fall allow growth of submerged aquatic vegetation and emergent vegetation within and around the lake edge, both important food sources for wintering migratory waterfowl as well as habitat for fish in Lake Mattamuskeet.

Methods

Field Sampling

Juvenile fish sampling was conducted to determine nursery habitat use within Lake Mattamuskeet during four nighttime sampling events from 2015 to 2017. The surveys took place on both east and west sections of Lake Mattamuskeet, which is bisected north to south by NC Highway 94; the causeway contains five concrete culverts approximately equally spaced along the span. Sampling was conducted from an aluminum flat-bottomed boat using a bow-mounted push net at a depth of 0.5 m. The sampling device consisted of a vertically elongated rectangular frame constructed of aluminum pipe; a square-tube rectangular net frame was affixed at the bottom of the pipe frame. The sampling device was deployed by inserting the pipe frame into slots of a bow-mounted aluminum plate, and then raising the frame vertically; adjustable pins on the frame controlled the pipe frame depth in the water column. (Figure 4.2). The net was a 3-m long, 0.5-m x 1-m neuston net outfitted with a 500-micron filter cup. Water temperature, dissolved oxygen, conductivity, salinity, pH, minimum tow depth, and wind speed and direction were recorded prior to and after each push net deployment. The start and end locations of each tow were determined using a handheld Garmin GPS. Each net deployment was 3 minutes long with a maintained speed of approximately 2 mph. After each tow, the net was rinsed and all specimens were removed for later enumeration. Catch effort can be equalized across all transects and locations by covering 0.1 miles in a 3-minute sampling period using the same net opening size each tow. Sampling dates were selected based on permitting weather conditions and staffing availability and were not able to be replicated year to year as such. At many times the lake was inaccessible due to high winds, and some transect locations were not able to be sampled due to the shallowness of the lake preventing gear from being deployed. As such, the objective of the multi-year and season sampling efforts was solely to determine Alewife presence and use of the lake.

The location of the tows coincided with ongoing research efforts by the U.S. Fish and Wildlife Service to survey submerged aquatic vegetation, water quality, depth, and bottom type. These ongoing surveys utilize 8 north-south transects (Figure 4.3) that encompass the habitat types within Lake Mattamuskeet.

Laboratory

Juvenile Alewives were weighed to the closest 0.1 g, measured (FL, mm), and photographed; otoliths were excised and placed into microtubes. Because of the similarities between the two river herring species, the peritoneum (lining of the abdominal cavity) of each fish was inspected for differentiation. Alewife peritoneum is pale with some dusky spotting while Blueback Herring peritoneum is black to dusky in color. When side by side, the differences in color of the abdominal cavity lining between the two species make identification possible. All other juvenile fish species were identified to species and enumerated.

Results

The nighttime push net sampling on September 29 and October 8-9, 2015 yielded a total of 2,008 fish comprising 9 different species (Table 4.1). The most abundant species were Inland Silverside *Menidia beryllina* (41.53% of the total catch), Killifish sp. *Fundulus sp.* (23.80%), and Shrimp sp. *Palaemonetes* sp.*2.91%).* Three juvenile Alewife were captured at 41 survey locations, comprising 0.15% of the total catch and ranging in size from 61 to 65 mm FL. No Blueback Herring were captured during the sampling effort. Environmental conditions were averaged for all net deployments at the beginning and end of each tow (N=41) with all tows maintaining a duration of 3 minutes at 2 mph, covering a distance of 0.1 miles each tow. Average wind speed was 7.2 $\pm$ 4.0 km/hr out of the Southwest, ranging from 0 to 15 km/hr. Water temperatures averaged 22.9 $\pm$ 2.0^{o} C ranging from 20.5 to 27.1^{o} C. In general, the dissolved oxygen concentrations were good, averaging 14.2 $\pm$ 1.5 mg/L with a range of 3.5 to 16.8 mg/L. Lake salinity was low, averaging 0.5 $\pm$ 0.1 ppt with a range of 0.1 to 0.6 ppt. Conductivity averaged 998.9 $\pm$ 167.7 uS, with a minimum of 178.4 uS and a maximum of 1304 uS. The pH of the lake was acidic, averaging 5.8 $\pm$ 0.4, with a minimum of 4.7 and a maximum of 6.4 (

). However, multiple pH meters and test strips were used during the sampling event due to mid-sampling instrument failure, introducing potential sampling error into and reducing the validity of these results. During the September/October 2015 sampling events, none of the environmental conditions recorded at each transect location resulted in significant ($p>0.05$) correlation with number of individuals of all species captured at each location.

Nighttime push net sampling on July 27-29 and August 5, 2016 collected a total of 2,201 fishes comprising 7 different species (Table 4.2). Again, the most abundant species captured was Inland Silverside (57.16% of the total catch), along with Threadfin Shad *Dorosoma petenense* (32.76%) and Gizzard Shad *Dorosoma cepedianum* (5.91%) comprising the bulk of the catches. There were 15 juvenile Alewives captured using 48 survey locations, comprising 0.68% of the total catch and ranging in fork length from 52 to 63 mm. No Blueback Herring were captured during the sampling effort. Again, environmental conditions taken at the beginning and end of each sampling tow were averaged (N=48). Wind speed averaged 16.2 ± 5.4 km/hr out of the Southwest, with a minimum of 4 km/hr and a maximum of 35 km/hr. Water temperatures averaged 31 ± 0.8 degrees C, with a minimum of 30 degrees C and a maximum of 33.6 degrees C. Dissolved oxygen averaged 9.3 ± 1.1 mg/L, with a minimum of 4.7 mg/L and a maximum of 10.7 mg/L. Salinity averaged 0.4 ± 0.1 ppt, with a minimum of 0.2 ppt and a maximum of 0.4 ppt. Conductivity averaged 811.4 ± 52.9 uS, with a minimum of 729 uS and a maximum of 915 uS. pH averaged 9.3 ± 0.4, with a minimum of 8.6 and a maximum of 10.2 (Table 4.8). During the July/August 2016 sampling events, the salinity, dissolved oxygen, conductivity, water temperature, and wind speed recorded at each transect location did not result in significant correlation with number of individuals captured at each location. However, pH was found to have a statistically significant weak negative correlation ($r = -0.35$; $p = 0.02$) with number of individuals captured.

Late season sampling conducted on the nights of November 1-2, 2016 captured a total of 443 fishes comprising 6 different species (Table 4.3). Again, the most abundant species captured were Inland Silverside (83.97%) and Threadfin Shad (13.54%). The third most abundant species captured was White Perch *Morone americana* (1.35%). Only one juvenile Alewife was captured at the 49 survey locations, comprising 0.23% of the total catch with a fork length of 71 mm. No Blueback Herring were captured during the sampling effort. Average (N=49) environmental conditions included wind speed at 6.1 $\pm$ 3.2 km/hr out of the Southwest, ranging from 0-12 km/hr; water temperature averaging 18.2 $\pm$ 0.8 ºC with a range of 17.2-19.9 ºC; and dissolved oxygen averaging 10.3 $\pm$ 0.9 mg/L with a range of 6.6 - 11.9 mg/L. Again, salinity was low averaging 0.3 $\pm$ 0.0 ppt with a range of 0.2 - 0.3 ppt, and low conductivity averaging 472.8 $\pm$ 50.8 uS, with a range of 385.1 - 554 uS. pH averaged 8.3 $\pm$ 1.1, with a minimum of 6.8 and a maximum of 10.0 (Table 4.9). During the November 2016 sampling events, none of the environmental conditions recorded at each transect location resulted in significant correlation with number of individuals captured at each location.

Nighttime sampling on June 12 and June 21, 2017 collected 2,185 fishes comprising 8 different species (Table 4.4). The most abundant species were Inland Silverside (55.84% of the total catch), Gizzard Shad (22.38%), and White Perch (20.32%). A total of 26 juvenile Alewife were collected at 29 survey locations, comprising 1.24% of the total catch and ranging in size from 42 to 67 mm FL. No Blueback Herring were captured during the sampling effort.

During the June 12 and 21, 2017 nighttime juvenile fish sampling on Lake Mattamuskeet, wind speed km/hr water temperature C, dissolved oxygen mg/L, salinity ppt, conductivity uS, and pH were recorded at each survey transect location at the beginning and end of each sampling tow and were averaged (N=29). Wind speed averaged 17.3 ± 5.1 km/hr out of the Southwest, with a minimum of 9 km/hr and a maximum of 25 km/hr. Water temperatures averaged 26.1 ± 1.4 degrees C, with a minimum of 24.4 degrees C and a maximum of 28.7 degrees C. Dissolved oxygen averaged 8.6 ± 0.6 mg/L, with a minimum of 7.8 mg/L and a maximum of 10.0 mg/L. Salinity averaged 0.3 ± 0.1 ppt, with a minimum of 0.2 ppt and a maximum of 0.3 ppt. Conductivity averaged 577.3 ± 47.5 uS, with a minimum of 438 uS and a maximum of 614 uS. pH averaged 8.8 ± 0.4, with a minimum of 8.1 and a maximum of 9.3 (Table 4.10). During the June 2017 sampling events, the salinity, conductivity, water temperature, and wind speed recorded at each transect location did not result in significant correlation with number of individuals captured at each location. However, pH was found to have a statistically significant moderate negative correlation with number of individuals captured with $r=-0.43$ and $p=0.02$. Additionally, dissolved oxygen was also found to have a statistically significant moderate negative correlation with number of individuals captured with $r=-0.52$ and $p=0.004$.

Salinity remained low throughout all sampling events, with a minimum mean of 0.3 ± 0.0 ppt and a maximum mean of 0.5 ± 0.1 ppt. These levels are also consistent with the salinity measurements taken from Waupoppin Canal during the 2015 and 2016 sampling seasons (Chapter Three of this dissertation) and are within the salinity tolerance ranges for both juvenile Alewives and Blueback Herring. Conductivity also remained low throughout all sampling events, with a minimum mean of 472.8 ± 50.8 uS and a maximum mean of 988.9 ± 167.7 uS. These levels are also consistent with the conductivity measurements taken from Waupoppin

Canal during the 2015 and 2016 sampling seasons (Chapter Three of this dissertation). Dissolved oxygen was relatively stable throughout all sampling events, with a minimum mean of 8.6 $\pm$ 0.6 mg/L and a maximum mean of 14.2 $\pm$ 1.5 mg/L, which are above the minimum dissolved oxygen level requirements for both juvenile Alewives and Blueback Herring. These levels are also consistent with the dissolved oxygen measurements taken from Waupoppin Canal during the 2015 and 2016 sampling seasons (Chapter Three of this dissertation). Water temperature showed more seasonal differences between sampling events, with a minimum mean of 18.2 $\pm$ 0.8 degrees Celsius during the November 2016 sampling and a maximum mean of 31 $\pm$ 0.8 degrees Celsius during the July/August 2016 sampling, which is slightly higher than the preferred temperature ranges for both juvenile Alewives and Blueback Herring. Wind speed varied greatly across sampling events but remained predominately out of the Southwest across all sampling events, with a minimum mean of 6.1 $\pm$ 3.2 km/hr and a maximum mean of 17.3 $\pm$ 5.1 km/hr. pH varied somewhat throughout the sampling events, with a minimum mean of 5.8 $\pm$ 0.4 and a maximum mean of 9.3 $\pm$ 0.4. Overall, these water quality parameters were within the expected bounds based on study location and previous conditions.

Discussion

During the four nighttime sampling events from 2015 to 2017, the greatest number of individuals of all species captured at any one location was at Transect 6 Site 1 (6-1) on the east side of Lake Mattamuskeet; 690 individuals were captured at that location in September/October 2015, and 4 individuals in November 2016. A total of 6,839 individuals of all species were captured during the four nighttime juvenile fish sampling events in Lake Mattamuskeet from 2015-2017 (Table 4.5).

Between the four nighttime juvenile fish sampling events in Lake Mattamuskeet from 2015 to 2017, the most juvenile Alewives captured at any one location occurred at transect 3-3 on the west side of Lake Mattamuskeet, with 5 juvenile Alewives captured at that location in both July/August 2016 and in June 2017. Transect 3-2 on the west side of Lake Mattamuskeet had the highest success rate of capturing a juvenile Alewife, with 1 Alewife captured at that location in both September/October 2015 and July/August 2016 and 2 Alewives captured at that location in June 2017 (a 75% success rate based on the four sampling events). The four sampling events spanned the months of June to November (split between 2015, 2016, and 2017). The highest abundance of juvenile Alewives was in June 2017 with 26 juveniles captured. The second highest abundance of juvenile Alewives were present in July/August 2016 with 15 juveniles captured. The third highest abundance of juvenile Alewives were present in September/October 2015 with 3 juveniles captured. The lowest abundance of juvenile Alewives was in November 2016 with 1 juvenile captured (Table 4.6). At no location during any sampling event were Alewives the sole species collected.

Previous studies at Lake Mattamuskeet by Tyus (1974), Rulifson and Wall (2006), and Godwin (2004) also indicated spawning success and presence of juvenile Alewives within the lake. Tyus (1972) collected 344 young fish in 1969, 12 young fish in 1970, and 32 young fish in 1972. Rulifson and Wall (2006) captured age-0 Alewives at the NC Highway 94 culverts, in the lake at most sampling locations, and at times on the lakeside of Waupoppin Water Control Structure. They used fyke nets, cast nets, experimental gill nets, and beach seines to indicate that spawning had occurred within the lake by adult Alewives by capturing 246 age-0 fish in 57 sampling days from July to September 1997 as well as an unspecified number of age-0 fish in October 1998 (Rulifson and Wall 2006). Godwin (2004) utilized push net surveys similar to the methodology of this study to determine that spawning had also occurred within the lake by adult Alewives through the presence of age-0 fish. This indicates a persistent and successful spawning population of adult Alewives represented by the four studies.

The study was designed to sample for juvenile fish in Lake Mattamuskeet following the submerged aquatic vegetation survey locations developed by the USFWS (Figure 4.5). Unfortunately, by 2015 when our surveys began, the lake's submerged aquatic vegetation had almost entirely disappeared (Moorman et al. 2017). Even so, the sampled 2015 transect sites (n=41) in the shallow open waters of lake Mattamuskeet yielded a total of 2,008 fishes comprising 9 different species (Table 4.1) though only three juvenile Alewife *Alosa pseudoharengus* were captured. Submerged aquatic vegetation was absent from the lake during the 2016 and 2017 sampling years, yet small fish continued to be caught in similar abundances at these open water sites during nighttime sampling. This result suggests that fish abundance did not change over the three-year period compared to the decreasing amount of submerged aquatic vegetation available as habitat. We did not sample during daylight hours and so we cannot interpret how lack of SAV might affect juvenile presence in the open waters during the day.

It is unknown whether the greater abundance of juvenile Alewives on the west side of Lake Mattamuskeet is due to adult fish spawning at those locations or if juvenile fish move to the west side of the lake from their original spawned locations. Juvenile use of the west side of the lake does highlight the need to manage and monitor both sides of the lake for river herring spawning and nursery habitat, as adult Alewives are at minimum entering Lake Mattamuskeet through Waupoppin Canal on the east side of the lake – even if they are then transiting to the west side of the lake to spawn or spawning on the east side of the lake with juveniles then transiting west into favored nursery areas. In order to effectively manage both sides of the lake for river herring spawning and nursery habitat, maintenance of the 5 causeway culverts under NC Highway 94 is imperative. Continued access through the 5 culverts appears to be of importance in connecting spawning and/or nursery habitat within the lake.

Despite the predominant wind direction being out of the Southwest with the Southwest corner of the west side of Lake Mattamuskeet generally being the calmest with the least wave action of any area of the lake, juvenile Alewife presence was relatively centered in the west side of the lake or slightly to the Northwest and not tucked into the Southwest corner. However, the shallowness of the Southwest corner of the west side of the lake precluded sampling in some locations, thus preventing investigation of Alewife presence in those areas.

Worth noting are the similarities between the USFWS 2016 bathymetric map (Figure 4.6) with juvenile Alewife presence. The deepest portion of Lake Mattamuskeet is found in the Northwest portion of the west side of the lake – which roughly lines up with the highest juvenile

Alewife abundance across all sampling years and could be a topic of future study to determine correlation. This indicates preference for deeper nursery habitat utilization by juvenile Alewives, although this preference does not appear to be related to any differences in recorded environmental conditions during sampling.

The results of this study indicate that juvenile Alewives utilize Lake Mattamuskeet as nursery habitat consistently until at least the beginning of August each year. By the end of September, most juvenile Alewives have exited the lake system through one of the four man-made canals that connect Lake Mattamuskeet to Pamlico Sound. By November, juvenile Alewife presence in the lake system is very low. Perhaps most importantly, these results indicate the need for downstream access for these juvenile Alewives through the WCSs that dictate water movement into and out of the lake system during the late summer and early fall to ensure the migratory success of this and other diadromous fish species (Table 4.6). Ensuring flow through the WCSs in each of the four canals is imperative for the seaward migration of juvenile Alewives in the late summer and fall. In the case of extended periods of flapgate closure due to lack of head pressure or wind events, manual opening of flapgates would be necessary to aid in the exit of juvenile Alewives from Lake Mattamuskeet to continue their diadromous life cycle if a sustained population of the diadromous species continues to be a priority for the refuge. It is recommended that periodic monitoring of the status of juvenile Alewives within Lake Mattamuskeet be investigated through replicated nighttime sampling efforts following the USFWS SAV survey route to determine shifts in presence and abundance of juvenile Alewives.

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Tables

Table 4.1. Catch during the nighttime juvenile sampling trips conducted in Lake Mattamuskeet, North Carolina. Sampling took place on the nights of September 29 and October 8-9, 2015.

Species		Catch	Percent of Total Catch
Inland Silverside	*Menidia beryllina*	834	41.53
Killifish	*Fundulus sp.*	478	23.80
Shrimp	*Palaemonetes sp.*	460	22.91
Threadfin Shad	*Dorosoma petenense*	192	9.56
White Perch	*Morone americana*	34	1.69
Yellow Perch	*Perca flavescens*	4	0.20
Alewife	*Alosa pseudoharengus*	3	0.15
Black Crappie	*Pomoxis nigromaculatus*	2	0.10
Sunfish	*Lepomis sp.*	1	0.05
Totals		2008	100

Table 4.2. Catch during the nighttime juvenile sampling trips conducted in Lake Mattamuskeet, North Carolina. Sampling took place on the nights of July 27-29 and August 5, 2016.

Species		Catch	Percent of Total Catch
Inland Silverside	*Menidia beryllina*	1258	57.16
Threadfin Shad	*Dorosoma petenense*	721	32.76
Gizzard Shad	*Dorosoma cepedianum*	130	5.91
White Perch	*Morone americana*	75	3.41
Alewife	*Alosa pseudoharengus*	15	0.68
Atlantic Menhaden	*Brevoortia tyrannus*	1	0.05
Channel Catfish	*Ictalurus punctatus*	1	0.05
Totals		2201	100

Table 4.3. Catch during the nighttime juvenile sampling trips conducted in Lake Mattamuskeet, North Carolina. Sampling took place on the nights of November 1-2 2016.

Species		Catch	Percent of Total Catch
Inland Silverside	*Menidia beryllina*	372	83.97
Threadfin Shad	*Dorosoma petenense*	60	13.54
White Perch	*Morone Americana*	6	1.35
Bay Anchovy	*Anchoa mitchilli*	3	0.68
Alewife	*Alosa pseudoharengus*	1	0.23
Atlantic Menhaden	*Brevoortia tyrannus*	1	0.23
Totals		443	100

Table 4.4. Catch during the nighttime juvenile sampling trips conducted in Lake Mattamuskeet, North Carolina. Sampling took place on the nights of June 12 and June 21, 2017.

Species		Catch	Percent of Total Catch
Inland Silverside	*Menidia beryllina*	1220	55.84
Gizzard Shad	*Dorosoma cepedianum*	489	22.38
White Perch	*Morone Americana*	444	20.32
Alewife	*Alosa pseudoharengus*	27	1.24
Atlantic Menhaden	*Brevoortia tyrannus*	2	0.09
Yellow Perch	*Perca flavescens*	1	0.05
Atlantic Croaker	*Micropogonias undulates*	1	0.05
American Eel	*Anguilla rostrate*	1	0.05
Totals		2185	100

Table 4.5. Catch during the nighttime juvenile sampling trips conducted in Lake Mattamuskeet, North Carolina. Sampling took place four separate occasions from 2015 to 2017.

Transect Number	September/ October 2015	July/August 2016	November 2016	June 2017
1_1		81	11	
1_2		70		
2_1	34	27	16	
2_2	31	30	14	26
2_3	49	37	7	26
2_4	22	26	4	26
2_5		55	2	
3_1	6	10	10	
3_2	21	37	5	31
3_3	9	103	7	128
3_4	10	78	7	81
3_5	3	103	10	95
3_6	5	169	10	66
3_7	8	43	11	
3_8	8	48	5	
3_9	21	6	3	
4_1	23			
4_2	24	41	6	
4_3	22	32	9	3
4_4	25	20	13	128
4_5	13	38	8	80
4_6	11	55	6	154
4_7	231	33	4	10
4_8	444	35	12	
5_1	13			
5_2	30	32	15	
5_3	7	68	2	91
5_4	15	75	5	100
5_5	17	96	2	286
5_6	12	61	6	126
5_7	9	69	2	159
5_8	42			
6_1	690		4	
6_2	2	11	8	
6_3	73	20	3	76
6_4	21	34	9	58

Transect Number	September/ October 2015	July/August 2016	November 2016	June 2017
6_5		33	4	62
6_6	5	74	5	33
6_7	9	29	5	77
6_8	15	77	5	41
6_9	15	57	6	77
6_10		40	6	
7_1		7	11	
7_2		25	8	
7_3		26	8	25
7_4		28	4	28
7_5		34	2	92
7_6		63	7	
7_7		42	10	
8_1		12	27	
8_2		5	14	
8_3		6	11	
8_4			74	
Total	1995	2201	443	2185

Table 4.6. Juvenile Alewife *Alosa pseudoharengus* collected by transect in Lake Mattamuskeet during nighttime juvenile fish sampling, September 29 and October 8-9 2015, July 27-29 and August 5 2016, November 1-2 2016, and June 12 and June 21 2017, Lake Mattamuskeet, North Carolina.

Transect Number	September/ October 2015	July/August 2016	November 2016	June 2017
1_1				
1_2				
2_1	1		1	
2_2	1			
2_3				1
2_4				3
2_5				
3_1				
3_2	1	1		2
3_3		5		5
3_4		4		
3_5				
3_6				
3_7				
3_8				
3_9				
4_1				
4_2		1		
4_3				2
4_4				2
4_5				2
4_6		2		1
4_7		1		
4_8				
5_1				
5_2				
5_3				2
5_4				
5_5				
5_6				
5_7				
5_8				
6_1				
6_2				
6_3				1

Transect Number	September/ October 2015	July/August 2016	November 2016	June 2017
6_4				1
6_5				
6_6				1
6_7				1
6_8		1		1
6_9				
6_10				
7_1				
7_2				
7_3				
7_4				1
7_5				
7_6				
7_7				
8_1				
8_2				
8_3				
8_4				
9_1				
Totals	3	15	1	26

Table 4.7. Water quality data collected in Lake Mattamuskeet during nighttime juvenile fish sampling, September 29 and October 8-9 2015, Lake Mattamuskeet, North Carolina. Number of samples (N), mean, minimum, and maximum values for wind speed km/hr, air temperature C, water temperature C, dissolved oxygen mg/L, salinity ppt, conductivity uS, and pH.

2015 Lake Water Quality				
Variable	N	Mean	Minimum	Maximum
Wind Speed km/hr	41	7.2±4.0	0	15
Water Temperature ^{o}C	41	22.9±2.0	20.5	27.1
Dissolved Oxygen mg/L	41	14.2±1.5	3.5	16.8
Salinity ppt	41	0.5±0.1	0.1	0.6
Conductivity uS	41	988.9±167.7	178.4	1304
pH	41	5.8±0.4	4.7	6.4

Table 4.8. Water quality data collected in Lake Mattamuskeet during nighttime juvenile fish sampling, July 27-29 and August 5, 2016, Lake Mattamuskeet, North Carolina. Number of samples (N), mean, minimum, and maximum values for wind speed km/hr, air temperature C, water temperature C, dissolved oxygen mg/L, salinity ppt, conductivity uS, and pH.

July and August 2016 Lake Water Quality				
Variable	N	Mean	Minimum	Maximum
Wind Speed km/hr	48	16.2$\pm$5.4	4	35
Water Temperature ^{o}C	48	31$\pm$0.8	30	33.6
Dissolved Oxygen mg/L	48	9.3$\pm$1.1	4.7	10.7
Salinity ppt	48	0.4$\pm$0.1	0.2	0.4
Conductivity uS	48	811.4$\pm$52.9	729	915
pH	48	9.3$\pm$0.4	8.6	10.2

Table 4.9. Water quality data collected in Lake Mattamuskeet during nighttime juvenile fish sampling, November 1-2, 2016, Lake Mattamuskeet, North Carolina. Number of samples (N), mean, minimum, and maximum values for wind speed km/hr, air temperature C, water temperature C, dissolved oxygen mg/L, salinity ppt, conductivity uS, and pH.

November 2016 Lake Water Quality				
Variable	N	Mean	Minimum	Maximum
Wind Speed km/hr	49	6.1±3.2	0	12.5
Water Temperature °C	49	18.2±0.8	17.2	19.9
Dissolved Oxygen mg/L	49	10.3±0.9	6.58	11.9
Salinity ppt	49	0.3±0.0	0.2	0.3
Conductivity uS	49	472.8±50.8	385.1	554
pH	49	8.3±1.1	6.8	10

Table 4.10. Water quality data collected in Lake Mattamuskeet during nighttime juvenile fish sampling, June 12 and June 21, 2017, Lake Mattamuskeet, North Carolina. Number of samples (N), mean, minimum, and maximum values for wind speed km/hr, air temperature C, water temperature C, dissolved oxygen mg/L, salinity ppt, conductivity uS, and pH.

2017 Lake Water Quality				
Variable	N	Mean	Minimum	Maximum
Wind Speed km/hr	29	17.3±5.1	9	25
Water Temperature °C	29	26.1±1.4	24.4	28.7
Dissolved Oxygen mg/L	29	8.6±0.6	7.8	10
Salinity ppt	29	0.3±0.1	0.2	0.3
Conductivity uS	29	577.3±47.5	438	614
pH	29	8.8±0.4	8.1	9.3

Figures

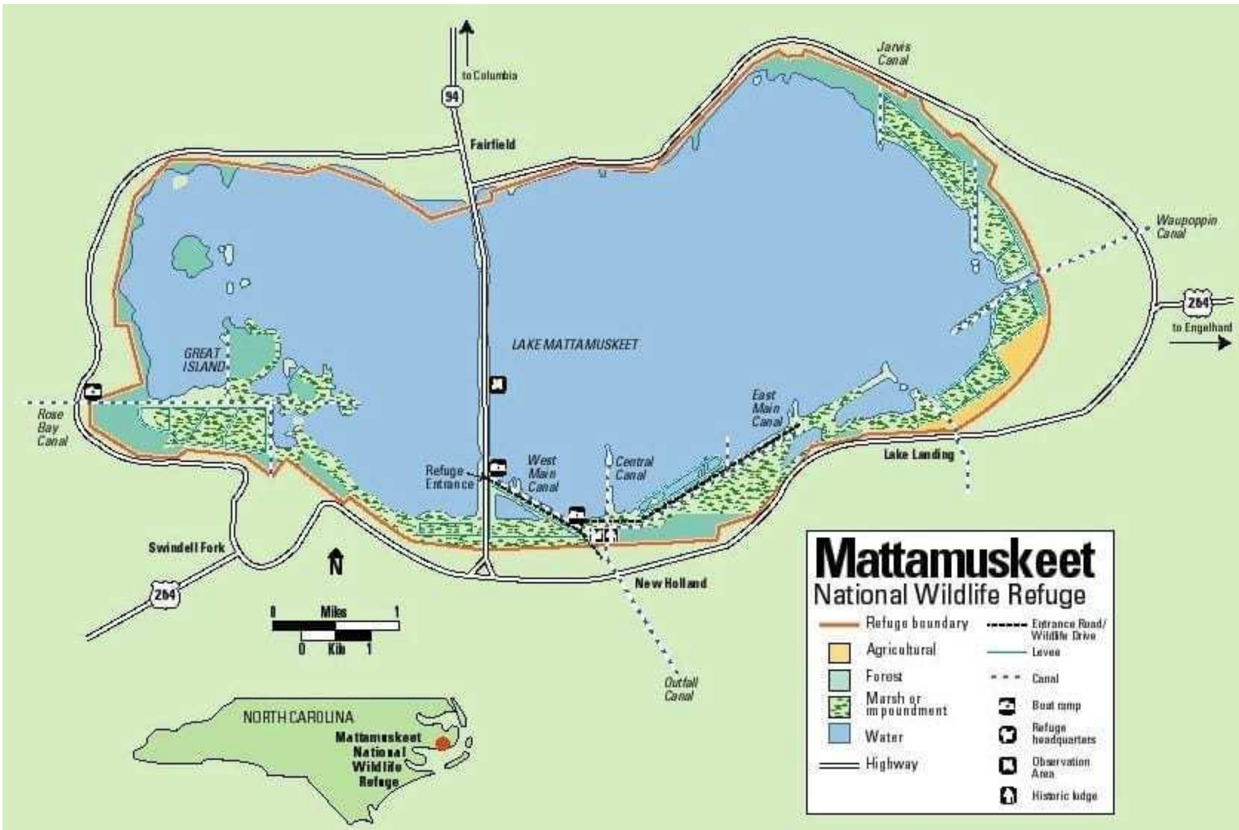

Figure 4.1. Map of the Mattamuskeet National Wildlife Refuge showing Lake Mattamuskeet, location of the four man-made canals (Rose Bay, Outfall/Central, Lake Landing, and Waupoppin), adjacent farmlands/wetland areas, and boundary road system. USFWS.

Figure 4.2. The author at the helm of the ‘Little Skimmer’ survey vessel with East Carolina University volunteers on one of the nighttime juvenile fish surveys in Lake Mattamuskeet. The sampling boat is shown outfitted with aluminum sampling frame and neuston net for collection of juvenile fishes. Lake Mattamuskeet, North Carolina.

Figure 4.3. The 8 transect locations used by the U.S. Fish and Wildlife Service for submerged aquatic vegetation surveys. Google Earth.

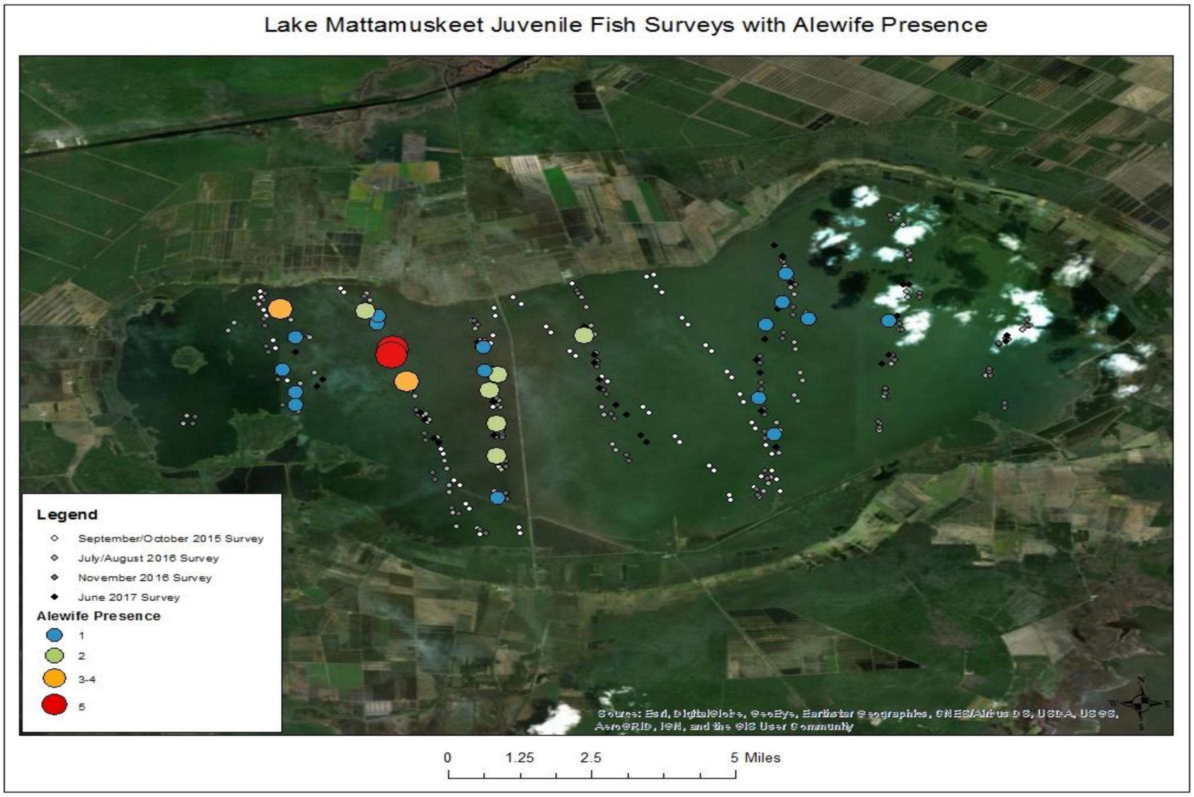

Figure 4.4. The sampling locations of the four nighttime juvenile fish sampling events on Lake Mattamuskeet, North Carolina. Transects are color-coded by sampling date. Juvenile Alewife *Alosa pseudoharengus* presence is noted for all sampling events by proportionally sized and heat-colored markers, ranging from a presence of 1 Alewife (small blue marker) to 5 Alewives (large red marker). ArcMap 10.6.

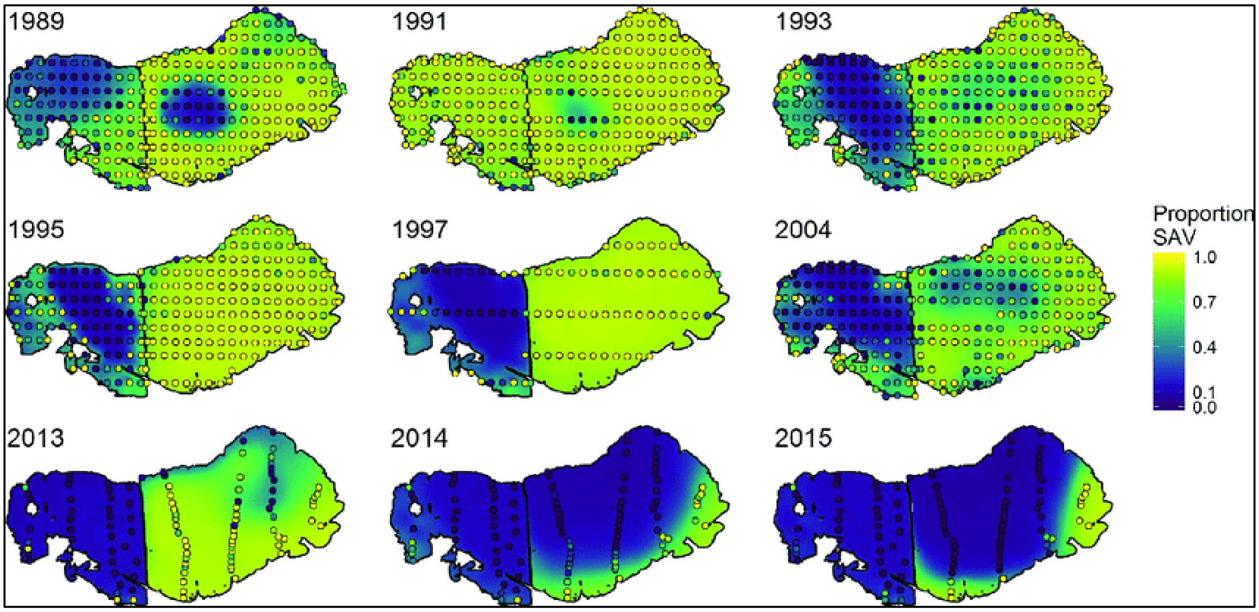

Figure 4.5. Depiction of submerged aquatic vegetation loss in Lake Mattamuskeet with survey locations noted. Moorman et al. 2017.

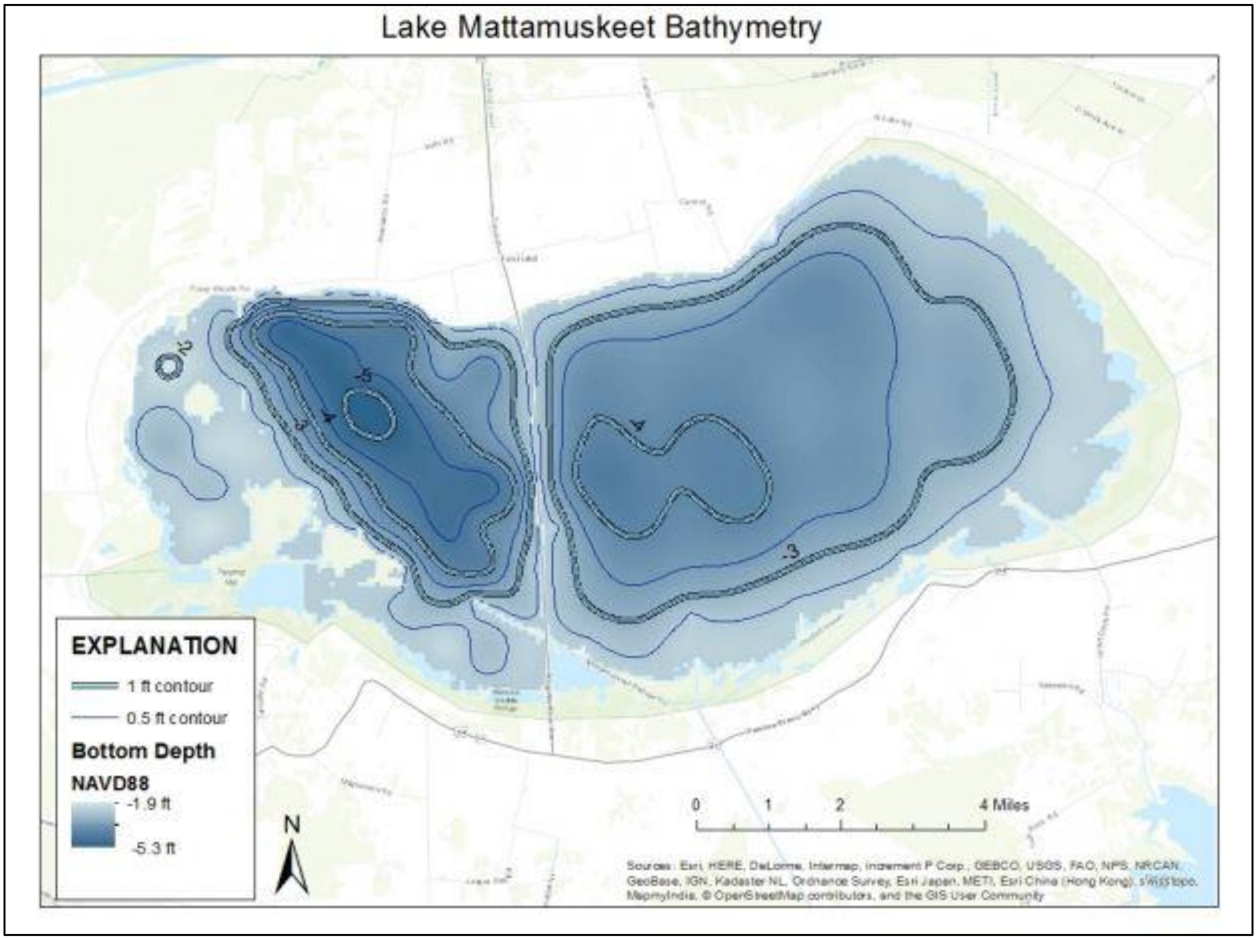

Figure 4.6. Depiction of Lake Mattamuskeet's bathymetry.   USFWS 2016.

Chapter Five: Challenges Associated with Managing National Wildlife Refuges for Multiple Conservation Purposes and Public Uses

Overview

The National Wildlife Refuge System within the United States Fish and Wildlife Service is managed by the United States Department of the Interior. The refuge system is an integral component of a larger, national effort to conserve and enhance fish, wildlife, and plant resources for the continued benefit of the American people by creating, maintaining, or restoring critical habitat. However, in creating and maintaining these habitats, managers and administrators often emphasize or focus on certain components of these natural resources, which can be detrimental to other species groups found within the managed area. While land-based wildlife and birds can easily enter and exit refuge areas based on seasonal habitat requirements, fish species can be inadvertently restricted in movements due to refuge management practices of holding water for waterfowl, shorebird, or other wildlife habitat. Therefore, the aquatic habitats of refuges are often created and maintained by water barriers, such as berms and water control structures (WCSs), which, if not designed properly, could be detrimental to the aquatic migratory species present within the refuge area.

Fragmentation of stream networks is a major threat to aquatic species in terms of population persistence, abundance, and diversity (Bourne et al. 2011). Aquatic species, such as diadromous fish are significantly impacted by stream fragmentation via the creation of large dams and low-head WCSs and resultant levels of stream alteration due to its impedance on necessary life cycle processes, such as habitat-switching migrations for purposes of spawning or changing ontogenetic requirements. Low-head WCSs and other forms of stream alteration resulting in fragmentation, sedimentation, channelization, temperature changes, or flooding can significantly change whole ecological communities through alteration of foodwebs, loss of biodiversity, and whole species extirpation or decline depending on the level of passability through the structure by aquatic species (Hall et al. 2011). In the case of diadromous fish, passability of a WCS is critical in completing the life cycle. It is therefore important to look at water management from both a human- and ecological-needs standpoint, especially for diadromous fish.

Examples of efforts to facilitate fish passage have been documented across the globe. In the United States, passage of salmon upstream for spawning purposes on both the West and East Coast are perhaps the most well-known examples of human effort to facilitate life cycle completion by migratory fishes, such as the efforts by the Army Corps of Engineers to restore salmon populations in the Pacific Northwest (Mighetto 1994). In the Northeast United States, fish passage often involves fish ladders: step-like pools of water that allow fish to bypass a dam. In the Southeast United States, the fall line demarcating the shift from upland to coastal plain is often hundreds of miles upstream, causing issues with more traditional fish passage methods that require medium to high head. Access to coastal aquatic habitats is primarily through low-head WCSs with waters released at depth to control water levels but inadvertently restrict access by aquatic species (Zigler et al. 2004).

In low-lying coastal areas, low-head WCSs are often used to facilitate drainage of agricultural and personal property, and to create wetlands and other habitats for waterfowl by regulating water flow in swamps, marshes, and impoundments. They are often used in coastal canals in the form of tide gates (a form of flapgate) to reduce saltwater intrusion into freshwater areas (Charland 1998). Low-head dams and WCSs are also used in shallow freshwater coastal lakes to reduce both saltwater intrusion and localized flooding of the surrounding area in times of high water. Unlike large dams that have been heavily studied and assessed as to their impacts on their surrounding aquatic and terrestrial environments, low-head dams and WCSs have not been thoroughly examined, and little is known about the impact low-head structures have on the surrounding environment.

Tide gates (a form of flapgate) are known to create a temporal physical barrier to fish migration when they impact stream connectivity, opening and closing with tides and wind as they respond to a differential in water pressure between the water body to be protected and the waters that may impact the protected area (Charland 1998). This limited stream connectivity poses a substantial threat to migratory fish species, especially those barriers directly affecting populations already in a depleted or declining state. Low- or no-flow conditions are associated with closed tide gates, which impede fish movement. Improved tide gates designed to minimize leakage have the potential to minimize upstream flow to prevent saltwater intrusion, but consequently exacerbate the issue of fish passage.

Low-lying areas and wetlands of the Southeast United States include many publicly owned gamelands, refuges, and preserves as well as privately owned properties often managed for hunting, fishing, or other recreational purposes (USFWS "Status and Trends of the Nation's Wetlands," n.d.). Many of these public and private lands are managed as man-made impoundments, which are drawn down in the spring to allow vegetation to grow and then flooded in the fall to attract waterfowl, shorebirds, and other wildlife. Other private and public lands are managed naturally or passively, allowing water levels of impounded areas to regulate themselves through evaporation, wind tides, or other means. This passive management typically produces low water in the spring and summer to allow submerged and emergent vegetation growth and spawning habitat for fishes and generally higher water in the fall and winter to provide resting and foraging areas for migratory waterfowl. The importance of these wintering areas for migratory waterfowl is evidenced by the abundance of publicly owned low-lying and wetland areas of the Southeast United States that are managed either actively or passively depending on system needs. Many of these public lands also provide habitat for fish species as well as public use opportunities in addition to waterfowl habitat, showcasing the need for a multi-faceted approach to public lands management to encompass social and biological needs of a given gameland, refuge, preserve, or other publicly owned land.

President Theodore Roosevelt established the first National Wildlife Refuge (NWR) through Executive Order on March 14, 1903 (USFWS "The Early Years," n.d.). The Bureau of Biological Survey was established in 1905 to oversee the management of new refuges, and through the Migratory Bird Act of 1913 were able to effectively give control of the management of migratory birds and their habitats to the federal government (USFWS "The Early Years," n.d.). In 1929, the National Wildlife Refuge System was established under the Migratory Bird Conservation Act (USFWS "Organization and Growth," n.d.). In 1934, the Migratory Bird Hunting and Conservation Stamp Act (Duck Stamp Act) as well as the Fish and Wildlife Coordination Act provided for growth and expansion of the National Wildlife Refuge System and allowed for agencies to acquire lands for the use of fish and wildlife habitat (USFWS "Organization and Growth," n.d.). The National Wildlife Refuge System has grown to include over 560 refuges since that time.

National Wildlife Refuges, which are managed federally by the United States Fish and Wildlife Service, are one example of publicly owned lands generally managed for public use opportunities and for habitat for fish, wildlife, plants, and their associated habitats. National Wildlife Refuges exist across the Nation but are particularly abundant in coastal, low-lying, and wetland areas of the Southeast United States. Many of these National Wildlife Refuges in the Southeast were established to provide wintering habitat for migratory waterfowl utilizing the Atlantic Flyway, which is one of the major North-South flyways for migratory birds in North America. One example of a National Wildlife Refuge in a low-lying coastal area that was established for wintering migratory waterfowl includes the largest natural lake in the state of North Carolina: Lake Mattamuskeet. Mattamuskeet National Wildlife Refuge is a premier stop for wintering waterfowl along the Atlantic Flyway, a spring and fall destination for neotropical migratory birds, and a historically important spawning area utilized by diadromous fishes (USFWS "Mattamuskeet NWR: Wildlife and Habitat," n.d.).

Once supporting a thriving fishery and source of income for local fishers in and around Lake Mattamuskeet (Tyus 1974), Alewife and American eel have declined range wide (NCDMF 2017). Alewife population declines led to a no harvest provision in 2007 for both commercial and recreational fisheries in joint and coastal waters of North Carolina (NCDMF 2017). Additionally, no Alewife greater than 6 inches may be taken from inland waters. According to NCDMF (2017), recruitment and juvenile abundance of Alewife are still below targets for rebuilding despite the imposed fishing moratorium. New regulations for American eel in 2014 included a minimum total fish length of 9 inches for both the commercial and recreational fisheries as well as a new recreational bag limit of 25 eels per person per day in North Carolina (NCDMF 2015).

Water control structure design may have a limiting effect on the passage of aquatic species to and from Lake Mattamuskeet through the four manmade canals (Wall and Rulifson 1999, Godwin and Rulifson 2004). Tide gates (and other forms of WCSs) are known to create a temporal barrier to fish migration, opening only during the ebb tide and closing during the flood tide (Bourne et al. 2011). At Mattamuskeet, new WCS designs (including the tightening and replacement of seals to prevent leaks from the sound side to the lake side, total replacement of top-hinged stainless steel gates, and/or installation of side-opening aluminum gates) in these canals has minimized upstream flow from the sound side of the WCSs to the lake side, potentially limiting access to and from the lake for these species, thus hindering spawning opportunities as well as potential recreational activities for the public associated with the continued migrations of these species.

Mattamuskeet National Wildlife Refuge was founded in accordance with the Migratory Bird Conservation Act of 1929 "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." (Migratory Bird Conservation Act: 16 U.S.C. § 715d, 1929). President Franklin D. Roosevelt officially created MNWR on December 18, 1934 by Executive Order 6924 "…as a refuge and breeding ground for birds and wild animals, and (2) that such portion as the Secretary of Agriculture [Interior] may deem proper be reserved for use as a shooting area, to be operated under a cooperative agreement or lease .... With regard to the waters ... the Secretary of Agriculture [Interior] ... may enter into a cooperative agreement or lease ... said waters may be used for fishing purposes ..." (Presidential Executive Order 6924, 1934). These founding documents leave much of the exact natural resource management requirements open to interpretation, although historical and current refuge management has interpreted this as providing optimal habitat for migratory birds, especially wintering waterfowl.

This focus of resource management on waterfowl habitat has potentially limited fishing opportunities and/or fishery habitat. Shallow lake levels create navigational issues for motorized boat users who intend to fish on the lake. Motorized boats are allowed on the lake from March 1st – October 31st each year to prevent disturbance to waterfowl on the lake and in the managed impoundments in the fall and winter. Shallow lake levels also tend to be warmer, pushing fish into the deeper, cooler canals adjacent to the lake during the summer months and limiting fishing opportunities in the lake itself. Shallow lake levels also potentially limit the spawning success of species desired for recreational sport fishing caused by the inability to access spawning beds near the shore of the lake due to water level itself or due to the high temperatures of the shallow water. The knowledge of what "once was" during the peak of river herring commercial landings and recreational value in North Carolina in the 1950s and 1960s leaves many public resource users with hope to obtain such a peak once more. Water quality and clarity in the lake has also decreased over time, which the public has often attributed to inputs to the Mattamuskeet watershed from surrounding nutrient-rich agricultural land and managed waterfowl impoundments that have deeded drainage rights into Lake Mattamuskeet (Howell and Moorman 2016).

Despite founding documents, all recreational uses must be included in management actions for the land to serve the public good. Public consensus and understanding of recreation specialization and feelings of group-based fraternal deprivation must play a role in management strategies to retain overall management approval, especially in coastal areas with limited resources such as a fishery. NWR Comprehensive Conservation Plans (CCPs) have been implemented by the National Wildlife Refuge System to better conserve NWR floral and faunal resources for the continued benefit of the American people (USFWS "System Planning –

Overview," n.d.). Such plans utilize public input as well as scientific data to determine areas of priority for management for each individual refuge. CCPs are useful in addressing the concerns of stakeholders while also holding true to the primary mission and founding documents of an individual refuge.

Purposes and methods of previous chapters

The first chapter of this dissertation served as an introduction to general water management as well as water management structures (often referred to as WCSs) and their functions and uses. Issues associated with WCSs, especially as related to barriers to fish passage in the Southeastern United States, were also discussed. Chapter Two discussed the National Wildlife Refuge System and the attempts of refuge planning to minimize public use conflicts while conserving natural resources using one National Wildlife Refuge in the Southeastern United States (Mattamuskeet National Wildlife Refuge, Hyde County North Carolina) as a case study. A word frequency and relationship cluster analysis of a subset of National Wildlife Refuge (NWR) Comprehensive Conservation Plans (CCPs) and founding documents was conducted to determine similarity in these guiding documents within and between refuges. Additionally, a cluster analysis of document similarity was conducted between each listed National Wildlife Refuge CCP and founding document. Chapter Three assessed the effectiveness of side-opening versus top-hinged gates in low-head WCSs in Lake Mattamuskeet for diadromous fish passage (which is considered a management priority within Mattamuskeet

NWR’s 2008 CCP). Chapter Four assessed the relative spawning success by adults and lake habitat use by juvenile diadromous fishes within Lake Mattamuskeet.

Results of previous chapters

None of the subsampled National Wildlife Refuges had close associations between the founding documents and the conservation plans (CCPs) based on my analysis. However, all of the CCPs for the sampled National Wildlife Refuges were very similar, likely due to the close geographic locations of the NWRs and the similar natural resources being managed. All founding documents for the sampled National Wildlife Refuges were also similar with one another, but not as similar as their CCPs. Expanding the analyses used to compare CCPs and founding documents to other regions of the USFWS may prove useful in examining management priorities versus public use and opinion of refuge management, especially where founding documents and first-generation CCPs are found to be more similar than in the refuges examined in our study.

Chapter Three’s six-week study from March 26 to May 7, 2015 demonstrated that 13 species used the test side-opening gate embayment to move between the lake and downstream canal habitats. Water velocities for the side-opening gate were significantly lower compared to the adjacent top-hinged gate. The 2016 study compared the side-opening gate to the top-hinged gate over a 10-week period, from February 25 to May 1. Water velocities through the side-opening gate were again significantly lower compared to the top-hinged gate. A total of 18 species used the WCS to move between lake and canal waters. The side-opening gate passed significantly more fish of all species (1539), and significantly more Alewife (175) compared to the top-hinged flapgate design (620 fish, 74 Alewife). In both study years, water quality and environmental conditions were normal for the springtime sampling periods. The spawning run size for adult Alewife through Waupoppin Canal continues to decline.

Chapter Four's four push net surveys conducted in 2015, 2016, and 2017 indicated that Alewife spawning still occurs in lake habitats, primarily on the west side of the lake. Juvenile Alewife appeared in June on the earliest survey. For all surveys combined, juveniles were most numerous on the west side of the lake, primarily to the northern side, and it appears that they move eastward and exit the lake in November. None of the four push net surveys indicated that juvenile Alewife were abundant in lake habitats.

Recommendations

Diadromous fish access to Lake Mattamuskeet is one of the priority projects identified in the 2008 MNWR CCP. We recommend that side-opening gates continue to be mounted in WCSs to enhance fish passage, especially for adult Alewife entering in the spring months and for juveniles exiting the lake in fall months. However, the number of side-opening gates should be carefully considered in light of resultant water pressure reduction on the top-hinged flapgates, potentially causing them to remain closed except under extreme conditions. Additionally, we recommend continued periodic monitoring of the status of the Alewife spawning run into Lake Mattamuskeet as continued juvenile surveys to determine long-term feasibility of the currently small but persistent migrating population utilizing the lake.

In addition to the continued need for monitoring of priority species identified in refuge CCPs, fishing visitation (one of the priority recreational use opportunities on National Wildlife Refuges) has decreased yearly from fiscal year 2010 (7.16 million fishing visits) to 2015 (6.77 million fishing visits) and is another issue that should be addressed by refuge management (although these numbers are not specific to Lake Mattamuskeet). The United States Fish and Wildlife Service partially contributes this decline to fewer staff and curtailed hours of fishing opportunity (USFWS "Annual Performance Report FY15," 2016). At least at Mattamuskeet NWR, other factors such as decreased access to fishing locations, poor water quality, or lack of lake access through WCSs or acceptable spawning habitat to maintain healthy fish populations (especially for species of historical importance, such as river herring) and encourage fishers through high success rates may be additional limiting factors in fishing visits and public satisfaction in managing the refuge for multiple, differing purposes.

When looking to future versions of National Wildlife Refuge CCPs, current needs as well as founding purposes must both be considered. Environmental as well as public use conditions at some locations across the nation and especially at Mattamuskeet NWR have changed dramatically since the first editions of CCPs were introduced into the National Wildlife Refuge System planning process. These differences include ecological community changes due to sea level rise, climate change, and other environmental factors, changes in public use activities and trends, and changes in refuge management capabilities due to differences in number of staff or size of budgets. These considerations will likely significantly change many of the second-generation CCPs and will hopefully serve as an updated vision to guide adaptive resource management for the following 15 years.

In addition to guiding adaptive resource management, the second-generation CCPs will also serve as a useful tool when determining shifting goals and priorities of refuges by comparison with first-generation CCPs. We recommend for further refuge planning and especially for the 2023 Mattamuskeet NWR CCP planning process that current public use interests as determined through public input processes, current condition of the ecological community including lake water quality and habitat use by priority species as based on the results of ongoing studies such as this one, and history of management including founding documents and previous CCPs be used to guide refuge management into the future.

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Appendix A. IACUC protocols.

East Carolina University.

Animal Care and Use Commitee
212 Ed Warren Life Sciences Building
East Carolina University
Greenville, NC 27834

252-744-2436 office
252-744-2355 fax

July 13, 2015

Roger Rulifson, Ph.D.
Department of ICSP
Flanagan Building
East Carolina University

Dear Dr. Rulifson:

Your Animal Use Protocol entitled, "Fish Passage Through Water Control Structures and Lake Recruitment at Mattamuskeet National Wildlife Refuge, Hyde County North Carolina" (AUP #D326) was reviewed by this institution's Animal Care and Use Committee on 7/13/15. The following action was taken by the Committee:

"Approved as submitted"

A copy is enclosed for your laboratory files. Please be reminded that all animal procedures must be conducted as described in the approved Animal Use Protocol. Modifications of these procedures cannot be performed without prior approval of the ACUC. The Animal Welfare Act and Public Health Service Guidelines require the ACUC to suspend activities not in accordance with approved procedures and report such activities to the responsible University Official (Vice Chancellor for Health Sciences or Vice Chancellor for Academic Affairs) and appropriate federal Agencies. **Please ensure that all personnel associated with this protocol have access to this approved copy of the AUP and are familiar with its contents.**

Sincerely yours,

Susan McRae, Ph.D.
Chair, Animal Care and Use Committee

SM/jd

Enclosure

EAST CAROLINA UNIVERSITY
ANIMAL USE PROTOCOL (AUP) FORM
LATEST REVISION NOVEMBER, 2013

Project Title:

Fish Passage Through Water Control Structures and Lake Recruitment at Mattamuskeet National Wildlife Refuge, Hyde County North Carolina

	Principal Investigator	**Secondary Contact**
Name	Roger Rulifson	Allison Stewart
Dept.	Institute for Coastal Science and Policy	Coastal Resources Management
Office Ph #	252-328-9400	336-339-6909
Cell Ph #	252-412-4411	336-339-6909
Pager #	Click here to enter text.	Click here to enter text.
Home Ph #	Click here to enter text.	Click here to enter text.
Email	rulifsonr@ecu.edu	stewartall14@students.ecu.edu

For IACUC Use Only

AUP #			
New/Renewal			
Full Review/Date	DR/Date		
Approval Date			

Study Type			
Pain/Distress Category			
Surgery	Survival	Multiple	
Prolonged Restraint			
Food/Fluid Regulation			
Other			
Hazard Approval/Dates	Rad	IBC	EHS
OHP Enrollment			
Mandatory Training			
Amendments Approved			

I. Personnel

A. Principal Investigator(s):

Roger Rulifson

B. Department(s):

Institute for Coastal and Marine Resources

C. List all personnel (PI's, co-investigators, technicians, students) that will be working with live animals and describe their qualifications and experience with these specific procedures. If people are to be trained, indicate by whom:

Name/Degree/Certification	Position/Role(s)/ Responsibilities in this Project	Required Online IACUC Training (Yes/No	Relevant Animal Experience/Training (include species, procedures, number of years, etc.)

Allison Stewart BS	Research Assistant and PhD student, field sampling, laboratory workup of field samples, data analysis report preparation	Yes	Prior fish and invertebrate sampling via different catchment types over past approximately 10 years
Roger Rulifson PhD	PI/Advisor, budget, report completion	yes	30 years with striped bass, river herring, American shad, hickory shad, and coastal sharks.
Click here to enter text.	Click here to enter text.	Choose an item.	Click here to enter text.
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Click here to enter text.	Click here to enter text.	Choose an item.	Click here to enter text.

II. Regulatory Compliance

A. Non-Technical Summary

Using language a non-scientist would understand, please provide a clear, concise, and sequential description of animal use. Additionally, explain the overall study objectives and benefits of proposed research or teaching activity to the advancement of knowledge, human or animal health, or good of society. (More detailed procedures are requested later in the AUP.)

Do not cut and paste the grant abstract.

Animal use will include sampling of major fish and invertebrate species present at Mattamuskeet National Wildlife Refuge via different catchment types. Handling will include measuring, weighing, sexing, and releasing the caught specimens. A subset of target species will be euthanized and then frozen for further or future lab analysis. A subset of target species may also be tagged for mark-recapture efforts.

The purpose of this study is to monitor fish and invertebrate passage through water control structures, in refuge canals, and within Lake Mattamuskeet. Fish and invertebrates will be sampled in order to make population estimates for target species and create management recommendations where merited.

B. Ethics and Animal Use

B.1. Duplication

Does this study duplicate existing research? Yes

If yes, why is it necessary? (note: teaching by definition is duplicative)

Parts of this study duplicate existing research that was done approximately 15 years ago. This study is necessary because the research done 15 years ago is no longer applicable and cannot be used to estimate current conditions or create management recommendations.

B.2. Alternatives to the Use of Live Animals

Are there less invasive procedures, other less sentient species, isolated organ preparation, cell or tissue culture, or computer simulation that can be used in place of the live vertebrate species proposed here? No

If yes, please explain why you cannot use these alternatives.

Click here to enter text.

B.3. Consideration of Alternatives to Painful/Distressful Procedures

a. Include a literature search to ensure that alternatives to all procedures that may cause more than momentary or slight pain or distress to the animals have been considered.

1. Please list all of the potentially painful or distressful procedures in the protocol:

Fish and invertebrates will be captured by net and/or cage. After a max of 12 hours (6 for gill nets and other totally submerged nets), the net/cage will be removed, and all specimens examined for species, weight, length, and sex, and returned to the water. Fish and invertebrates will be held in ambient water until they can be released. A subset of target fish and invertebrate species will be euthanized using an overexposure to MS-222 and frozen immediately for further or future lab analysis. Those not being collected will only be handled out of water for a brief period of time solely to be counted, measured, weighed, and sexed. A subset of released individuals may have a PIT tag inserted and will only be subjected to this procedure for a moment or two before being released into the water once more.

2. For the procedures listed above, provide the following information (please do not submit search results but retain them for your records):

Date Search was performed	March 2015
Database(s) searched	East Carolina University Libraries: ILAR, Nature
Time period covered by the search (i.e. 1975-2013):	1995-2015
Search strategy (including scientifically relevant terminology:	fish euthanasia, fish collection, invertebrate euthanasia
Other sources consulted:	Personal communications with experienced individuals

3. In a few sentences, please provide a brief narrative indicating the results of the search(es) to determine the availability of alternatives and explain why these alternatives were not chosen. Also, please address the 3 Rs of refinement, reduction, and replacement in your response. Refinement refers to modification of husbandry or experimental procedures to enhance animal well-being and minimize or eliminate pain and distress. Replacement refers to absolute (i.e. replacing animals with an inanimate system) or relative (i.e. using less sentient species) replacement. Reduction involves strategies such as experimental design analysis, application of newer technologies, use of appropriate statistical methods, etc., to use the fewest animals or maximize information without increasing animal pain or distress.

Because most of these species will be targeted by sportfishermen, no MS-222 can be used because they are released immediately. Therefore, special care will be taken to keep the collected animals in ambient waters until they are examined and released back to the wild. No alternatives to active sampling were discovered that could replace the intended research procedures. No additional refinement, reduction, and replacement is feasible in this research. Euthanasia of a subset of the target species (river herring) population sampled will be necessary in order to obtain demographics of the population: age, length, weight, gonadosomatic index, and food habits.

C. <u>Hazardous Agents</u>

1. **Protocol related hazards (chemical, biological, or radiological): Please indicate if any of the following are used in animals and the status of review/approval by the referenced committees:**

HAZARDS	Oversight Committee	Status (Approved, Pending, Submitted)/Date	AUP Appendix I Completed?
Radioisotopes	Radiation	Click here to enter text.	Choose an item.
Ionizing radiation	Radiation	Click here to enter text.	Choose an item.
Infectious agents (bacteria, viruses, rickettsia, prions, etc.)	IBC	Click here to enter text.	Choose an item.
Toxins of biological origins (venoms, plant toxins, etc.)	IBC	Click here to enter text.	Choose an item.
Transgenic, Knock In, Knock Out Animals---breeding, cross breeding or any use of live animals or tissues	IBC	Click here to enter text.	Choose an item.
Human tissues, cells, body fluids, cell lines	IBC	Click here to enter text.	Choose an item.
Viral/Plasmid Vectors/Recombinant DNA or recombinant techniques	IBC	Click here to enter text.	Choose an item.
Oncogenic/toxic/mutagenic chemical agents	EH&S	Click here to enter text.	Choose an item.
Nanoparticles	EH&S	Click here to enter text.	Choose an item.
Cell lines, tissues or other biological products injected or implanted in animals	DCM	Click here to enter text.	Choose an item.
Other agents		Click here to enter text.	Choose an item.

2. **Incidental hazards. Will personnel be exposed to any incidental zoonotic diseases or hazards during the study (field studies, primate work, etc)? If so, please identify each and explain steps taken to mitigate risk:**
   As with any field study, inherent outdoor risks will be associated with the study. This includes, but is not limited to: biting insects, snakes, extreme weather, etc. Personnel used will be briefed of such risks before beginning the field study. Boating hazards such as drowning is also a potential risk. Only MOCC certified boat users may operate a vessel, and all passengers of the vessel are required to wear Coast Guard approved PFDs and abide by all

other university, state, and federal safety protocol. Gloves will be worn when handling specimens. Sunscreen and insect repellent will be worn by field crew when able or feasible.

III. Animals and Housing

A. Species and strains:

All fresh water and marine fish and invertebrate species that inhabit Lake Mattamuskeet and its adjoining canals potentially will be sampled. This includes but is not limited to: alewife/blueback herring, black crappie, gizzard shad, longnose gar, largemouth bass, white perch, American eel, and Atlantic blue crab.

B. Weight, sex and/or age:

Sampling will not be determinate on weight, sex, or age of species. Some catchment types will exclude by size.

C. Animal numbers:

1. Please complete the following table

Total number of animals in treatment and control groups	Additional animals (Breeders, substitute animals)	Total number of animals used for this project
0-200 per sampling period, only a subset of target species to be euthanized	+Click here to enter text.	=0-10000, dependent on success of catchment types and species abundance

2. Justify the species and number (use statistical justification when possible) of animals requested:

The number of individuals will be determined by the success rate of different catchment types for all species and the species abundance. The different catchment types may include but are not limited to: dual-sided fish cage, gill net, eel pot, fyke net, hoop net, and push net. Average catch rates fall between 0-100 individuals per sample, with one sample per max of ~12 hours (6 hours for gill net and other submerged net types), approximately 20 samples per month.

3. Justify the number and use of any additional animals needed for this study:

None

a. For unforeseen outcomes/complications:

None

b. For refining techniques:

None

c. For breeding situations, briefly justify breeding configurations and offspring expected:

None

d. Indicate if following IACUC tail snip guidelines: Choose an item.
(if no, describe and justify)
NA

4. Will the phenotype of mutant, transgenic or knockout animals predispose them to any health, behavioral, physical abnormalities, or cause debilitating effects in experimental manipulations? No **(if yes, describe)**
NA

5. Are there any deviations from standard husbandry practices?
No **If yes, then describe conditions and justify the exceptions to standard housing (temperature, light cycles, sterile cages, special feed, prolonged weaning times, wire-bottom cages, etc.):**
NA

6. The default housing method for social species is pair or group housing (including mice, rats, guinea pigs, rabbits, dogs, pigs, monkeys). Is it necessary for animals to be singly housed at any time during the study?
No **(If yes, describe housing and justify the need to singly house social species):**
NA

7. Are there experimental or scientific reasons why routine environmental enrichment should not be provided? No
(If yes, describe and justify the need to withhold enrichment)
NA

8. If wild animals will be captured or used, provide permissions (collection permit # or other required information):
NCWRC Permit: to the Department of Biology
NCDMF Permit: to Roger A. Rulifson and graduate students
Mattamuskeet National Wildlife Refuge Special Use Permit: Form #1018-0102

9. List all laboratories or locations outside the animal facility where animals will be used. Note that animals may not stay in areas outside the animal facilities for more than 12 hours without prior IACUC approval. For field studies, list location of work/study site.
Mattamuskeet National Wildlife Refuge, Lake Mattamuskeet, Hyde County, NC.

IV. Animal Procedures

A. Outline the Experimental Design including all treatment and control groups and the number of animals in each. Tables or flow charts are particularly useful to communicate your design. Briefly state surgical

plans in this section. Surgical procedures can be described in detail in IV.S.

The number of fish sampled will depend on the success of attempts to catch them. Boat use will only be needed for push net surveys, which include attaching a net to a boat and collecting young-of-year fish as the boat is driven. Dual sided cages mounted in the water control structure embayments will be used approximately 20 times per month. Other catchment types will be used sporadically. All captured fish will be handled briefly to obtain weight, length, and sex before their release. A subset of target species will be euthanized using an overexposure to MS-222. A subset of target species may be PIT tagged (dependent on availability of tagging materials) and then released.

In sections IV.B-IV.S below, please respond to all items relating to your proposed animal procedures. If a section does not apply to your experimental plans, please leave it blank.

Please refer to DCM and IACUC websites for relevant guidelines and SOPs.

B. Anesthesia/Analgesia/Tranquilization/Pain/Distress Management For Procedures Other than Surgery:

Adequate records describing anesthetic monitoring and recovery must be maintained for all species.

If anesthesia/analgesia must be withheld for scientific reasons, please provide compelling scientific justification as to why this is necessary:

Click here to enter text.

1. **Describe the pre-procedural preparation of the animals:**
   a. **Food restricted for** Click here to enter text. **hours**
   b. **Food restriction is not recommended for rodents and rabbits and must be justified:**

   Click here to enter text.

   c. **Water restricted for** Click here to enter text. **hours**
   d. **Water restriction is not recommended in any species for routine pre-op prep and must be justified:**

   Click here to enter text.

2. **Anesthesia/Analgesia** ***for Procedures Other than Surgery***

	Agent	Concentration	Dose (mg/kg)	Max Volume	Route	Frequency	Number of days administered
Pre-procedure analgesic	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.
Pre-anesthetic	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.
Anesthetic	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.
Post procedure analgesic	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.
Other	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.

3. Reason for administering agent(s):
Click here to enter text.

4. For which procedure(s):
Click here to enter text.

5. Methods for monitoring anesthetic depth:
Click here to enter text.

6. Methods of physiologic support during anesthesia and recovery:
Click here to enter text.

7. Duration of recovery:
Click here to enter text.

8. Frequency of recovering monitoring:
Click here to enter text.

9. Specifically what will be monitored?
Click here to enter text.

10. When will animals be returned to their home environment?
Click here to enter text.

11. Describe any behavioral or husbandry manipulations that will be used to alleviate pain, distress, and/or discomfort:
Click here to enter text.

C. Use of Paralytics

1. Will paralyzing drugs be used? Choose an item
2. For what purpose:
Click here to enter text.
3. Please provide scientific justification for paralytic use:
Click here to enter text.
4. Paralytic drug:
Click here to enter text.
5. Dose:
Click here to enter text.
6. Method of ensuring appropriate analgesia during paralysis:
Click here to enter text.

D. Blood or Body Fluid Collection

1. Please fill out appropriate sections of the chart below:

	Location on animal	Needle/catheter size	Volume collected	Frequency of procedure	Time interval between collections
Blood Collection	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.
Body Fluid Collection	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.
Other	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.

E. Injections, Gavage, & Other Substance Administration

1. Please fill out appropriate sections of the chart below:

	Compound	Location & Route of admin	Needle/catheter/gavage size	Max volume admin	Freq of admin (ie two times per day)	Number of days admin (ie for 5 days)	Max dosages (mg/kg)
Injection / Infusion	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.
Gavage	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.
Other	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.

3. **Pharmaceutical grade drugs, biologics, reagents, and compounds are defined as agents approved by the Food and Drug Administration (FDA) or for which a chemical purity standard has been written/established by any recognized pharmacopeia such as USP, NF, BP, etc. These standards are used by manufacturers to help ensure that the products are of the appropriate chemical purity and quality, in the appropriate solution or compound, to ensure stability, safety, and efficacy. For all injections and infusions for CLINICAL USE, PHARMACEUTICAL GRADE compounds must be used whenever possible. Pharmaceutical grade injections and infusions for research test articles are preferred when available. If pharmaceutical grade compounds are not available and non-pharmaceutical grade agents must be used, then the following information is necessary:**

a. **Please provide a scientific justification for the use of ALL non-pharmaceutical grade compounds. This may include pharmaceutical-grade compound(s) that are not available in the appropriate concentration or formulation, or the appropriate vehicle control is unavailable.**

b. **Indicate the method of preparation, addressing items such as purity, sterility, pH, osmolality, pyrogenicity, adverse reactions, etc. (please refer to ECU IACUC guidelines for non-pharmaceutical grade compound use),**

labeling (i.e. preparation and use-by dates), administration and storage of each formulation that maintains stability and quality/sterility of the compound(s).

Click here to enter text.

F. Prolonged restraint with mechanical devices

Prolonged restraint in this context means *beyond routine care and use procedures* for rodent and rabbit restrainers, and large animal stocks. Prolonged restraint also includes *any* use of slings, tethers, metabolic crates, inhalation chambers, primate chairs and radiation exposure restraint devices.

1. **For what procedure(s):**
Click here to enter text.
2. **Explain why non-restraint alternatives cannot be utilized:**
Click here to enter text.
3. **Restraint device(s):**
Click here to enter text.
4. **Duration of restraint:**
Click here to enter text.
5. **Frequency of observations during restraint/person responsible:**
Click here to enter text.
6. **Frequency and total number of restraints:**
Click here to enter text.
7. **Conditioning procedures:**
Click here to enter text.
8. **Steps to assure comfort and well-being:**
Click here to enter text.
9. **Describe potential adverse effects of prolonged restraint and provide humane endpoints (criteria for either humanely euthanizing or otherwise removing from study):**
Click here to enter text.

G. Tumor Studies, Disease Models, Toxicity Testing, Vaccine Studies, Trauma Studies, Pain Studies, Organ or System Failure Studies, Shock Models, etc.

1. Describe methodology:
Click here to enter text.
2. Expected model and/or clinical/pathological manifestations:
Click here to enter text.
3. Signs of pain/discomfort:
Click here to enter text.
4. Frequency of observations:
Click here to enter text.
5. Describe potential adverse side effects of procedures and provide humane endpoints (criteria for either humanely euthanizing or otherwise removing from study):
Click here to enter text.

H. Treadmills/Swimming/Forced Exercise

1. Describe aversive stimulus (if used):
Click here to enter text.
2. Conditioning:
Click here to enter text.
3. Safeguards to protect animal:
Click here to enter text.
4. Duration:
Click here to enter text.
5. Frequency:
Click here to enter text.
6. Total number of sessions:
Click here to enter text.
7. Describe potential adverse effects of procedures and provide humane endpoints (criteria for either humanely euthanizing or otherwise removing from study):
Click here to enter text.

I. Projects Involving Food and Water Regulation or Dietary Manipulation

(*Routine pre-surgical fasting not relevant for this section)*

1. Food Regulation

a. Amount regulated and rationale:
Click here to enter text.

b. Frequency and duration of regulation (hours for short term/weeks or months for long term):
Click here to enter text.
c. Frequency of observation/parameters documented (i.e. recording body weight, body condition, etc.):
Click here to enter text.
d. Describe potential adverse effects of procedures and provide humane endpoints (criteria for either humanely euthanizing or otherwise removing from study):
Click here to enter text.

2. Fluid Regulation

a. Amount regulated and rationale:
Click here to enter text.
b. Frequency and duration of regulation (hours for short term/weeks or months for long term):
Click here to enter text.
c. Frequency of observation/parameters documented (body weight, hydration status, etc.):
Click here to enter text.
d. Describe potential adverse effects of procedures and provide humane endpoints (criteria for either humanely euthanizing or otherwise removing from study):
Click here to enter text.

3. Dietary Manipulations

a. **Compound supplemented/deleted and amount:**
   Click here to enter text.
b. **Frequency and duration (hours for short term/week or month for long term):**
   Click here to enter text.
c. **Frequency of observation/parameters documented:**
   Click here to enter text.
d. **Describe potential adverse effects of procedures and provide humane endpoints (criteria for either humanely euthanizing or otherwise removing from study):**
   Click here to enter text.

J. Endoscopy, Fluoroscopy, X-Ray, Ultrasound, MRI, CT, PET, Other Imaging

1. **Describe animal methodology:**
Click here to enter text.
2. **Duration of procedure:**
Click here to enter text.
3. **Frequency of observations during procedure:**
Click here to enter text.
4. **Frequency/total number of procedures:**
Click here to enter text.
5. **Method of transport to/from procedure area:**
Click here to enter text.
6. **Describe potential adverse side effects of procedures and provide humane endpoints (criteria for either humanely euthanizing or otherwise removing from study):**
Click here to enter text.
7. **Please provide or attach appropriate permissions/procedures for animal use on human equipment:**
Click here to enter text.

K. Polyclonal Antibody Production

1. **Antigen/adjuvant used and justification for adjuvant choice:**
Click here to enter text.
2. **Needle size:**
Click here to enter text.
3. **Route of injection:**
Click here to enter text.
4. **Site of injection:**
Click here to enter text.
5. **Volume of injection:**
Click here to enter text.
6. **Total number of injection sites:**
Click here to enter text.
7. **Frequency and total number of boosts:**
Click here to enter text.
8. **What will be done to minimize pain/distress:**

Click here to enter text.

9. Describe potential adverse effects of procedures and provide humane endpoints (criteria for either humanely euthanizing or otherwise removing from study):

Click here to enter text.

L. Monoclonal Antibody Production

1. Describe methodology:

Click here to enter text.

2. Is pristane used: Choose an item.

Volume of pristane:

Click here to enter text.

3. Will ascites be generated: Choose an item.

i. **Criteria/signs that will dictate ascites harvest:**

Click here to enter text.

ii. **Size of needle for taps:**

Click here to enter text.

iii. **Total number of taps:**

Click here to enter text.

iv. **How will animals be monitored/cared for following taps:**

Click here to enter text.

4. What will be done to minimize pain/distress:

Click here to enter text.

5. Describe potential adverse effects of procedures and provide humane endpoints (criteria for either humanely euthanizing or otherwise removing from study):

Click here to enter text.

M. Temperature/Light/Environmental Manipulations

1. Describe manipulation(s):

Click here to enter text.

2. Duration:

Click here to enter text.

3. Intensity:

Click here to enter text.

4. Frequency:

Click here to enter text.

5. Frequency of observations/parameters documented:

Click here to enter text.

6. Describe potential adverse effects of procedures and provide humane endpoints (criteria for either humanely euthanizing or otherwise removing from study):
Click here to enter text.

N. Behavioral Studies

1. Describe methodology/test(s) used:
Click here to enter text.
2. Will conditioning occur? If so, describe:
Click here to enter text.
3. If aversive stimulus used, frequency, intensity and duration:
Click here to enter text.
4. Length of time in test apparatus/test situation: ***(i.e., each test is ~10 mins)***
Click here to enter text.
5. Frequency of testing and duration of study: ***(i.e., 5 tests/week for 6 months)***
Click here to enter text.
6. Frequency of observation/monitoring during test:
Click here to enter text.
7. Describe potential adverse effects of procedures and provide humane endpoints (criteria for either humanely euthanizing or otherwise removing from study):
Click here to enter text.

O. Capture with Mechanical Devices/Traps/Nets

1. Description of capture device/method:
Fish cage with funnel entry that will be placed in the water for approximately 12 hours at a time. The cage will be removed after a max of 12-hour soak time and all fish will be removed from the cage, placed in ambient water tanks, and then weighed, measured, and returned to the water. Additional capture methods could include but are not limited to hoop or trap nets, fyke nets, gill nets, eel pots, minnow traps, and boat-powered push nets. These capture devices would be used to document movements of these species in the lake. Specimens collected by these methods will be measured, weighed, and released.

2. Maximum time animal will be in capture device:
Maximum of 12 hours for dual-sided cage and eel pots, all other methods will have a maximum capture time of 6 hours. Push nets will be checked after each transect (no greater than 10-minute increments)

3. Frequency of checking capture device:
Frequency is equivalent to maximum time of deployment.

4. Methods to ensure well-being of animals in capture device
Short handling time out of water and release back into water. Gill nets and other submerged nets will be checked every 6 hours to limit stress time but allow for proper soak time to be representative of species composition in sampled area. Push nets collect fish in net as the net is dragged in front of a boat under power. The fish remain in water in the push net until they are checked after each sample location.

5. Methods to avoid non-target species capture
Funnels will be designed to target herring-sized fish. Snakes will be able to escape through the mesh. Some turtles may enter the trap and will either remain in trap until checked or exit in the manner in which they entered. The upper portion of the trap is out of the water to allow for the potential oxygen needs of non-target species.

6. Method of transport to laboratory/field station/processing site and duration of transport:
Fish will be handled on site. A subset may be euthanized and then frozen and transported by car back to ECU for further or future lab analysis.

7. Methods to ensure animal well-being during transport:
Fish will already have been euthanized by the time of transport.

8. Expected mortality rates:
Low mortality rates are expected other than predation within fish cage and the subset of fish that will be euthanized for future or further lab analysis.

9. Describe potential adverse effects of procedures and provide humane endpoints (criteria for either humanely euthanizing or otherwise removing from study:
Fish will be released back to water unless kept as a subset for lab analysis. Any seriously injured fish will be euthanized using an overexposure of MS-222.

P. <u>Manipulation of Wild-Caught Animals in the Field or Laboratory</u>

1. Parameters to be measured/collected:
Weight, length, sex, species

2. Approximate time required for data collection per animal:
30 seconds

3. Method of restraint for data collection:

Hand-held

4. Methods to ensure animal well-being during processing:

Quick handling time and gentle handling

5. Disposition of animals post-processing

Fish will be released back into the lake or canal once examined.

6. Describe potential adverse effects of procedures and provide humane endpoints (criteria for either humanely euthanizing or otherwise removing from study

Low mortality rates are expected other than predation within the fish cage and the subset of fish that will be euthanized for future or further lab analysis. All other fish will be released back to water. Any seriously injured fish will be euthanized onsite by overexposure to MS-222.

Q. Wildlife Telemetry/Other Marking Methods

1. Describe methodology (including description of device:

PIT tags may be applied into the body cavity to a subset of target species for mark-recapture studies, dependent on availability of tagging supplies.

2. Will telemetry device/tags/etc. be removed? Choose an item. **If so, describe:**

Tags will not be removed

3. Describe potential adverse effects of procedures and provide humane endpoints (criteria for either humanely euthanizing or otherwise removing from study:

Any fish that are seriously injured from PIT tagging attempts will be euthanized by overexposure to MS-222.

R. Other Animal Manipulations

1. Describe methodology:

Click here to enter text.

2. Describe methods to ensure animal comfort and well-being:

Click here to enter text.

3. Describe potential adverse effects of procedures and provide humane endpoints (criteria for either humanely euthanizing or otherwise removing from study):

Click here to enter text.

S. Surgical Procedures

All survival surgical procedures must be done aseptically, regardless of species or location of surgery. Adequate records describing surgical procedures, anesthetic monitoring and postoperative care must be maintained for all species.

1. Location of Surgery (Building & Room #):
Click here to enter text.

2. Type of Surgery (check all that are appropriate):
Click here to enter text.

☐ **Non-survival surgery (animals euthanized without regaining consciousness)**
☐ **Major survival surgery (major surgery penetrates and exposes a body cavity or produces substantial impairment of physical or physiologic function)**
☐ **Minor survival surgery**
☐ **Multiple survival surgery**
If yes, provide scientific justification for multiple survival surgical procedures:
Click here to enter text.

3. Describe the pre-op preparation of the animals:

a. **Food restricted for** Click here to enter text. **hours**
b. **Food restricted is not recommended for rodents and rabbits and must be justified:**
Click here to enter text.
c. **Water restricted for** Click here to enter text. **hours**
d. **Water restriction is not recommended in any species for routine pre-op prep and be justified:**
Click here to enter text.

4. Minimal sterile techniques will include (check all that apply):
Please refer to DCM Guidelines for Aseptic Surgery for specific information on what is required for each species and type of surgery (survival vs. non-survival).

☐ **Sterile instruments**

How will instruments be sterilized?

Click here to enter text.

If serial surgeries are done, how will instruments be sterilized between surgeries:

Click here to enter text.

☐ **Sterile gloves**
☐ **Mask**
☐ **Cap**
☐ **Sterile gown**
☐ **Sanitized operating area**
☐ **Clipping or plucking of hair or feathers**
☐ **Skin preparation with a sterilant such as betadine**
☐ **Practices to maintain sterility of instruments during surgery**
☐ **Non-survival (clean gloves, clean instruments, etc.)**

5. Describe all surgical procedures:

a. Skin incision size and site on the animal:

Click here to enter text.

b. Describe surgery in detail (include size of implant if applicable):

Click here to enter text.

c. Method of wound closure:

Click here to enter text.

i. Number of layers

Click here to enter text.

ii. Type of wound closure and suture pattern:

Click here to enter text.

iii. Suture type/size/wound clips/tissue glue:

Click here to enter text.

iv. Plan for removing of skin sutures/wound clip/etc:

Click here to enter text.

6. Anesthetic Protocol:

a. If anesthesia/analgesia must be withheld for scientific reasons, please provide compelling scientific justification as to why this is necessary:

MS-222 will be used for those specimens retained for future lab analysis. All fish released back to the wild are sportfishes and therefore it is illegal to use MS-222 or other chemical on these fishes.

b. Anesthesia/Analgesia For Surgical Procedures

	Agent	Dose (mg/kg or %)	Volume	Route	Frequency	Number of days administered
Pre-operative analgesic	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.
Pre-anesthetic	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.
Anesthetic	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.
Post-operative Analgesic	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.
Other	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.

c. Methods that will be used to monitor anesthetic depth (include extra measures employed when paralyzing agents are used):
Click here to enter text.

d. Methods of physiologic support during anesthesia and immediate post-op period (fluids, warming, etc.):
Click here to enter text.

e. List what parameters are monitored during immediate post-op period. Provide the frequency and duration:
Click here to enter text.

f. Describe any other manipulations that will be used to alleviate pain, distress, and/or discomfort during the immediate post-op period (soft bedding, long sipper tubes, food on floor, dough diet, etc.):
Click here to enter text.

g. List criteria used to determine when animals are adequately recovered from anesthesia and when the animals can be returned to their home environment:
Click here to enter text.

7. Recovery from Surgical Manipulations (after animal regains consciousness and is returned to its home environment)

Click here to enter text.

a. What parameters (behavior, appetite, mobility, wound healing, etc.) will be monitored:

Click here to enter text.

b. How frequently (times per day) will animals be monitored:

Click here to enter text.

c. How long post-operatively (days) will animals be monitored:

Click here to enter text.

8. Surgical Manipulations Affecting Animals

a. Describe any signs of pain/discomfort/functional deficits resulting from the surgical procedure:

Click here to enter text.

b. What will be done to manage any signs of pain or discomfort (include pharmacologic and non-pharmacologic interventions):

Click here to enter text.

c. Describe potential adverse effects of procedures and provide humane endpoints (criteria for either humanely euthanizing or otherwise removing from study):

Click here to enter text.

V. Euthanasia

Please refer to the AVMA Guidelines for the Euthanasia of Animals: 2013 Edition and DCM Guidelines to determine appropriate euthanasia methods.

A. Euthanasia Procedure*. All investigators, even those conducting non-terminal studies, must complete this section in case euthanasia is required for humane reasons.*

1. Physical Method- If a physical method is used, the animal should be first sedated/anesthetized with CO_2 or other anesthetic agent. If prior sedation is not possible, a scientific justification must be provided:

- Injured or retained specimens for lab analysis will be overexposed to MS-222. Injured fish will be decapitated after MS-222. Specimens for lab use will then be placed in iced water.

Physical decapitation or pithing is not possible because the target tissue for examination is the brain and the otoliths just behind the brain.

(if other, describe the agent and delivery method)

Click here to enter text.

3. Non-Inhalant Pharmaceutical Method (injectables, MS-222, etc.)- Please provide the following:

a. Agent:

Click here to enter text.

b. Dose or concentration:

Click here to enter text.

c. Route:

Click here to enter text.

B. Method of ensuring death (can be physical method, such as pneumothorax or decapitation for small species and assessment method such as auscultation for large animals):

Injured fish will be decapitated after MS-222. Lab specimen Fish will remain in MS-222, then in iced water until deceased. They will then be stored on ice.

C. Describe disposition of carcass following euthanasia:

Lab specimen carcasses will be frozen in water for future lab analysis. The injured fish euthanized will be buried onsite.

I acknowledge that humane care and use of animals in research, teaching and testing is of paramount importance, and agree to conduct animal studies with professionalism, using ethical principles of sound animal stewardship. I further acknowledge that I will perform only those procedures that are described in this AUP and that my use of animals must conform to the standards described in the Animal Welfare Act, the Public Health Service Policy, The Guide For the Care and Use of Laboratory Animals, the Association for the Assessment and Accreditation of Laboratory Animal Care, and East Carolina University.

Please submit the completed animal use protocol form via e-mail attachment to iacuc@ecu.edu. You must also carbon copy your Department Chair.

PI Signature: Roger A.Rulifson e-mail **Date:** 7/10/2015

Veterinarian: Karen A. Oppelt **Date:** 7/13/15

IACUC Chair: S B McRae jd **Date:** 7/13/15

<table>
<tr><td colspan="12">APPENDIX 1-HAZARDOUS AGENTS</td></tr>
<tr><td colspan="4">Principal Investigator:</td><td colspan="4">Campus Phone:</td><td colspan="4">Home Phone:</td></tr>
<tr><td colspan="4">IACUC Protocol Number:</td><td colspan="4">Department:</td><td colspan="4">E-Mail:</td></tr>
<tr><td colspan="4">Secondary Contact:
Department:</td><td colspan="3">Campus
Phone:</td><td colspan="2">Home
Phone:</td><td colspan="3">E-Mail:</td></tr>
<tr><td colspan="6">Chemical Agents used:</td><td colspan="6">Radioisotopes used:</td></tr>
<tr><td colspan="6">Biohazardous Agents used:</td><td colspan="3">Animal
Biosafety Level:</td><td colspan="3">Infectious to
humans?</td></tr>
<tr><td colspan="12">PERSONAL PROTECTIVE EQUIPMENT REQUIRED:</td></tr>
<tr><td colspan="12">Route of Excretion:</td></tr>
<tr><td colspan="12">Precautions for Handling Live or Dead Animals:</td></tr>
<tr><td colspan="12">Animal Disposal:</td></tr>
<tr><td colspan="12">Bedding/Waste Disposal:</td></tr>
<tr><td colspan="12">Cage Decontamination:</td></tr>
<tr><td colspan="12">Additional Precautions to Protect Personnel, Adjacent Research Projects including Animals and the Environment:</td></tr>
<tr><td colspan="8">Initial Approval
Safety/Subject Matter Expert Signature & Date

____</td><td colspan="4"></td></tr>
</table>

Appendix B. Biological and Environmental Data

All fish captured at Waupoppin Water Control Structure during the 2015 sampling period of March 26 through May 7, 2015, Lake Mattamuskeet, North Carolina.

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150326	1800	7.25	Day	IM	Gizzard Shad	328.00	369.00	544.31	U
20150326	1800	7.25	Day	IM	Largemouth Bass	366.00	383.00	907.18	U
20150326	1800	7.25	Day	IM	Largemouth Bass	357.00	366.00	816.47	U
20150326	1800	7.25	Day	IM	Black Crappie	287.00	301.00	521.63	F
20150326	1800	7.25	Day	IM	Largemouth Bass	414.00	424.00	1338.10	U
20150326	1800	7.25	Day	IM	Largemouth Bass	362.00	375.00		U
20150326	1800	7.25	Day	IM	Black Crappie	284.00	290.00	396.89	F
20150326	1800	7.25	Day	IM	Black Crappie	216.00	228.00	127.57	U
20150326	1800	7.25	Day	IM	White Perch	162.00	171.00	14.17	U
20150326	1800	7.25	Day	IM	White Perch	190.00	204.00	56.70	U
20150326	1800	7.25	Day	IM	White Perch	155.00	164.00	14.17	U
20150326	1800	7.25	Day	IM	Gizzard Shad	300.00	348.00	283.50	M
20150326	1800	7.25	Day	IM	Gizzard Shad	315.00	357.00	340.19	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150326	1800	7.25	Day	IM	Gizzard Shad	308.00	352.00	340.19	M
20150326	1800	7.25	Day	IM	Gizzard Shad	355.00	388.00	396.89	U
20150326	1800	7.25	Day	IM	Alewife	214.00	239.00	42.52	M
20150326	1800	7.25	Day	IM	Atlantic Blue Crab	85.00			U
20150326	1800	7.25	Day	IM	Atlantic Blue Crab	110.00			M
20150326	1800	7.25	Day	IM	Atlantic Blue Crab	98.00			M
20150326	1800	7.25	Day	EM	Black Crappie	286.00	293.00	425.24	M
20150326	1800	7.25	Day	EM	Black Crappie	240.00	247.00	212.62	U
20150326	1800	7.25	Day	EM	White Perch	208.00	221.00	127.57	M
20150326	1800	7.25	Day	EM	White Perch	166.00	176.00	28.35	M
20150326	1800	7.25	Day	EM	Gizzard Shad	328.00	372.00	544.31	U
20150326	1800	7.25	Day	EM	White Perch	166.00	176.00	680.39	M
20150326	1800	7.25	Day	EM	White Perch	183.00	194.00	680.39	M
20150326	1800	7.25	Day	EM	White Perch	176.00	186.00	680.39	M
20150326	1800	7.25	Day	EM	White Perch	176.00	187.00	56.70	M
20150326	1800	7.25	Day	EM	White Perch	171.00	182.00	56.70	F
20150326	1800	7.25	Day	EM	White Perch	173.00	182.00	42.52	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150326	1800	7.25	Day	EM	Gizzard Shad	317.00	368.00	411.07	M
20150326	1800	7.25	Day	EM	Gizzard Shad	284.00	326.00	311.84	M
20150326	1800	7.25	Day	EM	Gizzard Shad	300.00	341.00	326.02	M
20150326	1800	7.25	Day	EM	White Perch	165.00	177.00	56.70	U
20150327	0715	11.25	Night	IM	Gizzard Shad	314.00	354.00	255.15	U
20150327	0715	11.25	Night	IM	Gizzard Shad	318.00	369.00	240.97	U
20150327	0715	11.25	Night	IM	Gizzard Shad	298.00	336.00	340.19	M
20150327	0715	11.25	Night	IM	Gizzard Shad	275.00	319.00	382.72	F
20150327	0715	11.25	Night	IM	Gizzard Shad	285.00	328.00	326.02	U
20150327	0715	11.25	Night	IM	Gizzard Shad	293.00	335.00	283.50	M
20150327	0715	11.25	Night	IM	White Perch	188.00	217.00	127.57	U
20150327	0715	11.25	Night	IM	Gizzard Shad	310.00	350.00	411.07	U
20150327	0715	11.25	Night	IM	Gizzard Shad	349.00	389.00	637.86	U
20150327	0715	11.25	Night	IM	Gizzard Shad	312.00	360.00	354.37	U
20150327	0715	11.25	Night	IM	Gizzard Shad	343.00	388.00	510.29	U
20150327	0715	11.25	Night	IM	Gizzard Shad	314.00	355.00	453.59	U
20150327	0715	11.25	Night	IM	Gizzard Shad	292.00	330.00	311.84	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150327	0715	11.25	Night	IM	Gizzard Shad	307.00	353.00	411.07	M
20150327	0715	11.25	Night	IM	Gizzard Shad	319.00	361.00	453.59	U
20150327	0715	11.25	Night	IM	Black Crappie	279.00	288.00	425.24	U
20150327	0715	11.25	Night	IM	Gizzard Shad	300.00	340.00	340.19	M
20150327	0715	11.25	Night	IM	White Perch	260.00	271.00	382.72	U
20150327	0715	11.25	Night	IM	Gizzard Shad	311.00	354.00	453.59	U
20150327	0715	11.25	Night	IM	White Perch	226.00	241.00	240.97	U
20150327	0715	11.25	Night	IM	White Perch	189.00	195.00	113.40	M
20150327	0715	11.25	Night	IM	White Perch	195.00	205.00	141.75	U
20150327	0715	11.25	Night	IM	White Perch	205.00	216.00	155.92	U
20150327	0715	11.25	Night	IM	Black Crappie	243.00	255.00	297.67	U
20150327	0715	11.25	Night	IM	White Perch	190.00	198.00	99.22	U
20150327	0715	11.25	Night	IM	White Perch	186.00	196.00	85.05	U
20150327	0715	11.25	Night	IM	White Perch	184.00	193.00	70.87	U
20150327	0715	11.25	Night	IM	White Perch	205.00	215.00	155.92	U
20150327	0715	11.25	Night	IM	White Perch	162.00	168.00	99.22	U
20150327	0715	11.25	Night	IM	White Perch	166.00	174.00	85.05	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150327	0715	11.25	Night	IM	White Perch	205.00	215.00	170.10	U
20150327	0715	11.25	Night	IM	Black Crappie	255.00	26.00	354.37	F
20150327	0715	11.25	Night	IM	White Perch	200.00	212.00	127.57	U
20150327	0715	11.25	Night	IM	White Perch	191.00	202.00	99.22	M
20150327	0715	11.25	Night	IM	White Perch	190.00	199.00	127.57	F
20150327	0715	11.25	Night	IM	Gizzard Shad	352.00	405.00	328.85	U
20150327	0715	11.25	Night	IM	White Perch	215.00	225.00	170.10	U
20150327	0715	11.25	Night	IM	Bluegill	216.00	226.00	226.80	M
20150327	0715	11.25	Night	IM	Bluegill	150.00	160.00	70.87	U
20150327	0715	11.25	Night	IM	Alewife	226.00	255.00	141.75	U
20150327	0715	11.25	Night	EM	White Perch	275.00	289.00	411.07	U
20150327	0715	11.25	Night	EM	White Perch	165.00	175.00	56.70	U
20150327	0715	11.25	Night	EM	White Perch	167.00	175.00	85.05	U
20150327	0715	11.25	Night	EM	White Perch	167.00	176.00	42.52	U
20150327	0715	11.25	Night	EM	White Perch	139.00	145.00	28.35	U
20150327	0715	11.25	Night	EM	White Perch	183.00	193.00	99.22	U
20150327	0715	11.25	Night	EM	White Perch	146.00	155.00	14.17	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150327	0715	11.25	Night	IM	Atlantic Blue Crab		102.00		M
20150327	0715	11.25	Night	IM	Atlantic Blue Crab		121.00		M
20150327	0715	11.25	Night	IM	Atlantic Blue Crab		91.00		M
20150327	0715	11.25	Night	IM	Atlantic Blue Crab		119.00		M
20150327	0715	11.25	Night	IM	Atlantic Blue Crab		100.00		M
20150327	0715	11.25	Night	IM	Atlantic Blue Crab		99.00		M
20150327	0715	11.25	Night	IM	Atlantic Blue Crab		102.00		M
20150327	0715	11.25	Night	IM	Atlantic Blue Crab		101.00		F
20150327	0715	11.25	Night	IM	Atlantic Blue Crab		121.00		F
20150327	0715	11.25	Night	IM	Atlantic Blue Crab		80.00		M
20150327	0715	11.25	Night	IM	Atlantic Blue Crab		101.00		M
20150327	0715	11.25	Night	IM	Gizzard Shad	310.00	351.00	439.42	M
20150327	0715	11.25	Night	IM	Gizzard Shad	318.00	366.00	439.42	U
20150327	0715	11.25	Night	IM	Gizzard Shad	300.00	348.00	340.19	M
20150327	0715	11.25	Night	IM	White Perch	195.00	214.00	141.75	U
20150327	0715	11.25	Night	IM	White Perch	210.00	225.00	170.10	M
20150327	0715	11.25	Night	IM	Gizzard Shad	308.00	351.00	396.89	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150327	0715	11.25	Night	IM	Gizzard Shad	336.00	384.00	198.45	U
20150327	0715	11.25	Night	IM	White Perch	194.00	210.00	113.40	U
20150327	0715	11.25	Night	IM	White Perch	205.00	215.00	141.75	U
20150327	0715	11.25	Night	IM	Gizzard Shad	337.00	390.00	538.64	U
20150327	0715	11.25	Night	IM	Gizzard Shad	307.00	357.00	354.37	M
20150327	0715	11.25	Night	IM	Gizzard Shad	240.00	285.00	155.92	U
20150327	0715	11.25	Night	IM	Gizzard Shad	330.00	360.00	439.42	M
20150327	0715	11.25	Night	IM	Gizzard Shad	300.00	352.00	354.37	M
20150327	0715	11.25	Night	IM	White Perch	190.00	202.00	85.05	M
20150327	0715	11.25	Night	IM	Gizzard Shad	320.00	368.00	453.59	F
20150327	0715	11.25	Night	IM	Gizzard Shad	270.00	320.00	226.80	M
20150327	0715	11.25	Night	IM	Gizzard Shad	312.00	360.00	595.34	U
20150327	0715	11.25	Night	IM	Gizzard Shad	320.00	369.00	566.99	M
20150327	0715	11.25	Night	IM	White Perch	210.00	224.00	226.80	U
20150327	0715	11.25	Night	IM	Gizzard Shad	298.00	347.00	411.07	M
20150327	0715	11.25	Night	IM	Gizzard Shad	318.00	368.00	453.59	M
20150327	0715	11.25	Night	IM	White Perch	177.00	188.00	127.57	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150327	0715	11.25	Night	IM	White Perch	184.00	195.00	141.75	M
20150327	0715	11.25	Night	IM	White Perch	190.00	201.00	141.75	M
20150327	0715	11.25	Night	IM	Gizzard Shad	260.00	316.00	255.15	M
20150327	1645	7.25	Day	IM	Alewife	238.00	271.00	184.27	U
20150327	1645	7.25	Day	IM	Alewife	216.00	242.00	113.40	U
20150327	1645	7.25	Day	IM	Alewife	233.00	265.00	170.10	M
20150327	1645	7.25	Day	IM	Alewife	218.00	247.00	127.57	M
20150327	1645	7.25	Day	IM	Alewife	247.00	280.00	184.27	U
20150327	1645	7.25	Day	IM	Alewife	242.00	271.00	170.10	U
20150327	1645	7.25	Day	IM	Alewife	250.00	239.00	212.62	F
20150327	1645	7.25	Day	IM	Alewife	210.00	240.00	113.40	M
20150327	1645	7.25	Day	IM	Alewife	233.00	262.00	155.92	M
20150327	1645	7.25	Day	IM	Alewife	220.00	250.00	127.57	M
20150327	1645	7.25	Day	IM	Black Crappie	274.00	284.00	396.89	F
20150327	1645	7.25	Day	IM	Largemouth Bass	369.00	384.00	850.49	U
20150327	1645	7.25	Day	IM	Black Crappie	255.00	262.00	340.19	U
20150327	1645	7.25	Day	IM	Black Crappie	289.00	277.00	396.89	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150327	1645	7.25	Day	IM	Gizzard Shad	320.00	368.00	510.29	M
20150327	1645	7.25	Day	IM	White Perch	190.00	201.00	155.92	U
20150328	0830	14.25	Night	IM	Gizzard Shad	300.00	444.00	396.89	M
20150328	0830	14.25	Night	IM	Gizzard Shad	330.00	378.00	453.59	U
20150328	0830	14.25	Night	IM	Gizzard Shad	360.00	410.00	765.44	U
20150328	0830	14.25	Night	IM	Gizzard Shad	310.00	350.00	453.59	U
20150328	0830	14.25	Night	IM	Gizzard Shad	321.00	365.00	524.47	U
20150328	0830	14.25	Night	IM	Gizzard Shad	338.00	379.00	566.99	M
20150328	0830	14.25	Night	IM	Gizzard Shad	288.00	328.00	326.02	M
20150328	0830	14.25	Night	IM	Gizzard Shad	325.00	365.00	538.64	M
20150328	0830	14.25	Night	IM	Gizzard Shad	310.00	356.00	453.59	U
20150328	0830	14.25	Night	IM	Gizzard Shad	300.00	339.00	368.54	M
20150328	0830	14.25	Night	IM	Gizzard Shad	342.00	389.00	623.69	F
20150328	0830	14.25	Night	IM	Gizzard Shad	285.00	323.00	340.19	M
20150328	0830	14.25	Night	IM	Gizzard Shad	304.00	353.00	382.72	U
20150328	0830	14.25	Night	IM	Gizzard Shad	259.00	296.00	226.80	M
20150328	0830	14.25	Night	IM	Gizzard Shad	228.00	269.00	141.75	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150328	0830	14.25	Night	IM	Gizzard Shad	344.00	397.00	467.77	U
20150328	0830	14.25	Night	IM	Gizzard Shad	340.00	381.00	552.82	U
20150328	0830	14.25	Night	IM	Gizzard Shad	360.00	412.00	538.64	U
20150328	0830	14.25	Night	IM	Gizzard Shad	305.00	350.00	396.89	M
20150328	0830	14.25	Night	IM	Gizzard Shad	344.00	401.00	566.99	U
20150328	0830	14.25	Night	IM	Gizzard Shad	305.00	358.00	439.42	M
20150328	0830	14.25	Night	IM	Gizzard Shad	355.00	411.00	652.04	U
20150328	0830	14.25	Night	IM	Gizzard Shad	345.00	394.00	609.51	U
20150328	0830	14.25	Night	IM	Gizzard Shad	335.00	389.00	566.99	U
20150328	0830	14.25	Night	IM	Gizzard Shad	305.00	348.00	411.07	M
20150328	0830	14.25	Night	IM	Gizzard Shad	315.00	373.00	510.29	U
20150328	0830	14.25	Night	IM	Gizzard Shad	335.00	385.00	609.51	U
20150328	0830	14.25	Night	IM	Gizzard Shad	330.00	379.00	524.47	U
20150328	0830	14.25	Night	IM	Gizzard Shad	338.00	395.00	524.47	U
20150328	0830	14.25	Night	EM	Atlantic Blue Crab		80.00		F
20150328	0830	14.25	Night	EM	Atlantic Blue Crab		99.00		M
20150328	0830	14.25	Night	EM	Atlantic Blue Crab		100.00		M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150328	0830	14.25	Night	EM	Atlantic Blue Crab		101.00		M
20150328	1630	6.25	Day	EM	Gizzard Shad	158.00	172.00	99.22	U
20150328	1630	6.25	Day	EM	Black Crappie	247.00	256.00	354.37	U
20150328	1630	6.25	Day	EM	Bowfin		595.00		U
20150328	1630	6.25	Day	EM	White Perch	210.00	210.00	226.80	F
20150328	1630	6.25	Day	IM	Black Crappie	304.00	314.00	666.21	F
20150328	1630	6.25	Day	IM	Gizzard Shad	190.00	216.00	127.57	M
20150328	1630	6.25	Day	IM	Black Crappie	265.00	274.00	382.72	F
20150328	1630	6.25	Day	IM	White Perch	169.00	177.00	113.40	M
20150328	1630	6.25	Day	IM	White Perch	260.00	271.00	368.54	F
20150328	1630	6.25	Day	IM	Black Crappie	255.00	264.00	340.19	M
20150328	1630	6.25	Day	IM	White Perch	219.00	231.00	269.32	U
20150328	1630	6.25	Day	IM	White Perch	190.00	215.00	198.45	F
20150328	1630	6.25	Day	IM	White Perch	180.00	191.00	170.10	M
20150328	1630	6.25	Day	IM	White Perch	236.00	250.00	269.32	F
20150328	1630	6.25	Day	IM	White Perch	220.00	234.00	240.97	U
20150328	1630	6.25	Day	IM	White Perch	180.00	199.00	127.57	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150328	1630	6.25	Day	IM	Alewife	225.00	254.00	226.80	M
20150328	1630	6.25	Day	IM	White Perch	189.00	199.00	212.62	M
20150328	1630	6.25	Day	IM	White Perch	210.00	206.00	255.15	U
20150328	1630	6.25	Day	IM	White Perch	224.00	235.00	297.67	U
20150328	1630	6.25	Day	IM	Alewife	240.00	269.00	255.15	F
20150328	1630	6.25	Day	IM	White Perch	186.00	196.00	155.92	M
20150328	1630	6.25	Day	IM	White Perch	214.00	226.00	269.32	U
20150328	1630	6.25	Day	IM	White Perch	185.00	195.00	184.27	M
20150328	1630	6.25	Day	IM	Alewife	240.00	271.00	255.15	M
20150328	1630	6.25	Day	IM	White Perch	190.00	205.00	198.45	F
20150328	1630	6.25	Day	IM	Black Crappie	200.00	210.00	226.80	U
20150328	1630	6.25	Day	IM	White Perch	190.00	205.00	198.45	M
20150328	1630	6.25	Day	IM	White Perch	194.00	205.00	198.45	F
20150328	1630	6.25	Day	IM	White Perch	180.00	191.00	184.27	M
20150328	1630	6.25	Day	IM	White Perch	150.00	159.00	113.40	U
20150328	1630	6.25	Day	IM	White Perch	188.00	196.00	198.45	M
20150328	1630	6.25	Day	IM	Atlantic Blue Crab		101.00		M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150328	1630	6.25	Day	EM	White Perch	155.00	164.00	28.35	U
20150404	0715	12.25	Night	EM	White Perch	140.00	150.00		U
20150404	0715	12.25	Night	EM	Gizzard Shad	375.00	422.00		U
20150404	0715	12.25	Night	EM	White Perch	160.00	169.00		M
20150404	0715	12.25	Night	EM	Alewife	213.00	244.00		M
20150404	0715	12.25	Night	EM	White Perch	220.00	231.00		F
20150404	0715	12.25	Night	EM	White Perch	150.00	159.00		U
20150404	0715	12.25	Night	EM	White Perch	227.00	241.00		U
20150404	0715	12.25	Night	EM	White Perch	222.00	235.00		U
20150404	0715	12.25	Night	EM	White Perch	132.00	139.00		U
20150404	0715	12.25	Night	IM	White Perch	280.00	299.00		U
20150404	0715	12.25	Night	IM	Black Crappie	250.00	261.00		F
20150404	0715	12.25	Night	IM	White Perch	248.00	264.00		U
20150404	0715	12.25	Night	IM	White Perch	192.00	205.00		M
20150404	0715	12.25	Night	IM	White Perch	195.00	207.00		U
20150404	0715	12.25	Night	IM	Black Crappie	271.00	283.00		M
20150404	0715	12.25	Night	IM	White Perch	241.00	256.00		U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150404	0715	12.25	Night	IM	White Perch	194.00	206.00		F
20150404	0715	12.25	Night	IM	White Perch	238.00	249.00		U
20150404	0715	12.25	Night	IM	Black Crappie	262.00	275.00		F
20150404	0715	12.25	Night	IM	White Perch	184.00	193.00		M
20150404	0715	12.25	Night	IM	White Perch	247.00	259.00		U
20150404	0715	12.25	Night	IM	White Perch	203.00	214.00		U
20150404	0715	12.25	Night	IM	White Perch	229.00	241.00		M
20150404	0715	12.25	Night	IM	White Perch	196.00	207.00		M
20150404	0715	12.25	Night	IM	White Perch	193.00	203.00		F
20150404	0715	12.25	Night	IM	White Perch	212.00	225.00		U
20150404	0715	12.25	Night	IM	White Perch	195.00	207.00		U
20150404	0715	12.25	Night	IM	White Perch	176.00	187.00		U
20150404	0715	12.25	Night	IM	Alewife	138.00	168.00		F
20150404	0715	12.25	Night	IM	White Perch	181.00	193.00		F
20150404	0715	12.25	Night	IM	White Perch	180.00	190.00		U
20150404	0715	12.25	Night	IM	White Perch	147.00	156.00		F
20150404	0715	12.25	Night	IM	Gizzard Shad	314.00	354.00		U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150404	0715	12.25	Night	IM	Gizzard Shad	277.00	322.00		M
20150404	0715	12.25	Night	IM	Gizzard Shad	252.00	296.00		M
20150404	0715	12.25	Night	IM	Gizzard Shad	345.00	396.00		F
20150404	0715	12.25	Night	IM	Gizzard Shad	205.00	235.00		M
20150404	0715	12.25	Night	IM	Gizzard Shad	330.00	379.00		F
20150404	0715	12.25	Night	IM	Gizzard Shad	295.00	343.00		U
20150404	0715	12.25	Night	IM	Gizzard Shad	305.00	351.00		M
20150404	0715	12.25	Night	IM	Gizzard Shad	245.00	291.00		M
20150404	0715	12.25	Night	IM	Bowfin		624.00		
20150404	0715	12.25	Night	IM	Atlantic Blue Crab		107.00		
20150404	1700	8.00	Day	EM	White Perch	220.00	232.00	226.80	M
20150404	1700	8.00	Day	EM	Striped Mullet	175.00	194.00	170.10	U
20150404	1700	8.00	Day	EM	White Perch	205.00	217.00	113.40	F
20150404	1700	8.00	Day	EM	White Perch	150.00	162.00	56.70	F
20150404	1700	8.00	Day	EM	Redear Sunfish	125.00	132.00	28.35	U
20150404	1700	8.00	Day	EM	White Perch	155.00	164.00	28.35	U
20150404	1700	8.00	Day	IM	Black Crappie	295.00	306.00	453.59	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150404	1700	8.00	Day	IM	Largemouth Bass	390.00	409.00	1133.98	U
20150404	1700	8.00	Day	IM	Black Crappie	305.00	321.00	680.39	F
20150404	1700	8.00	Day	IM	Black Crappie	176.00	186.00	340.19	F
20150404	1700	8.00	Day	IM	Black Crappie	293.00	306.00	453.59	F
20150404	1700	8.00	Day	IM	Largemouth Bass	350.00	370.00	680.39	M
20150404	1700	8.00	Day	IM	Black Crappie	283.00	295.00	453.59	F
20150404	1700	8.00	Day	IM	Black Crappie	295.00	306.00	566.99	F
20150404	1700	8.00	Day	IM	Gizzard Shad	325.00	375.00	566.99	U
20150404	1700	8.00	Day	IM	White Perch	210.00	220.00	566.99	F
20150404	1700	8.00	Day	IM	Gizzard Shad	330.00	379.00	680.39	U
20150404	1700	8.00	Day	IM	Black Crappie	255.00	269.00	566.99	F
20150404	1700	8.00	Day	IM	Black Crappie	250.00	263.00	453.59	F
20150404	1700	8.00	Day	IM	Black Crappie	290.00	301.00	453.59	F
20150404	1700	8.00	Day	IM	Gizzard Shad	315.00	364.00	566.99	U
20150404	1700	8.00	Day	IM	Gizzard Shad	335.00	388.00	566.99	U
20150404	1700	8.00	Day	IM	Gizzard Shad	291.00	340.00	226.80	M
20150404	1700	8.00	Day	IM	Gizzard Shad	305.00	350.00	453.59	F

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150404	1700	8.00	Day	IM	Gizzard Shad	288.00	331.00	226.80	U
20150404	1700	8.00	Day	IM	Black Crappie	185.00	195.00	56.70	U
20150404	1700	8.00	Day	IM	Black Crappie	275.00	289.00	453.59	M
20150404	1700	8.00	Day	IM	Largemouth Bass	320.00	333.00	566.99	M
20150404	1700	8.00	Day	IM	Black Crappie	250.00	262.00	226.80	U
20150404	1700	8.00	Day	IM	Gizzard Shad	320.00	372.00	340.19	F
20150404	1700	8.00	Day	IM	Alewife	223.00	252.00	56.70	M
20150404	1700	8.00	Day	IM	Gizzard Shad	310.00	357.00	340.19	M
20150404	1700	8.00	Day	IM	Common Carp	455.00	512.00	1587.57	M
20150404	1700	8.00	Day	IM	Alewife	250.00	284.00	113.40	F
20150404	1700	8.00	Day	IM	White Perch	169.00	179.00	56.70	M
20150404	1700	8.00	Day	IM	Black Crappie	139.00	147.00	28.35	U
20150404	1700	8.00	Day	IM	Gizzard Shad	173.00	202.00	56.70	U
20150404	1700	8.00	Day	IM	White Perch	168.00	179.00	85.05	F
20150404	1700	8.00	Day	IM	Alewife	219.00	252.00	85.05	M
20150404	1700	8.00	Day	IM	Gizzard Shad	166.00	199.00	56.70	U
20150404	1700	8.00	Day	IM	Gizzard Shad	188.00	219.00	85.05	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150404	1700	8.00	Day	IM	Alewife	220.00	246.00	85.05	F
20150404	1700	8.00	Day	IM	White Perch	188.00	200.00	113.40	M
20150404	1700	8.00	Day	IM	White Perch	180.00	190.00	113.40	M
20150404	1700	8.00	Day	EM	Atlantic Blue Crab		170.00		M
20150404	1700	8.00	Day	IM	Atlantic Blue Crab		88.00		M
20150405	0830	13.50	Night	IM	Largemouth Bass	375.00	354.00	680.39	M
20150405	0830	13.50	Night	IM	Largemouth Bass	345.00	363.00	481.94	F
20150405	0830	13.50	Night	IM	Black Crappie	290.00	298.00	340.19	F
20150405	0830	13.50	Night	IM	White Perch	223.00	236.00	113.40	U
20150405	0830	13.50	Night	IM	Largemouth Bass	319.00	335.00	396.89	M
20150405	0830	13.50	Night	IM	Largemouth Bass	321.00	336.00	425.24	U
20150405	0830	13.50	Night	IM	Black Crappie	255.00	267.00	226.80	F
20150405	0830	13.50	Night	IM	White Perch	238.00	249.00	226.80	U
20150405	0830	13.50	Night	IM	White Perch	202.00	214.00	226.80	U
20150405	0830	13.50	Night	IM	White Perch	295.00	308.00	396.89	U
20150405	0830	13.50	Night	IM	White Perch	214.00	225.00	85.05	U
20150405	0830	13.50	Night	IM	White Perch	280.00	298.00	283.50	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150405	0830	13.50	Night	IM	White Perch	205.00	214.00	226.80	U
20150405	0830	13.50	Night	IM	White Perch	188.00	201.00	170.10	U
20150405	0830	13.50	Night	IM	White Perch	275.00	287.00	283.50	U
20150405	0830	13.50	Night	IM	Black Crappie	253.00	265.00	226.80	M
20150405	0830	13.50	Night	IM	Black Crappie	238.00	247.00	226.80	M
20150405	0830	13.50	Night	IM	White Perch	183.00	193.00	56.70	M
20150405	0830	13.50	Night	IM	White Perch	198.00	209.00	56.70	F
20150405	0830	13.50	Night	IM	White Perch	181.00	193.00	85.05	M
20150405	0830	13.50	Night	IM	Black Crappie	254.00	264.00	226.80	U
20150405	0830	13.50	Night	IM	White Perch	178.00	189.00	56.70	F
20150405	0830	13.50	Night	IM	White Perch	190.00	201.00	113.40	F
20150405	0830	13.50	Night	IM	Black Crappie	275.00	287.00	680.39	F
20150405	0830	13.50	Night	IM	White Perch	190.00	203.00	113.40	F
20150405	0830	13.50	Night	IM	White Perch	202.00	213.00		F
20150405	0830	13.50	Night	IM	White Perch	194.00	205.00		M
20150405	0830	13.50	Night	IM	White Perch	183.00	193.00		M
20150405	0830	13.50	Night	IM	White Perch	205.00	219.00	141.75	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150405	0830	13.50	Night	IM	White Perch	209.00	220.00		U
20150405	0830	13.50	Night	IM	White Perch	194.00	205.00		U
20150405	0830	13.50	Night	IM	White Perch	186.00	196.00		M
20150405	0830	13.50	Night	IM	White Perch	175.00	185.00		F
20150405	0830	13.50	Night	EM	Largemouth Bass	341.00	360.00		M
20150405	0830	13.50	Night	EM	Bowfin		640.00		
20150405	0830	13.50	Night	EM	Gizzard Shad	302.00	354.00	510.29	M
20150405	0830	13.50	Night	EM	White Perch	230.00	241.00	226.80	U
20150405	0830	13.50	Night	EM	White Perch	170.00	181.00		U
20150405	0830	13.50	Night	EM	White Perch	221.00	232.00		U
20150405	0830	13.50	Night	EM	White Perch	160.00	168.00		U
20150405	0830	13.50	Night	EM	White Perch	211.00	222.00	226.80	U
20150405	0830	13.50	Night	EM	White Perch	232.00	245.00	283.50	U
20150405	0830	13.50	Night	EM	White Perch	153.00	163.00		F
20150405	0830	13.50	Night	EM	Atlantic Blue Crab	183.00			F
20150405	0830	13.50	Night	EM	White Perch	178.00	188.00		U
20150405	0830	13.50	Night	EM	White Perch	152.00	160.00		F

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150405	0830	13.50	Night	EM	White Perch	143.00	152.00		F
20150405	0830	13.50	Night	EM	Atlantic Blue Crab	88.00			M
20150405	0830	13.50	Night	EM	Alewife	264.00	302.00	226.80	F
20150405	0830	13.50	Night	EM	Alewife	244.00	281.00	226.80	F
20150405	0830	13.50	Night	EM	Alewife	235.00	268.00	226.80	F
20150405	0830	13.50	Night	EM	Alewife	250.00	288.00	226.80	U
20150405	0830	13.50	Night	EM	Alewife	237.00	271.00	226.80	U
20150405	0830	13.50	Night	IM	Alewife	218.00	248.00	226.80	M
20150405	0830	13.50	Night	IM	Alewife	245.00	282.00	226.80	F
20150405	0830	13.50	Night	IM	Alewife	225.00	255.00	226.80	M
20150405	0830	13.50	Night	IM	Alewife	220.00	253.00	226.80	F
20150405	1900	8.75	Day	IM	Gizzard Shad	320.00	366.00	680.39	U
20150405	1900	8.75	Day	IM	Gizzard Shad	307.00	355.00	680.39	U
20150405	1900	8.75	Day	IM	Gizzard Shad	334.00	395.00	907.18	F
20150405	1900	8.75	Day	IM	Gizzard Shad	295.00	342.00	680.39	U
20150405	1900	8.75	Day	IM	Gizzard Shad	301.00	354.00	453.59	U
20150405	1900	8.75	Day	IM	Gizzard Shad	335.00	385.00	453.59	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150405	1900	8.75	Day	IM	Gizzard Shad	280.00	326.00	453.59	M
20150405	1900	8.75	Day	IM	Gizzard Shad	300.00	348.00	453.59	U
20150405	1900	8.75	Day	IM	Gizzard Shad	278.00	315.00	453.59	M
20150405	1900	8.75	Day	IM	Gizzard Shad	295.00	339.00	453.59	M
20150405	1900	8.75	Day	IM	Gizzard Shad	286.00	334.00	453.59	U
20150405	1900	8.75	Day	IM	Gizzard Shad	292.00	337.00	453.59	U
20150405	1900	8.75	Day	IM	Gizzard Shad	260.00	311.00	396.89	M
20150410	0800	13.00	Night	IM	Largemouth Bass	365.00	370.00	652.04	U
20150410	0800	13.00	Night	IM	Black Crappie	285.00	295.00	453.59	F
20150410	0800	13.00	Night	IM	Black Crappie	238.00	249.00	255.15	M
20150410	0800	13.00	Night	EM	White Perch	258.00	274.00	226.80	U
20150410	0800	13.00	Night	EM	White Perch	178.00	188.00	28.35	U
20150410	0800	13.00	Night	EM	White Perch	235.00	251.00	141.75	M
20150410	0800	13.00	Night	EM	White Perch	218.00	230.00	113.40	U
20150410	0800	13.00	Night	EM	White Perch	250.00	266.00	198.45	M
20150410	0800	13.00	Night	EM	White Perch	224.00	237.00	141.75	M
20150410	0800	13.00	Night	EM	White Perch	204.00	216.00	56.70	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150410	0800	13.00	Night	EM	White Perch	220.00	233.00	113.40	M
20150410	0800	13.00	Night	EM	White Perch	235.00	247.00	141.75	U
20150410	0800	13.00	Night	EM	Black Crappie	255.00	265.00	226.80	M
20150410	0800	13.00	Night	EM	White Perch	258.00	273.00	226.80	M
20150410	0800	13.00	Night	EM	Largemouth Bass	305.00	325.00	340.19	U
20150410	0800	13.00	Night	EM	White Perch	210.00	220.00	85.05	M
20150410	0800	13.00	Night	EM	White Perch	251.00	265.00	198.45	U
20150410	0800	13.00	Night	EM	White Perch	230.00	244.00	141.75	M
20150410	0800	13.00	Night	EM	White Perch	198.00	209.00	28.35	U
20150410	0800	13.00	Night	EM	White Perch	216.00	226.00	85.05	U
20150410	0800	13.00	Night	EM	White Perch	195.00	208.00	56.70	U
20150410	0800	13.00	Night	EM	White Perch	185.00	196.00	28.35	M
20150410	0800	13.00	Night	EM	White Perch	192.00	206.00	56.70	M
20150410	0800	13.00	Night	EM	White Perch	238.00	251.00	255.15	M
20150410	0800	13.00	Night	EM	White Perch	278.00	290.00	283.50	U
20150410	0800	13.00	Night	EM	White Perch	261.00	276.00	354.37	U
20150410	0800	13.00	Night	EM	White Perch	230.00	240.00	311.84	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150410	0800	13.00	Night	EM	White Perch	238.00	251.00	226.80	M
20150410	0800	13.00	Night	EM	White Perch	205.00	220.00	28.35	U
20150410	0800	13.00	Night	EM	White Perch	198.00	210.00	85.05	U
20150410	0800	13.00	Night	EM	White Perch	235.00	248.00	70.87	U
20150410	0800	13.00	Night	EM	White Perch	223.00	235.00	42.52	M
20150410	0800	13.00	Night	EM	White Perch	235.00	250.00	127.57	M
20150410	0800	13.00	Night	EM	White Perch	228.00	242.00	113.40	M
20150410	0800	13.00	Night	EM	White Perch	218.00	230.00	113.40	M
20150410	0800	13.00	Night	EM	White Perch	190.00	204.00	42.52	M
20150410	0800	13.00	Night	EM	White Perch	205.00	217.00	56.70	M
20150410	0800	13.00	Night	EM	White Perch	240.00	255.00	198.45	U
20150410	0800	13.00	Night	EM	White Perch	235.00	254.00	155.92	U
20150410	0800	13.00	Night	EM	White Perch	210.00	224.00	127.57	U
20150410	0800	13.00	Night	EM	White Perch	192.00	206.00	56.70	U
20150410	0800	13.00	Night	EM	White Perch	190.00	201.00	42.52	M
20150410	0800	13.00	Night	EM	White Perch	202.00	214.00	85.05	M
20150410	0800	13.00	Night	EM	White Perch	175.00	186.00	85.05	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150410	0800	13.00	Night	EM	White Perch	204.00	218.00	141.75	U
20150410	0800	13.00	Night	EM	White Perch	218.00	229.00	198.45	U
20150410	0800	13.00	Night	EM	White Perch	205.00	216.00	184.27	U
20150410	0800	13.00	Night	IM	Gizzard Shad	370.00	425.00	666.21	U
20150410	0800	13.00	Night	IM	Gizzard Shad	325.00	376.00	609.51	U
20150410	0800	13.00	Night	IM	Gizzard Shad	314.00	360.00	652.04	U
20150410	0800	13.00	Night	IM	Gizzard Shad	305.00	355.00	566.99	U
20150410	0800	13.00	Night	IM	Gizzard Shad	320.00	370.00	609.51	U
20150410	0800	13.00	Night	IM	Gizzard Shad	330.00	380.00	552.82	U
20150410	0800	13.00	Night	IM	Gizzard Shad	320.00	376.00	751.26	U
20150410	0800	13.00	Night	IM	Gizzard Shad	248.00	298.00	155.92	U
20150410	0800	13.00	Night	IM	Gizzard Shad	311.00	360.00	354.37	M
20150410	0800	13.00	Night	IM	Gizzard Shad	275.00	315.00	283.50	M
20150410	0800	13.00	Night	IM	Gizzard Shad	325.00	375.00	552.82	M
20150410	0800	13.00	Night	IM	Gizzard Shad	320.00	372.00	666.21	M
20150410	0800	13.00	Night	IM	Gizzard Shad	310.00	360.00	595.34	U
20150410	0800	13.00	Night	IM	Gizzard Shad	270.00	318.00	510.29	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150410	0800	13.00	Night	IM	Gizzard Shad	330.00	380.00	921.36	U
20150410	0800	13.00	Night	IM	Gizzard Shad	305.00	350.00	453.59	F
20150410	0800	13.00	Night	IM	Gizzard Shad	235.00	290.00	481.94	U
20150410	0800	13.00	Night	IM	Gizzard Shad	320.00	375.00	694.56	U
20150410	0800	13.00	Night	IM	Gizzard Shad	320.00	370.00	694.56	U
20150410	0800	13.00	Night	IM	Gizzard Shad	280.00	327.00	666.21	M
20150410	0800	13.00	Night	IM	Gizzard Shad	290.00	237.00	708.74	M
20150410	0800	13.00	Night	IM	Gizzard Shad	340.00	384.00	439.42	U
20150410	0800	13.00	Night	IM	Gizzard Shad	314.00	362.00	439.42	U
20150410	0800	13.00	Night	IM	Gizzard Shad	318.00	365.00	453.59	U
20150410	0800	13.00	Night	IM	Gizzard Shad	270.00	315.00	340.19	M
20150410	0800	13.00	Night	IM	Gizzard Shad	235.00	290.00	510.29	U
20150410	0800	13.00	Night	IM	Gizzard Shad	185.00	220.00	85.05	U
20150410	0800	13.00	Night	IM	Gizzard Shad	230.00	265.00	226.80	U
20150410	0800	13.00	Night	IM	Alewife				U
20150410	0800	13.00	Night	EM	Alewife	236.00	269.00	226.80	U
20150410	0800	13.00	Night	IM	Alewife				U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150410	0800	13.00	Night	IM	Alewife	218.00	250.00	127.57	M
20150410	0800	13.00	Night	IM	Alewife	328.00	265.00	170.10	F
20150410	0800	13.00	Night	IM	Alewife	245.00	275.00	226.80	U
20150410	0800	13.00	Night	EM	Atlantic Blue Crab		166.00		F
20150410	0800	13.00	Night	EM	Atlantic Blue Crab		170.00		F
20150410	0800	13.00	Night	EM	Atlantic Blue Crab		175.00		F
20150410	1830	9.50	Day	IM	Black Crappie	265.00	291.00	425.24	F
20150410	1830	9.50	Day	IM	White Perch	261.00	275.00	311.84	U
20150410	1830	9.50	Day	IM	White Perch	209.00	219.00	85.05	M
20150410	1830	9.50	Day	IM	White Perch	245.00	256.00	255.15	U
20150410	1830	9.50	Day	IM	White Perch	175.00	185.00	56.70	M
20150410	1830	9.50	Day	IM	Largemouth Bass	325.00	345.00	510.29	U
20150410	1830	9.50	Day	IM	White Perch	165.00	175.00	28.35	M
20150410	1830	9.50	Day	IM	Atlantic Blue Crab		90.00		M
20150410	1830	9.50	Day	IM	Alewife	215.00	243.00	85.05	M
20150410	1830	9.50	Day	IM	Alewife	215.00	247.00	85.05	M
20150410	1830	9.50	Day	IM	Alewife	220.00	253.00	85.05	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150410	1830	9.50	Day	EM	White Perch	220.00	234.00	141.75	M
20150410	1830	9.50	Day	EM	White Perch	195.00	202.00	56.70	M
20150410	1830	9.50	Day	EM	White Perch	233.00	246.00	141.75	U
20150410	1830	9.50	Day	EM	White Perch	215.00	225.00	85.05	M
20150410	1830	9.50	Day	EM	White Perch	190.00	201.00	56.70	M
20150410	1830	9.50	Day	EM	White Perch	225.00	237.00	113.40	F
20150410	1830	9.50	Day	EM	White Perch	195.00	209.00	56.70	U
20150410	1830	9.50	Day	EM	White Perch	198.00	208.00	85.05	U
20150410	1830	9.50	Day	EM	White Perch	185.00	195.00	28.35	M
20150410	1830	9.50	Day	EM	White Perch	185.00	195.00	28.35	M
20150410	1830	9.50	Day	EM	White Perch	170.00	179.00	14.17	M
20150410	1830	9.50	Day	EM	White Perch	269.00	281.00	255.15	U
20150410	1830	9.50	Day	EM	White Perch	240.00	245.00	113.40	M
20150410	1830	9.50	Day	EM	White Perch	190.00	203.00	28.35	U
20150410	1830	9.50	Day	EM	White Perch	185.00	198.00	28.35	U
20150410	1830	9.50	Day	EM	Atlantic Blue Crab		76.00		M
20150410	1830	9.50	Day	EM	Alewife	265.00	304.00	113.40	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150410	1830	9.50	Day	EM	Alewife	255.00	286.00	113.40	U
20150410	1830	9.50	Day	EM	Alewife	230.00	259.00	85.05	M
20150410	1830	9.50	Day	EM	Alewife	218.00	246.00	56.70	U
20150410	1830	9.50	Day	EM	Alewife	235.00	265.00	85.05	U
20150410	1830	9.50	Day	EM	Alewife	240.00	275.00	226.80	U
20150410	1830	9.50	Day	EM	Alewife	220.00	251.00	113.40	U
20150410	1830	9.50	Day	EM	Alewife	230.00	266.00	170.10	M
20150411	0700	12.00	Night	EM	White Perch	180.00	191.00	85.05	M
20150411	0700	12.00	Night	EM	White Perch	170.00	179.00	56.70	M
20150411	0700	12.00	Night	EM	White Perch	210.00	226.00	141.75	U
20150411	0700	12.00	Night	EM	White Perch	185.00	196.00	85.05	U
20150411	0700	12.00	Night	EM	White Perch	180.00	192.00	85.05	U
20150411	0700	12.00	Night	EM	White Perch	195.00	207.00	85.05	F
20150411	0700	12.00	Night	EM	White Perch	244.00	258.00	226.80	M
20150411	0700	12.00	Night	EM	White Perch	175.00	186.00	56.70	U
20150411	0700	12.00	Night	EM	White Perch	185.00	199.00	85.05	U
20150411	0700	12.00	Night	EM	White Perch	285.00	302.00	396.89	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150411	0700	12.00	Night	EM	White Perch	195.00	205.00	85.05	U
20150411	0700	12.00	Night	EM	White Perch	230.00	244.00	141.75	U
20150411	0700	12.00	Night	EM	White Perch	202.00	215.00	113.40	U
20150411	0700	12.00	Night	EM	White Perch	160.00	170.00	56.70	M
20150411	0700	12.00	Night	EM	White Perch	220.00	235.00	141.75	U
20150411	0700	12.00	Night	EM	White Perch	200.00	212.00	85.05	U
20150411	0700	12.00	Night	EM	White Perch	240.00	257.00	198.45	M
20150411	0700	12.00	Night	EM	Alewife	235.00	265.00	85.05	U
20150411	0700	12.00	Night	EM	White Perch	225.00	230.00	141.75	U
20150411	0700	12.00	Night	EM	White Perch	205.00	219.00	113.40	U
20150411	0700	12.00	Night	EM	White Perch	250.00	261.00	226.80	U
20150411	0700	12.00	Night	EM	White Perch	192.00	206.00	85.05	M
20150411	0700	12.00	Night	EM	White Perch	225.00	241.00	141.75	U
20150411	0700	12.00	Night	EM	White Perch	218.00	225.00	141.75	U
20150411	0700	12.00	Night	EM	White Perch	225.00	241.00	141.75	U
20150411	0700	12.00	Night	EM	White Perch	185.00	194.00	56.70	F
20150411	0700	12.00	Night	EM	White Perch	210.00	221.00	113.40	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150411	0700	12.00	Night	EM	White Perch	190.00	199.00	85.05	M
20150411	0700	12.00	Night	EM	White Perch	205.00	219.00	113.40	U
20150411	0700	12.00	Night	EM	White Perch	215.00	226.00	141.75	M
20150411	0700	12.00	Night	EM	White Perch	220.00	233.00	141.75	M
20150411	0700	12.00	Night	EM	White Perch	263.00	276.00	283.50	U
20150411	0700	12.00	Night	EM	White Perch	265.00	283.00	283.50	M
20150411	0700	12.00	Night	EM	White Perch	235.00	247.00	198.45	U
20150411	0700	12.00	Night	EM	White Perch	181.00	194.00	85.05	U
20150411	0700	12.00	Night	EM	White Perch	204.00	216.00	85.05	M
20150411	0700	12.00	Night	EM	White Perch	220.00	234.00	113.40	M
20150411	0700	12.00	Night	EM	White Perch	205.00	219.00	113.40	U
20150411	0700	12.00	Night	EM	White Perch	205.00	216.00	113.40	F
20150411	0700	12.00	Night	EM	White Perch	190.00	201.00	113.40	M
20150411	0700	12.00	Night	EM	White Perch	225.00	238.00	198.45	U
20150411	0700	12.00	Night	EM	White Perch	215.00	230.00	141.75	U
20150411	0700	12.00	Night	EM	Black Crappie	170.00	178.00	56.70	M
20150411	0700	12.00	Night	EM	White Perch	175.00	186.00	56.70	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150411	0700	12.00	Night	EM	White Perch	187.00	198.00	56.70	M
20150411	0700	12.00	Night	EM	White Perch	172.00	183.00	56.70	M
20150411	0700	12.00	Night	EM	White Perch	250.00	205.00	198.45	U
20150411	0700	12.00	Night	EM	White Perch	200.00	215.00	85.05	U
20150411	0700	12.00	Night	EM	White Perch	215.00	226.00	113.40	U
20150411	0700	12.00	Night	EM	White Perch	205.00	218.00	113.40	U
20150411	0700	12.00	Night	EM	White Perch	199.00	211.00	85.05	U
20150411	0700	12.00	Night	EM	White Perch	200.00	211.00	85.05	M
20150411	0700	12.00	Night	IM	White Perch				
20150411	0700	12.00	Night	IM	Black Crappie	290.00	303.00	481.94	U
20150411	0700	12.00	Night	IM	White Perch	170.00	181.00	56.70	U
20150411	0700	12.00	Night	IM	Gizzard Shad	320.00	372.00	28.35	U
20150411	0700	12.00	Night	IM	Gizzard Shad	330.00	380.00	498.95	U
20150411	0700	12.00	Night	IM	Gizzard Shad	305.00	348.00	340.19	M
20150411	0700	12.00	Night	IM	Black Crappie	265.00	277.00	368.54	F
20150411	0700	12.00	Night	IM	White Perch	278.00	291.00	396.89	F
20150411	0700	12.00	Night	IM	Largemouth Bass	340.00	361.00	861.83	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150411	0700	12.00	Night	IM	Gizzard Shad	200.00	231.00	85.05	M
20150411	0700	12.00	Night	IM	Bluegill	158.00	168.00	56.70	U
20150411	0700	12.00	Night	IM	Black Crappie	115.00	120.00	14.17	U
20150411	0700	12.00	Night	IM	Gizzard Shad	270.00	312.00	283.50	U
20150411	0700	12.00	Night	IM	Alewife	221.00	257.00	85.05	M
20150411	0700	12.00	Night	IM	Longnose Gar		615.00	822.14	U
20150411	0700	12.00	Night	IM	Longnose Gar		650.00	878.84	M
20150411	0700	12.00	Night	IM	Longnose Gar		690.00	1247.38	U
20150411	0700	12.00	Night	IM	Longnose Gar		660.00	963.88	U
20150411	0700	12.00	Night	IM	Common Carp	410.00	465.00	1190.68	M
20150411	0700	12.00	Night	EM	Gizzard Shad	300.00	352.00	283.50	U
20150411	0700	12.00	Night	EM	Alewife	243.00	279.00	113.40	M
20150411	0700	12.00	Night	EM	Alewife	230.00	256.00	85.05	F
20150411	0700	12.00	Night	EM	Alewife	240.00	272.00	113.40	M
20150411	0700	12.00	Night	EM	Alewife	238.00	279.00	85.05	U
20150411	0700	12.00	Night	EM	Alewife	228.00	260.00	85.05	U
20150411	0700	12.00	Night	EM	Alewife	220.00	254.00	85.05	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150411	0700	12.00	Night	EM	Alewife	218.00	246.00	85.05	F
20150411	1800	9.00	Day	IM	Gizzard Shad	352.00	305.00	396.89	M
20150411	1800	9.00	Day	IM	Gizzard Shad	237.00	290.00	340.19	M
20150411	1800	9.00	Day	IM	Gizzard Shad	234.00	285.00	283.50	U
20150411	1800	9.00	Day	IM	Gizzard Shad	300.00	348.00	340.19	M
20150411	1800	9.00	Day	IM	Gizzard Shad	331.00	388.00	481.94	U
20150411	1800	9.00	Day	IM	Gizzard Shad	325.00	379.00	396.89	U
20150411	1800	9.00	Day	IM	Gizzard Shad	340.00	396.00	481.94	U
20150411	1800	9.00	Day	IM	Gizzard Shad	320.00	369.00	481.94	U
20150411	1800	9.00	Day	IM	Largemouth Bass	368.00	386.00	907.18	U
20150411	1800	9.00	Day	IM	Largemouth Bass	370.00	391.00	907.18	M
20150411	1800	9.00	Day	IM	Largemouth Bass	342.00	360.00	623.69	M
20150411	1800	9.00	Day	IM	Gizzard Shad	310.00	363.00	396.89	M
20150411	1800	9.00	Day	IM	Alewife	235.00	265.00	56.70	F
20150411	1800	9.00	Day	IM	Redear Sunfish	120.00	124.00	28.35	U
20150411	1800	9.00	Day	IM	Gizzard Shad	243.00	295.00	340.19	M
20150411	1800	9.00	Day	IM	Gizzard Shad	330.00	378.00	510.29	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150411	1800	9.00	Day	IM	Gizzard Shad	330.00	378.00	481.94	U
20150411	1800	9.00	Day	IM	Gizzard Shad	358.00	410.00	623.69	U
20150411	1800	9.00	Day	IM	Gizzard Shad	340.00	394.00	396.89	U
20150411	1800	9.00	Day	IM	Gizzard Shad	310.00	356.00	396.89	U
20150411	1800	9.00	Day	IM	Gizzard Shad	322.00	375.00	453.59	U
20150411	1800	9.00	Day	IM	Gizzard Shad	300.00	352.00	283.50	M
20150411	1800	9.00	Day	IM	Largemouth Bass	230.00	235.00	85.05	U
20150411	1800	9.00	Day	IM	Gizzard Shad	370.00	421.00	652.04	U
20150411	1800	9.00	Day	IM	Gizzard Shad	325.00	366.00	396.89	U
20150411	1800	9.00	Day	IM	Gizzard Shad	315.00	367.00	340.19	U
20150411	1800	9.00	Day	IM	Gizzard Shad	320.00	369.00	396.89	M
20150411	1800	9.00	Day	IM	Gizzard Shad	278.00	320.00	226.80	M
20150411	1800	9.00	Day	IM	Gizzard Shad	305.00	354.00	340.19	M
20150411	1800	9.00	Day	IM	Gizzard Shad	305.00	351.00	311.84	U
20150411	1800	9.00	Day	IM	Gizzard Shad	288.00	227.00	255.15	M
20150411	1800	9.00	Day	IM	Gizzard Shad	308.00	355.00	340.19	U
20150411	1800	9.00	Day	IM	Gizzard Shad	310.00	360.00	368.54	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150411	1800	9.00	Day	IM	Gizzard Shad	200.00	227.00	56.70	U
20150411	1800	9.00	Day	IM	Bowfin		550.00	1304.08	U
20150411	1800	9.00	Day	IM	Gizzard Shad	300.00	340.00	226.80	M
20150411	1800	9.00	Day	IM	Gizzard Shad	298.00	342.00	283.50	M
20150411	1800	9.00	Day	IM	Gizzard Shad	340.00	396.00	453.59	U
20150411	1800	9.00	Day	IM	Gizzard Shad	305.00	351.00	255.15	U
20150411	1800	9.00	Day	IM	Gizzard Shad	275.00	322.00	141.75	U
20150411	1800	9.00	Day	IM	Redear Sunfish	138.00	142.00	28.35	U
20150411	1800	9.00	Day	IM	Gizzard Shad	288.00	335.00	85.05	U
20150411	1800	9.00	Day	IM	Gizzard Shad	305.00	357.00	396.89	U
20150411	1800	9.00	Day	IM	Gizzard Shad	300.00	348.00	283.50	U
20150411	1800	9.00	Day	IM	Gizzard Shad	295.00	331.00	283.50	U
20150411	1800	9.00	Day	IM	Gizzard Shad	292.00	333.00	283.50	U
20150411	1800	9.00	Day	IM	Gizzard Shad	315.00	358.00	340.19	U
20150411	1800	9.00	Day	IM	Gizzard Shad	318.00	365.00	425.24	U
20150411	1800	9.00	Day	EM	Alewife	228.00	258.00	56.70	U
20150411	1800	9.00	Day	EM	Alewife	240.00	272.00	28.35	F

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150411	1800	9.00	Day	EM	Bowfin		551.00	1275.73	U
20150411	1800	9.00	Day	EM	White Perch	195.00	208.00	28.35	U
20150411	1800	9.00	Day	EM	White Perch	225.00	236.00	85.05	U
20150411	1800	9.00	Day	EM	White Perch	238.00	250.00	113.40	U
20150411	1800	9.00	Day	EM	Alewife	215.00	244.00	28.35	M
20150411	1800	9.00	Day	EM	White Perch	168.00	178.00	56.70	M
20150411	1800	9.00	Day	EM	White Perch	188.00	200.00	28.35	F
20150411	1800	9.00	Day	EM	White Perch	165.00	174.00	28.35	M
20150411	1800	9.00	Day	EM	White Perch	184.00	192.00	28.35	F
20150411	1800	9.00	Day	EM	White Perch	180.00	191.00	28.35	M
20150411	1800	9.00	Day	EM	White Perch	195.00	207.00	56.70	U
20150416	1930	11.25	Day	EM	Atlantic Blue Crab	180.00			F
20150416	1930	11.25	Day	EM	Atlantic Blue Crab	60.00			F
20150416	1930	11.25	Day	EM	Alewife	260.00	292.00	226.80	F
20150416	1930	11.25	Day	EM	White Perch	270.00	284.00	311.84	M
20150416	1930	11.25	Day	EM	White Perch	276.00	292.00	368.54	U
20150416	1930	11.25	Day	EM	White Perch	182.00	195.00	113.40	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150416	1930	11.25	Day	EM	White Perch	260.00	271.00	340.19	M
20150416	1930	11.25	Day	EM	White Perch	180.00	194.00	141.75	U
20150416	1930	11.25	Day	IM	White Perch				
20150416	1930	11.25	Day	IM	Gizzard Shad	355.00	408.00	737.09	U
20150416	1930	11.25	Day	IM	Gizzard Shad	322.00	376.00	538.64	U
20150416	1930	11.25	Day	IM	Gizzard Shad	339.00	395.00	595.34	U
20150416	1930	11.25	Day	IM	Gizzard Shad	295.00	345.00	396.89	U
20150416	1930	11.25	Day	IM	Gizzard Shad	295.00	342.00	425.24	M
20150416	1930	11.25	Day	IM	Gizzard Shad	313.00	359.00	481.94	U
20150416	1930	11.25	Day	IM	Gizzard Shad	288.00	335.00	340.19	U
20150416	1930	11.25	Day	IM	Black Crappie	285.00	295.00	28.35	F
20150416	1930	11.25	Day	IM	Gizzard Shad	303.00	353.00	453.59	U
20150416	1930	11.25	Day	IM	Gizzard Shad	302.00	354.00	425.24	U
20150416	1930	11.25	Day	IM	Black Crappie	270.00	280.00	425.24	U
20150416	1930	11.25	Day	IM	Gizzard Shad	255.00	391.00	283.50	M
20150416	1930	11.25	Day	IM	Gizzard Shad	290.00	338.00	425.24	M
20150416	1930	11.25	Day	IM	Alewife	205.00	238.00	141.75	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150416	1930	11.25	Day	IM	Alewife	213.00	242.00	141.75	M
20150416	1930	11.25	Day	IM	Alewife	226.00	261.00	85.05	U
20150417	0700	11.00	Night	EM	White Perch	262.00	279.00	283.50	M
20150417	0700	11.00	Night	EM	White Perch	184.00	194.00	56.70	M
20150417	0700	11.00	Night	EM	White Perch	251.00	264.00	226.80	U
20150417	0700	11.00	Night	EM	White Perch	290.00	304.00	425.24	M
20150417	0700	11.00	Night	EM	White Perch	259.00	275.00	255.15	M
20150417	0700	11.00	Night	EM	White Perch	265.00	275.00	283.50	U
20150417	0700	11.00	Night	EM	White Perch	275.00	290.00	311.84	M
20150417	0700	11.00	Night	EM	White Perch	207.00	221.00	113.40	M
20150417	0700	11.00	Night	EM	White Perch	255.00	269.00	255.15	M
20150417	0700	11.00	Night	EM	White Perch	256.00	269.00	226.80	U
20150417	0700	11.00	Night	EM	White Perch	190.00	202.00	85.05	U
20150417	0700	11.00	Night	EM	White Perch	265.00	277.00	311.84	M
20150417	0700	11.00	Night	EM	White Perch	198.00	209.00	113.40	M
20150417	0700	11.00	Night	EM	Gizzard Shad	180.00	205.00	28.35	U
20150417	0700	11.00	Night	EM	White Perch	210.00	221.00	113.40	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150417	0700	11.00	Night	EM	White Perch	190.00	200.00	56.70	U
20150417	0700	11.00	Night	EM	White Perch	175.00	185.00	28.35	U
20150417	0700	11.00	Night	EM	White Perch	186.00	198.00	56.70	U
20150417	0700	11.00	Night	IM	White Perch	228.00	241.00	141.75	U
20150417	0700	11.00	Night	IM	White Perch	188.00	198.00	28.35	U
20150417	0700	11.00	Night	IM	Channel Catfish		210.00	56.70	U
20150417	0700	11.00	Night	IM	Longnose Gar		635.00	935.53	F
20150417	0700	11.00	Night	IM	Gizzard Shad	310.00	355.00	425.24	M
20150417	0700	11.00	Night	IM	Gizzard Shad	345.00	399.00	595.34	F
20150417	0700	11.00	Night	IM	Gizzard Shad	298.00	345.00	340.19	M
20150417	0700	11.00	Night	IM	Gizzard Shad	315.00	365.00	340.19	U
20150417	0700	11.00	Night	IM	Gizzard Shad	285.00	328.00	283.50	U
20150417	0700	11.00	Night	IM	Gizzard Shad	288.00	335.00	340.19	M
20150417	0700	11.00	Night	IM	Gizzard Shad	320.00	370.00	481.94	U
20150417	0700	11.00	Night	IM	Gizzard Shad	340.00	386.00	510.29	U
20150417	0700	11.00	Night	IM	Gizzard Shad	288.00	335.00	340.19	M
20150417	0700	11.00	Night	IM	Gizzard Shad	330.00	378.00	538.64	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150417	0700	11.00	Night	IM	Gizzard Shad	320.00	365.00	453.59	U
20150417	0700	11.00	Night	IM	Gizzard Shad	328.00	350.00	425.24	U
20150417	0700	11.00	Night	IM	Gizzard Shad	320.00	365.00	396.89	U
20150417	0700	11.00	Night	IM	Gizzard Shad	305.00	356.00	396.89	M
20150417	0700	11.00	Night	IM	Gizzard Shad	410.00	466.00	963.88	F
20150417	0700	11.00	Night	IM	Gizzard Shad	285.00	327.00	283.50	M
20150417	0700	11.00	Night	IM	Gizzard Shad	295.00	342.00	311.84	M
20150417	0700	11.00	Night	IM	Gizzard Shad	333.00	383.00	510.29	U
20150417	0700	11.00	Night	IM	Gizzard Shad	295.00	336.00	311.84	U
20150417	0700	11.00	Night	IM	Gizzard Shad	328.00	379.00	538.64	U
20150417	0700	11.00	Night	IM	Gizzard Shad	280.00	327.00	283.50	M
20150417	0700	11.00	Night	IM	Gizzard Shad	307.00	358.00	453.59	M
20150417	0700	11.00	Night	IM	Gizzard Shad	295.00	338.00	283.50	M
20150417	0700	11.00	Night	IM	Gizzard Shad	325.00	372.00	396.89	U
20150417	0700	11.00	Night	IM	Gizzard Shad	345.00	401.00	566.99	U
20150417	0700	11.00	Night	IM	Gizzard Shad	338.00	388.00	538.64	U
20150417	0700	11.00	Night	IM	Gizzard Shad	335.00	388.00	595.34	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150417	0700	11.00	Night	IM	Gizzard Shad	330.00	382.00	396.89	U
20150417	0700	11.00	Night	IM	Gizzard Shad	315.00	369.00	510.29	U
20150417	0700	11.00	Night	IM	Gizzard Shad	348.00	406.00	595.34	U
20150417	0700	11.00	Night	IM	Gizzard Shad	280.00	333.00	226.80	M
20150417	0700	11.00	Night	IM	Gizzard Shad	305.00	352.00	283.50	U
20150417	0700	11.00	Night	IM	Gizzard Shad	300.00	344.00	311.84	M
20150417	0700	11.00	Night	IM	Gizzard Shad	304.00	356.00	425.24	U
20150417	0700	11.00	Night	IM	Gizzard Shad	328.00	373.00	595.34	U
20150417	0700	11.00	Night	IM	Gizzard Shad	312.00	361.00	425.24	U
20150417	0700	11.00	Night	IM	Gizzard Shad	310.00	355.00	453.59	M
20150417	0700	11.00	Night	IM	Gizzard Shad	320.00	370.00	481.94	M
20150417	0700	11.00	Night	IM	Gizzard Shad	310.00	360.00	425.24	M
20150417	0700	11.00	Night	IM	Gizzard Shad	285.00	330.00	255.15	M
20150417	0700	11.00	Night	IM	Gizzard Shad	298.00	340.00	311.84	M
20150417	0700	11.00	Night	EM	Alewife				M
20150417	0700	11.00	Night	EM	Alewife	238.00	274.00	85.05	U
20150417	0700	11.00	Night	EM	Alewife	243.00	270.00	85.05	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150417	0700	11.00	Night	EM	Alewife	234.00	267.00	113.40	M
20150417	0700	11.00	Night	EM	Alewife	240.00	274.00	85.05	U
20150417	0700	11.00	Night	EM	Alewife	228.00	260.00	113.40	M
20150417	0700	11.00	Night	EM	Atlantic Blue Crab		178.00		M
20150417	0700	11.00	Night	EM	Atlantic Blue Crab		168.00		M
20150417	0700	11.00	Night	EM	Atlantic Blue Crab		175.00		F
20150417	0700	11.00	Night	EM	Atlantic Blue Crab		155.00		M
20150417	0700	11.00	Night	EM	White Perch	178.00	190.00	56.70	M
20150417	1730	8.00	Day	EM	White Perch	192.00	206.00	113.40	U
20150417	1730	8.00	Day	EM	White Perch	205.00	217.00	141.75	U
20150417	1730	8.00	Day	EM	White Perch	215.00	224.00	141.75	M
20150417	1730	8.00	Day	EM	White Perch	188.00	199.00	113.40	M
20150417	1730	8.00	Day	EM	White Perch	189.00	199.00	113.40	U
20150417	1730	8.00	Day	EM	White Perch	184.00	194.00	85.05	U
20150417	1730	8.00	Day	EM	White Perch	229.00	243.00	198.45	M
20150417	1730	8.00	Day	EM	White Perch	252.00	266.00	255.15	M
20150417	1730	8.00	Day	EM	White Perch	175.00	187.00	56.70	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150417	1730	8.00	Day	EM	Alewife	256.00	291.00	141.75	F
20150417	1730	8.00	Day	EM	Alewife	245.00	278.00	113.40	F
20150417	1730	8.00	Day	EM	Alewife	eaten			F
20150417	1730	8.00	Day	EM	Atlantic Blue Crab		185.00		M
20150417	1730	8.00	Day	IM	Atlantic Blue Crab		110.00		M
20150417	1730	8.00	Day	IM	Atlantic Blue Crab		50.00		M
20150417	1730	8.00	Day	IM	Longnose Gar		615.00	765.44	U
20150417	1730	8.00	Day	IM	Gizzard Shad	304.00	351.00	453.59	U
20150417	1730	8.00	Day	IM	Gizzard Shad	325.00	375.00	481.94	U
20150417	1730	8.00	Day	IM	Gizzard Shad	298.00	345.00	311.84	M
20150417	1730	8.00	Day	IM	Gizzard Shad	302.00	347.00	396.89	U
20150417	1730	8.00	Day	IM	Gizzard Shad	325.00	378.00	595.34	U
20150417	1730	8.00	Day	IM	Gizzard Shad	320.00	372.00	425.24	U
20150417	1730	8.00	Day	IM	Gizzard Shad	317.00	366.00	396.89	M
20150417	1730	8.00	Day	IM	Redear Sunfish	139.00	147.00	85.05	U
20150417	1730	8.00	Day	IM	Largemouth Bass	288.00	307.00	368.54	M
20150417	1730	8.00	Day	IM	Redear Sunfish	142.00	149.00	85.05	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150417	1730	8.00	Day	IM	Alewife	216.00	246.00	141.75	M
20150418	0700	12.00	Night	IM	Longnose Gar		730.00	1360.78	U
20150418	0700	12.00	Night	IM	Longnose Gar		650.00	1077.28	F
20150418	0700	12.00	Night	IM	Longnose Gar		715.00	1275.73	U
20150418	0700	12.00	Night	IM	Longnose Gar		740.00	1389.13	F
20150418	0700	12.00	Night	IM	Longnose Gar		738.00	1304.08	M
20150418	0700	12.00	Night	IM	Longnose Gar		732.00	1105.63	U
20150418	0700	12.00	Night	IM	Longnose Gar		657.00	878.84	U
20150418	0700	12.00	Night	IM	Longnose Gar		751.00	1247.38	U
20150418	0700	12.00	Night	IM	Longnose Gar		661.00	822.14	U
20150418	0700	12.00	Night	IM	Longnose Gar		709.00	1077.28	M
20150418	0700	12.00	Night	IM	Longnose Gar		647.00	907.18	M
20150418	0700	12.00	Night	EM	White Perch	200.00	212.00	85.05	U
20150418	0700	12.00	Night	EM	White Perch	250.00	263.00	255.15	M
20150418	0700	12.00	Night	EM	White Perch	245.00	258.00	198.45	M
20150418	0700	12.00	Night	EM	White Perch	205.00	216.00	85.05	M
20150418	0700	12.00	Night	EM	White Perch	250.00	264.00	283.50	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150418	0700	12.00	Night	EM	White Perch	168.00	176.00	28.35	M
20150418	0700	12.00	Night	EM	White Perch	186.00	198.00	28.35	M
20150423	0730	12.00	Night	IM	Largemouth Bass	410.00	430.00	1315.42	U
20150423	0730	12.00	Night	IM	Gizzard Shad	286.00	331.00	311.84	M
20150423	0730	12.00	Night	IM	Black Crappie	297.00	311.00	680.39	F
20150423	0730	12.00	Night	IM	Black Crappie	234.00	245.00	226.80	F
20150423	0730	12.00	Night	IM	Longnose Gar		741.00	1769.01	U
20150423	0730	12.00	Night	IM	Gizzard Shad	319.00	361.00	396.89	U
20150423	0730	12.00	Night	IM	Common Carp	465.00	510.00	1224.70	U
20150423	0730	12.00	Night	IM	Longnose Gar		694.00	1088.62	U
20150423	0730	12.00	Night	IM	Longnose Gar		636.00	521.63	U
20150423	0730	12.00	Night	IM	Longnose Gar		713.00	1315.42	U
20150423	0730	12.00	Night	IM	Longnose Gar		702.00	1043.26	U
20150423	0730	12.00	Night	IM	Longnose Gar		700.00	957.08	M
20150423	0730	12.00	Night	IM	Longnose Gar		721.00	1224.70	U
20150423	0730	12.00	Night	IM	Longnose Gar		675.00	1043.26	U
20150423	0730	12.00	Night	IM	Longnose Gar		590.00	816.47	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150423	0730	12.00	Night	IM	Longnose Gar		660.00	1088.62	U
20150423	0730	12.00	Night	IM	Longnose Gar		705.00	957.08	U
20150423	0730	12.00	Night	IM	Longnose Gar		755.00	1451.50	M
20150423	0730	12.00	Night	IM	Longnose Gar		768.00	1678.29	U
20150423	0730	12.00	Night	IM	Atlantic Blue Crab		180.00		F
20150423	0730	12.00	Night	EM	Common Carp	370.00	410.00	517.10	U
20150423	0730	12.00	Night	EM	White Perch	275.00	252.00	226.80	U
20150423	0730	12.00	Night	EM	White Perch	248.00	261.00	113.40	U
20150423	0730	12.00	Night	EM	White Perch	290.00	305.00	283.50	U
20150423	0730	12.00	Night	EM	White Perch	192.00	200.00	28.35	M
20150423	0730	12.00	Night	EM	White Perch	188.00	199.00	28.35	M
20150423	0730	12.00	Night	EM	White Perch	195.00	207.00	28.35	U
20150423	0730	12.00	Night	EM	Atlantic Blue Crab		200.00		M
20150423	0730	12.00	Night	EM	Atlantic Blue Crab		180.00		M
20150423	0730	12.00	Night	EM	Atlantic Blue Crab		180.00		M
20150423	0730	12.00	Night	EM	Atlantic Blue Crab		160.00		M
20150423	0730	12.00	Night	EM	Atlantic Blue Crab		180.00		M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150423	1830	7.50	Day	IM	Black Crappie	280.00	290.00	340.19	U
20150423	1830	7.50	Day	IM	Largemouth Bass	358.00	379.00	861.83	U
20150423	1830	7.50	Day	IM	Largemouth Bass	410.00	435.00	966.15	U
20150423	1830	7.50	Day	IM	Gizzard Shad	317.00	370.00	453.59	U
20150423	1830	7.50	Day	IM	Gizzard Shad	310.00	366.00	589.67	U
20150423	1830	7.50	Day	IM	Gizzard Shad	305.00	353.00	396.89	U
20150423	1830	7.50	Day	IM	Gizzard Shad	319.00	369.00	498.95	U
20150423	1830	7.50	Day	IM	Gizzard Shad	290.00	339.00	368.54	U
20150423	1830	7.50	Day	IM	Gizzard Shad	300.00	353.00	425.24	U
20150423	1830	7.50	Day	IM	Gizzard Shad	288.00	335.00	340.19	U
20150423	1830	7.50	Day	IM	Gizzard Shad	188.00	216.00	85.05	U
20150423	1830	7.50	Day	IM	Gizzard Shad	168.00	195.00	56.70	M
20150423	1830	7.50	Day	IM	Gizzard Shad	302.00	349.00	340.19	U
20150423	1830	7.50	Day	IM	Alewife	250.00	288.00	226.80	F
20150423	1830	7.50	Day	IM	Alewife	214.00	247.00	113.40	M
20150423	1830	7.50	Day	IM	Alewife	209.00	241.00	85.05	M
20150423	1830	7.50	Day	IM	Alewife	225.00	254.00	113.40	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150423	1830	7.50	Day	IM	Alewife	225.00	265.00	170.10	F
20150423	1830	7.50	Day	EM	White Perch	130.00	138.00	28.35	U
20150423	1830	7.50	Day	EM	Alewife	225.00	260.00	113.40	U
20150423	1830	7.50	Day	EM	White Perch	239.00	254.00	198.45	M
20150423	1830	7.50	Day	EM	White Perch	174.00	185.00	56.70	M
20150423	1830	7.50	Day	EM	Atlantic Blue Crab	172.00			M
20150423	1830	7.50	Day	EM	Atlantic Blue Crab	175.00			M
20150423	1830	7.50	Day	EM	Atlantic Blue Crab	173.00			M
20150423	1830	7.50	Day	EM	Atlantic Blue Crab	182.00			M
20150424	0700	11.50	Night	IM	Largemouth Bass	310.00	325.00	538.64	U
20150424	0700	11.50	Night	IM	Black Crappie	290.00	301.00	481.94	U
20150424	0700	11.50	Night	IM	Black Crappie	280.00	290.00	425.24	F
20150424	0700	11.50	Night	IM	Largemouth Bass	320.00	334.00	481.94	U
20150424	0700	11.50	Night	IM	White Perch	200.00	212.00	113.40	U
20150424	0700	11.50	Night	IM	Gizzard Shad	280.00	325.00	311.84	M
20150424	0700	11.50	Night	IM	Gizzard Shad	295.00	334.00	340.19	M
20150424	0700	11.50	Night	IM	Gizzard Shad	280.00	327.00	283.50	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150424	0700	11.50	Night	IM	Gizzard Shad	280.00	326.00	226.80	U
20150424	0700	11.50	Night	IM	Gizzard Shad	320.00	375.00	425.24	U
20150424	0700	11.50	Night	IM	Gizzard Shad	310.00	355.00	340.19	U
20150424	0700	11.50	Night	IM	Gizzard Shad	315.00	362.00	340.19	U
20150424	0700	11.50	Night	IM	Gizzard Shad	300.00	352.00	283.50	M
20150424	0700	11.50	Night	IM	Gizzard Shad	333.00	378.00	481.94	U
20150424	0700	11.50	Night	IM	Gizzard Shad	300.00	350.00	396.89	U
20150424	0700	11.50	Night	IM	Gizzard Shad	320.00	370.00	425.24	U
20150424	0700	11.50	Night	IM	Gizzard Shad	295.00	335.00	311.84	U
20150424	0700	11.50	Night	IM	Gizzard Shad	315.00	367.00	425.24	U
20150424	0700	11.50	Night	IM	Gizzard Shad	313.00	356.00	425.24	U
20150424	0700	11.50	Night	IM	Gizzard Shad	294.00	339.00	283.50	U
20150424	0700	11.50	Night	IM	Gizzard Shad	272.00	319.00	170.10	U
20150424	0700	11.50	Night	IM	Common Carp	455.00	500.00	1530.87	M
20150424	0700	11.50	Night	IM	Common Carp	475.00	526.00	2126.21	U
20150424	0700	11.50	Night	IM	Common Carp	605.00	662.00	3798.84	M
20150424	0700	11.50	Night	IM	Alewife	246.00	281.00	170.10	F

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150424	0700	11.50	Night	EM	White Perch	185.00	196.00	14.17	U
20150424	0700	11.50	Night	EM	White Perch	275.00	288.00	283.50	U
20150424	0700	11.50	Night	EM	White Perch	197.00	205.00	28.35	U
20150424	0700	11.50	Night	EM	White Perch	190.00	201.00	28.35	U
20150424	0700	11.50	Night	EM	White Perch	182.00	193.00	56.70	M
20150424	0700	11.50	Night	EM	White Perch	174.00	184.00	85.05	M
20150424	0700	11.50	Night	EM	Alewife	218.00	252.00	85.05	M
20150424	0700	11.50	Night	EM	Atlantic Blue Crab		195.00		M
20150424	0700	11.50	Night	EM	Atlantic Blue Crab		170.00		M
20150424	0700	11.50	Night	EM	Atlantic Blue Crab		185.00		F
20150424	0700	11.50	Night	EM	Atlantic Blue Crab		185.00		M
20150424	0700	11.50	Night	EM	Atlantic Blue Crab		175.00		U
20150424	0700	11.50	Night	EM	Atlantic Blue Crab		160.00		M
20150424	1800	7.00	Day	IM	Longnose Gar		889.00	2585.48	F
20150424	1800	7.00	Day	IM	Common Carp	487.00	536.00	1729.32	M
20150424	1800	7.00	Day	IM	Gizzard Shad	331.00	377.00	453.59	U
20150424	1800	7.00	Day	IM	White Perch	262.00	273.00	226.80	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150424	1800	7.00	Day	IM	Alewife				U
20150424	1800	7.00	Day	IM	Alewife	237.00	270.00	85.05	M
20150424	1800	7.00	Day	IM	Alewife	231.00	268.00	56.70	F
20150424	1800	7.00	Day	IM	Alewife	225.00	257.00	85.05	M
20150424	1800	7.00	Day	EM	White Perch	264.00	275.00	226.80	U
20150424	1800	7.00	Day	EM	White Perch	212.00	223.00	85.05	U
20150424	1800	7.00	Day	EM	White Perch	203.00	214.00	85.05	U
20150424	1800	7.00	Day	EM	Atlantic Blue Crab		200.00		M
20150424	1800	7.00	Day	EM	Atlantic Blue Crab		180.00		M
20150424	1800	7.00	Day	EM	Atlantic Blue Crab		165.00		M
20150424	1800	7.00	Day	EM	Atlantic Blue Crab		175.00		M
20150424	1800	7.00	Day	EM	Atlantic Blue Crab		168.00		M
20150506	0700	11.50	Night	IM	Black Crappie	230.00	244.00	198.45	F
20150506	0700	11.50	Night	IM	Black Crappie	287.00	297.00	510.29	F
20150506	0700	11.50	Night	IM	Largemouth Bass	319.00	330.00	623.69	U
20150506	0700	11.50	Night	IM	Alewife	223.00	256.00	113.40	F
20150506	0700	11.50	Night	IM	Black Crappie	238.00	249.00	283.50	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150506	0700	11.50	Night	IM	White Perch	172.00	183.00	56.70	U
20150506	0700	11.50	Night	IM	Gizzard Shad	320.00	380.00	425.24	M
20150506	0700	11.50	Night	IM	Gizzard Shad	272.00	321.00	340.19	M
20150506	0700	11.50	Night	IM	Gizzard Shad	296.00	343.00	368.54	M
20150506	0700	11.50	Night	IM	Gizzard Shad	320.00	368.00	481.94	U
20150506	0700	11.50	Night	IM	Gizzard Shad	270.00	316.00	226.80	U
20150506	0700	11.50	Night	IM	Longnose Gar		675.00	1105.63	M
20150506	0700	11.50	Night	IM	Longnose Gar		847.00	1984.47	U
20150506	0700	11.50	Night	IM	Longnose Gar		675.00	963.88	U
20150506	0700	11.50	Night	IM	Longnose Gar		760.00	907.18	U
20150506	0700	11.50	Night	IM	Longnose Gar		655.00	1077.28	U
20150506	0700	11.50	Night	IM	Longnose Gar		675.00	1077.28	U
20150506	0700	11.50	Night	IM	Longnose Gar		650.00	1190.68	U
20150506	0700	11.50	Night	IM	Longnose Gar		655.00	935.53	U
20150506	0700	11.50	Night	EM	Gizzard Shad	309.00	355.00	283.50	U
20150506	0700	11.50	Night	EM	White Perch	265.00	279.00	283.50	U
20150506	0700	11.50	Night	EM	Gizzard Shad	340.00	394.00	481.94	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150506	0700	11.50	Night	EM	Longnose Gar		670.00	1133.98	M
20150506	0700	11.50	Night	EM	Atlantic Blue Crab		170.00		M
20150506	0700	11.50	Night	EM	Atlantic Blue Crab		205.00		M
20150506	0700	11.50	Night	EM	Atlantic Blue Crab		182.00		M
20150506	0700	11.50	Night	EM	Atlantic Blue Crab		190.00		M
20150506	1845	9.75	Day	IM	Largemouth Bass	365.00	382.00	793.79	F
20150506	1845	9.75	Day	IM	Gizzard Shad	195.00	227.00	85.05	U
20150506	1845	9.75	Day	IM	Gizzard Shad	315.00	371.00	396.89	U
20150506	1845	9.75	Day	IM	Black Crappie	285.00	301.00	481.94	U
20150506	1845	9.75	Day	IM	Gizzard Shad	315.00	369.00	453.59	U
20150506	1845	9.75	Day	IM	Black Crappie	265.00	276.00	311.84	M
20150506	1845	9.75	Day	IM	Gizzard Shad	185.00	210.00	56.70	U
20150506	1845	9.75	Day	IM	Gizzard Shad	203.00	235.00	85.05	U
20150506	1845	9.75	Day	IM	Black Crappie	270.00	282.00	340.19	M
20150506	1845	9.75	Day	IM	Black Crappie	245.00	257.00	255.15	F
20150506	1845	9.75	Day	IM	Longnose Gar	920.00		2494.76	U
20150506	1845	9.75	Day	IM	Longnose Gar	815.00		1644.27	F

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150506	1845	9.75	Day	IM	Longnose Gar	665.00		878.84	M
20150506	1845	9.75	Day	IM	Longnose Gar	645.00		737.09	
20150506	1845	9.75	Day	IM	Longnose Gar	798.00		1587.57	U
20150506	1845	9.75	Day	IM	Longnose Gar	921.00		2126.21	U
20150506	1845	9.75	Day	IM	Longnose Gar	627.00		793.79	U
20150506	1845	9.75	Day	IM	Longnose Gar	790.00		1360.78	U
20150506	1845	9.75	Day	EM	Gizzard Shad	160.00		14.17	U
20150506	1845	9.75	Day	EM	Atlantic Blue Crab	172.00			M
20150506	1845	9.75	Day	EM	Atlantic Blue Crab	198.00			M
20150506	1845	9.75	Day	EM	Atlantic Blue Crab	171.00			M
20150507	0830	13.75	Night	IM	Gizzard Shad	305.00	352.00	425.24	U
20150507	0830	13.75	Night	IM	Alewife	240.00	276.00	113.40	F
20150507	0830	13.75	Night	EM	Longnose Gar		705.00	1077.28	U
20150507	0830	13.75	Night	EM	Striped Mullet	257.00	283.00	198.45	U
20150507	0830	13.75	Night	EM	Gizzard Shad	315.00	371.00	340.19	U
20150507	0830	13.75	Night	EM	Gizzard Shad	315.00	370.00	396.89	U
20150507	0830	13.75	Night	EM	Gizzard Shad	290.00	341.00	311.84	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20150507	0830	13.75	Night	EM	White Perch	246.00	267.00	255.15	U
20150507	0830	13.75	Night	EM	White Perch	217.00	229.00	141.75	U
20150507	0830	13.75	Night	EM	Gizzard Shad	312.00	362.00	396.89	U
20150507	0830	13.75	Night	EM	Gizzard Shad	265.00	311.00	198.45	U
20150507	0830	13.75	Night	EM	Striped Mullet	222.00	245.00	141.75	U
20150507	0830	13.75	Night	EM	Gizzard Shad	305.00	357.00	340.19	U
20150507	0830	13.75	Night	EM	Gizzard Shad	288.00	343.00	283.50	U
20150507	0830	13.75	Night	EM	Gizzard Shad	322.00	376.00	340.19	U
20150507	0830	13.75	Night	EM	Gizzard Shad	168.00	199.00	56.70	U
20150507	0830	13.75	Night	EM	Alewife	205.00	239.00	85.05	U
20150507	0830	13.75	Night	EM	Longnose Gar		725.00	1417.48	U
20150507	0830	13.75	Night	EM	Atlantic Blue Crab		160.00		M
20150507	0830	13.75	Night	EM	Atlantic Blue Crab		201.00		M
20150507	0830	13.75	Night	EM	Atlantic Blue Crab		195.00		M
20150507	0830	13.75	Night	EM	Atlantic Blue Crab		170.00		F

Subset of Alewife Alosa pseudoharengus captured at Waupoppin Water Control Structure during the 2015 sampling period of March 26 through May 7, 2015, Lake Mattamuskeet, North Carolina.

Date	Time	Hours	Period	Fish Identification	Species	Status	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Gonad Weight (g)	Sex	Sex Stage	GSI
20150404	0715	12.25	Night	15WAUPAW26	ALEWIFE	IM	230.00	262.00	195.21	7.00	22.94	F	5	11.75
20150404	0715	12.25	Night	15WAUPAW27	ALEWIFE	EM	205.00	236.00	128.10	5.00	5.51	M	4	4.30
20150404	1700	8	Day	15WAUPAW28	ALEWIFE	IM	223.00	252.00	149.39	4.00	7.11	M	4	4.76
20150404	1700	8	Day	15WAUPAW29	ALEWIFE	IM	214.00	244.00	138.50	5.00	8.77	F	4	6.33
20150404	1700	8	Day	15WAUPAW30	ALEWIFE	IM	242.00	277.00	203.24	6.00	28.61	F	5	14.08
20150404	1700	8	Day	15WAUPAW31	ALEWIFE	IM	214.00	248.00	132.06	5.00	5.16	M	3	3.91
20150405	0830	13.5	Night	15WAUPAW01	ALEWIFE	IM	217.00	246.00	146.44	6.00	5.55	M	4	3.79
20150405	0830	13.5	Night	15WAUPAW02	ALEWIFE	IM	241.00	276.00	223.26	9.00	32.00	F	5	14.33
20150405	0830	13.5	Night	15WAUPAW03	ALEWIFE	IM	213.00	242.00	147.48	6.00	6.71	M	5	4.55
20150405	0830	13.5	Night	15WAUPAW04	ALEWIFE	IM	215.00	246.00	144.76	5.00	12.29	F	4	8.49
20150405	0830	13.5	Night	15WAUPAW09	ALEWIFE	EM	231.00	265.00	128.38	7.00	2.62	F	3	2.04
20150405	0830	13.5	Night	15WAUPAW10	ALEWIFE	EM	260.00	297.00	189.66	5.00	8.17	F	4	4.31
20150405	0830	13.5	Night	15WAUPAW11	ALEWIFE	EM	247.00	283.00	159.69	7.00	3.55	F	3	2.22
20150405	0830	13.5	Night	15WAUPAW12	ALEWIFE	EM	244.00	276.00	173.04	6.00	4.58	F	3	2.65
20150405	0830	13.5	Night	15WAUPAW13	ALEWIFE	EM	233.00	267.00	135.65	4.00	2.68	F	3	1.98
20150405	0830	13.5	Night	15WAUPAW14	ALEWIFE	IM	221.00	252.00	108.15	5.00	2.13	F	3	1.97
20150410	0800	13	Night	15WAUPAW71	ALEWIFE	IM			106.86	5.00	0.75	M	3	0.70
20150410	0800	13	Night	15WAUPAW81	ALEWIFE	EM	234.00	265.00	146.61	5.00	1.04	F	3	0.71
20150410	0800	13	Night	15WAUPAW82	ALEWIFE	EM			140.23	5.00	1.24	M	3	0.88
20150410	0800	13	Night	15WAUPAW83	ALEWIFE	EM	215.00	247.00	112.73	5.00	1.16	M	4	1.03
20150410	0800	13	Night	15WAUPAW84	ALEWIFE	EM	230.00	258.00	120.47	8.00	1.29	F	3	1.07
20150410	0800	13	Night	15WAUPAW85	ALEWIFE	EM	235.00	266.00	133.73	7.00	2.72	F	3	2.03
20150410	1830	9.5	Day	15WAUPAW38	ALEWIFE	IM	208.00	237.00	108.05	6.00	1.09	M	3	1.01
20150410	1830	9.5	Day	15WAUPAW39	ALEWIFE	IM	207.00		111.71	4.00	1.27	M	3	1.14

Date	Time	Hours	Period	Fish Identification	Species	Status	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Gonad Weight (g)	Sex	Sex Stage	GSI
20150410	1830	9.5	Day	15WAUPAW40	ALEWIFE	IM	214.00	244.00	119.38	5.00	1.40	M	3	1.17
20150410	1830	9.5	Day	15WAUPAW41	ALEWIFE	EM	247.00	284.00	169.46	5.00	1.87	F	3	1.10
20150410	1830	9.5	Day	15WAUPAW42	ALEWIFE	EM	233.00	256.00	137.32	4.00	2.03	M	3	1.48
20150410	1830	9.5	Day	15WAUPAW43	ALEWIFE	EM	258.00	295.00	188.66	5.00	2.68	F	3	1.42
20150410	1830	9.5	Day	15WAUPAW44	ALEWIFE	EM	238.00	270.00	235.04	5.00	2.27	M	3	0.97
20150410	1830	9.5	Day	15WAUPAW45	ALEWIFE	EM	227.00	261.00	237.97	4.00	2.75	F	3	1.16
20150410	1830	9.5	Day	15WAUPAW46	ALEWIFE	EM	215.00	247.00	108.60	5.00	4.61	F	4	4.24
20150410	1830	9.5	Day	15WAUPAW47	ALEWIFE	EM	230.00	263.00	144.24	4.00	1.04	F	3	0.72
20150410	1830	9.5	Day	15WAUPAW48	ALEWIFE	EM	216.00	248.00	113.06	5.00	2.46	F	3	2.18
20150411	0700	12	Night	15WAUPAW32	ALEWIFE	IM	220.00	253.00	123.39	5.00	1.22	M	3	0.99
20150411	0700	12	Night	15WAUPAW64	ALEWIFE	EM	236.00	269.00	151.66	4.00	0.59	M	3	0.39
20150411	0700	12	Night	15WAUPAW65	ALEWIFE	EM	242.00	275.00	147.82	7.00	1.91	F	3	1.29
20150411	0700	12	Night	15WAUPAW66	ALEWIFE	EM	225.00	256.00	129.69	5.00	2.32	F	3	1.79
20150411	0700	12	Night	15WAUPAW67	ALEWIFE	EM	218.00	249.00	115.45	4.00	0.87	M	3	0.75
20150411	0700	12	Night	15WAUPAW68	ALEWIFE	EM	225.00	255.00	131.60	5.00	11.42	F	5	8.68
20150411	0700	12	Night	15WAUPAW69	ALEWIFE	EM	133.00	165.00	160.74	5.00	2.02	M	3	1.26
20150411	0700	12	Night	15WAUPAW70	ALEWIFE	EM	213.00	242.00	118.91	6.00	10.99	F	5	9.24
20150411	1800	9	Day	15WAUPAW08	ALEWIFE	IM	233.00		146.68	6.00	4.02	F	3	2.74
20150411	1800	9	Day	15WAUPAW15	ALEWIFE	EM	233.00	265.00	155.84	5.00	3.38	F	3	2.17
20150411	1800	9	Day	15WAUPAW16	ALEWIFE	EM	223.00	254.00	120.91	4.00	2.09	F	3	1.73
20150411	1800	9	Day	15WAUPAW17	ALEWIFE	EM	205.00	240.00	109.42	5.00	0.99	M	3	0.90
20150416	1930	11.25	Day	15WAUPAW49	ALEWIFE	EM	252.00	285.00	184.50	5.00	3.42	F	3	1.85
20150416	1930	11.25	Day	15WAUPAW72	ALEWIFE	IM	209.00	240.00	118.76	6.00	4.59	M	4	3.86
20150416	1930	11.25	Day	15WAUPAW73	ALEWIFE	IM	223.00	255.00	116.58	5.00	1.37	F	3	1.18
20150416	1930	11.25	Day	15WAUPAW74	ALEWIFE	IM	203.00	233.00	121.61	5.00	5.33	M	4	4.38
20150417	0700	11	Night	15WAUPAW18	ALEWIFE	EM	233.00	266.00	128.65	8.00	3.76	M	3	2.92
20150417	0700	11	Night	15WAUPAW19	ALEWIFE	EM	222.00	255.00	144.19	5.00	1.23	F	3	0.85
20150417	0700	11	Night	15WAUPAW20	ALEWIFE	EM	227.00	258.00	159.68	6.00	2.58	M	3	1.62

Date	Time	Hours	Period	Fish Identification	Species	Status	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Gonad Weight (g)	Sex	Sex Stage	GSI
20150417	0700	11	Night	15WAUPAW21	ALEWIFE	EM	236.00	270.00	138.65	7.00	3.52	F	3	2.54
20150417	0700	11	Night	15WAUPAW22	ALEWIFE	EM	233.00	267.00	142.39	5.00	5.67	F	4	3.98
20150417	1730	8	Day	15WAUPAW07	ALEWIFE	IM	215.00	245.00	134.76	5.00	7.75	M	5	5.75
20150417	1730	8	Day	15WAUPAW23	ALEWIFE	EM	241.00	273.00	145.68	5.00	5.43	F	4	3.73
20150417	1730	8	Day	15WAUPAW24	ALEWIFE	EM			151.14	4.00	8.00	F	4	5.29
20150417	1730	8	Day	15WAUPAW25	ALEWIFE	EM	251.00	285.00	181.31	6.00	5.46	F	4	3.01
20150418	0700	12	Night	15WAUPAW36	ALEWIFE	IM	207.00	239.00	110.67	5.00	0.64	M	3	0.58
20150418	0700	12	Night	15WAUPAW50	ALEWIFE	EM			92.74	5.00	0.70	M	3	0.75
20150418	0700	12	Night	15WAUPAW51	ALEWIFE	EM			109.26	5.00	1.12	M	3	1.03
20150418	0700	12	Night	15WAUPAW52	ALEWIFE	EM	242.00	275.00	171.62	5.00	0.64	M	3	0.37
20150418	0700	12	Night	15WAUPAW53	ALEWIFE	EM	206.00	242.00	103.54	6.00	0.40	M	3	0.39
20150418	0700	12	Night	15WAUPAW54	ALEWIFE	EM			73.80		0.18	M	3	0.24
20150418	0700	12	Night	15WAUPAW55	ALEWIFE	EM			115.03	6.00	0.68	F	3	0.59
20150418	0700	12	Night	15WAUPAW56	ALEWIFE	EM	240.00	274.00	134.76	6.00	0.85	F	3	0.63
20150418	0700	12	Night	15WAUPAW57	ALEWIFE	EM	215.00	257.00	102.87	5.00	0.29	F	3	0.28
20150418	0700	12	Night	15WAUPAW58	ALEWIFE	EM	225.00	258.00	138.53	4.00	0.27	F	3	0.19
20150423	1830	7.5	Day	15WAUPAW37	ALEWIFE	EM	221.00		119.12	5.00	2.86	F	4	2.40
20150423	1830	7.5	Day	15WAUPAW59	ALEWIFE	IM	222.00	251.00	115.87	5.00	0.57	F	3	0.49
20150423	1830	7.5	Day	15WAUPAW60	ALEWIFE	IM	223.00	259.00	166.79	5.00	18.51	F	5	11.10
20150423	1830	7.5	Day	15WAUPAW61	ALEWIFE	IM	247.00	281.00	229.86	7.00	31.04	F	5	13.50
20150423	1830	7.5	Day	15WAUPAW62	ALEWIFE	IM	205.00	237.00	103.64	5.00	0.93	M	3	0.90
20150423	1830	7.5	Day	15WAUPAW63	ALEWIFE	IM	213.00	245.00	120.06	6.00	0.34	F	3	0.28
20150424	0700	11.5	Night	15WAUPAW75	ALEWIFE	IM	235.00		194.86	7.00	25.00	F	5	12.83
20150424	0700	11.5	Night	15WAUPAW76	ALEWIFE	EM	212.00	246.00	120.34	5.00	0.66	M	3	0.55
20150424	1800	7	Day	15WAUPAW77	ALEWIFE	IM	230.00	262.00	116.02	7.00	0.48	M	3	0.41
20150424	1800	7	Day	15WAUPAW78	ALEWIFE	IM	222.00	253.00	156.11	6.00	7.83	M	4	5.02
20150424	1800	7	Day	15WAUPAW79	ALEWIFE	IM			91.00	6.00	0.50	M	3	0.55
20150424	1800	7	Day	15WAUPAW80	ALEWIFE	IM	227.00	260.00	120.38	4.00	1.13	M	3	0.94

Date	Time	Hours	Period	Fish Identification	Species	Status	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Gonad Weight (g)	Sex	Sex Stage	GSI
20150507	0830	13.75	Night	15WAUPAW05	ALEWIFE	EM	207.00	238.00	100.21	4.00	0.45	M	3	0.45
20150507	0830	13.75	Night	15WAUPAW06	ALEWIFE	IM	236.00	271.00	141.66	5.00	3.22	F	3	2.27

All fish captured at Waupoppin Water Control Structure during the 2016 sampling period of February 25 through May1, 2016, Lake Mattamuskeet, North Carolina.

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160225	1900	5.00	Day	SOG IM	Gizzard Shad		382.00	566.99	U
20160225	1900	5.00	Day	SOG IM	Gizzard Shad		353.00	396.89	M
20160225	1900	5.00	Day	SOG IM	Gizzard Shad		364.00	481.94	M
20160225	1900	5.00	Day	SOG IM	Black Crappie		192.00	85.05	U
20160225	1900	5.00	Day	SOG IM	Gizzard Shad		349.00	396.89	M
20160225	1900	5.00	Day	SOG IM	Gizzard Shad		395.00	566.99	U
20160225	1900	5.00	Day	SOG IM	Gizzard Shad		372.00	425.24	U
20160225	1900	5.00	Day	SOG IM	White Perch		201.00	28.35	U
20160225	1900	5.00	Day	SOG IM	White Perch		199.00	56.70	U
20160225	1900	5.00	Day	SOG IM	Black Crappie		280.00	311.84	U
20160225	1900	5.00	Day	SOG IM	Gizzard Shad		340.00	368.54	U
20160225	1900	5.00	Day	SOG IM	Gizzard Shad		355.00	368.54	U
20160225	1900	5.00	Day	SOG IM	Striped Mullet		271.00	85.05	U
20160225	1900	5.00	Day	SOG IM	Gizzard Shad		311.00	255.15	U
20160225	1900	5.00	Day	SOG EM	Atlantic Blue Crab		166.00		M
20160225	1930	5.50	Day	THG IM	Black Crappie		314.00		U
20160225	1930	5.50	Day	THG IM	Black Crappie		298.00		F
20160225	1930	5.50	Day	THG IM	Black Crappie		282.00		U
20160225	1930	5.50	Day	THG IM	White Perch		232.00		U
20160225	1930	5.50	Day	THG IM	Gizzard Shad		110.00		U
20160225	1930	5.50	Day	THG IM	White Perch		130.00		U
20160225	1930	5.50	Day	THG EM	Bowfin				U
20160226	0800	12.00	Night	THG IM	Bowfin		670.00	1757.67	U
20160226	0800	12.00	Night	THG IM	Gizzard Shad		377.00	453.59	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160226	0800	12.00	Night	THG IM	Gizzard Shad		390.00	680.39	U
20160226	0800	12.00	Night	THG IM	Alewife	241.00	280.00	198.45	U
20160226	0800	12.00	Night	THG IM	Gizzard Shad		152.00	28.35	U
20160226	0800	12.00	Night	THG IM	White Perch		210.00	113.40	U
20160226	0800	12.00	Night	THG IM	White Perch		258.00	283.50	U
20160226	0800	12.00	Night	THG IM	Alewife	220.00	253.00	113.40	M
20160226	0800	12.00	Night	THG IM	Gizzard Shad		407.00	793.79	U
20160226	0800	12.00	Night	THG IM	White Perch		246.00	198.45	M
20160226	0800	12.00	Night	THG IM	White Perch		191.00	85.05	U
20160226	0800	12.00	Night	THG IM	White Perch		179.00	56.70	U
20160226	0800	12.00	Night	THG IM	White Perch		256.00	255.15	F
20160226	0800	12.00	Night	THG IM	Striped Mullet		202.00	28.35	U
20160226	0800	12.00	Night	THG IM	Alewife	240.00	273.00	170.10	M
20160226	0800	12.00	Night	THG IM	White Perch		225.00	141.75	U
20160226	0800	12.00	Night	THG IM	Gizzard Shad		365.00	396.89	U
20160226	0800	12.00	Night	THG IM	White Perch		238.00	170.10	U
20160226	0800	12.00	Night	THG IM	Striped Mullet		250.00	113.40	U
20160226	0800	12.00	Night	THG IM	Alewife	210.00	240.00	85.05	U
20160226	0800	12.00	Night	THG IM	White Perch		168.00	28.35	U
20160226	0800	12.00	Night	THG IM	White Perch		216.00	113.40	M
20160226	0800	12.00	Night	THG IM	Striped Mullet		240.00	85.05	U
20160226	0800	12.00	Night	THG IM	White Perch		210.00	85.05	M
20160226	0800	12.00	Night	THG IM	Alewife	222.00	252.00	85.05	U
20160226	0800	12.00	Night	THG IM	White Perch		230.00	141.75	U
20160226	0800	12.00	Night	THG IM	Alewife	225.00	255.00	113.40	U
20160226	0800	12.00	Night	THG IM	Striped Mullet		245.00	56.70	U
20160226	0800	12.00	Night	THG IM	White Perch		201.00	56.70	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160226	0800	12.00	Night	THG IM	Striped Mullet		302.00	170.10	U
20160226	0800	12.00	Night	THG IM	White Perch		212.00	85.05	U
20160226	0800	12.00	Night	THG IM	Striped Mullet		210.00	28.35	U
20160226	0800	12.00	Night	THG IM	White Perch		182.00	28.35	U
20160226	0800	12.00	Night	THG IM	White Perch		192.00	56.70	U
20160226	0800	12.00	Night	THG IM	Alewife	210.00	238.00	56.70	M
20160226	0800	12.00	Night	THG IM	White Perch		235.00	170.10	U
20160226	0800	12.00	Night	THG IM	Striped Mullet		270.00	85.05	U
20160226	0800	12.00	Night	THG IM	Alewife	235.00	269.00	113.40	U
20160226	0800	12.00	Night	THG IM	White Perch		220.00	113.40	U
20160226	0800	12.00	Night	THG IM	White Perch		195.00	85.05	U
20160226	0800	12.00	Night	THG IM	Alewife	220.00	249.00	85.05	M
20160226	0800	12.00	Night	THG IM	White Perch		187.00	56.70	U
20160226	0800	12.00	Night	THG IM	Striped Mullet		203.00	28.35	U
20160226	0800	12.00	Night	THG IM	White Perch		190.00	28.35	U
20160226	0800	12.00	Night	THG IM	Striped Mullet		253.00	226.80	U
20160226	0800	12.00	Night	THG IM	Striped Mullet		235.00	56.70	U
20160226	0800	12.00	Night	THG IM	White Perch		122.00	28.35	U
20160226	0800	12.00	Night	THG IM	White Perch		200.00	85.05	M
20160226	0800	12.00	Night	THG IM	White Perch		205.00	56.70	M
20160226	0800	12.00	Night	THG IM	White Perch		195.00	56.70	M
20160226	0800	12.00	Night	THG IM	Striped Mullet		289.00	141.75	U
20160226	0800	12.00	Night	THG IM	Striped Mullet		232.00	56.70	U
20160226	0800	12.00	Night	THG IM	White Perch		161.00	113.40	U
20160226	0800	12.00	Night	THG IM	Striped Mullet		117.00	28.35	U
20160226	0800	12.00	Night	THG IM	Striped Mullet		186.00	28.35	U
20160226	0800	12.00	Night	THG IM	White Perch		120.00	28.35	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160226	0800	12.00	Night	THG IM	White Perch		115.00	28.35	U
20160226	0800	12.00	Night	THG IM	Striped Mullet		229.00	28.35	U
20160226	0800	12.00	Night	THG EM	White Perch		50.00	14.17	U
20160226	0900	13.75	Night	SOG IM	Gizzard Shad		375.00	368.54	M
20160226	0900	13.75	Night	SOG IM	Gizzard Shad		333.00	198.45	U
20160226	0900	13.75	Night	SOG IM	Gizzard Shad		356.00	368.54	U
20160226	0900	13.75	Night	SOG IM	Striped Mullet		254.00	28.35	U
20160226	0900	13.75	Night	SOG IM	Striped Mullet		407.00	566.99	U
20160226	0900	13.75	Night	SOG IM	Striped Mullet		261.00	85.05	U
20160226	0900	13.75	Night	SOG IM	White Perch		221.00	56.70	U
20160226	0900	13.75	Night	SOG IM	Striped Mullet		265.00	85.05	U
20160226	0900	13.75	Night	SOG IM	Striped Mullet		268.00	85.05	U
20160226	0900	13.75	Night	SOG IM	White Perch		235.00	113.40	M
20160226	0900	13.75	Night	SOG IM	Gizzard Shad		353.00	340.19	U
20160226	0900	13.75	Night	SOG IM	Gizzard Shad		365.00	368.54	U
20160226	0900	13.75	Night	SOG IM	Gizzard Shad		422.00	623.69	U
20160226	0900	13.75	Night	SOG IM	Striped Mullet		272.00	85.05	U
20160226	0900	13.75	Night	SOG IM	White Perch		219.00	56.70	M
20160226	0900	13.75	Night	SOG IM	Gizzard Shad		351.00	311.84	U
20160226	0900	13.75	Night	SOG IM	Gizzard Shad		344.00	255.15	M
20160226	0900	13.75	Night	SOG IM	Gizzard Shad		395.00	453.59	U
20160226	0900	13.75	Night	SOG IM	Gizzard Shad		400.00	453.59	M
20160226	0900	13.75	Night	SOG IM	Striped Mullet		255.00	85.05	U
20160226	0900	13.75	Night	SOG IM	Alewife		234.00	28.35	U
20160226	0900	13.75	Night	SOG IM	Black Crappie		253.00	141.75	U
20160226	0900	13.75	Night	SOG IM	White Perch		228.00	85.05	U
20160226	0900	13.75	Night	SOG IM	Bluegill		195.00	56.70	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160226	0900	13.75	Night	SOG IM	Striped Mullet		275.00	566.99	U
20160226	0900	13.75	Night	SOG IM	Gizzard Shad		391.00	425.24	M
20160226	0900	13.75	Night	SOG IM	White Perch		238.00	141.75	M
20160226	0900	13.75	Night	SOG IM	White Perch		205.00	56.70	U
20160226	0900	13.75	Night	SOG IM	Gizzard Shad		381.00	396.89	U
20160226	0900	13.75	Night	SOG IM	Striped Mullet		246.00	170.10	U
20160226	0900	13.75	Night	SOG IM	Striped Mullet		308.00	113.40	U
20160226	0900	13.75	Night	SOG IM	Striped Mullet		254.00	28.35	U
20160226	0900	13.75	Night	SOG IM	White Perch		241.00	113.40	U
20160226	0900	13.75	Night	SOG IM	Alewife	225.00	257.00	28.35	U
20160226	0900	13.75	Night	SOG IM	Gizzard Shad		250.00	255.15	M
20160226	0900	13.75	Night	SOG IM	Striped Mullet		275.00	56.70	U
20160226	0900	13.75	Night	SOG IM	White Perch		210.00	28.35	U
20160226	0900	13.75	Night	SOG IM	White Perch		212.00	85.05	U
20160226	0900	13.75	Night	SOG IM	Gizzard Shad		355.00	340.19	U
20160226	0900	13.75	Night	SOG IM	Alewife	219.00	250.00	28.35	M
20160226	0900	13.75	Night	SOG IM	Black Crappie		165.00	14.17	U
20160226	0900	13.75	Night	SOG IM	Striped Mullet		316.00	170.10	U
20160226	0900	13.75	Night	SOG IM	White Perch		195.00	28.35	M
20160226	0900	13.75	Night	SOG IM	Alewife	226.00	260.00	141.75	M
20160226	0900	13.75	Night	SOG IM	Gizzard Shad		406.00	708.74	U
20160226	0900	13.75	Night	SOG IM	Gizzard Shad		344.00	311.84	U
20160226	0900	13.75	Night	SOG IM	Striped Mullet		250.00	113.40	U
20160226	0900	13.75	Night	SOG IM	Striped Mullet		254.00	113.40	U
20160226	0900	13.75	Night	SOG IM	White Perch		224.00	170.10	M
20160226	0900	13.75	Night	SOG IM	Gizzard Shad		352.00	453.59	U
20160226	0900	13.75	Night	SOG IM	Gizzard Shad		335.00	311.84	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160226	0900	13.75	Night	SOG IM	Black Crappie		240.00	198.45	U
20160226	0900	13.75	Night	SOG IM	Gizzard Shad		332.00	396.89	M
20160226	0900	13.75	Night	SOG IM	Gizzard Shad		360.00	453.59	U
20160226	0900	13.75	Night	SOG IM	Gizzard Shad		339.00	340.19	M
20160226	0900	13.75	Night	SOG IM	Black Crappie		246.00	226.80	U
20160226	0900	13.75	Night	SOG IM	White Perch		252.00	255.15	U
20160226	0900	13.75	Night	SOG IM	White Perch		245.00	170.10	M
20160226	0900	13.75	Night	SOG IM	Gizzard Shad		295.00	198.45	M
20160226	0900	13.75	Night	SOG IM	Black Crappie		268.00	311.84	U
20160226	0900	13.75	Night	SOG IM	Gizzard Shad		376.00	425.24	U
20160226	0900	13.75	Night	SOG IM	Gizzard Shad		396.00	566.99	U
20160226	0900	13.75	Night	SOG IM	White Perch		240.00	226.80	M
20160226	0900	13.75	Night	SOG IM	Black Crappie		222.00	170.10	M
20160226	0900	13.75	Night	SOG IM	Striped Mullet		275.00	170.10	U
20160226	0900	13.75	Night	SOG IM	Striped Mullet		270.00	170.10	U
20160226	0900	13.75	Night	SOG IM	Gizzard Shad		405.00	652.04	U
20160226	0900	13.75	Night	SOG IM	Striped Mullet		295.00	226.80	U
20160226	0900	13.75	Night	SOG IM	Striped Mullet		279.00	198.45	U
20160226	0900	13.75	Night	SOG IM	Striped Mullet		316.00	283.50	U
20160226	0900	13.75	Night	SOG IM	Striped Mullet		370.00	453.59	M
20160226	0900	13.75	Night	SOG IM	Black Crappie		301.00	481.94	U
20160226	0900	13.75	Night	SOG IM	Striped Mullet		285.00	198.45	U
20160226	0900	13.75	Night	SOG IM	Bowfin		380.00	595.34	U
20160226	0900	13.75	Night	SOG IM	White Perch		200.00	141.75	U
20160226	0900	13.75	Night	SOG IM	Alewife	228.00	259.00	170.10	M
20160226	0900	13.75	Night	SOG IM	Striped Mullet		281.00	198.45	U
20160226	0900	13.75	Night	SOG IM	Striped Mullet		280.00	198.45	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160226	0900	13.75	Night	SOG IM	Striped Mullet		235.00	113.40	U
20160226	0900	13.75	Night	SOG IM	Striped Mullet		284.00	170.10	U
20160226	0900	13.75	Night	SOG IM	Striped Mullet		212.00	85.05	U
20160226	0900	13.75	Night	SOG EM	White Perch		120.00	28.35	U
20160226	0900	13.75	Night	SOG EM	White Perch		169.00	85.05	U
20160226	0900	13.75	Night	SOG EM	Striped Mullet		245.00	113.40	U
20160226	0900	13.75	Night	SOG EM	Bowfin		618.00	1786.02	U
20160226	0900	13.75	Night	SOG EM	Striped Mullet		255.00	113.40	U
20160226	0900	13.75	Night	SOG EM	Redear Sunfish		145.00	14.17	U
20160226	0900	13.75	Night	SOG EM	White Perch		170.00	14.17	U
20160226	0900	13.75	Night	SOG EM	Redear Sunfish		145.00	56.70	U
20160226	0900	13.75	Night	SOG EM	White Perch		120.00	14.17	U
20160226	2000	11.00	Day	THG IM	White Perch		240.00	198.45	U
20160226	2000	11.00	Day	THG IM	Alewife	245.00	279.00	198.45	U
20160226	2000	11.00	Day	THG IM	White Perch		245.00	198.45	U
20160226	2000	11.00	Day	THG IM	White Perch		247.00	198.45	M
20160226	2000	11.00	Day	THG IM	Black Crappie		290.00	311.84	U
20160226	2000	11.00	Day	THG IM	White Perch		205.00	85.05	M
20160226	2000	11.00	Day	THG IM	White Perch		203.00	85.05	M
20160226	2000	11.00	Day	THG IM	White Perch		270.00	311.84	U
20160226	2000	11.00	Day	THG IM	White Perch		254.00	226.80	U
20160226	2000	11.00	Day	THG IM	White Perch		210.00	113.40	M
20160226	2000	11.00	Day	THG IM	White Perch		285.00	283.50	U
20160226	2000	11.00	Day	THG IM	White Perch		202.00	85.05	M
20160226	2000	11.00	Day	THG IM	White Perch		201.00	85.05	M
20160226	2000	11.00	Day	THG IM	Alewife	224.00	256.00	113.40	U
20160226	2000	11.00	Day	THG IM	White Perch		218.00	85.05	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160226	2000	11.00	Day	THG IM	White Perch		199.00	85.05	M
20160226	2000	11.00	Day	THG IM	White Perch		185.00	56.70	M
20160226	2000	11.00	Day	THG IM	White Perch		200.00	85.05	M
20160226	2000	11.00	Day	THG IM	White Perch		205.00	113.40	U
20160226	2000	11.00	Day	THG IM	White Perch		197.00	85.05	M
20160226	2000	11.00	Day	THG IM	White Perch		195.00	56.70	M
20160226	2000	11.00	Day	THG IM	White Perch		205.00	85.05	U
20160226	2000	11.00	Day	THG IM	Bowfin		541.00		U
20160226	2030	10.50	Day	SOG IM	Black Crappie		330.00	652.04	U
20160226	2030	10.50	Day	SOG IM	White Perch		218.00	170.10	U
20160226	2030	10.50	Day	SOG IM	White Perch		205.00	113.40	U
20160226	2030	10.50	Day	SOG IM	White Perch		206.00	113.40	M
20160226	2030	10.50	Day	SOG IM	Alewife	241.00	274.00	170.10	U
20160226	2030	10.50	Day	SOG IM	White Perch		210.00	141.75	M
20160226	2030	10.50	Day	SOG IM	White Perch		215.00	141.75	M
20160226	2030	10.50	Day	SOG IM	White Perch		220.00	170.10	M
20160226	2030	10.50	Day	SOG IM	White Perch		242.00	198.45	M
20160226	2030	10.50	Day	SOG IM	White Perch		192.00	85.05	M
20160226	2030	10.50	Day	SOG IM	Alewife	238.00	267.00	170.10	U
20160226	2030	10.50	Day	SOG IM	Alewife	235.00	267.00	170.10	M
20160226	2030	10.50	Day	SOG IM	Alewife	235.00	267.00	170.10	U
20160226	2030	10.50	Day	SOG IM	Alewife	228.00	261.00	141.75	M
20160226	2030	10.50	Day	SOG IM	Alewife	240.00	272.00	170.10	M
20160226	2030	10.50	Day	SOG IM	Alewife	241.00	277.00	198.45	U
20160226	2030	10.50	Day	SOG IM	Alewife	248.00	280.00	198.45	U
20160226	2030	10.50	Day	SOG IM	Alewife	221.00	253.00	141.75	M
20160226	2030	10.50	Day	SOG IM	Alewife	231.00	204.00	141.75	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160227	0800	11.75	Night	THG IM	Alewife	231.00	262.00	141.75	M
20160227	0800	11.75	Night	THG IM	Alewife	233.00	267.00	170.10	M
20160227	0800	11.75	Night	THG IM	White Perch		235.00	198.45	M
20160227	0800	11.75	Night	THG IM	White Perch		182.00	85.05	U
20160227	0800	11.75	Night	THG IM	White Perch		215.00	198.45	U
20160227	0800	11.75	Night	THG IM	White Perch		241.00	255.15	M
20160227	0800	11.75	Night	THG IM	White Perch		201.00	141.75	U
20160227	0800	11.75	Night	THG IM	White Perch		211.00	170.10	M
20160227	0800	11.75	Night	THG IM	White Perch		152.00	28.35	U
20160227	0800	11.75	Night	THG IM	White Perch		169.00	113.40	U
20160227	0800	11.75	Night	THG IM	White Perch		195.00	113.40	U
20160227	0800	11.75	Night	THG IM	White Perch		203.00	113.40	M
20160227	0800	11.75	Night	THG IM	White Perch		198.00	141.75	U
20160227	0800	11.75	Night	THG IM	White Perch		198.00	141.75	M
20160227	0800	11.75	Night	THG IM	White Perch		215.00	141.75	M
20160227	0800	11.75	Night	THG IM	White Perch		255.00	311.84	U
20160227	0800	11.75	Night	THG IM	White Perch		190.00	141.75	U
20160227	0800	11.75	Night	THG IM	White Perch		206.00	141.75	M
20160227	0800	11.75	Night	THG IM	White Perch		166.00	85.05	U
20160227	0800	11.75	Night	THG IM	White Perch		211.00	198.45	U
20160227	0800	11.75	Night	THG IM	White Perch		202.00	141.75	M
20160227	0800	11.75	Night	THG IM	White Perch	185.00		141.75	M
20160227	0800	11.75	Night	THG IM	White Perch		252.00	311.84	U
20160227	0800	11.75	Night	THG IM	White Perch		208.00	170.10	U
20160227	0800	11.75	Night	THG IM	White Perch		205.00	170.10	M
20160227	0800	11.75	Night	THG IM	White Perch		202.00	141.75	U
20160227	0800	11.75	Night	THG IM	White Perch		252.00	311.84	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160227	0800	11.75	Night	THG IM	White Perch		238.00	198.45	U
20160227	0800	11.75	Night	THG IM	White Perch		185.00	85.05	U
20160227	0800	11.75	Night	THG IM	White Perch		219.00	170.10	U
20160227	0800	11.75	Night	THG IM	White Perch		202.00	113.40	M
20160227	0800	11.75	Night	THG IM	White Perch		201.00	113.40	U
20160227	0800	11.75	Night	THG IM	White Perch		256.00	255.15	M
20160227	0800	11.75	Night	THG IM	White Perch		205.00	113.40	M
20160227	0800	11.75	Night	THG IM	White Perch		217.00	141.75	M
20160227	0800	11.75	Night	THG IM	White Perch		215.00	141.75	U
20160227	0800	11.75	Night	THG IM	White Perch		184.00	85.05	M
20160227	0800	11.75	Night	THG IM	White Perch		212.00	141.75	M
20160227	0800	11.75	Night	THG IM	White Perch		211.00	113.40	U
20160227	0800	11.75	Night	THG IM	White Perch		216.00	113.40	M
20160227	0800	11.75	Night	THG IM	White Perch		148.00	28.35	U
20160227	0800	11.75	Night	THG IM	White Perch		244.00	198.45	U
20160227	0800	11.75	Night	THG IM	White Perch		258.00	255.15	U
20160227	0800	11.75	Night	THG IM	White Perch		252.00	226.80	U
20160227	0800	11.75	Night	THG IM	White Perch		202.00	113.40	M
20160227	0800	11.75	Night	THG IM	White Perch		240.00	226.80	U
20160227	0800	11.75	Night	THG IM	White Perch		235.00	141.75	M
20160227	0800	11.75	Night	THG IM	White Perch		182.00	85.05	M
20160227	0800	11.75	Night	THG IM	White Perch		238.00	198.45	M
20160227	0800	11.75	Night	THG IM	White Perch		195.00	113.40	M
20160227	0800	11.75	Night	THG IM	White Perch		198.00	85.05	M
20160227	0800	11.75	Night	THG IM	White Perch		196.00	113.40	M
20160227	0800	11.75	Night	THG IM	White Perch		215.00	113.40	M
20160227	0800	11.75	Night	THG IM	White Perch		180.00	85.05	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160227	0800	11.75	Night	THG IM	White Perch		201.00	113.40	U
20160227	0800	11.75	Night	THG IM	White Perch		191.00	85.05	U
20160227	0800	11.75	Night	THG IM	White Perch		197.00	113.40	U
20160227	0800	11.75	Night	THG IM	White Perch		210.00	141.75	M
20160227	0800	11.75	Night	THG IM	White Perch		217.00	113.40	M
20160227	0800	11.75	Night	THG IM	White Perch		145.00	28.35	U
20160227	0800	11.75	Night	THG IM	White Perch		175.00	85.05	M
20160227	0800	11.75	Night	THG IM	White Perch		212.00	113.40	M
20160227	0800	11.75	Night	THG IM	White Perch		229.00	141.75	M
20160227	0800	11.75	Night	THG IM	White Perch		209.00	141.75	U
20160227	0800	11.75	Night	THG IM	White Perch		209.00	113.40	U
20160227	0800	11.75	Night	THG IM	White Perch		210.00	113.40	U
20160227	0800	11.75	Night	THG IM	White Perch		245.00	198.45	M
20160227	0800	11.75	Night	THG IM	White Perch		195.00	85.05	U
20160227	0800	11.75	Night	THG IM	White Perch		282.00	141.75	M
20160227	0800	11.75	Night	THG IM	White Perch		166.00	56.70	U
20160227	0800	11.75	Night	THG IM	White Perch		214.00	113.40	M
20160227	0800	11.75	Night	THG IM	White Perch		240.00	198.45	U
20160227	0800	11.75	Night	THG IM	White Perch		236.00	198.45	U
20160227	0800	11.75	Night	THG IM	White Perch		225.00	170.10	U
20160227	0800	11.75	Night	THG IM	White Perch		215.00	170.10	M
20160227	0800	11.75	Night	THG IM	White Perch		262.00	283.50	M
20160227	0800	11.75	Night	THG IM	White Perch		255.00	255.15	U
20160227	0800	11.75	Night	THG IM	White Perch		222.00	141.75	U
20160227	0800	11.75	Night	THG IM	White Perch		252.00	226.80	U
20160227	0800	11.75	Night	THG IM	White Perch		210.00	113.40	U
20160227	0800	11.75	Night	THG IM	White Perch		187.00	56.70	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160227	0800	11.75	Night	THG IM	White Perch		160.00	28.35	M
20160227	0800	11.75	Night	THG IM	White Perch		228.00	170.10	M
20160227	0800	11.75	Night	THG IM	White Perch		172.00	28.35	U
20160227	0800	11.75	Night	THG IM	White Perch		177.00	56.70	M
20160227	0800	11.75	Night	THG IM	White Perch		203.00	85.05	U
20160227	0800	11.75	Night	THG IM	White Perch		219.00	141.75	U
20160227	0800	11.75	Night	THG IM	White Perch		237.00	198.45	M
20160227	0800	11.75	Night	THG IM	White Perch		210.00	113.40	U
20160227	0800	11.75	Night	THG IM	White Perch		115.00	28.35	U
20160227	0800	11.75	Night	THG IM	White Perch		105.00	14.17	M
20160227	0800	11.75	Night	THG IM	White Perch		221.00	113.40	M
20160227	0800	11.75	Night	THG IM	White Perch		197.00	113.40	M
20160227	0800	11.75	Night	THG IM	White Perch		191.00	85.05	M
20160227	0800	11.75	Night	THG IM	White Perch		186.00	85.05	U
20160227	0800	11.75	Night	THG IM	White Perch		177.00	56.70	U
20160227	0800	11.75	Night	THG IM	White Perch		145.00	28.35	M
20160227	0800	11.75	Night	THG IM	White Perch		150.00	28.35	U
20160227	0800	11.75	Night	THG IM	White Perch		168.00	56.70	U
20160227	0800	11.75	Night	THG IM	White Perch		145.00	28.35	M
20160227	0800	11.75	Night	THG IM	White Perch		195.00	85.05	M
20160227	0800	11.75	Night	THG IM	White Perch		198.00	113.40	U
20160227	0800	11.75	Night	THG IM	White Perch		175.00	56.70	U
20160227	0800	11.75	Night	THG IM	White Perch		191.00	113.40	M
20160227	0800	11.75	Night	THG IM	White Perch		203.00	141.75	U
20160227	0800	11.75	Night	THG IM	White Perch		179.00	85.05	U
20160227	0800	11.75	Night	THG IM	White Perch		198.00	141.75	U
20160227	0800	11.75	Night	THG IM	White Perch		184.00	85.05	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160227	0800	11.75	Night	THG IM	White Perch		187.00	85.05	U
20160227	0800	11.75	Night	THG IM	White Perch		169.00	56.70	U
20160227	0800	11.75	Night	THG IM	White Perch		210.00	141.75	U
20160227	0800	11.75	Night	THG IM	White Perch		189.00	85.05	U
20160227	0800	11.75	Night	THG IM	White Perch		151.00	56.70	U
20160227	0800	11.75	Night	THG IM	White Perch		212.00	141.75	M
20160227	0800	11.75	Night	THG IM	White Perch		194.00	113.40	M
20160227	0800	11.75	Night	THG IM	White Perch		169.00	56.70	M
20160227	0800	11.75	Night	THG IM	White Perch		181.00	85.05	M
20160227	0800	11.75	Night	THG IM	White Perch		227.00	198.45	U
20160227	0800	11.75	Night	THG IM	White Perch		170.00	85.05	U
20160227	0800	11.75	Night	THG IM	White Perch		149.00	28.35	U
20160227	0800	11.75	Night	THG IM	White Perch		160.00	56.70	U
20160227	0800	11.75	Night	THG IM	White Perch		177.00	56.70	M
20160227	0800	11.75	Night	THG IM	White Perch		231.00	198.45	U
20160227	0800	11.75	Night	THG IM	White Perch		186.00	141.75	U
20160227	0800	11.75	Night	THG IM	White Perch		191.00	85.05	U
20160227	0800	11.75	Night	THG IM	White Perch		210.00	141.75	U
20160227	0800	11.75	Night	THG IM	White Perch		130.00	28.35	U
20160227	0800	11.75	Night	THG IM	Gizzard Shad		171.00	28.35	U
20160227	0800	11.75	Night	THG IM	Gizzard Shad		155.00	28.35	U
20160227	0800	11.75	Night	THG IM	Gizzard Shad		145.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		152.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		197.00	56.70	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		190.00	56.70	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		282.00	198.45	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		271.00	141.75	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		263.00	170.10	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160227	0800	11.75	Night	THG IM	Striped Mullet		177.00	56.70	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		250.00	141.75	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		217.00	85.05	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		190.00	56.70	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		141.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		185.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		155.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		140.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		293.00	198.45	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		188.00	56.70	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		174.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		166.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		253.00	113.40	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		190.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		250.00	113.40	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		175.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		198.00	56.70	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		235.00	85.05	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		200.00	56.70	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		186.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		193.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		195.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		214.00	56.70	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		185.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		216.00	56.70	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		206.00	56.70	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		260.00	141.75	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		185.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		184.00	28.35	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160227	0800	11.75	Night	THG IM	Striped Mullet		175.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		196.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		168.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		193.00	56.70	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		178.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		173.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		160.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		155.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		162.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		274.00	170.10	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		165.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		246.00	113.40	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		193.00	56.70	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		190.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		155.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		140.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		200.00	56.70	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		237.00	85.05	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		201.00	56.70	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		166.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		179.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		158.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		230.00	85.05	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		234.00	85.05	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		214.00	56.70	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		156.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		290.00	170.10	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		266.00	113.40	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		234.00	85.05	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160227	0800	11.75	Night	THG IM	Striped Mullet		286.00	198.45	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		205.00	56.70	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		243.00	113.40	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		225.00	56.70	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		243.00	85.05	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		230.00	85.05	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		215.00	56.70	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		326.00	283.50	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		225.00	85.05	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		256.00	141.75	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		200.00	56.70	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		220.00	56.70	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		192.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		218.00	56.70	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		203.00	56.70	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		155.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		205.00	56.70	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		200.00	56.70	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		141.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		252.00	113.40	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		228.00	56.70	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		210.00	56.70	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		245.00	85.05	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		206.00	56.70	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		233.00	85.05	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		178.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		233.00	85.05	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		242.00	85.05	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		140.00	28.35	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160227	0800	11.75	Night	THG IM	Striped Mullet		181.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		188.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		230.00	56.70	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		167.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		178.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		198.00	28.35	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		261.00	141.75	U
20160227	0800	11.75	Night	THG IM	Striped Mullet		186.00	28.35	U
20160227	0815	11.50	Night	SOG EM	White Perch		190.00	85.05	U
20160227	0815	11.50	Night	SOG EM	Striped Mullet		235.00	141.75	U
20160227	0815	11.50	Night	SOG EM	Striped Mullet		185.00	85.05	U
20160227	0815	11.50	Night	SOG EM	Bluegill		110.00	28.35	U
20160227	0815	11.50	Night	SOG EM	White Perch		172.00	85.05	U
20160227	0815	11.50	Night	SOG EM	Striped Mullet		238.00	170.10	U
20160227	0815	11.50	Night	SOG EM	Striped Mullet		225.00	141.75	U
20160227	0815	11.50	Night	SOG EM	Striped Mullet		230.00	141.75	U
20160227	0815	11.50	Night	SOG IM	Black Crappie		202.00	170.10	U
20160227	0815	11.50	Night	SOG IM	Black Crappie		198.00	85.05	U
20160227	0815	11.50	Night	SOG IM	White Perch		196.00	113.40	M
20160227	0815	11.50	Night	SOG IM	Largemouth Bass		272.00	255.15	U
20160227	0815	11.50	Night	SOG IM	Gizzard Shad		360.00	453.59	U
20160227	0815	11.50	Night	SOG IM	Black Crappie		215.00	113.40	U
20160227	0815	11.50	Night	SOG IM	Black Crappie		247.00	226.80	U
20160227	0815	11.50	Night	SOG IM	Bluegill		185.00	113.40	U
20160227	0815	11.50	Night	SOG IM	White Perch		225.00	141.75	M
20160227	0815	11.50	Night	SOG IM	Black Crappie		245.00	226.80	U
20160227	0815	11.50	Night	SOG IM	Bluegill		174.00	85.05	U
20160227	0815	11.50	Night	SOG IM	Black Crappie		230.00	170.10	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160227	0815	11.50	Night	SOG IM	Black Crappie		195.00	85.05	U
20160227	0815	11.50	Night	SOG IM	Bluegill		155.00	56.70	U
20160227	0815	11.50	Night	SOG IM	Bluegill		168.00	85.05	U
20160227	0815	11.50	Night	SOG IM	Bluegill		160.00	85.05	U
20160227	0815	11.50	Night	SOG IM	Bluegill		148.00	28.35	U
20160227	0815	11.50	Night	SOG IM	White Perch		245.00	198.45	M
20160227	0815	11.50	Night	SOG IM	White Perch		203.00	113.40	U
20160227	0815	11.50	Night	SOG IM	White Perch		207.00	113.40	M
20160227	0815	11.50	Night	SOG IM	White Perch		217.00	113.40	U
20160227	0815	11.50	Night	SOG IM	White Perch		193.00	113.40	M
20160227	0815	11.50	Night	SOG IM	White Perch		194.00	113.40	U
20160227	0815	11.50	Night	SOG IM	White Perch		204.00	113.40	M
20160227	0815	11.50	Night	SOG IM	White Perch		220.00	141.75	M
20160227	0815	11.50	Night	SOG IM	White Perch		203.00	141.75	U
20160227	0815	11.50	Night	SOG IM	White Perch		248.00	226.80	M
20160227	0815	11.50	Night	SOG IM	White Perch		202.00	85.05	M
20160227	0815	11.50	Night	SOG IM	White Perch		211.00	113.40	M
20160227	0815	11.50	Night	SOG IM	White Perch		207.00	85.05	M
20160227	0815	11.50	Night	SOG IM	White Perch		202.00	85.05	M
20160227	0815	11.50	Night	SOG IM	White Perch		191.00	85.05	M
20160227	0815	11.50	Night	SOG IM	White Perch		217.00	141.75	U
20160227	0815	11.50	Night	SOG IM	White Perch		186.00	85.05	M
20160227	0815	11.50	Night	SOG IM	White Perch		198.00	85.05	M
20160227	0815	11.50	Night	SOG IM	White Perch		198.00	85.05	M
20160227	0815	11.50	Night	SOG IM	White Perch		181.00	56.70	U
20160227	0815	11.50	Night	SOG IM	White Perch		203.00	113.40	M
20160227	0815	11.50	Night	SOG IM	White Perch		203.00	113.40	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160227	0815	11.50	Night	SOG IM	White Perch		212.00	141.75	U
20160227	0815	11.50	Night	SOG IM	White Perch		209.00	141.75	U
20160227	0815	11.50	Night	SOG IM	White Perch		225.00	141.75	M
20160227	0815	11.50	Night	SOG IM	White Perch		188.00	85.05	U
20160227	0815	11.50	Night	SOG IM	White Perch		188.00	85.05	M
20160227	0815	11.50	Night	SOG IM	White Perch		218.00	141.75	M
20160227	0815	11.50	Night	SOG IM	White Perch		231.00	198.45	M
20160227	0815	11.50	Night	SOG IM	White Perch		202.00	113.40	M
20160227	0815	11.50	Night	SOG IM	White Perch		215.00	113.40	M
20160227	0815	11.50	Night	SOG IM	White Perch		232.00	198.45	U
20160227	0815	11.50	Night	SOG IM	White Perch		180.00	56.70	M
20160227	0815	11.50	Night	SOG IM	White Perch		235.00	198.45	F
20160227	0815	11.50	Night	SOG IM	White Perch		211.00	170.10	M
20160227	0815	11.50	Night	SOG IM	White Perch		177.00	85.05	U
20160227	0815	11.50	Night	SOG IM	White Perch		229.00	170.10	U
20160227	0815	11.50	Night	SOG IM	White Perch		183.00	56.70	M
20160227	0815	11.50	Night	SOG IM	White Perch		221.00	85.05	U
20160227	0815	11.50	Night	SOG IM	White Perch		207.00	113.40	M
20160227	0815	11.50	Night	SOG IM	White Perch		205.00	113.40	M
20160227	0815	11.50	Night	SOG IM	White Perch		206.00	113.40	M
20160227	0815	11.50	Night	SOG IM	White Perch		219.00	141.75	U
20160227	0815	11.50	Night	SOG IM	White Perch		188.00	85.05	M
20160227	0815	11.50	Night	SOG IM	White Perch		201.00	113.40	U
20160227	0815	11.50	Night	SOG IM	White Perch		217.00	141.75	U
20160227	0815	11.50	Night	SOG IM	White Perch		199.00	113.40	U
20160227	0815	11.50	Night	SOG IM	White Perch		192.00	56.70	M
20160227	0815	11.50	Night	SOG IM	White Perch		211.00	113.40	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160227	0815	11.50	Night	SOG IM	White Perch		209.00	113.40	M
20160227	0815	11.50	Night	SOG IM	White Perch		198.00	85.05	M
20160227	0815	11.50	Night	SOG IM	White Perch		221.00	113.40	U
20160227	0815	11.50	Night	SOG IM	White Perch		194.00	85.05	M
20160227	0815	11.50	Night	SOG IM	White Perch		187.00	113.40	M
20160227	0815	11.50	Night	SOG IM	White Perch		203.00	113.40	M
20160227	0815	11.50	Night	SOG IM	White Perch		212.00	113.40	M
20160227	0815	11.50	Night	SOG IM	White Perch		209.00	113.40	U
20160227	0815	11.50	Night	SOG IM	White Perch		204.00	113.40	M
20160227	0815	11.50	Night	SOG IM	White Perch		234.00	170.10	M
20160227	0815	11.50	Night	SOG IM	White Perch		231.00	170.10	U
20160227	0815	11.50	Night	SOG IM	White Perch		235.00	170.10	U
20160227	0815	11.50	Night	SOG IM	White Perch		165.00	28.35	M
20160227	0815	11.50	Night	SOG IM	White Perch		217.00	141.75	U
20160227	0815	11.50	Night	SOG IM	White Perch		204.00	85.05	M
20160227	0815	11.50	Night	SOG IM	White Perch		209.00	113.40	U
20160227	0815	11.50	Night	SOG IM	White Perch		203.00	85.05	M
20160227	0815	11.50	Night	SOG IM	White Perch		193.00	85.05	U
20160227	0815	11.50	Night	SOG IM	White Perch		185.00	56.70	M
20160227	0815	11.50	Night	SOG IM	White Perch		197.00	85.05	M
20160227	0815	11.50	Night	SOG IM	White Perch		200.00	113.40	U
20160227	0815	11.50	Night	SOG IM	Alewife	247.00	280.00	170.10	U
20160227	0815	11.50	Night	SOG IM	Alewife	240.00	275.00	170.10	U
20160227	0815	11.50	Night	SOG IM	Alewife	228.00	260.00	113.40	M
20160227	0815	11.50	Night	SOG IM	Alewife	234.00	267.00	141.75	U
20160227	0815	11.50	Night	SOG IM	Alewife	226.00	258.00	113.40	M
20160227	0815	11.50	Night	SOG IM	Alewife	219.00	250.00	113.40	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160227	0815	11.50	Night	SOG IM	Alewife	246.00	280.00	170.10	U
20160227	0815	11.50	Night	SOG IM	Striped Mullet		258.00	170.10	U
20160227	0815	11.50	Night	SOG IM	Striped Mullet		220.00	85.05	U
20160227	0815	11.50	Night	SOG IM	Striped Mullet		261.00	141.75	U
20160227	0815	11.50	Night	SOG IM	Striped Mullet		258.00	141.75	U
20160227	0815	11.50	Night	SOG IM	Striped Mullet		275.00	198.45	U
20160227	0815	11.50	Night	SOG IM	Striped Mullet		295.00	255.15	U
20160227	0815	11.50	Night	SOG IM	Striped Mullet		305.00	226.80	U
20160227	0815	11.50	Night	SOG IM	Striped Mullet		286.00	226.80	U
20160227	0815	11.50	Night	SOG IM	Striped Mullet		263.00	141.75	U
20160227	0815	11.50	Night	SOG IM	Striped Mullet		319.00	311.84	U
20160227	0815	11.50	Night	SOG IM	Striped Mullet		312.00	283.50	U
20160227	0815	11.50	Night	SOG IM	Striped Mullet		267.00	170.10	U
20160227	0815	11.50	Night	SOG IM	Striped Mullet		277.00	198.45	U
20160227	0815	11.50	Night	SOG IM	Striped Mullet		258.00	170.10	U
20160227	0815	11.50	Night	SOG IM	Striped Mullet		283.00	226.80	U
20160302	0845	11.75	Night	SOG IM	Black Crappie		319.00	538.64	U
20160302	0845	11.75	Night	SOG IM	Black Crappie		270.00	311.84	F
20160302	0845	11.75	Night	SOG IM	White Perch		220.00	170.10	M
20160302	0845	11.75	Night	SOG IM	Alewife	215.00	250.00	141.75	M
20160302	0845	11.75	Night	SOG IM	White Perch		220.00	141.75	F
20160302	0845	11.75	Night	SOG IM	White Perch		215.00	141.75	F
20160302	0845	11.75	Night	SOG IM	White Perch		205.00	113.40	F
20160302	0845	11.75	Night	SOG IM	White Perch		180.00	85.05	M
20160302	0845	11.75	Night	SOG IM	White Perch		195.00	113.40	F
20160302	0845	11.75	Night	SOG IM	Largemouth Bass		225.00	113.40	F
20160302	0845	11.75	Night	SOG IM	White Perch		200.00	113.40	F
20160302	0845	11.75	Night	SOG IM	White Perch		170.00	56.70	M
20160302	0845	11.75	Night	SOG IM	White Perch		210.00	113.40	F

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160302	0845	11.75	Night	SOG IM	White Perch		200.00	113.40	F
20160302	0845	11.75	Night	SOG EM	Alewife				U
20160302	0845	11.75	Night	SOG EM	Atlantic Blue Crab		155.00		M
20160302	0845	11.75	Night	SOG EM	Atlantic Blue Crab		160.00		M
20160302	0845	11.75	Night	SOG EM	Atlantic Blue Crab		170.00		M
20160302	0915	12.25	Night	THG IM	Alewife	225.00	255.00	141.75	M
20160302	0915	12.25	Night	THG IM	Gizzard Shad		343.00	396.89	U
20160302	0915	12.25	Night	THG IM	Alewife	237.00	271.00	198.45	M
20160302	0915	12.25	Night	THG IM	White Perch		205.00	113.40	U
20160302	0915	12.25	Night	THG IM	Alewife	215.00	247.00	141.75	M
20160302	0915	12.25	Night	THG IM	Alewife	240.00	272.00	198.45	F
20160302	0915	12.25	Night	THG IM	Black Crappie		311.00	510.29	U
20160302	0915	12.25	Night	THG IM	Alewife	212.00	237.00	113.40	M
20160302	0915	12.25	Night	THG IM	White Perch		310.00	396.89	U
20160302	0915	12.25	Night	THG IM	Alewife	239.00	272.00	170.10	U
20160302	0915	12.25	Night	THG IM	Alewife	245.00	281.00	198.45	F
20160302	0915	12.25	Night	THG IM	White Perch		127.00	14.17	U
20160302	0915	12.25	Night	THG IM	Black Crappie		131.00	14.17	U
20160302	1730	8.25	Day	SOG IM	Alewife	225.00	260.00	198.45	F
20160302	1730	8.25	Day	SOG IM	Alewife	237.00	272.00	198.45	F
20160302	1730	8.25	Day	SOG IM	Alewife	222.00	254.00	141.75	F
20160302	1730	8.25	Day	SOG IM	Atlantic Blue Crab		145.00		M
20160302	1730	8.25	Day	SOG IM	Atlantic Blue Crab		155.00		M
20160302	1730	8.25	Day	SOG EM	Gizzard Shad		195.00	56.70	U
20160302	1730	8.25	Day	SOG EM	White Perch		190.00	85.05	F
20160302	1900	9.75	Day	THG IM	Alewife	251.00	283.00		F
20160302	1900	9.75	Day	THG IM	White Perch		192.00		F
20160302	1900	9.75	Day	THG IM	Alewife	253.00	282.00		M
20160302	1900	9.75	Day	THG IM	Alewife	228.00	257.00		M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160302	1900	9.75	Day	THG IM	Alewife	218.00	239.00		M
20160302	1900	9.75	Day	THG IM	White Perch		218.00		M
20160302	1900	9.75	Day	THG IM	Alewife	245.00	266.00		U
20160302	1900	9.75	Day	THG IM	White Perch		179.00	85.05	F
20160302	1900	9.75	Day	THG IM	White Perch		220.00	170.10	M
20160302	1900	9.75	Day	THG IM	White Perch		200.00	113.40	M
20160302	1900	9.75	Day	THG IM	White Perch		152.00	28.35	M
20160302	1900	9.75	Day	THG IM	Gizzard Shad		151.00	14.17	U
20160303	0800	13.00	Night	SOG EM	White Perch		187.00	56.70	M
20160303	0800	13.00	Night	SOG IM	White Perch		287.00	396.89	F
20160303	0800	13.00	Night	SOG IM	Striped Mullet		295.00	198.45	U
20160303	0800	13.00	Night	SOG IM	White Perch		204.00	141.75	M
20160303	0800	13.00	Night	SOG IM	White Perch		242.00	226.80	U
20160303	0800	13.00	Night	SOG IM	White Perch		193.00	85.05	M
20160303	0800	13.00	Night	SOG IM	White Perch		173.00	85.05	M
20160303	0800	13.00	Night	SOG IM	White Perch		216.00	113.40	U
20160303	0800	13.00	Night	SOG IM	White Perch		214.00	113.40	M
20160303	0800	13.00	Night	SOG IM	White Perch		259.00	255.15	F
20160303	0800	13.00	Night	SOG IM	Alewife	212.00	243.00	113.40	M
20160303	0800	13.00	Night	SOG IM	White Perch		239.00	226.80	M
20160303	0800	13.00	Night	SOG IM	White Perch		218.00	170.10	F
20160303	0800	13.00	Night	SOG IM	White Perch		208.00	141.75	M
20160303	0800	13.00	Night	SOG IM	White Perch		205.00	113.40	M
20160303	0800	13.00	Night	SOG IM	White Perch		203.00	113.40	U
20160303	0800	13.00	Night	SOG IM	White Perch		262.00	283.50	M
20160303	0800	13.00	Night	SOG IM	Alewife	233.00	266.00	141.75	M
20160303	0800	13.00	Night	SOG IM	White Perch		199.00	113.40	F
20160303	0800	13.00	Night	SOG IM	White Perch		187.00	113.40	M
20160303	0800	13.00	Night	SOG IM	White Perch		223.00	141.75	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160303	0800	13.00	Night	SOG IM	White Perch		223.00	170.10	F
20160303	0800	13.00	Night	SOG IM	White Perch		216.00	141.75	M
20160303	0800	13.00	Night	SOG IM	White Perch		208.00	141.75	F
20160303	0800	13.00	Night	SOG IM	Gizzard Shad		373.00	510.29	U
20160303	0800	13.00	Night	SOG IM	Striped Mullet		270.00	170.10	U
20160303	0800	13.00	Night	SOG IM	White Perch		231.00	198.45	M
20160303	0800	13.00	Night	SOG IM	White Perch		177.00	85.05	M
20160303	0800	13.00	Night	SOG IM	White Perch		221.00	141.75	F
20160303	0800	13.00	Night	SOG IM	White Perch		232.00	170.10	M
20160303	0800	13.00	Night	SOG IM	White Perch		191.00	113.40	U
20160303	0800	13.00	Night	SOG IM	Alewife	212.00	235.00	141.75	M
20160303	0800	13.00	Night	SOG IM	White Perch		220.00	170.10	M
20160303	0800	13.00	Night	SOG IM	White Perch		233.00	198.45	F
20160303	0800	13.00	Night	SOG IM	White Perch		204.00	141.75	F
20160303	0800	13.00	Night	SOG IM	Gizzard Shad		224.00	113.40	U
20160303	0800	13.00	Night	SOG IM	White Perch		195.00	141.75	M
20160303	0800	13.00	Night	SOG IM	Redear Sunfish		146.00	85.05	U
20160303	0800	13.00	Night	SOG IM	White Perch		195.00	141.75	M
20160303	0800	13.00	Night	SOG IM	White Perch		218.00	170.10	M
20160303	0800	13.00	Night	SOG IM	White Perch		226.00	198.45	M
20160303	0800	13.00	Night	SOG IM	White Perch		213.00	141.75	M
20160303	0800	13.00	Night	SOG IM	White Perch		239.00	226.80	U
20160303	0800	13.00	Night	SOG IM	White Perch		210.00	141.75	U
20160303	0800	13.00	Night	SOG IM	White Perch		216.00	141.75	F
20160303	0800	13.00	Night	SOG IM	White Perch		198.00	141.75	U
20160303	0800	13.00	Night	SOG IM	White Perch		177.00	85.05	M
20160303	0800	13.00	Night	SOG IM	White Perch		235.00	198.45	U
20160303	0800	13.00	Night	SOG IM	Striped Mullet		288.00	226.80	U
20160303	0800	13.00	Night	SOG IM	White Perch		196.00	113.40	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160303	0800	13.00	Night	SOG IM	White Perch		239.00	198.45	U
20160303	0800	13.00	Night	SOG IM	Black Crappie		312.00	566.99	U
20160303	0800	13.00	Night	SOG IM	White Perch		207.00	113.40	U
20160303	0800	13.00	Night	SOG IM	White Perch		222.00	170.10	F
20160303	0800	13.00	Night	SOG IM	White Perch		223.00	141.75	M
20160303	0800	13.00	Night	SOG IM	Alewife	242.00	274.00	198.45	M
20160303	0800	13.00	Night	SOG IM	White Perch		205.00	141.75	M
20160303	0800	13.00	Night	SOG IM	Alewife	270.00	307.00	283.50	F
20160303	0800	13.00	Night	SOG IM	White Perch		244.00	226.80	U
20160303	0800	13.00	Night	SOG IM	White Perch		214.00	141.75	M
20160303	0800	13.00	Night	SOG IM	Black Crappie		310.00	368.54	U
20160303	0800	13.00	Night	SOG IM	White Perch		211.00	141.75	U
20160303	0800	13.00	Night	SOG IM	White Perch		204.00	141.75	M
20160303	0800	13.00	Night	SOG IM	White Perch		260.00	283.50	U
20160303	0800	13.00	Night	SOG IM	White Perch		251.00	226.80	U
20160303	0800	13.00	Night	SOG IM	White Perch		205.00	113.40	M
20160303	0800	13.00	Night	SOG IM	Black Crappie		252.00	311.84	U
20160303	0800	13.00	Night	SOG IM	Striped Mullet		325.00	311.84	U
20160303	0800	13.00	Night	SOG IM	Striped Mullet		332.00	311.84	U
20160303	0800	13.00	Night	SOG IM	White Perch		234.00	141.75	U
20160303	0800	13.00	Night	SOG IM	White Perch		235.00	198.45	M
20160303	0800	13.00	Night	SOG IM	White Perch		208.00	113.40	U
20160303	0800	13.00	Night	SOG IM	White Perch		205.00	113.40	M
20160303	0800	13.00	Night	SOG IM	White Perch		202.00	113.40	U
20160303	0800	13.00	Night	SOG IM	White Perch		253.00	283.50	U
20160303	0800	13.00	Night	SOG IM	White Perch		226.00	198.45	U
20160303	0800	13.00	Night	SOG IM	White Perch		202.00	113.40	M
20160303	0800	13.00	Night	SOG IM	Black Crappie		184.00	85.05	U
20160303	0800	13.00	Night	SOG IM	White Perch		180.00	85.05	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160303	0800	13.00	Night	SOG IM	White Perch		214.00	141.75	U
20160303	0800	13.00	Night	SOG IM	Alewife	235.00	269.00	170.10	M
20160303	0800	13.00	Night	SOG IM	White Perch		205.00	141.75	M
20160303	0800	13.00	Night	SOG IM	White Perch		206.00	141.75	U
20160303	0800	13.00	Night	SOG IM	White Perch		216.00	141.75	U
20160303	0800	13.00	Night	SOG IM	Alewife	205.00	248.00	141.75	F
20160303	0800	13.00	Night	SOG IM	Striped Mullet		307.00	255.15	U
20160303	0800	13.00	Night	SOG IM	Alewife	240.00	271.00	198.45	U
20160303	0800	13.00	Night	SOG IM	Gizzard Shad		217.00	283.50	M
20160303	0800	13.00	Night	SOG IM	Alewife	225.00	260.00	141.75	F
20160303	0800	13.00	Night	SOG IM	White Perch		210.00	113.40	M
20160303	0800	13.00	Night	SOG IM	White Perch		240.00	198.45	U
20160303	0800	13.00	Night	SOG IM	Striped Mullet		226.00	255.15	U
20160303	0800	13.00	Night	SOG IM	White Perch		210.00	141.75	U
20160303	0800	13.00	Night	SOG IM	White Perch		207.00	113.40	U
20160303	0800	13.00	Night	SOG IM	White Perch		181.00	85.05	U
20160303	0800	13.00	Night	SOG IM	White Perch		178.00	85.05	M
20160303	0800	13.00	Night	SOG IM	White Perch		172.00	85.05	M
20160303	0800	13.00	Night	SOG IM	White Perch		214.00	141.75	U
20160303	0800	13.00	Night	SOG IM	White Perch		175.00	85.05	M
20160303	0800	13.00	Night	SOG IM	White Perch		185.00	85.05	M
20160303	0800	13.00	Night	SOG IM	Striped Mullet		315.00	283.50	U
20160303	0800	13.00	Night	SOG IM	White Perch		211.00	141.75	U
20160303	0800	13.00	Night	SOG IM	Redear Sunfish		179.00	113.40	U
20160303	1000	14.00	Night	THG EM	Black Crappie		197.00	141.75	F
20160303	1000	14.00	Night	THG EM	Gizzard Shad		135.00	28.35	U
20160303	1000	14.00	Night	THG IM	Common Carp		511.00	1587.57	U
20160303	1000	14.00	Night	THG IM	Alewife	245.00	274.00	198.45	F
20160303	1000	14.00	Night	THG IM	Alewife	237.00	270.00	141.75	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160303	1000	14.00	Night	THG IM	White Perch		210.00	113.40	M
20160303	1000	14.00	Night	THG IM	White Perch		220.00	170.10	U
20160303	1000	14.00	Night	THG IM	Gizzard Shad		171.00	28.35	U
20160303	1000	14.00	Night	THG IM	White Perch		215.00	141.75	U
20160303	1000	14.00	Night	THG IM	Gizzard Shad		164.00	28.35	U
20160303	1000	14.00	Night	THG IM	Gizzard Shad		362.00	425.24	U
20160303	1000	14.00	Night	THG IM	Gizzard Shad		340.00	340.19	M
20160303	1000	14.00	Night	THG IM	Alewife	223.00	253.00	170.10	M
20160303	1000	14.00	Night	THG IM	White Perch		248.00	255.15	U
20160303	1000	14.00	Night	THG IM	Gizzard Shad		397.00	623.69	M
20160303	1000	14.00	Night	THG IM	White Perch		195.00	113.40	M
20160303	1000	14.00	Night	THG IM	Alewife	221.00	250.00	141.75	M
20160303	1000	14.00	Night	THG IM	Gizzard Shad		155.00	28.35	U
20160303	1000	14.00	Night	THG IM	White Perch		266.00	311.84	F
20160303	1000	14.00	Night	THG IM	White Perch		187.00	113.40	U
20160303	1000	14.00	Night	THG IM	White Perch		257.00	283.50	M
20160303	1000	14.00	Night	THG IM	Gizzard Shad		172.00	28.35	U
20160303	1000	14.00	Night	THG IM	White Perch		203.00	113.40	M
20160303	1000	14.00	Night	THG IM	Gizzard Shad		162.00	28.35	U
20160303	1000	14.00	Night	THG IM	Alewife	242.00	274.00	198.45	F
20160303	1000	14.00	Night	THG IM	Alewife	230.00	259.00	141.75	F
20160303	1000	14.00	Night	THG IM	White Perch		216.00	170.10	U
20160303	1000	14.00	Night	THG IM	Alewife	252.00	285.00	198.45	F
20160303	1000	14.00	Night	THG IM	White Perch		215.00	141.75	F
20160303	1000	14.00	Night	THG IM	Alewife	235.00	267.00	198.45	M
20160303	1000	14.00	Night	THG IM	White Perch		215.00	141.75	U
20160303	1000	14.00	Night	THG IM	White Perch		183.00	85.05	M
20160303	1000	14.00	Night	THG IM	White Perch		195.00	85.05	M
20160303	1000	14.00	Night	THG IM	White Perch		202.00	113.40	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160303	1000	14.00	Night	THG IM	White Perch		197.00	85.05	M
20160303	1000	14.00	Night	THG IM	White Perch		277.00	198.45	M
20160303	1000	14.00	Night	THG IM	White Perch		193.00	113.40	U
20160303	1000	14.00	Night	THG IM	White Perch		215.00	141.75	U
20160303	1000	14.00	Night	THG IM	White Perch		197.00	85.05	U
20160303	1000	14.00	Night	THG IM	White Perch		235.00	226.80	U
20160303	1000	14.00	Night	THG IM	Gizzard Shad		182.00	56.70	U
20160303	1000	14.00	Night	THG IM	Gizzard Shad		159.00	28.35	U
20160303	1700	7.00	Day	SOG IM	Alewife	243.00	279.00	170.10	U
20160303	1700	7.00	Day	SOG IM	Alewife	247.00	278.00	170.10	M
20160303	1700	7.00	Day	SOG IM	Alewife	455.00	268.00	141.75	M
20160303	1700	7.00	Day	SOG IM	Alewife	240.00	274.00	170.10	M
20160303	1700	7.00	Day	SOG IM	Alewife	206.00	662.00	85.05	M
20160303	1700	7.00	Day	SOG IM	Alewife	239.00	268.00	170.10	M
20160303	1700	7.00	Day	SOG IM	Alewife	236.00	267.00	141.75	M
20160303	1700	7.00	Day	SOG IM	Alewife	247.00	278.00	170.10	F
20160303	1700	7.00	Day	SOG IM	Alewife	238.00	270.00	141.75	U
20160303	1700	7.00	Day	SOG IM	Alewife	233.00	262.00	141.75	M
20160303	1700	7.00	Day	SOG IM	Alewife	236.00	270.00	170.10	U
20160303	1700	7.00	Day	SOG IM	Alewife	238.00	271.00	170.10	U
20160303	1700	7.00	Day	SOG IM	Alewife	211.00	240.00	85.05	U
20160303	1700	7.00	Day	SOG IM	Alewife	216.00	245.00	85.05	M
20160303	1700	7.00	Day	SOG IM	Alewife	242.00	274.00	113.40	U
20160303	1700	7.00	Day	SOG IM	Alewife	230.00	259.00	113.40	U
20160303	1700	7.00	Day	SOG IM	White Perch		209.00	113.40	F
20160303	1700	7.00	Day	SOG IM	White Perch		183.00	56.70	U
20160303	1700	7.00	Day	SOG IM	White Perch		212.00	113.40	M
20160303	1700	7.00	Day	SOG EM	Gizzard Shad		156.00	14.17	U
20160303	1745	7.00	Day	THG EM	Pumpkinseed		100.00	14.17	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160303	1745	7.00	Day	THG IM	Alewife	245.00	281.00	198.45	U
20160303	1745	7.00	Day	THG IM	Alewife	244.00	277.00	198.45	F
20160303	1745	7.00	Day	THG IM	Alewife	223.00	254.00	141.75	M
20160303	1745	7.00	Day	THG IM	Alewife	214.00	245.00	113.40	U
20160303	1745	7.00	Day	THG IM	Alewife	226.00	257.00	113.40	F
20160303	1745	7.00	Day	THG IM	Gizzard Shad		156.00	28.35	M
20160303	1745	7.00	Day	THG IM	Redear Sunfish		142.00	56.70	U
20160303	1745	7.00	Day	THG IM	White Perch		196.00	113.40	M
20160303	1745	7.00	Day	THG IM	White Perch		200.00	113.40	F
20160310	0800	11.50	Night	THG IM	White Perch		213.00	113.40	U
20160310	0800	11.50	Night	THG IM	Alewife	250.00	284.00	226.80	U
20160310	0800	11.50	Night	THG IM	Alewife	223.00	255.00	170.10	U
20160310	0800	11.50	Night	THG IM	Alewife	238.00	274.00	170.10	U
20160310	0800	11.50	Night	THG IM	Alewife	233.00	264.00	170.10	U
20160310	0800	11.50	Night	THG IM	White Perch		175.00	56.70	M
20160310	0800	11.50	Night	THG IM	Alewife	238.00	269.00	198.45	F
20160310	0800	11.50	Night	THG IM	Alewife	231.00	265.00	170.10	F
20160310	0800	11.50	Night	THG IM	Alewife	223.00	254.00	141.75	U
20160310	0800	11.50	Night	THG IM	Alewife	227.00	255.00	170.10	M
20160310	0800	11.50	Night	THG IM	White Perch		146.00	28.35	U
20160310	0800	11.50	Night	THG IM	White Perch		197.00	113.40	M
20160310	0800	11.50	Night	THG IM	White Perch		165.00	85.05	M
20160310	0800	11.50	Night	THG IM	White Perch		160.00	85.05	M
20160310	0800	11.50	Night	THG IM	White Perch		199.00	113.40	U
20160310	0800	11.50	Night	THG IM	White Perch		184.00	85.05	M
20160310	0800	11.50	Night	THG IM	White Perch		179.00	85.05	M
20160310	0800	11.50	Night	THG IM	White Perch		194.00	85.05	M
20160310	0800	11.50	Night	THG IM	Gizzard Shad		156.00	28.35	U
20160310	0800	11.50	Night	THG IM	White Perch		124.00	28.35	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160310	0800	11.50	Night	THG EM	Bluegill		154.00	56.70	U
20160310	0830	12.00	Night	SOG IM	White Perch		273.00	340.19	F
20160310	0830	12.00	Night	SOG IM	Alewife	227.00	258.00	170.10	M
20160310	0830	12.00	Night	SOG IM	Alewife	272.00	303.00	311.84	U
20160310	0830	12.00	Night	SOG IM	Alewife	237.00	266.00	226.80	F
20160310	0830	12.00	Night	SOG IM	Alewife	220.00	248.00	170.10	M
20160310	0830	12.00	Night	SOG IM	Alewife	227.00	255.00	141.75	F
20160310	0830	12.00	Night	SOG IM	White Perch		185.00	85.05	M
20160310	0830	12.00	Night	SOG IM	White Perch		168.00	28.35	U
20160310	0830	12.00	Night	SOG IM	Pumpkinseed		175.00	85.05	U
20160310	0830	12.00	Night	SOG IM	White Perch		197.00	85.05	U
20160310	0830	12.00	Night	SOG IM	Atlantic Blue Crab		150.00		M
20160310	0830	12.00	Night	SOG IM	Atlantic Blue Crab		171.00		M
20160310	0830	12.00	Night	SOG IM	Atlantic Blue Crab		175.00		M
20160310	0830	12.00	Night	SOG IM	Atlantic Blue Crab		155.00		M
20160310	0830	12.00	Night	SOG IM	Atlantic Blue Crab		165.00		M
20160310	0830	12.00	Night	SOG IM	Atlantic Blue Crab		160.00		M
20160310	0830	12.00	Night	SOG IM	Atlantic Blue Crab		135.00		M
20160310	0830	12.00	Night	SOG IM	Atlantic Blue Crab		155.00		M
20160310	1800	8.50	Day	SOG IM	Alewife	256.00	284.00	198.45	U
20160310	1800	8.50	Day	SOG IM	Alewife	237.00	266.00	170.10	U
20160310	1800	8.50	Day	SOG IM	Alewife	214.00	242.00	113.40	F
20160310	1800	8.50	Day	SOG IM	Redear Sunfish		147.00	28.35	U
20160310	1800	8.50	Day	SOG EM	Atlantic Blue Crab		177.00		M
20160310	1800	8.50	Day	SOG EM	Atlantic Blue Crab		144.00		M
20160310	1800	8.50	Day	SOG EM	Atlantic Blue Crab		149.00		M
20160310	1800	8.50	Day	SOG EM	Atlantic Blue Crab		163.00		M
20160310	1800	8.50	Day	SOG EM	Atlantic Blue Crab		163.00		M
20160310	1815	9.75	Day	THG IM	White Perch		147.00	28.35	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160310	1815	9.75	Day	THG IM	White Perch		197.00	141.75	U
20160310	1815	9.75	Day	THG IM	Gizzard Shad		273.00	141.75	M
20160310	1815	9.75	Day	THG IM	White Perch		217.00	141.75	F
20160310	1815	9.75	Day	THG IM	Gizzard Shad		166.00	28.35	U
20160310	1815	9.75	Day	THG IM	White Perch		192.00	85.05	M
20160310	1815	9.75	Day	THG IM	White Perch		168.00	56.70	M
20160310	1815	9.75	Day	THG IM	Alewife	221.00	247.00	141.75	M
20160310	1815	9.75	Day	THG IM	White Perch		182.00	56.70	M
20160310	1815	9.75	Day	THG IM	Alewife	236.00	269.00	170.10	M
20160310	1815	9.75	Day	THG IM	White Perch		244.00	198.45	F
20160310	1815	9.75	Day	THG IM	White Perch		214.00	141.75	U
20160310	1815	9.75	Day	THG IM	White Perch		194.00	113.40	M
20160310	1815	9.75	Day	THG IM	White Perch		175.00	56.70	M
20160310	1815	9.75	Day	THG EM	Redear Sunfish		129.00	28.35	U
20160311	0715	13.25	Night	SOG IM	Alewife	238.00	274.00	141.75	F
20160311	0715	13.25	Night	SOG IM	White Perch		223.00	141.75	U
20160311	0715	13.25	Night	SOG IM	White Perch		247.00	226.80	U
20160311	0715	13.25	Night	SOG IM	White Perch		272.00	311.84	U
20160311	0715	13.25	Night	SOG IM	White Perch		218.00	141.75	U
20160311	0715	13.25	Night	SOG IM	Black Crappie		278.00	311.84	F
20160311	0715	13.25	Night	SOG IM	White Perch		276.00	283.50	U
20160311	0715	13.25	Night	SOG IM	Gizzard Shad		378.00	510.29	F
20160311	0715	13.25	Night	SOG IM	White Perch		241.00	198.45	U
20160311	0715	13.25	Night	SOG IM	White Perch		239.00	141.75	U
20160311	0715	13.25	Night	SOG EM	White Perch		182.00	56.70	U
20160311	0715	13.25	Night	SOG EM	Atlantic Blue Crab		125.00		M
20160311	0715	13.25	Night	SOG EM	Atlantic Blue Crab		127.00		M
20160311	0715	13.25	Night	SOG EM	Atlantic Blue Crab		132.00		M
20160311	0715	13.25	Night	SOG EM	Atlantic Blue Crab		158.00		F

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160311	0715	13.25	Night	SOG EM	Atlantic Blue Crab		115.00		M
20160311	0745	13.25	Night	THG IM	Gizzard Shad		382.00	510.29	U
20160311	0745	13.25	Night	THG IM	White Perch		240.00	198.45	F
20160311	0745	13.25	Night	THG IM	Alewife	236.00	267.00	141.75	F
20160311	0745	13.25	Night	THG IM	White Perch		256.00	255.15	F
20160311	0745	13.25	Night	THG IM	White Perch		163.00	28.35	U
20160311	0745	13.25	Night	THG IM	Alewife	220.00	250.00	113.40	U
20160311	0745	13.25	Night	THG IM	White Perch		134.00	28.35	U
20160311	0745	13.25	Night	THG IM	White Perch		240.00	226.80	U
20160311	0745	13.25	Night	THG IM	Alewife	225.00	257.00	141.75	F
20160311	0745	13.25	Night	THG IM	White Perch		260.00	255.15	F
20160311	0745	13.25	Night	THG IM	White Perch		250.00	255.15	U
20160311	0745	13.25	Night	THG IM	White Perch		242.00	198.45	U
20160311	0745	13.25	Night	THG IM	White Perch		258.00	255.15	U
20160311	0745	13.25	Night	THG IM	Gizzard Shad		123.00	28.35	U
20160311	0745	13.25	Night	THG IM	Alewife	225.00	257.00	113.40	U
20160311	0745	13.25	Night	THG IM	White Perch		194.00	113.40	M
20160311	0745	13.25	Night	THG IM	White Perch		211.00	141.75	U
20160311	0745	13.25	Night	THG IM	Gizzard Shad		193.00	28.35	U
20160311	0745	13.25	Night	THG IM	Alewife	220.00	250.00	141.75	M
20160311	0745	13.25	Night	THG IM	Gizzard Shad		174.00	28.35	U
20160311	0745	13.25	Night	THG IM	White Perch		123.00	28.35	U
20160311	0745	13.25	Night	THG IM	White Perch		178.00	85.05	M
20160311	0745	13.25	Night	THG IM	White Perch		194.00	85.05	U
20160311	0745	13.25	Night	THG IM	White Perch		262.00	283.50	F
20160311	0745	13.25	Night	THG IM	White Perch		223.00	170.10	F
20160311	1800	10.50	Day	SOG IM	Largemouth Bass		437.00	1190.68	F
20160311	1800	10.50	Day	SOG IM	Alewife	eaten			U
20160311	1800	10.50	Day	SOG IM	Alewife	eaten			U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160311	1800	10.50	Day	SOG IM	White Perch	eaten			U
20160311	1800	10.50	Day	SOG IM	American Eel	escaped			U
20160311	1800	10.50	Day	SOG IM	Largemouth Bass		301.00	283.50	U
20160311	1800	10.50	Day	SOG IM	Alewife	228.00	257.00	141.75	M
20160311	1800	10.50	Day	SOG IM	Alewife	249.00	280.00	198.45	F
20160311	1800	10.50	Day	SOG IM	Alewife	208.00	232.00	85.05	M
20160311	1800	10.50	Day	SOG IM	Alewife	236.00	268.00	170.10	U
20160311	1800	10.50	Day	SOG IM	Alewife	233.00	264.00	141.75	U
20160311	1800	10.50	Day	SOG IM	Alewife	225.00	256.00	113.40	M
20160311	1800	10.50	Day	SOG EM	Striped Mullet		281.00	141.75	U
20160311	1800	10.50	Day	SOG EM	Atlantic Blue Crab		172.00		M
20160311	1800	10.50	Day	SOG EM	Atlantic Blue Crab		154.00		M
20160311	1830	10.50	Day	THG IM	Black Crappie		327.00	652.04	F
20160311	1830	10.50	Day	THG IM	White Perch		214.00	141.75	U
20160311	1830	10.50	Day	THG IM	Alewife	235.00	263.00	170.10	U
20160311	1830	10.50	Day	THG IM	Black Crappie		315.00	595.34	U
20160311	1830	10.50	Day	THG IM	Alewife	241.00	266.00	198.45	U
20160311	1830	10.50	Day	THG IM	Alewife	194.00	221.00	85.05	M
20160311	1830	10.50	Day	THG IM	Bowfin		397.00	453.59	U
20160311	1830	10.50	Day	THG IM	Alewife	232.00	263.00	141.75	U
20160311	1830	10.50	Day	THG IM	White Perch		227.00	198.45	F
20160311	1830	10.50	Day	THG IM	White Perch		194.00	85.05	M
20160311	1830	10.50	Day	THG IM	Alewife	227.00	258.00	170.10	M
20160311	1830	10.50	Day	THG EM	White Perch		133.00	28.35	U
20160318	2330	6.75	Night	SOG EM	White Perch		172.00	56.70	M
20160318	2330	6.75	Night	SOG EM	White Perch				U
20160318	2330	6.75	Night	SOG EM	Alewife	245.00	276.00	141.75	F
20160318	2330	6.75	Night	SOG EM	Alewife	228.00	260.00	113.40	M
20160318	2330	6.75	Night	SOG EM	Alewife	230.00	263.00	113.40	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160318	2330	6.75	Night	SOG EM	White Perch		178.00	56.70	M
20160318	2330	6.75	Night	SOG EM	White Perch		212.00	85.05	U
20160318	2330	6.75	Night	SOG EM	Alewife	227.00	258.00	113.40	M
20160318	2330	6.75	Night	SOG IM	White Perch		173.00	28.35	M
20160318	2330	6.75	Night	SOG IM	Black Crappie		140.00	14.17	U
20160318	2330	6.75	Night	SOG IM	Atlantic Blue Crab		115.00		F
20160318	2345	7.50	Night	THG EM	Black Crappie		275.00	255.15	F
20160318	2345	7.50	Night	THG IM	Alewife	212.00	241.00	85.05	M
20160319	0800	8.00	Night	THG EM	White Perch		240.00	198.45	U
20160319	0800	8.00	Night	THG EM	Alewife	217.00	247.00	113.40	U
20160319	0830	8.75	Night	SOG EM	White Perch		126.00	85.05	M
20160319	0830	8.75	Night	SOG EM	White Perch		200.00	85.05	M
20160319	0830	8.75	Night	SOG EM	White Perch		199.00	113.40	F
20160319	0830	8.75	Night	SOG EM	White Perch		203.00	113.40	M
20160319	0830	8.75	Night	SOG EM	White Perch		262.00	283.50	U
20160319	0830	8.75	Night	SOG EM	White Perch		223.00	141.75	U
20160319	0830	8.75	Night	SOG EM	White Perch		204.00	113.40	U
20160319	0830	8.75	Night	SOG EM	White Perch		220.00	141.75	U
20160319	0830	8.75	Night	SOG EM	White Perch		213.00	113.40	U
20160319	0830	8.75	Night	SOG EM	White Perch		222.00	170.10	M
20160319	0830	8.75	Night	SOG EM	White Perch		262.00	311.84	F
20160319	0830	8.75	Night	SOG EM	White Perch		233.00	198.45	U
20160319	0830	8.75	Night	SOG EM	White Perch		221.00	170.10	U
20160319	0830	8.75	Night	SOG EM	White Perch		251.00	226.80	U
20160319	0830	8.75	Night	SOG EM	White Perch		200.00	141.75	U
20160319	0830	8.75	Night	SOG EM	White Perch		195.00	113.40	M
20160319	0830	8.75	Night	SOG EM	White Perch		242.00	198.45	F
20160319	0830	8.75	Night	SOG EM	White Perch		205.00	141.75	F
20160319	0830	8.75	Night	SOG EM	White Perch		220.00	198.45	F

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160319	0830	8.75	Night	SOG EM	White Perch		206.00	170.10	M
20160319	0830	8.75	Night	SOG EM	White Perch		209.00	141.75	U
20160319	0830	8.75	Night	SOG EM	White Perch		252.00	255.15	U
20160319	0830	8.75	Night	SOG EM	White Perch		231.00	226.80	U
20160319	0830	8.75	Night	SOG EM	White Perch		209.00	198.45	U
20160319	0830	8.75	Night	SOG EM	White Perch		212.00	170.10	U
20160319	0830	8.75	Night	SOG EM	White Perch		233.00	141.75	M
20160319	0830	8.75	Night	SOG EM	White Perch		240.00	198.45	F
20160319	0830	8.75	Night	SOG EM	White Perch		232.00	141.75	M
20160319	0830	8.75	Night	SOG EM	White Perch		231.00	141.75	U
20160319	0830	8.75	Night	SOG EM	White Perch		195.00	85.05	U
20160319	0830	8.75	Night	SOG EM	White Perch		217.00	113.40	F
20160319	0830	8.75	Night	SOG EM	White Perch		201.00	113.40	M
20160319	0830	8.75	Night	SOG EM	White Perch		195.00	85.05	M
20160319	0830	8.75	Night	SOG EM	White Perch		206.00	85.05	F
20160319	0830	8.75	Night	SOG EM	White Perch		220.00	113.40	U
20160319	0830	8.75	Night	SOG EM	White Perch		200.00	113.40	U
20160319	0830	8.75	Night	SOG EM	White Perch		188.00	56.70	M
20160319	0830	8.75	Night	SOG EM	White Perch		192.00	85.05	U
20160319	0830	8.75	Night	SOG EM	White Perch		193.00	85.05	M
20160319	0830	8.75	Night	SOG EM	White Perch		194.00	56.70	M
20160319	0830	8.75	Night	SOG EM	White Perch		212.00	113.40	M
20160319	0830	8.75	Night	SOG EM	White Perch		222.00	113.40	U
20160319	0830	8.75	Night	SOG EM	White Perch		211.00	113.40	U
20160319	0830	8.75	Night	SOG EM	White Perch		195.00	56.70	U
20160319	0830	8.75	Night	SOG EM	White Perch		178.00	56.70	M
20160319	0830	8.75	Night	SOG EM	White Perch		216.00	113.40	U
20160319	0830	8.75	Night	SOG EM	White Perch		210.00	113.40	M
20160319	0830	8.75	Night	SOG EM	White Perch		224.00	141.75	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160319	0830	8.75	Night	SOG EM	White Perch		202.00	85.05	U
20160319	0830	8.75	Night	SOG EM	White Perch		182.00	56.70	U
20160319	0830	8.75	Night	SOG EM	Alewife		284.00	141.75	U
20160319	0830	8.75	Night	SOG EM	Alewife		277.00	198.45	M
20160319	0830	8.75	Night	SOG EM	Alewife		306.00	226.80	U
20160319	0830	8.75	Night	SOG EM	Alewife		270.00	141.75	M
20160319	0830	8.75	Night	SOG EM	White Perch		225.00	113.40	U
20160319	0830	8.75	Night	SOG EM	White Perch		227.00	141.75	U
20160319	0830	8.75	Night	SOG EM	White Perch		192.00	85.05	M
20160319	0830	8.75	Night	SOG EM	White Perch		205.00	85.05	M
20160319	0830	8.75	Night	SOG IM	Pumpkinseed		204.00	198.45	U
20160319	0830	8.75	Night	SOG IM	White Perch		223.00	141.75	U
20160319	0830	8.75	Night	SOG IM	Atlantic Blue Crab		165.00		F
20160319	1745	8.25	Day	THG IM	Atlantic Blue Crab		155.00		M
20160319	1745	8.25	Day	THG IM	Gizzard Shad		221.00	113.40	U
20160319	1745	8.25	Day	THG IM	Gizzard Shad		430.00	793.79	F
20160319	1800	8.50	Day	SOG EM	White Perch		237.00	198.45	M
20160319	1800	8.50	Day	SOG EM	Black Crappie		148.00	28.35	U
20160319	1800	8.50	Day	SOG EM	Alewife	232.00	265.00	113.40	M
20160319	1800	8.50	Day	SOG EM	Alewife	238.00	271.00	141.75	M
20160319	1800	8.50	Day	SOG EM	White Perch		202.00	85.05	M
20160319	1800	8.50	Day	SOG EM	White Perch		221.00	141.75	M
20160319	1800	8.50	Day	SOG EM	White Perch		246.00	198.45	U
20160319	1800	8.50	Day	SOG EM	Alewife		275.00	113.40	F
20160319	1800	8.50	Day	SOG EM	White Perch		188.00	85.05	M
20160319	1800	8.50	Day	SOG EM	White Perch		195.00	85.05	M
20160319	1800	8.50	Day	SOG EM	White Perch		219.00	141.75	U
20160319	1800	8.50	Day	SOG EM	White Perch		195.00	85.05	M
20160319	1800	8.50	Day	SOG EM	White Perch		180.00	56.70	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160319	1800	8.50	Day	SOG EM	White Perch		231.00	141.75	F
20160319	1800	8.50	Day	SOG EM	White Perch		219.00	141.75	M
20160319	1800	8.50	Day	SOG EM	White Perch		200.00	85.05	U
20160319	1800	8.50	Day	SOG EM	White Perch		265.00	255.15	M
20160319	1800	8.50	Day	SOG EM	White Perch		191.00	85.05	U
20160319	1800	8.50	Day	SOG EM	White Perch		181.00	56.70	M
20160319	1800	8.50	Day	SOG EM	White Perch		197.00	85.05	M
20160319	1800	8.50	Day	SOG EM	White Perch		218.00	113.40	U
20160319	1800	8.50	Day	SOG EM	White Perch		206.00	113.40	M
20160319	1800	8.50	Day	SOG EM	White Perch		243.00	170.10	U
20160319	1800	8.50	Day	SOG EM	White Perch		203.00	113.40	U
20160319	1800	8.50	Day	SOG EM	White Perch		206.00	85.05	M
20160319	1800	8.50	Day	SOG EM	White Perch		211.00	85.05	M
20160319	1800	8.50	Day	SOG EM	White Perch		196.00	85.05	U
20160319	1800	8.50	Day	SOG EM	White Perch		190.00	85.05	M
20160319	1800	8.50	Day	SOG EM	White Perch		200.00	85.05	M
20160319	1800	8.50	Day	SOG IM	Alewife	218.00	251.00	85.05	U
20160319	1800	8.50	Day	SOG IM	Golden Shiner		186.00	28.35	U
20160319	1800	8.50	Day	SOG IM	White Perch		187.00	56.70	M
20160319	1800	8.50	Day	SOG IM	White Perch		173.00	56.70	M
20160319	1800	8.50	Day	SOG IM	White Perch		178.00	56.70	M
20160319	1800	8.50	Day	SOG IM	White Perch		166.00	28.35	M
20160319	1800	8.50	Day	SOG IM	Black Crappie		138.00	28.35	U
20160319	2130	3.75	Night	THG IM	Black Crappie		290.00	425.24	U
20160319	2130	3.75	Night	THG IM	Redear Sunfish		130.00	28.35	U
20160319	2130	3.75	Night	THG EM	Alewife	263.00	298.00	198.45	F
20160319	2130	3.75	Night	THG EM	Alewife	229.00	261.00	85.05	F
20160319	2145	3.75	Night	SOG EM	White Perch		175.00	28.35	M
20160319	2145	3.75	Night	SOG EM	White Perch		186.00	56.70	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160319	2145	3.75	Night	SOG EM	White Perch		194.00	56.70	M
20160319	2145	3.75	Night	SOG EM	White Perch		177.00	28.35	M
20160319	2145	3.75	Night	SOG EM	White Perch		201.00	56.70	U
20160319	2145	3.75	Night	SOG EM	White Perch		236.00	113.40	U
20160319	2145	3.75	Night	SOG EM	White Perch		229.00	113.40	M
20160319	2145	3.75	Night	SOG EM	White Perch		194.00	56.70	U
20160319	2145	3.75	Night	SOG EM	White Perch		252.00	141.75	M
20160319	2145	3.75	Night	SOG EM	White Perch		186.00	56.70	U
20160319	2145	3.75	Night	SOG EM	White Perch		216.00	85.05	U
20160319	2145	3.75	Night	SOG EM	White Perch		200.00	56.70	U
20160319	2145	3.75	Night	SOG EM	Alewife	252.00	289.00	141.75	F
20160319	2145	3.75	Night	SOG IM	White Perch		203.00	56.70	M
20160319	2145	3.75	Night	SOG IM	White Perch		191.00	56.70	M
20160319	2145	3.75	Night	SOG IM	White Perch		246.00	141.75	U
20160319	2145	3.75	Night	SOG IM	Black Crappie		245.00	453.59	F
20160319	2145	3.75	Night	SOG IM	Black Crappie		249.00	226.80	U
20160319	2145	3.75	Night	SOG IM	Black Crappie		200.00	56.70	M
20160319	2145	3.75	Night	SOG IM	Black Crappie		177.00	28.35	M
20160319	2145	3.75	Night	SOG IM	Black Crappie		186.00	56.70	M
20160319	2145	3.75	Night	SOG IM	Black Crappie		276.00	340.19	F
20160319	2145	3.75	Night	SOG IM	White Perch		182.00	28.35	M
20160319	2145	3.75	Night	SOG IM	White Perch		264.00	226.80	M
20160319	2145	3.75	Night	SOG IM	White Perch		211.00	85.05	M
20160319	2145	3.75	Night	SOG IM	White Perch		223.00	113.40	M
20160319	2145	3.75	Night	SOG IM	Bluegill		145.00	28.35	U
20160320	0745	9.75	Night	SOG EM	Atlantic Blue Crab		153.00		M
20160320	0745	9.75	Night	SOG EM	Alewife	238.00	273.00	141.75	U
20160320	0745	9.75	Night	SOG EM	White Perch		252.00	198.45	U
20160320	0745	9.75	Night	SOG EM	White Perch		223.00	141.75	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160320	0745	9.75	Night	SOG EM	White Perch		197.00	85.05	M
20160320	0745	9.75	Night	SOG EM	White Perch		206.00	113.40	M
20160320	0745	9.75	Night	SOG EM	White Perch		182.00	56.70	M
20160320	0745	9.75	Night	SOG EM	White Perch		232.00	141.75	U
20160320	0745	9.75	Night	SOG EM	White Perch		178.00	28.35	M
20160320	0745	9.75	Night	SOG EM	Bluegill		eaten		U
20160320	0745	9.75	Night	SOG EM	Common Carp		432.00	1020.58	M
20160320	0745	9.75	Night	SOG IM	Black Crappie		322.00	623.69	F
20160320	0745	9.75	Night	SOG IM	Alewife	239.00	272.00	198.45	U
20160320	0745	9.75	Night	SOG IM	Black Crappie		305.00	566.99	F
20160320	0745	9.75	Night	SOG IM	Alewife	230.00	260.00	141.75	M
20160320	0745	9.75	Night	SOG IM	Gizzard Shad		344.00	368.54	M
20160320	0745	9.75	Night	SOG IM	White Perch		278.00	396.89	U
20160320	0745	9.75	Night	SOG IM	Gizzard Shad		358.00	425.24	U
20160320	0745	9.75	Night	SOG IM	Black Crappie		222.00	141.75	U
20160320	0745	9.75	Night	SOG IM	White Perch		250.00	255.15	U
20160320	0745	9.75	Night	SOG IM	Alewife	213.00	238.00	113.40	M
20160320	0830	11.00	Night	THG EM	Bluegill		150.00	28.35	U
20160320	0830	11.00	Night	THG EM	White Perch		115.00	28.35	U
20160320	0830	11.00	Night	THG IM	Alewife	210.00	242.00	85.05	M
20160324	0900	13.00	Night	SOG EM	White Perch		186.00	85.05	M
20160324	0900	13.00	Night	SOG EM	White Perch		227.00	141.75	U
20160324	0900	13.00	Night	SOG EM	White Perch		185.00	85.05	M
20160324	0900	13.00	Night	SOG EM	White Perch		210.00	113.40	U
20160324	0900	13.00	Night	SOG EM	White Perch		220.00	113.40	M
20160324	0900	13.00	Night	SOG EM	White Perch		191.00	85.05	M
20160324	0900	13.00	Night	SOG EM	White Perch		186.00	85.05	M
20160324	0900	13.00	Night	SOG EM	White Perch		207.00	141.75	U
20160324	0900	13.00	Night	SOG EM	White Perch		210.00	141.75	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160324	0900	13.00	Night	SOG EM	White Perch		192.00	85.05	U
20160324	0900	13.00	Night	SOG EM	White Perch		194.00	85.05	M
20160324	0900	13.00	Night	SOG EM	White Perch		196.00	85.05	U
20160324	0900	13.00	Night	SOG EM	White Perch		185.00	85.05	U
20160324	0900	13.00	Night	SOG EM	Atlantic Blue Crab		155.00		M
20160324	0900	13.00	Night	SOG EM	Atlantic Blue Crab		170.00		M
20160324	0900	13.00	Night	SOG IM	White Perch		200.00	141.75	U
20160324	0900	13.00	Night	SOG IM	White Perch		191.00	85.05	U
20160324	0900	13.00	Night	SOG IM	Black Crappie		314.00	510.29	U
20160324	0900	13.00	Night	SOG IM	White Perch		236.00	226.80	U
20160324	0900	13.00	Night	SOG IM	White Perch		205.00	141.75	U
20160324	0900	13.00	Night	SOG IM	White Perch		251.00	226.80	F
20160324	0900	13.00	Night	SOG IM	White Perch		189.00	85.05	M
20160324	0900	13.00	Night	SOG IM	White Perch		260.00	226.80	U
20160324	0900	13.00	Night	SOG IM	Alewife	235.00	266.00	141.75	M
20160324	0900	13.00	Night	SOG IM	Alewife	240.00	274.00	198.45	F
20160324	0900	13.00	Night	SOG IM	Alewife	225.00	256.00	113.40	M
20160324	0945	13.75	Night	THG IM	Alewife	234.00	268.00	141.75	M
20160324	0945	13.75	Night	THG IM	Alewife	237.00	272.00	141.75	M
20160324	0945	13.75	Night	THG IM	Alewife	202.00	231.00	85.05	M
20160324	0945	13.75	Night	THG IM	Alewife	234.00	264.00	141.75	F
20160324	0945	13.75	Night	THG IM	Alewife	235.00	267.00	141.75	F
20160324	0945	13.75	Night	THG IM	Alewife	248.00	284.00	170.10	F
20160324	0945	13.75	Night	THG IM	Alewife	226.00	255.00	113.40	F
20160324	0945	13.75	Night	THG IM	White Perch		229.00	113.40	U
20160324	0945	13.75	Night	THG IM	Alewife	228.00	262.00	141.75	M
20160324	0945	13.75	Night	THG IM	Alewife	228.00	261.00	113.40	M
20160324	0945	13.75	Night	THG IM	Black Crappie		167.00	28.35	U
20160324	0945	13.75	Night	THG IM	Alewife	214.00	245.00	85.05	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160324	0945	13.75	Night	THG IM	Alewife	237.00	271.00	141.75	F
20160324	0945	13.75	Night	THG IM	White Perch		188.00	56.70	M
20160324	0945	13.75	Night	THG IM	Gizzard Shad		149.00	28.35	U
20160324	0945	13.75	Night	THG IM	White Perch		218.00	113.40	U
20160324	1800	8.00	Day	THG IM	Alewife	248.00	283.00	198.45	F
20160324	1800	8.00	Day	THG IM	Gizzard Shad		158.00	28.35	U
20160324	1800	8.00	Day	THG IM	Alewife	230.00	263.00	141.75	M
20160324	1800	8.00	Day	THG EM	yellow_perch		125.00	28.35	U
20160324	1830	9.00	Day	SOG EM	American Eel		670.00	453.59	U
20160324	1830	9.00	Day	SOG EM	White Perch		170.00	56.70	M
20160324	1830	9.00	Day	SOG EM	White Perch		204.00	113.40	M
20160324	1830	9.00	Day	SOG EM	White Perch		197.00	85.05	M
20160324	1830	9.00	Day	SOG EM	White Perch		205.00	113.40	M
20160324	1830	9.00	Day	SOG EM	White Perch		172.00	28.35	U
20160324	1830	9.00	Day	SOG EM	White Perch		199.00	113.40	U
20160324	1830	9.00	Day	SOG EM	White Perch		203.00	85.05	U
20160324	1830	9.00	Day	SOG EM	White Perch		195.00	85.05	M
20160324	1830	9.00	Day	SOG EM	Redear Sunfish		190.00	113.40	M
20160324	1830	9.00	Day	SOG EM	White Perch		229.00	170.10	U
20160324	1830	9.00	Day	SOG EM	Largemouth Bass		390.00	793.79	M
20160324	1830	9.00	Day	SOG EM	White Perch		195.00	85.05	M
20160324	1830	9.00	Day	SOG EM	White Perch		194.00	56.70	M
20160324	1830	9.00	Day	SOG EM	White Perch		184.00	56.70	M
20160324	1830	9.00	Day	SOG EM	White Perch		213.00	113.40	U
20160324	1830	9.00	Day	SOG EM	White Perch		183.00	56.70	M
20160324	1830	9.00	Day	SOG EM	Alewife	226.00	256.00	113.40	U
20160324	1830	9.00	Day	SOG EM	Alewife	233.00	267.00	113.40	F
20160324	1830	9.00	Day	SOG IM	Alewife	224.00	257.00	141.75	M
20160324	1830	9.00	Day	SOG IM	Alewife	255.00	286.00	198.45	F

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160324	1830	9.00	Day	SOG IM	Alewife	235.00	266.00	141.75	M
20160324	1830	9.00	Day	SOG IM	Alewife	233.00	263.00	141.75	M
20160324	1830	9.00	Day	SOG IM	Largemouth Bass		396.00	907.18	U
20160324	1830	9.00	Day	SOG IM	Alewife	228.00	260.00	141.75	M
20160324	1830	9.00	Day	SOG IM	Alewife	230.00	263.00	141.75	M
20160324	1830	9.00	Day	SOG IM	Largemouth Bass		368.00	708.74	M
20160324	1830	9.00	Day	SOG IM	White Perch		184.00	56.70	M
20160325	0730	13.25	Night	THG IM	White Perch		169.00	56.70	M
20160325	0730	13.25	Night	THG IM	White Perch		218.00	141.75	U
20160325	0730	13.25	Night	THG IM	Alewife	242.00	274.00	198.45	U
20160325	0730	13.25	Night	THG IM	Alewife	218.00	247.00	141.75	M
20160325	0730	13.25	Night	THG IM	Gizzard Shad		294.00	255.15	M
20160325	0730	13.25	Night	THG IM	Alewife	221.00	252.00	113.40	U
20160325	0730	13.25	Night	THG IM	Alewife	241.00	273.00	170.10	U
20160325	0730	13.25	Night	THG IM	Alewife	222.00	253.00	113.40	U
20160325	0730	13.25	Night	THG IM	Gizzard Shad		149.00	14.17	U
20160325	0730	13.25	Night	THG IM	White Perch		172.00	56.70	M
20160325	0730	13.25	Night	THG IM	Alewife	243.00	276.00	198.45	U
20160325	0730	13.25	Night	THG IM	Alewife	224.00	255.00	113.40	M
20160325	0730	13.25	Night	THG IM	Gizzard Shad		118.00	14.17	U
20160325	0830	13.50	Night	SOG EM	White Perch		213.00	85.05	U
20160325	0830	13.50	Night	SOG EM	White Perch		169.00	56.70	M
20160325	0830	13.50	Night	SOG EM	White Perch		196.00	85.05	U
20160325	0830	13.50	Night	SOG EM	White Perch		189.00	56.70	U
20160325	0830	13.50	Night	SOG EM	White Perch		240.00	141.75	U
20160325	0830	13.50	Night	SOG EM	White Perch		258.00	198.45	U
20160325	0830	13.50	Night	SOG EM	White Perch		194.00	85.05	M
20160325	0830	13.50	Night	SOG EM	White Perch		245.00	170.10	U
20160325	0830	13.50	Night	SOG EM	White Perch		198.00	85.05	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160325	0830	13.50	Night	SOG EM	White Perch		214.00	113.40	U
20160325	0830	13.50	Night	SOG EM	White Perch		197.00	56.70	M
20160325	0830	13.50	Night	SOG EM	White Perch		167.00	56.70	U
20160325	0830	13.50	Night	SOG EM	White Perch		192.00	85.05	U
20160325	0830	13.50	Night	SOG EM	White Perch		171.00	56.70	U
20160325	0830	13.50	Night	SOG EM	White Perch		184.00	85.05	U
20160325	0830	13.50	Night	SOG EM	White Perch		197.00	113.40	U
20160325	0830	13.50	Night	SOG EM	White Perch		205.00	85.05	U
20160325	0830	13.50	Night	SOG EM	Atlantic Blue Crab		157.00		F
20160325	0830	13.50	Night	SOG EM	Atlantic Blue Crab		150.00		F
20160325	0830	13.50	Night	SOG EM	Atlantic Blue Crab		198.00		M
20160325	0830	13.50	Night	SOG EM	Atlantic Blue Crab		171.00		M
20160325	0830	13.50	Night	SOG EM	American Eel		495.00	340.19	U
20160325	0830	13.50	Night	SOG IM	Black Crappie		224.00	141.75	F
20160325	0830	13.50	Night	SOG IM	Bluegill		175.00	85.05	U
20160325	0830	13.50	Night	SOG IM	White Perch		186.00	85.05	M
20160325	0830	13.50	Night	SOG IM	Alewife	237.00	270.00	198.45	F
20160325	0830	13.50	Night	SOG IM	Black Crappie		275.00	340.19	F
20160325	0830	13.50	Night	SOG IM	White Perch		230.00	198.45	F
20160325	0830	13.50	Night	SOG IM	White Perch		260.00	283.50	U
20160325	0830	13.50	Night	SOG IM	Alewife	245.00	276.00	56.70	F
20160325	0830	13.50	Night	SOG IM	White Perch		200.00	85.05	U
20160325	0830	13.50	Night	SOG IM	White Perch		198.00	141.75	U
20160325	1730	8.25	Day	SOG EM	Bowfin		536.00	1105.63	U
20160325	1730	8.25	Day	SOG EM	White Perch				U
20160325	1730	8.25	Day	SOG EM	Gizzard Shad		295.00	198.45	M
20160325	1730	8.25	Day	SOG EM	White Perch		177.00	28.35	M
20160325	1730	8.25	Day	SOG EM	White Perch		200.00	28.35	M
20160325	1730	8.25	Day	SOG EM	White Perch		237.00	113.40	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160325	1730	8.25	Day	SOG EM	Redear Sunfish		140.00	28.35	U
20160325	1730	8.25	Day	SOG EM	Atlantic Blue Crab		182.00		M
20160325	1730	8.25	Day	SOG EM	Atlantic Blue Crab		144.00		F
20160325	1730	8.25	Day	SOG EM	Atlantic Blue Crab		161.00		M
20160325	1730	8.25	Day	SOG EM	Atlantic Blue Crab		163.00		F
20160325	1730	8.25	Day	SOG EM	Atlantic Blue Crab		165.00		M
20160325	1730	8.25	Day	SOG EM	Atlantic Blue Crab		194.00		M
20160325	1730	8.25	Day	SOG IM	Alewife	215.00	249.00	141.75	U
20160325	1730	8.25	Day	SOG IM	White Perch				U
20160325	1730	8.25	Day	SOG IM	Alewife	232.00	263.00	141.75	M
20160325	1730	8.25	Day	SOG IM	Largemouth Bass		394.00	793.79	U
20160325	1730	8.25	Day	SOG IM	Alewife	219.00	250.00	141.75	U
20160325	1730	8.25	Day	SOG IM	Alewife	236.00	264.00	141.75	U
20160325	1730	8.25	Day	SOG IM	Redear Sunfish		105.00	28.35	U
20160325	1800	10.00	Day	THG IM	White Perch		271.00	226.80	F
20160325	1800	10.00	Day	THG IM	Alewife	231.00	262.00	141.75	U
20160325	1800	10.00	Day	THG IM	White Perch		197.00	85.05	M
20160325	1800	10.00	Day	THG IM	Gizzard Shad		160.00	28.35	M
20160325	1800	10.00	Day	THG IM	Gizzard Shad		168.00	28.35	U
20160325	1800	10.00	Day	THG IM	Black Crappie		118.00	28.35	U
20160401	0930	12.50	Night	SOG EM	Striped Mullet		421.00	595.34	U
20160401	0930	12.50	Night	SOG EM	White Perch		207.00	113.40	U
20160401	0930	12.50	Night	SOG EM	White Perch		221.00	141.75	U
20160401	0930	12.50	Night	SOG EM	White Perch		218.00	141.75	M
20160401	0930	12.50	Night	SOG EM	White Perch		264.00	255.15	U
20160401	0930	12.50	Night	SOG EM	White Perch		273.00	283.50	M
20160401	0930	12.50	Night	SOG EM	White Perch		205.00	113.40	U
20160401	0930	12.50	Night	SOG EM	White Perch		195.00	85.05	U
20160401	0930	12.50	Night	SOG EM	White Perch		197.00	85.05	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160401	0930	12.50	Night	SOG EM	White Perch		188.00	56.70	M
20160401	0930	12.50	Night	SOG EM	White Perch		215.00	141.75	U
20160401	0930	12.50	Night	SOG EM	White Perch		197.00	56.70	M
20160401	0930	12.50	Night	SOG EM	White Perch		209.00	56.70	U
20160401	0930	12.50	Night	SOG EM	White Perch		249.00	198.45	U
20160401	0930	12.50	Night	SOG EM	White Perch		180.00	28.35	M
20160401	0930	12.50	Night	SOG EM	White Perch		222.00	226.80	M
20160401	0930	12.50	Night	SOG EM	White Perch		217.00	113.40	U
20160401	0930	12.50	Night	SOG EM	White Perch		183.00	28.35	U
20160401	0930	12.50	Night	SOG EM	White Perch		231.00	141.75	U
20160401	0930	12.50	Night	SOG EM	White Perch		240.00	113.40	U
20160401	0930	12.50	Night	SOG EM	White Perch		225.00	141.75	U
20160401	0930	12.50	Night	SOG EM	White Perch		276.00	283.50	M
20160401	0930	12.50	Night	SOG EM	White Perch		183.00	28.35	M
20160401	0930	12.50	Night	SOG EM	White Perch		211.00	56.70	U
20160401	0930	12.50	Night	SOG EM	White Perch		192.00	56.70	U
20160401	0930	12.50	Night	SOG EM	White Perch		225.00	141.75	M
20160401	0930	12.50	Night	SOG EM	White Perch		212.00	113.40	M
20160401	0930	12.50	Night	SOG EM	White Perch		245.00	198.45	U
20160401	0930	12.50	Night	SOG EM	White Perch		220.00	113.40	U
20160401	0930	12.50	Night	SOG EM	White Perch		287.00	340.19	U
20160401	0930	12.50	Night	SOG EM	White Perch		250.00	198.45	U
20160401	0930	12.50	Night	SOG EM	White Perch		232.00	141.75	M
20160401	0930	12.50	Night	SOG EM	White Perch		227.00	141.75	M
20160401	0930	12.50	Night	SOG EM	White Perch		237.00	170.10	U
20160401	0930	12.50	Night	SOG EM	White Perch		282.00	311.84	U
20160401	0930	12.50	Night	SOG EM	White Perch		255.00	226.80	U
20160401	0930	12.50	Night	SOG EM	White Perch		236.00	170.10	M
20160401	0930	12.50	Night	SOG EM	White Perch		222.00	113.40	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160401	0930	12.50	Night	SOG EM	White Perch		235.00	226.80	U
20160401	0930	12.50	Night	SOG EM	White Perch		242.00	170.10	U
20160401	0930	12.50	Night	SOG EM	White Perch		274.00	255.15	U
20160401	0930	12.50	Night	SOG EM	White Perch		256.00	226.80	U
20160401	0930	12.50	Night	SOG EM	White Perch		254.00	226.80	U
20160401	0930	12.50	Night	SOG EM	White Perch		234.00	141.75	M
20160401	0930	12.50	Night	SOG EM	White Perch		246.00	226.80	U
20160401	0930	12.50	Night	SOG EM	White Perch		234.00	170.10	U
20160401	0930	12.50	Night	SOG EM	White Perch		170.00	28.35	U
20160401	0930	12.50	Night	SOG EM	Alewife	230.00	264.00		M
20160401	0930	12.50	Night	SOG EM	White Perch		229.00	141.75	U
20160401	0930	12.50	Night	SOG EM	White Perch		227.00	141.75	U
20160401	0930	12.50	Night	SOG EM	White Perch		281.00	311.84	M
20160401	0930	12.50	Night	SOG EM	White Perch		264.00	255.15	U
20160401	0930	12.50	Night	SOG EM	White Perch		231.00	170.10	U
20160401	0930	12.50	Night	SOG EM	White Perch		257.00	226.80	F
20160401	0930	12.50	Night	SOG EM	White Perch		205.00	85.05	U
20160401	0930	12.50	Night	SOG EM	White Perch		172.00	56.70	M
20160401	0930	12.50	Night	SOG EM	White Perch		244.00	226.80	U
20160401	0930	12.50	Night	SOG EM	White Perch		238.00	170.10	U
20160401	0930	12.50	Night	SOG EM	White Perch		293.00	340.19	U
20160401	0930	12.50	Night	SOG EM	White Perch		208.00	113.40	M
20160401	0930	12.50	Night	SOG EM	White Perch		264.00	255.15	U
20160401	0930	12.50	Night	SOG EM	White Perch		185.00	56.70	M
20160401	0930	12.50	Night	SOG EM	White Perch		247.00	198.45	U
20160401	0930	12.50	Night	SOG EM	White Perch		199.00	85.05	U
20160401	0930	12.50	Night	SOG EM	White Perch		199.00	113.40	F
20160401	0930	12.50	Night	SOG EM	Alewife	224.00	289.00	85.05	U
20160401	0930	12.50	Night	SOG EM	White Perch		201.00	85.05	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160401	0930	12.50	Night	SOG EM	White Perch		234.00	170.10	U
20160401	0930	12.50	Night	SOG EM	White Perch		285.00	340.19	U
20160401	0930	12.50	Night	SOG EM	White Perch		229.00	141.75	M
20160401	0930	12.50	Night	SOG EM	White Perch		242.00	198.45	U
20160401	0930	12.50	Night	SOG EM	White Perch		203.00	56.70	U
20160401	0930	12.50	Night	SOG EM	White Perch		194.00	56.70	M
20160401	0930	12.50	Night	SOG EM	White Perch		192.00	56.70	U
20160401	0930	12.50	Night	SOG EM	White Perch		233.00	141.75	U
20160401	0930	12.50	Night	SOG EM	White Perch		245.00	198.45	U
20160401	0930	12.50	Night	SOG EM	White Perch		273.00	283.50	U
20160401	0930	12.50	Night	SOG EM	White Perch		236.00	198.45	U
20160401	0930	12.50	Night	SOG EM	Alewife	242.00	275.00	170.10	U
20160401	0930	12.50	Night	SOG EM	White Perch		219.00	141.75	U
20160401	0930	12.50	Night	SOG EM	White Perch		216.00	141.75	U
20160401	0930	12.50	Night	SOG EM	White Perch		264.00	255.15	U
20160401	0930	12.50	Night	SOG EM	White Perch		243.00	198.45	M
20160401	0930	12.50	Night	SOG EM	White Perch		195.00	85.05	M
20160401	0930	12.50	Night	SOG EM	White Perch		271.00	283.50	U
20160401	0930	12.50	Night	SOG EM	White Perch		221.00	113.40	U
20160401	0930	12.50	Night	SOG EM	White Perch		226.00	170.10	U
20160401	0930	12.50	Night	SOG EM	White Perch		204.00	113.40	M
20160401	0930	12.50	Night	SOG EM	White Perch		262.00	226.80	M
20160401	0930	12.50	Night	SOG EM	Alewife				U
20160401	0930	12.50	Night	SOG EM	Alewife				U
20160401	0930	12.50	Night	SOG EM	White Perch		227.00	141.75	M
20160401	0930	12.50	Night	SOG EM	Alewife		257.00	141.75	U
20160401	0930	12.50	Night	SOG EM	Alewife	227.00	260.00	113.40	U
20160401	0930	12.50	Night	SOG EM	Atlantic Blue Crab		114.00		M
20160401	0930	12.50	Night	SOG EM	Atlantic Blue Crab		154.00		M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160401	0930	12.50	Night	SOG EM	Atlantic Blue Crab		147.00		M
20160401	0930	12.50	Night	SOG EM	Atlantic Blue Crab		153.00		M
20160401	0930	12.50	Night	SOG IM	White Perch		245.00	226.80	U
20160401	0930	12.50	Night	SOG IM	Gizzard Shad		388.00	566.99	U
20160401	0930	12.50	Night	SOG IM	Gizzard Shad		339.00	396.89	U
20160401	0930	12.50	Night	SOG IM	White Perch		192.00	28.35	M
20160401	0930	12.50	Night	SOG IM	White Perch		196.00	56.70	U
20160401	0930	12.50	Night	SOG IM	Black Crappie		325.00	623.69	F
20160401	0930	12.50	Night	SOG IM	Gizzard Shad		263.00	198.45	M
20160401	0930	12.50	Night	SOG IM	Gizzard Shad		360.00	566.99	U
20160401	0930	12.50	Night	SOG IM	White Perch		207.00	56.70	M
20160401	0930	12.50	Night	SOG IM	White Perch		249.00	198.45	UU
20160401	0930	12.50	Night	SOG IM	Gizzard Shad		207.00	28.35	M
20160401	0930	12.50	Night	SOG IM	Black Crappie		270.00	368.54	F
20160401	0930	12.50	Night	SOG IM	White Perch		218.00	198.45	U
20160401	1100	14.00	Night	THG EM	Gizzard Shad		133.00	28.35	U
20160401	1100	14.00	Night	THG IM	White Perch		179.00	28.35	M
20160401	1100	14.00	Night	THG IM	Alewife	242.00	279.00	198.45	M
20160401	1100	14.00	Night	THG IM	Alewife	217.00	248.00	113.40	U
20160401	1100	14.00	Night	THG IM	Atlantic Blue Crab		58.00		M
20160401	1700	6.00	Day	SOG EM	Common Carp		478.00	1133.98	U
20160401	1700	6.00	Day	SOG EM	Common Carp		465.00	1275.73	F
20160401	1700	6.00	Day	SOG EM	Common Carp		457.00	1020.58	M
20160401	1700	6.00	Day	SOG EM	Atlantic Blue Crab		150.00		M
20160401	1700	6.00	Day	SOG EM	Atlantic Blue Crab		82.00		M
20160401	1700	6.00	Day	SOG EM	White Perch		297.00	340.19	U
20160401	1700	6.00	Day	SOG EM	White Perch		190.00	56.70	U
20160401	1700	6.00	Day	SOG EM	White Perch		223.00	141.75	M
20160401	1700	6.00	Day	SOG EM	White Perch		221.00	113.40	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160401	1700	6.00	Day	SOG EM	Alewife		299.00	170.10	U
20160401	1700	6.00	Day	SOG EM	White Perch		215.00	85.05	U
20160401	1700	6.00	Day	SOG EM	White Perch		217.00	113.40	M
20160401	1700	6.00	Day	SOG EM	White Perch		260.00	226.80	U
20160401	1700	6.00	Day	SOG EM	White Perch		215.00	113.40	U
20160401	1700	6.00	Day	SOG EM	White Perch		224.00	141.75	U
20160401	1700	6.00	Day	SOG EM	White Perch		243.00	198.45	U
20160401	1700	6.00	Day	SOG EM	White Perch		264.00	283.50	M
20160401	1700	6.00	Day	SOG EM	White Perch		217.00	113.40	M
20160401	1700	6.00	Day	SOG EM	White Perch		225.00	141.75	M
20160401	1700	6.00	Day	SOG EM	White Perch		176.00	85.05	M
20160401	1700	6.00	Day	SOG EM	White Perch		195.00	85.05	U
20160401	1700	6.00	Day	SOG EM	White Perch		225.00	85.05	U
20160401	1700	6.00	Day	SOG EM	White Perch		265.00	255.15	U
20160401	1700	6.00	Day	SOG EM	White Perch		242.00	170.10	U
20160401	1700	6.00	Day	SOG EM	White Perch		260.00	226.80	M
20160401	1700	6.00	Day	SOG EM	White Perch		243.00	198.45	U
20160401	1700	6.00	Day	SOG EM	White Perch		258.00	226.80	U
20160401	1700	6.00	Day	SOG EM	Alewife	208.00	241.00	113.40	M
20160401	1700	6.00	Day	SOG EM	White Perch		205.00	113.40	U
20160401	1700	6.00	Day	SOG EM	White Perch		250.00	226.80	U
20160401	1700	6.00	Day	SOG EM	White Perch		242.00	198.45	U
20160401	1700	6.00	Day	SOG EM	Alewife	220.00	248.00	141.75	U
20160401	1700	6.00	Day	SOG EM	White Perch		286.00	311.84	U
20160401	1700	6.00	Day	SOG EM	White Perch		213.00	113.40	M
20160401	1700	6.00	Day	SOG EM	White Perch		175.00	28.35	U
20160401	1700	6.00	Day	SOG EM	White Perch		234.00	198.45	M
20160401	1700	6.00	Day	SOG EM	White Perch		247.00	198.45	U
20160401	1700	6.00	Day	SOG EM	Gizzard Shad		151.00	28.35	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160401	1700	6.00	Day	SOG IM	Common Carp		451.00	1275.73	U
20160401	1700	6.00	Day	SOG IM	Gizzard Shad		160.00	198.45	U
20160401	1700	6.00	Day	SOG IM	Alewife	229.00	261.00	226.80	M
20160401	1700	6.00	Day	SOG IM	Alewife	230.00	261.00	113.40	U
20160401	1700	6.00	Day	SOG IM	Alewife	234.00	267.00	141.75	U
20160401	1700	6.00	Day	SOG IM	Bluegill		140.00	28.35	U
20160401	1700	6.00	Day	SOG IM	White Perch		246.00	170.10	U
20160401	1700	6.00	Day	SOG IM	Black Crappie		315.00	566.99	U
20160401	1700	6.00	Day	SOG IM	Black Crappie		286.00	396.89	U
20160401	1700	6.00	Day	SOG IM	Gizzard Shad		191.00	28.35	U
20160401	1700	6.00	Day	SOG IM	Striped Mullet		238.00	56.70	U
20160401	1700	6.00	Day	SOG IM	Bluegill		199.00	113.40	U
20160401	1800	7.00	Day	THG EM	Atlantic Blue Crab		145.00		M
20160401	1800	7.00	Day	THG IM	White Perch		244.00		U
20160401	1800	7.00	Day	THG IM	Black Crappie		122.00	28.35	U
20160401	1800	7.00	Day	THG IM	Gizzard Shad		384.00		U
20160401	1800	7.00	Day	THG IM	Gizzard Shad		357.00		M
20160401	1800	7.00	Day	THG IM	Gizzard Shad		338.00		M
20160401	1800	7.00	Day	THG IM	White Perch		225.00		U
20160401	1800	7.00	Day	THG IM	White Perch		263.00		U
20160401	1800	7.00	Day	THG IM	Gizzard Shad		152.00		U
20160401	1800	7.00	Day	THG IM	Gizzard Shad		253.00		M
20160401	1800	7.00	Day	THG IM	White Perch		86.00		U
20160402	0730	13.50	Night	SOG EM	Atlantic Blue Crab		150.00		M
20160402	0730	13.50	Night	SOG EM	Alewife				U
20160402	0730	13.50	Night	SOG EM	White Perch				U
20160402	0730	13.50	Night	SOG EM	Atlantic Blue Crab		188.00		M
20160402	0730	13.50	Night	SOG EM	Atlantic Blue Crab		159.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		187.00		U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160402	0730	13.50	Night	SOG EM	White Perch		273.00		U
20160402	0730	13.50	Night	SOG EM	White Perch		207.00		U
20160402	0730	13.50	Night	SOG EM	White Perch		228.00		U
20160402	0730	13.50	Night	SOG EM	White Perch		260.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		234.00		U
20160402	0730	13.50	Night	SOG EM	White Perch		239.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		196.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		204.00		U
20160402	0730	13.50	Night	SOG EM	White Perch		249.00		U
20160402	0730	13.50	Night	SOG EM	White Perch		190.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		248.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		166.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		180.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		243.00		U
20160402	0730	13.50	Night	SOG EM	White Perch		217.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		203.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		180.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		205.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		192.00		U
20160402	0730	13.50	Night	SOG EM	White Perch		220.00		U
20160402	0730	13.50	Night	SOG EM	White Perch		186.00		U
20160402	0730	13.50	Night	SOG EM	White Perch		176.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		203.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		187.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		226.00		U
20160402	0730	13.50	Night	SOG EM	White Perch		234.00		U
20160402	0730	13.50	Night	SOG EM	White Perch		192.00		U
20160402	0730	13.50	Night	SOG EM	White Perch		195.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		275.00		U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160402	0730	13.50	Night	SOG EM	White Perch		192.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		226.00		U
20160402	0730	13.50	Night	SOG EM	White Perch		197.00		U
20160402	0730	13.50	Night	SOG EM	White Perch		251.00		U
20160402	0730	13.50	Night	SOG EM	White Perch		226.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		197.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		243.00		U
20160402	0730	13.50	Night	SOG EM	White Perch		206.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		236.00		U
20160402	0730	13.50	Night	SOG EM	White Perch		219.00		U
20160402	0730	13.50	Night	SOG EM	White Perch		190.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		168.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		223.00		U
20160402	0730	13.50	Night	SOG EM	White Perch		234.00		U
20160402	0730	13.50	Night	SOG EM	White Perch		198.00		U
20160402	0730	13.50	Night	SOG EM	White Perch		202.00		U
20160402	0730	13.50	Night	SOG EM	White Perch		201.00		U
20160402	0730	13.50	Night	SOG EM	White Perch		209.00		U
20160402	0730	13.50	Night	SOG EM	White Perch		208.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		201.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		267.00		U
20160402	0730	13.50	Night	SOG EM	White Perch		198.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		205.00		U
20160402	0730	13.50	Night	SOG EM	Gizzard Shad		387.00		U
20160402	0730	13.50	Night	SOG EM	White Perch		270.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		204.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		219.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		204.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		197.00		U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160402	0730	13.50	Night	SOG EM	White Perch		197.00		U
20160402	0730	13.50	Night	SOG EM	White Perch		148.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		179.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		209.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		196.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		197.00		U
20160402	0730	13.50	Night	SOG EM	White Perch		179.00		M
20160402	0730	13.50	Night	SOG EM	White Perch		178.00		M
20160402	0730	13.50	Night	SOG EM	Alewife	220.00	253.00		U
20160402	0730	13.50	Night	SOG EM	Alewife	233.00	262.00		U
20160402	0730	13.50	Night	SOG EM	Alewife				U
20160402	0730	13.50	Night	SOG EM	Alewife	235.00	270.00		U
20160402	0730	13.50	Night	SOG IM	Alewife	244.00	276.00		F
20160402	0730	13.50	Night	SOG IM	Alewife	235.00	268.00		F
20160402	0730	13.50	Night	SOG IM	White Perch		223.00		U
20160402	0730	13.50	Night	SOG IM	Gizzard Shad		388.00		F
20160402	0730	13.50	Night	SOG IM	White Perch		256.00		U
20160402	0730	13.50	Night	SOG IM	Gizzard Shad		320.00		F
20160402	0730	13.50	Night	SOG IM	Black Crappie		150.00		U
20160402	0830	14.25	Night	THG EM	White Perch		137.00		U
20160402	0830	14.25	Night	THG IM	Common Carp		690.00		U
20160402	0830	14.25	Night	THG IM	Common Carp		570.00		U
20160402	0830	14.25	Night	THG IM	Common Carp		440.00		M
20160402	0830	14.25	Night	THG IM	Common Carp		485.00		U
20160402	0830	14.25	Night	THG IM	Common Carp		465.00		M
20160402	0830	14.25	Night	THG IM	Gizzard Shad		181.00		U
20160402	0830	14.25	Night	THG IM	White Perch		113.00		U
20160402	1800	9.50	Day	SOG EM	Atlantic Blue Crab		130.00		M
20160402	1800	9.50	Day	SOG EM	Alewife	226.00	256.00		M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160402	1800	9.50	Day	SOG EM	White Perch		198.00		U
20160402	1800	9.50	Day	SOG EM	White Perch		199.00		U
20160402	1800	9.50	Day	SOG EM	White Perch		193.00		M
20160402	1800	9.50	Day	SOG EM	White Perch		204.00		M
20160402	1800	9.50	Day	SOG EM	White Perch		204.00		U
20160402	1800	9.50	Day	SOG EM	White Perch		260.00		M
20160402	1800	9.50	Day	SOG EM	White Perch		200.00		U
20160402	1800	9.50	Day	SOG EM	White Perch		225.00		U
20160402	1800	9.50	Day	SOG EM	White Perch		116.00		U
20160402	1800	9.50	Day	SOG EM	White Perch		197.00		M
20160402	1800	9.50	Day	SOG EM	White Perch		170.00		M
20160402	1800	9.50	Day	SOG EM	White Perch		230.00		U
20160402	1800	9.50	Day	SOG EM	White Perch		245.00		U
20160402	1800	9.50	Day	SOG EM	White Perch		212.00		U
20160402	1800	9.50	Day	SOG EM	White Perch		223.00		U
20160402	1800	9.50	Day	SOG EM	White Perch		205.00		U
20160402	1800	9.50	Day	SOG EM	White Perch		201.00		U
20160402	1800	9.50	Day	SOG EM	White Perch		205.00		U
20160402	1800	9.50	Day	SOG EM	White Perch		256.00		U
20160402	1800	9.50	Day	SOG EM	White Perch		198.00		U
20160402	1800	9.50	Day	SOG EM	White Perch		205.00		U
20160402	1800	9.50	Day	SOG EM	White Perch		234.00		U
20160402	1800	9.50	Day	SOG EM	White Perch		198.00		U
20160402	1800	9.50	Day	SOG EM	White Perch		203.00		M
20160402	1800	9.50	Day	SOG EM	White Perch		206.00		U
20160402	1800	9.50	Day	SOG EM	White Perch		204.00		M
20160402	1800	9.50	Day	SOG EM	White Perch		247.00		U
20160402	1800	9.50	Day	SOG EM	White Perch		170.00		M
20160402	1800	9.50	Day	SOG EM	White Perch		189.00		U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160402	1800	9.50	Day	SOG EM	White Perch		242.00		U
20160402	1800	9.50	Day	SOG EM	White Perch		187.00		U
20160402	1800	9.50	Day	SOG EM	White Perch		182.00		M
20160402	1800	9.50	Day	SOG EM	White Perch		194.00		U
20160402	1800	9.50	Day	SOG EM	Common Carp		445.00		M
20160402	1800	9.50	Day	SOG EM	Common Carp		473.00		U
20160402	1800	9.50	Day	SOG EM	Common Carp		435.00		F
20160402	1800	9.50	Day	SOG EM	Common Carp		415.00		M
20160402	1800	9.50	Day	SOG IM	Longnose Gar		662.00		U
20160402	1800	9.50	Day	SOG IM	White Perch		178.00		M
20160402	1800	9.50	Day	SOG IM	Gizzard Shad		343.00		U
20160402	1800	9.50	Day	SOG IM	Gizzard Shad		377.00		U
20160402	1800	9.50	Day	SOG IM	Gizzard Shad		326.00		U
20160402	1800	9.50	Day	SOG IM	Gizzard Shad		317.00		M
20160402	1800	9.50	Day	SOG IM	Gizzard Shad		226.00		M
20160402	1800	9.50	Day	SOG IM	White Perch		261.00		U
20160402	1845	9.00	Day	THG IM	Gizzard Shad		255.00		M
20160402	1845	9.00	Day	THG IM	Common Carp		533.00		U
20160402	1845	9.00	Day	THG IM	Common Carp		505.00		U
20160402	1845	9.00	Day	THG IM	Common Carp		449.00		M
20160406	0845	13.75	Night	SOG EM	White Perch		209.00	113.40	F
20160406	0845	13.75	Night	SOG EM	Striped Mullet		291.00	198.45	U
20160406	0845	13.75	Night	SOG EM	Alewife		262.00	85.05	U
20160406	0845	13.75	Night	SOG EM	White Perch		214.00	113.40	M
20160406	0845	13.75	Night	SOG EM	Atlantic Blue Crab		114.00	113.40	M
20160406	0845	13.75	Night	SOG IM	Gizzard Shad		400.00	623.69	F
20160406	0845	13.75	Night	SOG IM	White Perch		222.00	170.10	U
20160406	0845	13.75	Night	SOG IM	White Perch		180.00	198.45	U
20160406	0845	13.75	Night	SOG IM	White Perch		221.00	170.10	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160406	0845	13.75	Night	SOG IM	Gizzard Shad		285.00	198.45	M
20160406	0845	13.75	Night	SOG IM	White Perch		203.00	141.75	F
20160406	0845	13.75	Night	SOG IM	White Perch		205.00	113.40	U
20160406	0845	13.75	Night	SOG IM	White Perch		210.00	113.40	U
20160406	0845	13.75	Night	SOG IM	Gizzard Shad		355.00	453.59	U
20160406	0845	13.75	Night	SOG IM	White Perch		235.00	198.45	M
20160406	0845	13.75	Night	SOG IM	White Perch		201.00	141.75	F
20160406	0845	13.75	Night	SOG IM	Gizzard Shad		195.00	113.40	M
20160406	0845	13.75	Night	SOG IM	Black Crappie		284.00	311.84	U
20160406	0845	13.75	Night	SOG IM	White Perch		184.00	85.05	M
20160406	0845	13.75	Night	SOG IM	Gizzard Shad		333.00	311.84	U
20160406	0845	13.75	Night	SOG IM	White Perch		233.00	226.80	M
20160406	0845	13.75	Night	SOG IM	White Perch		221.00	170.10	U
20160406	0845	13.75	Night	SOG IM	White Perch		273.00	311.84	U
20160406	0845	13.75	Night	SOG IM	Black Crappie		269.00	311.84	U
20160406	0845	13.75	Night	SOG IM	Striped Mullet		295.00	255.15	M
20160406	0845	13.75	Night	SOG IM	White Perch		244.00	255.15	U
20160406	0845	13.75	Night	SOG IM	White Perch		206.00	141.75	U
20160406	0845	13.75	Night	SOG IM	White Perch		231.00	198.45	U
20160406	0845	13.75	Night	SOG IM	White Perch		233.00	198.45	F
20160406	0845	13.75	Night	SOG IM	Gizzard Shad		377.00	481.94	U
20160406	0845	13.75	Night	SOG IM	White Perch		231.00	198.45	U
20160406	0845	13.75	Night	SOG IM	Gizzard Shad		365.00	453.59	U
20160406	0845	13.75	Night	SOG IM	White Perch		220.00	198.45	U
20160406	0845	13.75	Night	SOG IM	White Perch		243.00	198.45	U
20160406	0845	13.75	Night	SOG IM	White Perch		236.00	198.45	U
20160406	0845	13.75	Night	SOG IM	White Perch		180.00	85.05	U
20160406	0845	13.75	Night	SOG IM	White Perch		245.00	226.80	U
20160406	0845	13.75	Night	SOG IM	White Perch		212.00	113.40	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160406	0845	13.75	Night	SOG IM	White Perch		222.00	198.45	U
20160406	0845	13.75	Night	SOG IM	Black Crappie		240.00	226.80	M
20160406	0845	13.75	Night	SOG IM	Black Crappie		215.00	170.10	F
20160406	0845	13.75	Night	SOG IM	Black Crappie		247.00	283.50	F
20160406	0845	13.75	Night	SOG IM	White Perch		216.00	170.10	U
20160406	0845	13.75	Night	SOG IM	White Perch		221.00	141.75	M
20160406	0845	13.75	Night	SOG IM	Gizzard Shad		209.00	85.05	U
20160406	0845	13.75	Night	SOG IM	Alewife	243.00	266.00	198.45	F
20160406	0845	13.75	Night	SOG IM	Alewife	215.00	247.00	141.75	M
20160406	0845	13.75	Night	SOG IM	Alewife	234.00	267.00	198.45	M
20160406	0845	13.75	Night	SOG IM	Alewife	245.00	274.00	226.80	F
20160406	0945	14.75	Night	THG IM	White Perch		213.00	141.75	U
20160406	0945	14.75	Night	THG IM	White Perch		260.00	283.50	M
20160406	0945	14.75	Night	THG IM	White Perch		197.00	113.40	U
20160406	0945	14.75	Night	THG IM	White Perch			0.00	U
20160406	1845	9.50	Day	SOG IM	Gizzard Shad		392.00	566.99	U
20160406	1845	9.50	Day	SOG IM	Gizzard Shad		370.00	481.94	U
20160406	1845	9.50	Day	SOG IM	Gizzard Shad		426.00	737.09	U
20160406	1845	9.50	Day	SOG IM	Gizzard Shad		352.00	396.89	M
20160406	1845	9.50	Day	SOG IM	Largemouth Bass		312.00	425.24	U
20160406	1845	9.50	Day	SOG IM	Largemouth Bass		390.00	878.84	F
20160406	1845	9.50	Day	SOG IM	Alewife	254.00	287.00	226.80	U
20160406	1845	9.50	Day	SOG IM	Gizzard Shad		377.00	510.29	M
20160406	1845	9.50	Day	SOG IM	Gizzard Shad		356.00	481.94	U
20160406	1845	9.50	Day	SOG IM	Largemouth Bass		357.00	708.74	U
20160406	1845	9.50	Day	SOG IM	Gizzard Shad		347.00	368.54	M
20160406	1845	9.50	Day	SOG IM	Alewife	235.00	271.00	170.10	U
20160406	1845	9.50	Day	SOG IM	Largemouth Bass		324.00	510.29	U
20160406	1845	9.50	Day	SOG IM	Largemouth Bass		369.00	680.39	F

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160406	1845	9.50	Day	SOG IM	Largemouth Bass		388.00	907.18	U
20160406	1845	9.50	Day	SOG IM	Largemouth Bass		368.00	737.09	U
20160406	1845	9.50	Day	SOG EM	Alewife	229.00	257.00	113.40	F
20160406	1845	9.50	Day	SOG EM	White Perch		208.00	141.75	U
20160406	1845	9.50	Day	SOG EM	Black Crappie		216.00	170.10	F
20160406	1845	9.50	Day	SOG EM	Alewife	228.00	259.00	113.40	U
20160406	1900	9.25	Day	THG EM	White Perch		94.00	14.17	U
20160406	1900	9.25	Day	THG IM	White Perch		203.00	113.40	U
20160406	1900	9.25	Day	THG IM	Atlantic Blue Crab		82.00	0.00	M
20160407	0830	13.50	Night	SOG IM	White Perch		213.00	113.40	U
20160407	0830	13.50	Night	SOG IM	White Perch		232.00	198.45	U
20160407	0830	13.50	Night	SOG IM	White Perch		204.00	113.40	U
20160407	0830	13.50	Night	SOG IM	Black Crappie		205.00	141.75	M
20160407	0830	13.50	Night	SOG IM	White Perch		210.00	141.75	U
20160407	0830	13.50	Night	SOG IM	White Perch		228.00	170.10	U
20160407	0830	13.50	Night	SOG IM	White Perch		202.00	113.40	U
20160407	0830	13.50	Night	SOG IM	White Perch		263.00	311.84	U
20160407	0830	13.50	Night	SOG IM	White Perch		218.00	141.75	U
20160407	0830	13.50	Night	SOG IM	White Perch		214.00	113.40	U
20160407	0830	13.50	Night	SOG IM	Black Crappie		188.00	56.70	U
20160407	0830	13.50	Night	SOG IM	White Perch		229.00	170.10	U
20160407	0830	13.50	Night	SOG IM	White Perch		208.00	141.75	F
20160407	0830	13.50	Night	SOG IM	White Perch		208.00	113.40	U
20160407	0830	13.50	Night	SOG IM	Black Crappie		135.00	28.35	U
20160407	0830	13.50	Night	SOG IM	White Perch		203.00	141.75	U
20160407	0830	13.50	Night	SOG IM	White Perch		186.00	56.70	U
20160407	0830	13.50	Night	SOG IM	Alewife				U
20160407	0830	13.50	Night	SOG IM	Golden Shiner		205.00	85.05	U
20160407	0830	13.50	Night	SOG IM	White Perch		225.00	170.10	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160407	0830	13.50	Night	SOG IM	White Perch		215.00	141.75	U
20160407	0830	13.50	Night	SOG IM	Gizzard Shad		333.00	311.84	M
20160407	0830	13.50	Night	SOG IM	White Perch		214.00	113.40	U
20160407	0830	13.50	Night	SOG IM	White Perch		240.00	198.45	U
20160407	0830	13.50	Night	SOG IM	White Perch		210.00	141.75	U
20160407	0830	13.50	Night	SOG IM	White Perch		225.00	170.10	U
20160407	0830	13.50	Night	SOG IM	White Perch		235.00	170.10	U
20160407	0830	13.50	Night	SOG IM	White Perch		205.00	141.75	U
20160407	0830	13.50	Night	SOG IM	White Perch		212.00	141.75	M
20160407	0830	13.50	Night	SOG IM	White Perch		250.00	255.15	U
20160407	0830	13.50	Night	SOG IM	White Perch		183.00	56.70	M
20160407	0830	13.50	Night	SOG IM	White Perch		219.00	170.10	U
20160407	0830	13.50	Night	SOG IM	White Perch		247.00	198.45	U
20160407	0830	13.50	Night	SOG IM	White Perch		190.00	141.75	U
20160407	0830	13.50	Night	SOG IM	White Perch		233.00	170.10	U
20160407	0830	13.50	Night	SOG IM	Black Crappie		326.00	623.69	U
20160407	0830	13.50	Night	SOG IM	White Perch		197.00	113.40	M
20160407	0830	13.50	Night	SOG IM	White Perch		182.00	56.70	M
20160407	0830	13.50	Night	SOG IM	White Perch		233.00	198.45	U
20160407	0830	13.50	Night	SOG IM	White Perch		258.00	283.50	U
20160407	0830	13.50	Night	SOG IM	White Perch		195.00	56.70	U
20160407	0830	13.50	Night	SOG IM	White Perch		215.00	141.75	U
20160407	0830	13.50	Night	SOG IM	Gizzard Shad		342.00	396.89	U
20160407	0830	13.50	Night	SOG IM	White Perch		240.00	170.10	U
20160407	0830	13.50	Night	SOG IM	White Perch		215.00	141.75	U
20160407	0830	13.50	Night	SOG IM	White Perch		224.00	170.10	F
20160407	0830	13.50	Night	SOG IM	Gizzard Shad		361.00	425.24	M
20160407	0830	13.50	Night	SOG IM	White Perch		202.00	113.40	U
20160407	0830	13.50	Night	SOG IM	White Perch		215.00	141.75	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160407	0830	13.50	Night	SOG IM	White Perch		265.00	255.15	U
20160407	0830	13.50	Night	SOG IM	White Perch		204.00	141.75	F
20160407	0830	13.50	Night	SOG IM	White Perch		244.00	198.45	U
20160407	0830	13.50	Night	SOG IM	White Perch		208.00	85.05	U
20160407	0830	13.50	Night	SOG IM	White Perch		203.00	113.40	U
20160407	0830	13.50	Night	SOG IM	Gizzard Shad		357.00	396.89	U
20160407	0830	13.50	Night	SOG IM	White Perch		199.00	56.70	M
20160407	0830	13.50	Night	SOG IM	White Perch		210.00	141.75	U
20160407	0830	13.50	Night	SOG IM	Gizzard Shad		347.00	368.54	M
20160407	0830	13.50	Night	SOG IM	White Perch		209.00	141.75	U
20160407	0830	13.50	Night	SOG IM	White Perch		218.00	141.75	U
20160407	0830	13.50	Night	SOG IM	White Perch		188.00	56.70	U
20160407	0830	13.50	Night	SOG IM	Black Crappie		248.00	255.15	F
20160407	0830	13.50	Night	SOG IM	White Perch		244.00	198.45	U
20160407	0830	13.50	Night	SOG IM	White Perch		188.00	56.70	U
20160407	0830	13.50	Night	SOG IM	White Perch		212.00	141.75	U
20160407	0830	13.50	Night	SOG IM	Black Crappie		291.00	453.59	F
20160407	0830	13.50	Night	SOG IM	Black Crappie		194.00	113.40	U
20160407	0830	13.50	Night	SOG EM	White Perch		211.00	141.75	U
20160407	0830	13.50	Night	SOG EM	White Perch		232.00	141.75	M
20160407	0830	13.50	Night	SOG EM	White Perch		203.00	85.05	U
20160407	0830	13.50	Night	SOG EM	White Perch		229.00	141.75	U
20160407	0830	13.50	Night	SOG EM	White Perch		233.00	141.75	U
20160407	0830	13.50	Night	SOG EM	White Perch		224.00	141.75	U
20160407	0830	13.50	Night	SOG EM	White Perch		225.00	170.10	U
20160407	0830	13.50	Night	SOG EM	White Perch		228.00	141.75	U
20160407	0830	13.50	Night	SOG EM	White Perch		197.00	85.05	U
20160407	0830	13.50	Night	SOG EM	White Perch		195.00	85.05	M
20160407	0830	13.50	Night	SOG EM	White Perch		176.00	56.70	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160407	0830	13.50	Night	SOG EM	White Perch		173.00	56.70	U
20160407	0830	13.50	Night	SOG EM	White Perch		227.00	198.45	U
20160407	0830	13.50	Night	SOG EM	White Perch		183.00	56.70	U
20160407	0830	13.50	Night	SOG EM	White Perch		204.00	113.40	U
20160407	0830	13.50	Night	SOG EM	White Perch		280.00	311.84	F
20160407	0830	13.50	Night	SOG EM	White Perch		261.00	255.15	U
20160407	0830	13.50	Night	SOG EM	White Perch		278.00	283.50	U
20160407	0830	13.50	Night	SOG EM	White Perch		213.00	85.05	U
20160407	0830	13.50	Night	SOG EM	White Perch		191.00	56.70	U
20160407	0830	13.50	Night	SOG EM	White Perch		188.00	56.70	U
20160407	0830	13.50	Night	SOG EM	White Perch		186.00	56.70	U
20160407	0830	13.50	Night	SOG EM	White Perch		194.00	56.70	U
20160407	0830	13.50	Night	SOG EM	White Perch		186.00	56.70	U
20160407	0830	13.50	Night	SOG EM	White Perch		215.00	141.75	U
20160407	0830	13.50	Night	SOG EM	White Perch		236.00	170.10	U
20160407	0830	13.50	Night	SOG EM	White Perch		183.00	56.70	U
20160407	0830	13.50	Night	SOG EM	White Perch		202.00	85.05	U
20160407	0830	13.50	Night	SOG EM	White Perch		234.00	141.75	U
20160407	0830	13.50	Night	SOG EM	White Perch		186.00	56.70	U
20160407	0830	13.50	Night	SOG EM	White Perch		183.00	56.70	M
20160407	0830	13.50	Night	SOG EM	White Perch		217.00	141.75	U
20160407	0830	13.50	Night	SOG EM	White Perch		205.00	113.40	U
20160407	0830	13.50	Night	SOG EM	White Perch		183.00	56.70	M
20160407	0830	13.50	Night	SOG EM	White Perch		210.00	113.40	M
20160407	0830	13.50	Night	SOG EM	White Perch		177.00	56.70	U
20160407	0830	13.50	Night	SOG EM	White Perch		208.00	113.40	U
20160407	0830	13.50	Night	SOG EM	White Perch		275.00	283.50	U
20160407	0830	13.50	Night	SOG EM	Black Crappie		182.00	56.70	U
20160407	0830	13.50	Night	SOG EM	White Perch		193.00	56.70	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160407	0830	13.50	Night	SOG EM	White Perch		192.00	56.70	U
20160407	0830	13.50	Night	SOG EM	Black Crappie		145.00	28.35	U
20160407	0830	13.50	Night	SOG EM	White Perch		231.00	170.10	U
20160407	0830	13.50	Night	SOG EM	White Perch		185.00	56.70	U
20160407	0830	13.50	Night	SOG EM	White Perch		204.00	56.70	U
20160407	0830	13.50	Night	SOG EM	White Perch		196.00	56.70	U
20160407	0830	13.50	Night	SOG EM	White Perch		173.00	56.70	M
20160407	0830	13.50	Night	SOG EM	White Perch		187.00	56.70	U
20160407	0830	13.50	Night	SOG EM	White Perch		197.00	56.70	U
20160407	0830	13.50	Night	SOG EM	White Perch		199.00	56.70	U
20160407	0830	13.50	Night	SOG EM	White Perch		176.00	28.35	U
20160407	0830	13.50	Night	SOG EM	White Perch		228.00	141.75	U
20160407	0830	13.50	Night	SOG EM	Alewife	236.00	267.00	85.05	U
20160407	0830	13.50	Night	SOG EM	Redear Sunfish		142.00	28.35	M
20160407	0830	13.50	Night	SOG EM	Alewife	238.00	274.00	113.40	U
20160407	0830	13.50	Night	SOG EM	Alewife	236.00	269.00	113.40	F
20160407	0830	13.50	Night	SOG EM	Alewife	237.00	269.00	113.40	U
20160407	0830	13.50	Night	SOG EM	Alewife	233.00	274.00	141.75	F
20160407	0830	13.50	Night	SOG EM	Alewife	204.00	233.00	85.05	M
20160407	0830	13.50	Night	SOG EM	Atlantic Blue Crab		141.00		F
20160407	1000	13.75	Night	THG IM	Gizzard Shad		330.00	311.84	U
20160407	1000	13.75	Night	THG IM	Bluegill		135.00	28.35	U
20160407	1000	13.75	Night	THG IM	Atlantic Blue Crab		74.00		M
20160407	1000	13.75	Night	THG IM	Atlantic Blue Crab				U
20160407	1900	9.25	Day	SOG EM	Atlantic Blue Crab		160.00		M
20160407	1900	9.25	Day	SOG EM	White Perch		195.00	85.05	U
20160407	1900	9.25	Day	SOG EM	White Perch		280.00	283.50	U
20160407	1900	9.25	Day	SOG EM	White Perch		241.00	170.10	M
20160407	1900	9.25	Day	SOG EM	White Perch		194.00	85.05	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160407	1900	9.25	Day	SOG EM	White Perch		195.00	85.05	M
20160407	1900	9.25	Day	SOG EM	White Perch		278.00	255.15	U
20160407	1900	9.25	Day	SOG EM	White Perch		187.00	56.70	U
20160407	1900	9.25	Day	SOG EM	White Perch		192.00	113.40	U
20160407	1900	9.25	Day	SOG EM	White Perch		295.00	368.54	M
20160407	1900	9.25	Day	SOG EM	White Perch		198.00	56.70	M
20160407	1900	9.25	Day	SOG EM	Black Crappie		146.00	28.35	U
20160407	1900	9.25	Day	SOG EM	White Perch		195.00	56.70	U
20160407	1900	9.25	Day	SOG EM	White Perch		250.00	226.80	U
20160407	1900	9.25	Day	SOG EM	White Perch		199.00	56.70	U
20160407	1900	9.25	Day	SOG EM	White Perch		150.00	28.35	M
20160407	1900	9.25	Day	SOG EM	White Perch		303.00	396.89	F
20160407	1900	9.25	Day	SOG EM	White Perch		203.00	85.05	U
20160407	1900	9.25	Day	SOG EM	Bluegill		138.00	28.35	U
20160407	1900	9.25	Day	SOG EM	White Perch		217.00		U
20160407	1900	9.25	Day	SOG EM	Gizzard Shad		167.00	28.35	U
20160407	1900	9.25	Day	SOG EM	White Perch		191.00	56.70	U
20160407	1900	9.25	Day	SOG EM	Alewife	226.00	258.00	113.40	M
20160407	1900	9.25	Day	SOG EM	Alewife	240.00	276.00	85.05	F
20160407	1900	9.25	Day	SOG EM	Alewife	223.00	256.00	113.40	F
20160407	1900	9.25	Day	SOG EM	Alewife	233.00	265.00	113.40	F
20160407	1900	9.25	Day	SOG EM	Alewife	223.00	251.00	113.40	U
20160407	1900	9.25	Day	SOG EM	Alewife	223.00	256.00	113.40	M
20160407	1900	9.25	Day	SOG EM	Alewife	217.00	250.00	113.40	F
20160407	1900	9.25	Day	SOG IM	White Perch		166.00	28.35	M
20160407	1900	9.25	Day	SOG IM	Gizzard Shad		353.00	396.89	M
20160407	1900	9.25	Day	SOG IM	Gizzard Shad		380.00	453.59	U
20160407	1900	9.25	Day	SOG IM	Golden Shiner		190.00	85.05	U
20160407	1900	9.25	Day	SOG IM	Gizzard Shad		343.00	396.89	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160407	1900	9.25	Day	SOG IM	Largemouth Bass		393.00	935.53	U
20160407	1900	9.25	Day	SOG IM	Black Crappie		215.00	141.75	M
20160407	1900	9.25	Day	SOG IM	Gizzard Shad		152.00	28.35	U
20160407	1900	9.25	Day	SOG IM	Atlantic Blue Crab		190.00		M
20160407	1900	9.25	Day	SOG IM	Alewife	220.00	250.00	113.40	M
20160407	1900	9.25	Day	SOG IM	Alewife	225.00	256.00	141.75	M
20160407	1930	9.25	Day	THG IM	Gizzard Shad		145.00	28.35	U
20160407	1930	9.25	Day	THG IM	Common Carp		490.00	1474.18	M
20160407	1930	9.25	Day	THG IM	Atlantic Blue Crab		70.00		M
20160407	1930	9.25	Day	THG IM	Atlantic Blue Crab		104.00		M
20160407	1930	9.25	Day	THG IM	Atlantic Blue Crab		85.00		M
20160414	1845	7.75	Day	SOG EM	Alewife	198.00	237.00	56.70	U
20160414	1845	7.75	Day	SOG EM	Black Crappie		270.00	340.19	F
20160414	1845	7.75	Day	SOG EM	White Perch		206.00	85.05	M
20160414	1845	7.75	Day	SOG EM	Black Crappie		256.00	283.50	U
20160414	1845	7.75	Day	SOG EM	Bluegill		146.00	56.70	U
20160414	1845	7.75	Day	SOG EM	Bluegill		133.00	28.35	U
20160414	1845	7.75	Day	SOG EM	Atlantic Blue Crab		125.00		F
20160414	1845	7.75	Day	SOG EM	Atlantic Blue Crab		142.00		M
20160414	1845	7.75	Day	SOG IM	Gizzard Shad		368.00	425.24	M
20160414	1845	7.75	Day	SOG IM	Black Crappie		275.00	340.19	F
20160414	1845	7.75	Day	SOG IM	Gizzard Shad		352.00	368.54	U
20160414	1915	8.25	Day	THG EM	Bluegill		135.00	28.35	U
20160414	1915	8.25	Day	THG EM	Atlantic Blue Crab		69.00		M
20160414	1915	8.25	Day	THG EM	Atlantic Blue Crab		84.00		M
20160415	0830	13.25	Night	SOG EM	Black Crappie		247.00	255.15	U
20160415	0830	13.25	Night	SOG EM	Alewife	212.00	241.00	85.05	M
20160415	0830	13.25	Night	SOG EM	Alewife	238.00	269.00	170.10	M
20160415	0830	13.25	Night	SOG EM	Gizzard Shad		191.00	28.35	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160415	0830	13.25	Night	SOG EM	Alewife	224.00	258.00	141.75	U
20160415	0830	13.25	Night	SOG EM	Alewife	223.00	256.00	141.75	F
20160415	0830	13.25	Night	SOG EM	Alewife	247.00	283.00	170.10	F
20160415	0830	13.25	Night	SOG EM	Gizzard Shad		176.00	56.70	U
20160415	0830	13.25	Night	SOG EM	Atlantic Blue Crab		168.00		F
20160415	0830	13.25	Night	SOG EM	Atlantic Blue Crab		164.00		F
20160415	0830	13.25	Night	SOG EM	Atlantic Blue Crab		155.00		M
20160415	0830	13.25	Night	SOG IM	White Perch		244.00	198.45	U
20160415	0830	13.25	Night	SOG IM	White Perch		312.00	453.59	M
20160415	0830	13.25	Night	SOG IM	Alewife	221.00	253.00	141.75	M
20160415	0830	13.25	Night	SOG IM	Gizzard Shad		348.00	368.54	U
20160415	0830	13.25	Night	SOG IM	Alewife	224.00	251.00	141.75	F
20160415	0830	13.25	Night	SOG IM	White Perch		236.00	198.45	U
20160415	0830	13.25	Night	SOG IM	Gizzard Shad		272.00	170.10	U
20160415	0830	13.25	Night	SOG IM	White Perch		221.00	198.45	U
20160415	0830	13.25	Night	SOG IM	White Perch		206.00	113.40	U
20160415	0830	13.25	Night	SOG IM	Gizzard Shad		230.00	56.70	M
20160415	0830	13.25	Night	SOG IM	White Perch		235.00	170.10	U
20160415	0830	13.25	Night	SOG IM	White Perch		234.00	141.75	M
20160415	0930	14.50	Night	THG IM	White Perch		110.00	28.35	U
20160415	2015	11.00	Day	SOG EM	Atlantic Blue Crab		85.00		M
20160415	2015	11.00	Day	SOG EM	White Perch		196.00	85.05	U
20160415	2015	11.00	Day	SOG EM	Alewife		266.00	56.70	U
20160415	2015	11.00	Day	SOG EM	Atlantic Blue Crab		166.00		M
20160415	2015	11.00	Day	SOG EM	Atlantic Blue Crab		105.00		M
20160415	2015	11.00	Day	SOG EM	Atlantic Blue Crab		90.00		M
20160415	2015	11.00	Day	SOG EM	Atlantic Blue Crab		76.00		M
20160415	2015	11.00	Day	SOG EM	Atlantic Blue Crab		72.00		M
20160415	2015	11.00	Day	SOG EM	Gizzard Shad		154.00	28.35	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160415	2015	11.00	Day	SOG IM	White Perch		291.00	340.19	U
20160415	2015	11.00	Day	SOG IM	Gizzard Shad		395.00	510.29	U
20160415	2015	11.00	Day	SOG IM	Gizzard Shad		316.00	311.84	M
20160415	2015	11.00	Day	SOG IM	Black Crappie		304.00	453.59	U
20160415	2015	11.00	Day	SOG IM	Black Crappie		317.00	595.34	F
20160415	2015	11.00	Day	SOG IM	Gizzard Shad		370.00	481.94	U
20160415	2015	11.00	Day	SOG IM	Gizzard Shad		145.00	28.35	U
20160415	2015	11.00	Day	SOG IM	White Perch		243.00	170.10	U
20160415	2015	11.00	Day	SOG IM	White Perch		222.00	141.75	U
20160415	2015	11.00	Day	SOG IM	Black Crappie		216.00	113.40	U
20160415	2015	11.00	Day	SOG IM	Black Crappie		143.00	28.35	U
20160415	2015	11.00	Day	SOG IM	Bluegill		140.00	28.35	U
20160415	2030	11.00	Day	THG IM	Redear Sunfish		168.00	113.40	U
20160415	2030	11.00	Day	THG IM	Redear Sunfish		146.00	28.35	U
20160415	2030	11.00	Day	THG IM	Atlantic Blue Crab		75.00		F
20160415	2030	11.00	Day	THG EM	Atlantic Blue Crab		70.00		M
20160416	0900	12.50	Night	SOG IM	Largemouth Bass		395.00	963.88	U
20160416	0900	12.50	Night	SOG IM	Gizzard Shad		381.00	566.99	M
20160416	0900	12.50	Night	SOG IM	White Perch		255.00	226.80	U
20160416	0900	12.50	Night	SOG IM	White Perch		255.00	226.80	U
20160416	0900	12.50	Night	SOG IM	Alewife		265.00	141.75	M
20160416	0900	12.50	Night	SOG IM	Gizzard Shad		344.00	340.19	M
20160416	0900	12.50	Night	SOG IM	Gizzard Shad		354.00	481.94	M
20160416	0900	12.50	Night	SOG IM	Gizzard Shad		350.00	396.89	U
20160416	0900	12.50	Night	SOG IM	Gizzard Shad		222.00	85.05	U
20160416	0900	12.50	Night	SOG IM	White Perch		203.00	113.40	M
20160416	0900	12.50	Night	SOG IM	Gizzard Shad		340.00	396.89	U
20160416	0900	12.50	Night	SOG IM	Gizzard Shad		361.00	481.94	U
20160416	0900	12.50	Night	SOG IM	White Perch		225.00	170.10	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160416	0900	12.50	Night	SOG IM	White Perch		236.00	170.10	U
20160416	0900	12.50	Night	SOG IM	Gizzard Shad		338.00	340.19	M
20160416	0900	12.50	Night	SOG EM	White Perch		225.00	141.75	U
20160416	0900	12.50	Night	SOG EM	Redear Sunfish		150.00	56.70	U
20160416	0930	12.75	Night	THG IM	Atlantic Blue Crab		73.00		U
20160422	1845	6.75	Day	SOG EM	Atlantic Blue Crab		146.00		M
20160422	1845	6.75	Day	SOG EM	Bowfin		475.00	1077.28	U
20160422	1845	6.75	Day	SOG EM	Black Crappie		323.00	510.29	U
20160422	1845	6.75	Day	SOG EM	Alewife	230.00	262.00	113.40	U
20160422	1845	6.75	Day	SOG EM	Alewife	226.00	257.00	85.05	U
20160422	1845	6.75	Day	SOG EM	Alewife	240.00	273.00	85.05	U
20160422	1845	6.75	Day	SOG EM	Alewife	223.00	253.00	85.05	M
20160422	1845	6.75	Day	SOG EM	Alewife	213.00	248.00	85.05	F
20160422	1845	6.75	Day	SOG EM	Alewife		268.00	113.40	M
20160422	1845	6.75	Day	SOG EM	White Perch		231.00	170.10	M
20160422	1845	6.75	Day	SOG EM	White Perch		223.00	113.40	M
20160422	1845	6.75	Day	SOG EM	White Perch		255.00	198.45	U
20160422	1845	6.75	Day	SOG EM	White Perch		189.00	85.05	U
20160422	1845	6.75	Day	SOG EM	White Perch		209.00	113.40	U
20160422	1845	6.75	Day	SOG IM	Gizzard Shad		388.00	481.94	U
20160422	1845	6.75	Day	SOG IM	Gizzard Shad		375.00	453.59	U
20160422	1845	6.75	Day	SOG IM	Gizzard Shad		382.00	453.59	U
20160422	1845	6.75	Day	SOG IM	Gizzard Shad		175.00	28.35	U
20160422	1845	6.75	Day	SOG IM	White Perch		174.00	85.05	U
20160422	1845	6.75	Day	SOG IM	Gizzard Shad		278.00	170.10	U
20160422	1845	6.75	Day	SOG IM	Gizzard Shad		220.00	56.70	U
20160422	1915	7.25	Day	THG IM	Bluegill		155.00	28.35	U
20160422	1915	7.25	Day	THG IM	Atlantic Blue Crab		84.00		M
20160422	1915	7.25	Day	THG IM	Atlantic Blue Crab		119.00		M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160423	0830	13.50	Night	SOG IM	Longnose Gar		630.00	850.49	U
20160423	0830	13.50	Night	SOG IM	Longnose Gar		705.00	1304.08	U
20160423	0830	13.50	Night	SOG IM	Longnose Gar		611.00	822.14	M
20160423	0830	13.50	Night	SOG IM	Longnose Gar		680.00	1133.98	U
20160423	0830	13.50	Night	SOG IM	Longnose Gar		748.00	1133.98	U
20160423	0830	13.50	Night	SOG IM	Longnose Gar		605.00	765.44	U
20160423	0830	13.50	Night	SOG IM	Longnose Gar		733.00	1389.13	U
20160423	0830	13.50	Night	SOG IM	White Perch		245.00	170.10	U
20160423	0830	13.50	Night	SOG IM	White Perch		278.00	283.50	U
20160423	0830	13.50	Night	SOG IM	White Perch		225.00	141.75	U
20160423	0830	13.50	Night	SOG IM	White Perch		212.00	141.75	U
20160423	0830	13.50	Night	SOG IM	Gizzard Shad		343.00	340.19	U
20160423	0830	13.50	Night	SOG IM	White Perch		303.00	396.89	U
20160423	0830	13.50	Night	SOG IM	White Perch		262.00	226.80	U
20160423	0830	13.50	Night	SOG IM	White Perch		210.00	113.40	U
20160423	0830	13.50	Night	SOG IM	White Perch		245.00	198.45	U
20160423	0830	13.50	Night	SOG IM	Gizzard Shad		365.00	425.24	U
20160423	0830	13.50	Night	SOG IM	Gizzard Shad		386.00	595.34	U
20160423	0830	13.50	Night	SOG IM	White Perch		265.00	255.15	U
20160423	0830	13.50	Night	SOG IM	Gizzard Shad		342.00	311.84	U
20160423	0830	13.50	Night	SOG IM	White Perch		233.00	170.10	U
20160423	0830	13.50	Night	SOG IM	White Perch		238.00	198.45	U
20160423	0830	13.50	Night	SOG IM	White Perch		255.00	198.45	U
20160423	0830	13.50	Night	SOG IM	Black Crappie		254.00	255.15	F
20160423	0830	13.50	Night	SOG IM	Gizzard Shad		342.00	311.84	M
20160423	0830	13.50	Night	SOG IM	Gizzard Shad		215.00	56.70	U
20160423	0830	13.50	Night	SOG EM	White Perch		276.00	255.15	U
20160423	0830	13.50	Night	SOG EM	White Perch		268.00	255.15	U
20160423	0830	13.50	Night	SOG EM	White Perch		225.00	85.05	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160423	0830	13.50	Night	SOG EM	White Perch		240.00	170.10	U
20160423	0830	13.50	Night	SOG EM	White Perch		278.00	283.50	U
20160423	0830	13.50	Night	SOG EM	White Perch		272.00	255.15	U
20160423	0830	13.50	Night	SOG EM	White Perch		252.00	198.45	U
20160423	0830	13.50	Night	SOG EM	White Perch		228.00	141.75	U
20160423	0830	13.50	Night	SOG EM	White Perch		206.00	85.05	U
20160423	0830	13.50	Night	SOG EM	White Perch		233.00	170.10	U
20160423	0830	13.50	Night	SOG EM	White Perch		233.00	170.10	U
20160423	0830	13.50	Night	SOG EM	White Perch		199.00	85.05	U
20160423	0830	13.50	Night	SOG EM	White Perch		195.00	85.05	M
20160423	0830	13.50	Night	SOG EM	White Perch		188.00	85.05	U
20160423	0830	13.50	Night	SOG EM	White Perch				U
20160423	0830	13.50	Night	SOG EM	White Perch		184.00	28.35	U
20160423	0830	13.50	Night	SOG EM	White Perch		255.00	226.80	U
20160423	0830	13.50	Night	SOG EM	White Perch		212.00	113.40	U
20160423	0830	13.50	Night	SOG EM	White Perch		173.00	56.70	U
20160423	0830	13.50	Night	SOG EM	White Perch		171.00	56.70	U
20160423	0830	13.50	Night	SOG EM	White Perch		303.00	368.54	U
20160423	0830	13.50	Night	SOG EM	White Perch		273.00	198.45	U
20160423	0830	13.50	Night	SOG EM	White Perch		236.00	170.10	U
20160423	0830	13.50	Night	SOG EM	White Perch		263.00	255.15	U
20160423	0830	13.50	Night	SOG EM	White Perch		238.00	170.10	M
20160423	0830	13.50	Night	SOG EM	White Perch		208.00	113.40	U
20160423	0830	13.50	Night	SOG EM	White Perch		204.00	85.05	U
20160423	0830	13.50	Night	SOG EM	White Perch		220.00	141.75	U
20160423	0830	13.50	Night	SOG EM	White Perch		240.00	170.10	M
20160423	0830	13.50	Night	SOG EM	White Perch		220.00	113.40	U
20160423	0830	13.50	Night	SOG EM	White Perch		228.00	141.75	U
20160423	0830	13.50	Night	SOG EM	Alewife				U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160423	0830	13.50	Night	SOG EM	White Perch		250.00	198.45	U
20160423	0830	13.50	Night	SOG EM	Gizzard Shad		200.00	56.70	U
20160423	0830	13.50	Night	SOG EM	White Perch		204.00	113.40	M
20160423	0830	13.50	Night	SOG EM	Bowfin		640.00	2267.96	U
20160423	0830	13.50	Night	SOG EM	Atlantic Blue Crab		154.00		M
20160423	0830	13.50	Night	SOG EM	Atlantic Blue Crab		164.00		M
20160423	0830	13.50	Night	SOG EM	Atlantic Blue Crab		155.00		M
20160423	0830	13.50	Night	SOG EM	Alewife	110.00	132.00	28.35	U
20160423	0830	13.50	Night	SOG EM	Alewife	244.00	277.00	141.75	F
20160423	0830	13.50	Night	SOG EM	Alewife	220.00	253.00	113.40	M
20160423	0830	13.50	Night	SOG IM	Common Carp		470.00	1360.78	U
20160423	0830	13.50	Night	SOG IM	Common Carp		500.00	1927.77	U
20160423	0830	13.50	Night	SOG IM	Common Carp		430.00	1105.63	U
20160423	0945	14.25	Night	THG IM	Atlantic Blue Crab		65.00		M
20160423	0945	14.25	Night	THG IM	White Perch		80.00	14.17	U
20160423	0945	14.25	Night	THG IM	Channel Catfish		150.00	28.35	U
20160423	1700	7.25	Day	SOG EM	Longnose Gar		665.00	1133.98	U
20160423	1700	7.25	Day	SOG EM	Atlantic Blue Crab		120.00		F
20160423	1700	7.25	Day	SOG EM	Atlantic Blue Crab		155.00		M
20160423	1700	7.25	Day	SOG IM	Largemouth Bass		351.00	510.29	M
20160423	1700	7.25	Day	SOG EM	Largemouth Bass		379.00	623.69	U
20160423	1700	7.25	Day	SOG EM	White Perch		217.00	113.40	M
20160423	1700	7.25	Day	SOG EM	White Perch		195.00	85.05	M
20160423	1700	7.25	Day	SOG IM	Atlantic Blue Crab		135.00		M
20160423	1700	7.25	Day	SOG EM	White Perch		261.00	170.10	F
20160423	1700	7.25	Day	SOG EM	White Perch		186.00	28.35	M
20160423	1700	7.25	Day	SOG EM	White Perch		209.00	85.05	U
20160423	1700	7.25	Day	SOG EM	Bluegill		160.00	170.10	U
20160423	1700	7.25	Day	SOG EM	Bluegill		140.00	28.35	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160423	1700	7.25	Day	SOG EM	White Perch		191.00	56.70	M
20160423	1700	7.25	Day	SOG EM	White Perch		197.00	28.35	M
20160423	1700	7.25	Day	SOG EM	White Perch		193.00	85.05	M
20160423	1700	7.25	Day	SOG EM	Bluegill		174.00	85.05	U
20160423	1700	7.25	Day	SOG EM	White Perch		210.00	85.05	U
20160423	1700	7.25	Day	SOG EM	Alewife	251.00	274.00	113.40	U
20160423	1700	7.25	Day	SOG IM	White Perch		200.00	85.05	M
20160423	1700	7.25	Day	SOG IM	Alewife	240.00	272.00	85.05	U
20160423	1700	7.25	Day	SOG IM	Alewife	233.00	251.00	113.40	U
20160423	1700	7.25	Day	SOG IM	Alewife	229.00	260.00	56.70	U
20160423	1730	7.50	Day	THG IM	Black Crappie		178.00	113.40	U
20160423	1730	7.50	Day	THG EM	Bluegill		185.00	141.75	U
20160423	1730	7.50	Day	THG EM	Bluegill		172.00	56.70	U
20160423	1730	7.50	Day	THG EM	Black Crappie		125.00	28.35	U
20160424	0700	13.50	Night	SOG IM	White Perch		252.00	170.10	U
20160424	0700	13.50	Night	SOG IM	White Perch		239.00	170.10	U
20160424	0700	13.50	Night	SOG IM	White Perch		230.00	141.75	U
20160424	0700	13.50	Night	SOG IM	White Perch		225.00	85.05	U
20160424	0700	13.50	Night	SOG IM	White Perch		260.00	283.50	U
20160424	0700	13.50	Night	SOG IM	White Perch		187.00	56.70	U
20160424	0700	13.50	Night	SOG IM	White Perch		213.00	141.75	U
20160424	0700	13.50	Night	SOG IM	White Perch		195.00	85.05	U
20160424	0700	13.50	Night	SOG IM	White Perch		180.00	56.70	U
20160424	0700	13.50	Night	SOG IM	White Perch		228.00	141.75	U
20160424	0700	13.50	Night	SOG IM	White Perch		264.00	226.80	U
20160424	0700	13.50	Night	SOG IM	White Perch		205.00	113.40	U
20160424	0700	13.50	Night	SOG IM	White Perch		257.00	255.15	U
20160424	0700	13.50	Night	SOG IM	White Perch		197.00	85.05	M
20160424	0700	13.50	Night	SOG IM	White Perch		198.00	85.05	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160424	0700	13.50	Night	SOG IM	White Perch		268.00	226.80	U
20160424	0700	13.50	Night	SOG IM	White Perch		302.00	396.89	U
20160424	0700	13.50	Night	SOG IM	Black Crappie		280.00	396.89	F
20160424	0700	13.50	Night	SOG IM	Black Crappie		277.00	311.84	U
20160424	0700	13.50	Night	SOG IM	Black Crappie		197.00	85.05	U
20160424	0700	13.50	Night	SOG IM	Black Crappie		270.00	255.15	U
20160424	0700	13.50	Night	SOG IM	White Perch		261.00	226.80	U
20160424	0700	13.50	Night	SOG IM	Black Crappie		153.00	28.35	U
20160424	0700	13.50	Night	SOG IM	White Perch		261.00	255.15	U
20160424	0700	13.50	Night	SOG IM	White Perch		198.00	85.05	U
20160424	0700	13.50	Night	SOG IM	Gizzard Shad		381.00	425.24	U
20160424	0700	13.50	Night	SOG IM	Gizzard Shad		363.00	453.59	U
20160424	0700	13.50	Night	SOG IM	Gizzard Shad		395.00	453.59	U
20160424	0700	13.50	Night	SOG IM	Gizzard Shad		395.00	595.34	F
20160424	0700	13.50	Night	SOG IM	Gizzard Shad		320.00	283.50	M
20160424	0700	13.50	Night	SOG IM	Striped Mullet		399.00	538.64	U
20160424	0700	13.50	Night	SOG IM	Black Crappie		240.00	368.54	U
20160424	0700	13.50	Night	SOG IM	Gizzard Shad		390.00	538.64	U
20160424	0700	13.50	Night	SOG IM	Gizzard Shad		375.00	510.29	U
20160424	0700	13.50	Night	SOG IM	Gizzard Shad		360.00	368.54	U
20160424	0700	13.50	Night	SOG IM	Gizzard Shad		350.00	425.24	U
20160424	0700	13.50	Night	SOG IM	Gizzard Shad		320.00	226.80	U
20160424	0700	13.50	Night	SOG IM	White Perch		245.00	198.45	U
20160424	0700	13.50	Night	SOG IM	Largemouth Bass		304.00	340.19	U
20160424	0700	13.50	Night	SOG IM	Channel Catfish		249.00	141.75	U
20160424	0700	13.50	Night	SOG IM	Gizzard Shad		385.00	538.64	U
20160424	0700	13.50	Night	SOG IM	Gizzard Shad		322.00	283.50	M
20160424	0700	13.50	Night	SOG IM	Gizzard Shad		393.00	652.04	U
20160424	0700	13.50	Night	SOG IM	Gizzard Shad		360.00	425.24	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160424	0700	13.50	Night	SOG IM	Gizzard Shad		380.00	566.99	U
20160424	0700	13.50	Night	SOG IM	Gizzard Shad		320.00	566.99	M
20160424	0700	13.50	Night	SOG IM	Gizzard Shad		345.00	368.54	U
20160424	0700	13.50	Night	SOG IM	White Perch		236.00	170.10	U
20160424	0700	13.50	Night	SOG IM	Gizzard Shad		280.00	170.10	M
20160424	0700	13.50	Night	SOG IM	Bluegill		144.00	56.70	U
20160424	0700	13.50	Night	SOG IM	Gizzard Shad		225.00	113.40	M
20160424	0700	13.50	Night	SOG IM	Bluegill		174.00	85.05	U
20160424	0700	13.50	Night	SOG IM	Bluegill		131.00	28.35	U
20160424	0700	13.50	Night	SOG IM	Bluegill		144.00	56.70	U
20160424	0700	13.50	Night	SOG IM	Longnose Gar		695.00	1133.98	U
20160424	0700	13.50	Night	SOG IM	Longnose Gar		654.00	765.44	U
20160424	0700	13.50	Night	SOG IM	Longnose Gar		700.00	1219.03	U
20160424	0700	13.50	Night	SOG EM	Bowfin		485.00	907.18	U
20160424	0700	13.50	Night	SOG EM	Longnose Gar		645.00	907.18	U
20160424	0700	13.50	Night	SOG EM	Longnose Gar		652.00	1020.58	U
20160424	0700	13.50	Night	SOG EM	White Perch		255.00	198.45	U
20160424	0700	13.50	Night	SOG EM	White Perch		302.00	368.54	U
20160424	0700	13.50	Night	SOG EM	White Perch		240.00	170.10	M
20160424	0700	13.50	Night	SOG EM	White Perch		197.00	85.05	U
20160424	0700	13.50	Night	SOG EM	White Perch		195.00	56.70	U
20160424	0700	13.50	Night	SOG EM	White Perch		211.00	113.40	U
20160424	0700	13.50	Night	SOG EM	White Perch		220.00	141.75	U
20160424	0700	13.50	Night	SOG EM	White Perch		201.00	28.35	U
20160424	0700	13.50	Night	SOG EM	White Perch		234.00	141.75	U
20160424	0700	13.50	Night	SOG EM	White Perch		216.00	56.70	U
20160424	0700	13.50	Night	SOG EM	White Perch		256.00	226.80	U
20160424	0700	13.50	Night	SOG EM	White Perch		233.00	141.75	U
20160424	0700	13.50	Night	SOG EM	White Perch		288.00	85.05	M

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160424	0700	13.50	Night	SOG EM	White Perch		180.00	85.05	U
20160424	0700	13.50	Night	SOG EM	White Perch		217.00	85.05	U
20160424	0700	13.50	Night	SOG EM	White Perch		215.00	113.40	U
20160424	0700	13.50	Night	SOG EM	White Perch		218.00	113.40	U
20160424	0700	13.50	Night	SOG EM	White Perch		235.00	170.10	U
20160424	0700	13.50	Night	SOG EM	White Perch		197.00	85.05	U
20160424	0700	13.50	Night	SOG EM	White Perch		205.00	85.05	U
20160424	0700	13.50	Night	SOG EM	White Perch		188.00	56.70	U
20160424	0700	13.50	Night	SOG EM	Gizzard Shad		187.00	28.35	U
20160424	0700	13.50	Night	SOG EM	Gizzard Shad		160.00	28.35	U
20160424	0700	13.50	Night	SOG EM	Striped Mullet		198.00	56.70	U
20160424	0700	13.50	Night	SOG EM	White Perch		204.00	85.05	M
20160424	0700	13.50	Night	SOG EM	Alewife	246.00	278.00	141.75	U
20160424	0700	13.50	Night	SOG EM	Alewife	222.00	250.00	56.70	M
20160424	0700	13.50	Night	SOG EM	Alewife	236.00	267.00	141.75	U
20160424	0700	13.50	Night	SOG EM	Alewife	233.00		113.40	U
20160424	0700	13.50	Night	SOG EM	Alewife	228.00	261.00	141.75	U
20160424	0800	14.00	Night	THG IM	Atlantic Blue Crab				M
20160424	0800	14.00	Night	THG IM	White Perch		199.00	56.70	U
20160424	0800	14.00	Night	THG IM	Alewife	216.00	250.00	85.05	U
20160424	0800	14.00	Night	THG IM	White Perch		196.00	85.05	M
20160424	0800	14.00	Night	THG IM	White Perch		150.00	28.35	U
20160424	0800	14.00	Night	THG IM	White Perch		235.00	198.45	U
20160424	0800	14.00	Night	THG IM	White Perch		209.00	113.40	U
20160424	0800	14.00	Night	THG IM	White Perch		176.00	56.70	U
20160424	0800	14.00	Night	THG IM	White Perch		98.00	14.17	U
20160424	0800	14.00	Night	THG EM	White Perch		193.00	85.05	U
20160424	0800	14.00	Night	THG EM	Bluegill		132.00	56.70	U
20160429	2045	12.75	Day	THG IM	Gizzard Shad		162.00	28.35	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160429	2100	13.00	Day	SOG EM	Alewife	242.00	274.00	141.75	U
20160429	2100	13.00	Day	SOG EM	White Perch		249.00	170.10	U
20160429	2100	13.00	Day	SOG EM	White Perch		255.00	198.45	U
20160429	2100	13.00	Day	SOG IM	Black Crappie		235.00	595.34	U
20160429	2100	13.00	Day	SOG IM	White Perch		261.00	226.80	U
20160429	2100	13.00	Day	SOG IM	White Perch		186.00	85.05	U
20160429	2100	13.00	Day	SOG IM	White Perch		253.00	198.45	U
20160429	2100	13.00	Day	SOG IM	White Perch		290.00	340.19	U
20160429	2100	13.00	Day	SOG IM	White Perch		222.00	141.75	U
20160429	2100	13.00	Day	SOG IM	Gizzard Shad		356.00	368.54	U
20160429	2100	13.00	Day	SOG IM	Gizzard Shad		402.00	652.04	U
20160429	2100	13.00	Day	SOG IM	Gizzard Shad		380.00	425.24	U
20160429	2100	13.00	Day	SOG IM	Gizzard Shad		420.00	623.69	U
20160429	2100	13.00	Day	SOG IM	Gizzard Shad		357.00	311.84	U
20160429	2100	13.00	Day	SOG IM	Longnose Gar		690.00	1077.28	U
20160429	2100	13.00	Day	SOG IM	Longnose Gar		700.00	1162.33	U
20160429	2100	13.00	Day	SOG IM	Longnose Gar		660.00	1077.28	U
20160430	0945	12.75	Night	THG EM	American Eel		400.00	141.75	U
20160430	0945	12.75	Night	THG EM	Striped Mullet		161.00	28.35	U
20160430	0945	12.75	Night	THG EM	Striped Mullet		278.00	170.10	U
20160430	0945	12.75	Night	THG EM	Striped Mullet		219.00	85.05	U
20160430	0945	12.75	Night	THG EM	Striped Mullet		188.00	56.70	U
20160430	0945	12.75	Night	THG EM	Striped Mullet		176.00	56.70	U
20160430	0945	12.75	Night	THG EM	Striped Mullet		170.00	28.35	U
20160430	0945	12.75	Night	THG EM	Striped Mullet		158.00	28.35	U
20160430	0945	12.75	Night	THG EM	Striped Mullet		178.00	56.70	U
20160430	0945	12.75	Night	THG EM	Striped Mullet		153.00	56.70	U
20160430	0945	12.75	Night	THG EM	Striped Mullet		158.00	56.70	U
20160430	0945	12.75	Night	THG EM	Striped Mullet		157.00	28.35	U

Date	Time	Hours	Period	Status	Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex
20160430	0945	12.75	Night	THG EM	Striped Mullet		157.00	56.70	U
20160430	0945	12.75	Night	THG EM	Striped Mullet		137.00	28.35	U
20160430	0945	12.75	Night	THG EM	Striped Mullet		162.00	28.35	U
20160430	1000	12.50	Night	SOG EM	Longnose Gar		795.00	1587.57	F
20160430	1000	12.50	Night	SOG EM	White Perch		155.00	28.35	U
20160430	1730	7.50	Day	THG IM	Bluegill		185.00	28.35	U
20160430	1745	7.50	Day	SOG IM	Bluegill		132.00	56.70	U
20160430	1745	7.50	Day	SOG EM	White Perch		213.00	113.40	U
20160430	1745	7.50	Day	SOG EM	Bluegill		144.00	56.70	U
20160430	1745	7.50	Day	SOG EM	White Perch		94.00	28.35	U
20160430	1745	7.50	Day	SOG EM	Threadfin Shad		127.00	28.35	U
20160501	0700	13.25	Night	THG EM	Striped Mullet		164.00	28.35	U
20160501	0700	13.25	Night	THG EM	Striped Mullet		155.00	28.35	U
20160501	0700	13.25	Night	THG EM	Striped Mullet		180.00	56.70	U
20160501	0700	13.25	Night	THG EM	Striped Mullet		176.00	56.70	U
20160501	0700	13.25	Night	THG EM	Striped Mullet		155.00	28.35	U
20160501	0700	13.25	Night	THG EM	Striped Mullet		142.00	28.35	U
20160501	0715	13.25	Night	SOG EM	Pumpkinseed		170.00	85.05	U
20160501	0715	13.25	Night	SOG EM	White Perch		195.00	113.40	M

Subset of Alewife Alosa pseudoharengus captured at Waupoppin Water Control Structure during the 2015 sampling period of February 25 through May1, 2016, Lake Mattamuskeet, North Carolina.

Date	Time	Hours	Period	Fish Identification	Species	Gate	Status	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Gonad Weight (g)	Sex	Sex Stage	GSI
20160226	0800	12.00	Night	16WAUPAW244	ALEWIFE	THG	IM	234.00	264.00	213.40	4	12.01	M	5	5.63
20160226	0800	12.00	Night	16WAUPAW245	ALEWIFE	THG	IM	205.00	234.00	124.96	5	7.25	M	4	5.80
20160226	0800	12.00	Night	16WAUPAW246	ALEWIFE	THG	IM	214.00	248.00	148.88	6	8.15	M	4	5.47
20160226	0800	12.00	Night	16WAUPAW247	ALEWIFE	THG	IM	235.00	270.00	216.54	5	18.61	F	4	8.59
20160226	0800	12.00	Night	16WAUPAW248	ALEWIFE	THG	IM	213.00	243.00	154.50	5	10.85	F	4	7.02
20160226	0800	12.00	Night	16WAUPAW249	ALEWIFE	THG	IM	225.00	260.00	164.91	7	13.40	F	4	8.13
20160226	0800	12.00	Night	16WAUPAW250	ALEWIFE	THG	IM	214.00	244.00	169.96	7	17.76	F	4	10.45
20160226	0800	12.00	Night	16WAUPAW251	ALEWIFE	THG	IM	201.00	233.00	127.21	4	6.56	M	4	5.16
20160226	0800	12.00	Night	16WAUPAW252	ALEWIFE	THG	IM	211.00	243.00	155.51	6	7.37	M	4	4.74
20160226	0900	13.75	Night	16WAUPAW231	ALEWIFE	SOG	IM	220.00	251.00	160.56	4	7.26	M	4	4.52
20160226	0900	13.75	Night	16WAUPAW232	ALEWIFE	SOG	IM	216.00	251.00	163.16	4	11.39	F	4	6.98
20160226	0900	13.75	Night	16WAUPAW233	ALEWIFE	SOG	IM	216.00	249.00	173.84	5	12.20	M	5	7.02
20160226	0900	13.75	Night	16WAUPAW234	ALEWIFE	SOG	IM	210.00	240.00	141.92	6	6.82	M	4	4.81
20160226	0900	13.75	Night	16WAUPAW235	ALEWIFE	SOG	IM	196.00	221.00	115.23	5	3.18	M	4	2.76
20160226	2000	11.00	Day	16WAUPAW150	ALEWIFE	THG	IM	213.00	254.00	153.95	5	13.77	F	4	8.94
20160226	2000	11.00	Day	16WAUPAW151	ALEWIFE	THG	IM	233.00	266.00	220.34	4	13.11	F	4	5.95
20160226	2030	10.50	Day	16WAUPAW178	ALEWIFE	SOG	IM	216.00	250.00	163.24	5	9.39	M	4	5.75
20160226	2030	10.50	Day	16WAUPAW179	ALEWIFE	SOG	IM	225.00		184.63	5	11.80	M	4	6.39
20160226	2030	10.50	Day	16WAUPAW180	ALEWIFE	SOG	IM	225.00		186.75	4	17.42	F	4	9.33
20160226	2030	10.50	Day	16WAUPAW181	ALEWIFE	SOG	IM	228.00	262.00	193.03	3	22.06	F	4	11.43
20160226	2030	10.50	Day	16WAUPAW182	ALEWIFE	SOG	IM	233.00	268.00	196.00	8	17.92	F	4	9.14
20160226	2030	10.50	Day	16WAUPAW183	ALEWIFE	SOG	IM	230.00	264.00	194.39	6	8.31	M	4	4.27
20160226	2030	10.50	Day	16WAUPAW184	ALEWIFE	SOG	IM	231.00	267.00	205.11	5	28.60	F	5	13.94
20160226	2030	10.50	Day	16WAUPAW185	ALEWIFE	SOG	IM	223.00	258.00	183.99	6	16.83	F	4	9.15

Date	Time	Hours	Period	Fish Identification	Species	Gate	Status	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Gonad Weight (g)	Sex	Sex Stage	GSI
20160226	2030	10.50	Day	16WAUPAW186	ALEWIFE	SOG	IM	212.00	243.00	155.56	5	7.52	M	4	4.83
20160226	2030	10.50	Day	16WAUPAW187	ALEWIFE	SOG	IM	220.00	251.00	166.06	4	11.64	M	4	7.01
20160227	0800	11.75	Night	16WAUPAW218	ALEWIFE	THG	IM	220.00	280.00	167.79	4	11.12	M	4	6.63
20160227	0800	11.75	Night	16WAUPAW219	ALEWIFE	THG	IM	223.00	254.00	166.86	4	8.39	M	4	5.03
20160227	0815	11.50	Night	16WAUPAW225	ALEWIFE	SOG	IM	235.00	270.00	210.29	4	21.08	F	5	10.02
20160227	0815	11.50	Night	16WAUPAW226	ALEWIFE	SOG	IM	223.00	255.00	192.80	5	20.88	F	5	10.83
20160227	0815	11.50	Night	16WAUPAW227	ALEWIFE	SOG	IM	217.00	248.00	159.83	4	7.67	M	4	4.80
20160227	0815	11.50	Night	16WAUPAW228	ALEWIFE	SOG	IM	215.00	243.00	148.40	5	9.16	M	4	6.17
20160227	0815	11.50	Night	16WAUPAW229	ALEWIFE	SOG	IM	218.00	250.00	157.57	5	7.90	M	4	5.01
20160227	0815	11.50	Night	16WAUPAW230	ALEWIFE	SOG	IM	235.00	268.00	221.52	6	17.67	F	4	7.98
20160227	0815	11.50	Night	16WAUPAW224	ALEWIFE	SOG	IM	230.00	264.00	199.55	5	14.51	F	4	7.27
20160302	0845	11.75	Night	16WAUPAW152	ALEWIFE	SOG	IM	207.00		151.08	4	10.40	M	4	6.88
20160302	0915	12.25	Night	16WAUPAW161	ALEWIFE	THG	IM	227.00	262.00	197.09	6	23.02	F	5	11.68
20160302	0915	12.25	Night	16WAUPAW162	ALEWIFE	THG	IM	227.00	260.00	196.74	5	14.27	M	4	7.25
20160302	0915	12.25	Night	16WAUPAW163	ALEWIFE	THG	IM	215.00	246.00	157.22	5	8.47	M	4	5.39
20160302	0915	12.25	Night	16WAUPAW164	ALEWIFE	THG	IM	226.00	259.00	190.87	5	22.26	F	5	11.66
20160302	0915	12.25	Night	16WAUPAW165	ALEWIFE	THG	IM	200.00	229.00	116.29	5	6.27	M	4	5.39
20160302	0915	12.25	Night	16WAUPAW166	ALEWIFE	THG	IM	204.00	236.00	141.21	5	5.31	M	4	3.76
20160302	0915	12.25	Night	16WAUPAW167	ALEWIFE	THG	IM	235.00	270.00	215.82	5	24.93	F	5	11.55
20160302	1730	8.25	Day	16WAUPAW153	ALEWIFE	SOG	IM	229.00	262.00	186.52	4	23.59	F	5	12.65
20160302	1730	8.25	Day	16WAUPAW154	ALEWIFE	SOG	IM	214.00	243.00	149.55	4	18.04	F	4	12.06
20160302	1730	8.25	Day	16WAUPAW155	ALEWIFE	SOG	IM	216.00		161.23	5	15.56	F	4	9.65
20160302	1900	9.75	Day	16WAUPAW156	ALEWIFE	THG	IM	230.00	260.00	191.42	6	22.24	F	5	11.62
20160302	1900	9.75	Day	16WAUPAW157	ALEWIFE	THG	IM	219.00	252.00	173.10	7	8.16	M	4	4.71
20160302	1900	9.75	Day	16WAUPAW158	ALEWIFE	THG	IM	242.00	274.00	224.20	5	14.50	M	4	6.47
20160302	1900	9.75	Day	16WAUPAW159	ALEWIFE	THG	IM	200.00	231.00	117.99	5	4.73	M	4	4.01
20160302	1900	9.75	Day	16WAUPAW160	ALEWIFE	THG	IM	236.00	270.00	232.16	5	24.51	F	5	10.56
20160303	0800	13.00	Night	16WAUPAW253	ALEWIFE	SOG	IM	220.00	253.00	176.93	7	16.76	F	4	9.47

Date	Time	Hours	Period	Fish Identification	Species	Gate	Status	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Gonad Weight (g)	Sex	Sex Stage	GSI
20160303	0800	13.00	Night	16WAUPAW254	ALEWIFE	SOG	IM	230.00	263.00	195.48	6	12.95	M	4	6.62
20160303	800	13.00	Night	16WAUPAW255	ALEWIFE	SOG	IM	208.00	239.00	153.46	6	12.11	F	4	7.89
20160303	0800	13.00	Night	16WAUPAW256	ALEWIFE	SOG	IM	228.00	261.00	179.18	5	8.37	M	4	4.67
20160303	0800	13.00	Night	16WAUPAW257	ALEWIFE	SOG	IM	257.00	293.00	281.97	5	37.97	F	5	13.47
20160303	0800	13.00	Night	16WAUPAW258	ALEWIFE	SOG	IM	228.00	264.00	206.70	6	11.55	M	5	5.59
20160303	0800	13.00	Night	16WAUPAW259	ALEWIFE	SOG	IM	196.00	228.00	128.09	4	6.03	M	4	4.71
20160303	0800	13.00	Night	16WAUPAW260	ALEWIFE	SOG	IM	205.00	235.00	129.73	5	7.77	M	4	5.99
20160303	0800	13.00	Night	16WAUPAW261	ALEWIFE	SOG	IM	225.00	257.00	161.43	5	9.65	M	4	5.98
20160303	1000	14.00	Night	16WAUPAW236	ALEWIFE	THG	IM	237.00	272.00	203.33	5	19.89	F	4	9.78
20160303	1000	14.00	Night	16WAUPAW237	ALEWIFE	THG	IM	208.00	240.00	142.23	6	7.18	M	4	5.05
20160303	1000	14.00	Night	16WAUPAW238	ALEWIFE	THG	IM	212.00	244.00	160.29	5	9.43	M	4	5.88
20160303	1000	14.00	Night	16WAUPAW239	ALEWIFE	THG	IM	232.00	264.00	176.94	5	16.99	F	4	9.60
20160303	1000	14.00	Night	16WAUPAW240	ALEWIFE	THG	IM	228.00	261.00	203.20	5	22.78	F	5	11.21
20160303	1000	14.00	Night	16WAUPAW241	ALEWIFE	THG	IM	219.00	254.00	183.27	5	10.31	M	4	5.63
20160303	1000	14.00	Night	16WAUPAW242	ALEWIFE	THG	IM	225.00	259.00	178.68	4	8.07	M	4	4.52
20160303	1000	14.00	Night	16WAUPAW243	ALEWIFE	THG	IM	218.00	249.00	163.65	7	19.05	F	4	11.64
20160303	1700	7.00	Day	16WAUPAW173	ALEWIFE	SOG	IM	228.00		190.11	4	13.35	F	4	7.02
20160303	1700	7.00	Day	16WAUPAW174	ALEWIFE	SOG	IM	200.00	230.00	128.06	4	4.54	M	4	3.55
20160303	1700	7.00	Day	16WAUPAW175	ALEWIFE	SOG	IM	225.00	255.00	182.50	5	14.13	F	4	7.74
20160303	1700	7.00	Day	16WAUPAW176	ALEWIFE	SOG	IM	216.00	249.00	169.72	5	17.64	F	4	10.39
20160303	1700	7.00	Day	16WAUPAW177	ALEWIFE	SOG	IM	206.00	239.00	134.53	4	6.54	F	4	4.86
20160303	1700	7.00	Day	16WAUPAW188	ALEWIFE	SOG	IM	225.00	259.00	199.22	6	23.42	F	4	11.76
20160303	1700	7.00	Day	16WAUPAW189	ALEWIFE	SOG	IM	233.00	268.00	196.19	4	12.08	M	4	6.16
20160303	1700	7.00	Day	16WAUPAW190	ALEWIFE	SOG	IM	224.00	256.00	183.72	5	17.35	F	4	9.44
20160303	1700	7.00	Day	16WAUPAW191	ALEWIFE	SOG	IM	220.00	255.00	177.04	5	12.65	M	4	7.15
20160303	1700	7.00	Day	16WAUPAW192	ALEWIFE	SOG	IM	219.00	250.00		5	7.46	M	4	
20160303	1700	7.00	Day	16WAUPAW193	ALEWIFE	SOG	IM	236.00	266.00	204.56	5	15.85	F	4	7.75
20160303	1700	7.00	Day	16WAUPAW194	ALEWIFE	SOG	IM	230.00	265.00	186.49	5	9.81	M	4	5.26

Date	Time	Hours	Period	Fish Identification	Species	Gate	Status	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Gonad Weight (g)	Sex	Sex Stage	GSI
20160303	1700	7.00	Day	16WAUPAW195	ALEWIFE	SOG	IM	225.00	255.00	187.35	5	9.23	M	4	4.93
20160303	1700	7.00	Day	16WAUPAW196	ALEWIFE	SOG	IM	230.00	265.00	190.79	4	19.98	F	4	10.47
20160303	1700	7.00	Day	16WAUPAW197	ALEWIFE	SOG	IM	197.00	227.00	117.38	5	4.32	M	4	3.68
20160303	1700	7.00	Day	16WAUPAW198	ALEWIFE	SOG	IM	223.00	255.00	173.00	5	7.88	M	4	4.55
20160303	1745	7.00	Day	16WAUPAW168	ALEWIFE	THG	IM	231.00	265.00	205.21	5	25.99	F	5	12.67
20160303	1745	7.00	Day	16WAUPAW169	ALEWIFE	THG	IM	230.00	261.00	198.18	4	16.52	F	4	8.34
20160303	1745	7.00	Day	16WAUPAW170	ALEWIFE	THG	IM	201.00	232.00	123.45	5	5.00	M	4	4.05
20160303	1745	7.00	Day	16WAUPAW171	ALEWIFE	THG	IM	212.00	245.00	149.77	6	8.92	M	4	5.96
20160303	1745	7.00	Day	16WAUPAW172	ALEWIFE	THG	IM	211.00	243.00	142.07	5	6.43	M	4	4.53
20160310	0800	11.50	Night	16WAUPAW203	ALEWIFE	THG	IM	220.00	255.00	172.39	4	17.01	F	4	9.87
20160310	0800	11.50	Night	16WAUPAW204	ALEWIFE	THG	IM	212.00	242.00	153.05	5	10.44	F	4	6.82
20160310	0800	11.50	Night	16WAUPAW205	ALEWIFE	THG	IM	227.00	261.00	183.81	4	14.14	F	4	7.69
20160310	0800	11.50	Night	16WAUPAW206	ALEWIFE	THG	IM	212.00	244.00	159.17	4	10.51	M	4	6.60
20160310	0800	11.50	Night	16WAUPAW207	ALEWIFE	THG	IM	218.00	252.00	169.70	4	16.08	F	4	9.48
20160310	0800	11.50	Night	16WAUPAW208	ALEWIFE	THG	IM	211.00	245.00	171.92	4	19.43	F	4	11.30
20160310	0800	11.50	Night	16WAUPAW209	ALEWIFE	THG	IM	224.00	260.00	194.31	5	16.56	F	4	8.52
20160310	0800	11.50	Night	16WAUPAW210	ALEWIFE	THG	IM	236.00	265.00	214.62	5	26.05	F	5	12.14
20160310	0830	12.00	Night	16WAUPAW199	ALEWIFE	SOG	IM	247.00	285.00	264.87	5	36.48	F	5	13.77
20160310	0830	12.00	Night	16WAUPAW200	ALEWIFE	SOG	IM	209.00	240.00	136.70	4	7.17	M	4	5.25
20160310	0830	12.00	Night	16WAUPAW201	ALEWIFE	SOG	IM	217.00	247.00	162.55	4	19.04	F	4	11.71
20160310	0830	12.00	Night	16WAUPAW202	ALEWIFE	SOG	IM	216.00	250.00	148.60	3	7.27	M	4	4.89
20160310	1800	8.50	Day	16WAUPAW220	ALEWIFE	SOG	IM	242.00	270.00	216.22	6	29.72	F	5	13.75
20160310	1800	8.50	Day	16WAUPAW221	ALEWIFE	SOG	IM	223.00	254.00	185.80	6	16.27	F	4	8.76
20160310	1800	8.50	Day	16WAUPAW222	ALEWIFE	SOG	IM	201.00	231.00	129.15	5	4.45	M	4	3.45
20160310	1815	9.75	Day	16WAUPAW216	ALEWIFE	THG	IM	212.00	243.00	150.59	4	8.76	M	4	5.82
20160310	1815	9.75	Day	16WAUPAW217	ALEWIFE	THG	IM	224.00	255.00	186.48	8	10.71	M	4	5.74
20160311	0715	13.25	Night	16WAUPAW223	ALEWIFE	SOG	IM	228.00	262.00	185.28	4	19.37	F	5	10.45
20160311	0745	13.25	Night	16WAUPAW211	ALEWIFE	THG	IM	214.00	245.00	149.91	5	7.51	M	4	5.01

Date	Time	Hours	Period	Fish Identification	Species	Gate	Status	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Gonad Weight (g)	Sex	Sex Stage	GSI
20160311	0745	13.25	Night	16WAUPAW212	ALEWIFE	THG	IM	208.00	238.00	142.41	5	6.35	M	4	4.46
20160311	0745	13.25	Night	16WAUPAW213	ALEWIFE	THG	IM	215.00	248.00	163.91	5	12.92	F	4	7.88
20160311	0745	13.25	Night	16WAUPAW214	ALEWIFE	THG	IM	224.00	254.00	179.42	5	18.02	F	4	10.04
20160311	0745	13.25	Night	16WAUPAW215	ALEWIFE	THG	IM	208.00	238.00	145.66	4	11.04	F	4	7.58
20160311	1800	10.50	Day	16WAUPAW144	ALEWIFE	SOG	IM	216.00	245.00	155.81	6	6.92	M	4	4.44
20160311	1800	10.50	Day	16WAUPAW145	ALEWIFE	SOG	IM	218.00	251.00	181.23	5	17.12	F	4	9.45
20160311	1800	10.50	Day	16WAUPAW146	ALEWIFE	SOG	IM	236.00	269.00	205.34	5	19.64	F	4	9.56
20160311	1800	10.50	Day	16WAUPAW147	ALEWIFE	SOG	IM	214.00	246.00	142.09	4	7.16	M	4	5.04
20160311	1800	10.50	Day	16WAUPAW148	ALEWIFE	SOG	IM	195.00	224.00	114.33	5	5.10	M	4	4.46
20160311	1800	10.50	Day	16WAUPAW149	ALEWIFE	SOG	IM	218.00	250.00	181.82	4	21.92	F	4	12.06
20160311	1830	10.50	Day	16WAUPAW139	ALEWIFE	THG	IM	225.00	257.00	194.27	4	22.93	F	5	11.80
20160311	1830	10.50	Day	16WAUPAW140	ALEWIFE	THG	IM	215.00	247.00	167.81	6	10.59	M	4	6.31
20160311	1830	10.50	Day	16WAUPAW141	ALEWIFE	THG	IM	220.00	252.00	155.08	4	16.23	F	4	10.47
20160311	1830	10.50	Day	16WAUPAW142	ALEWIFE	THG	IM	184.00	212.00	98.96	4	5.09	M	4	5.14
20160311	1830	10.50	Day	16WAUPAW143	ALEWIFE	THG	IM	220.00	253.00	165.37	6	23.92	F	5	14.46
20160318	0800	8.00	Night	16WAUPAW24	ALEWIFE	THG	EM	203.00	234.00	138.85	7	2.11	M	4	1.52
20160318	2330	6.75	Night	16WAUPAW01	ALEWIFE	SOG	EM	220.00	250.00	141.27	6	1.38	M	4	0.98
20160318	2330	6.75	Night	16WAUPAW02	ALEWIFE	SOG	EM	232.00	266.00	173.58	5	5.25	F	4	3.02
20160318	2330	6.75	Night	16WAUPAW03	ALEWIFE	SOG	EM	217.00	250.00	133.11	6	1.54	M	3	1.16
20160318	2330	6.75	Night	16WAUPAW04	ALEWIFE	SOG	EM	221.00	252.00	147.92	5	0.86	M	4	0.58
20160318	2345	7.50	Night	16WAUPAW25	ALEWIFE	THG	IM	197.00	228.00	119.38	6	6.17	M	4	5.17
20160319	0800	8.00	Night	16WAUPAW23	ALEWIFE	THG	IM			118.82	7	6.42	M	5	5.40
20160319	0830	8.75	Night	16WAUPAW13	ALEWIFE	SOG	IM	196.00	225.00	128.00	4	6.74	M	5	5.27
20160319	0830	8.75	Night	16WAUPAW14	ALEWIFE	SOG	IM	219.00	256.00	193.63	5	25.41	F	5	13.12
20160319	0830	8.75	Night	16WAUPAW15	ALEWIFE	SOG	IM	206.00	247.00	176.08	4	11.89	M	5	6.75
20160319	0830	8.75	Night	16WAUPAW22	ALEWIFE	SOG	EM	224.00	235.00	152.62	5	4.07	F	4	2.67
20160319	0830	8.75	Night	16WAUPAW06	ALEWIFE	SOG	EM	230.00	262.00	158.49	5	1.89	M	4	1.19
20160319	0830	8.75	Night	16WAUPAW07	ALEWIFE	SOG	EM	255.00	290.00	233.18	7	6.47	F	4	2.77

Date	Time	Hours	Period	Fish Identification	Species	Gate	Status	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Gonad Weight (g)	Sex	Sex Stage	GSI
20160319	0830	8.75	Night	16WAUPAW08	ALEWIFE	SOG	EM	237.00	270.00	172.10	5	2.44	F	4	1.42
20160319	0830	8.75	Night	16WAUPAW09	ALEWIFE	SOG	EM	233.00	263.00	198.07	4	15.94	M	5	8.05
20160319	1800	8.50	Day	16WAUPAW16	ALEWIFE	SOG	EM	211.00	253.00	145.79	6	1.60	M	4	1.10
20160319	1800	8.50	Day	16WAUPAW17	ALEWIFE	SOG	EM	225.00	259.00	155.50		4.29	M	5	2.76
20160319	1800	8.50	Day	16WAUPAW18	ALEWIFE	SOG	EM	229.00	265.00	141.16	7	2.19	F	4	1.55
20160319	1800	8.50	Day	16WAUPAW20	ALEWIFE	SOG	IM	200.00	240.00	123.64	6	4.11	F	4	3.32
20160319	2130	3.75	Night	16WAUPAW11	ALEWIFE	THG	EM	213.00	245.00	126.10	5	2.80	F	4	2.22
20160319	2130	3.75	Night	16WAUPAW12	ALEWIFE	THG	EM	246.00	285.00	215.77		6.51	F	4	3.02
20160319	2145	3.75	Day	16WAUPAW21	ALEWIFE	SOG	EM	235.00	278.00	203.74	7	4.91	F	4	2.41
20160324	0900	13.00	Night	16WAUPAW91	ALEWIFE	SOG	IM	225.00		168.51	4	10.62	M	4	6.30
20160324	0900	13.00	Night	16WAUPAW92	ALEWIFE	SOG	IM	226.00	260.00	208.42	5	29.00	F	5	13.91
20160324	0900	13.00	Night	16WAUPAW93	ALEWIFE	SOG	IM	214.00	246.00	141.43	5	6.39	M	4	4.52
20160324	0945	13.75	Night	16WAUPAW128	ALEWIFE	THG	IM	228.00	263.00	180.79	6	13.83	M	5	7.65
20160324	0945	13.75	Night	16WAUPAW129	ALEWIFE	THG	IM	192.00	220.00	111.62	5	5.93	M	4	5.31
20160324	0945	13.75	Night	16WAUPAW130	ALEWIFE	THG	IM	217.00	246.00	164.82	5	18.44	F	4	11.19
20160324	0945	13.75	Night	16WAUPAW131	ALEWIFE	THG	IM	219.00	252.00	161.34	6	9.04	M	4	5.60
20160324	0945	13.75	Night	16WAUPAW132	ALEWIFE	THG	IM	204.00	235.00	131.34	6	8.59	M	4	6.54
20160324	0945	13.75	Night	16WAUPAW133	ALEWIFE	THG	IM	226.00	259.00	180.39	5	27.27	F	5	15.12
20160324	0945	13.75	Night	16WAUPAW134	ALEWIFE	THG	IM	223.00	257.00	176.29	6	10.16	M	4	5.76
20160324	0945	13.75	Night	16WAUPAW135	ALEWIFE	THG	IM	224.00	256.00	194.40	5	27.18	F	5	13.98
20160324	0945	13.75	Night	16WAUPAW136	ALEWIFE	THG	IM	223.00	253.00	165.78	5	9.01	M	4	5.43
20160324	0945	13.75	Night	16WAUPAW137	ALEWIFE	THG	IM	237.00	273.00	209.86	5	35.13	F	5	16.74
20160324	0945	13.75	Night	16WAUPAW138	ALEWIFE	THG	IM	224.00	255.00	169.86	4	16.12	F	4	9.49
20160324	1800	8.00	Day	16WAUPAW67	ALEWIFE	THG	IM	219.00	252.00	157.25	5	9.30	M	4	5.91
20160324	1800	8.00	Day	16WAUPAW68	ALEWIFE	THG	IM	234.00	270.00	228.71	5	27.21	F	5	11.90
20160324	1830	9.00	Day	16WAUPAW56	ALEWIFE	SOG	EM	225.00	251.00	141.15	4	4.37	F	3	3.10
20160324	1830	9.00	Day	16WAUPAW57	ALEWIFE	SOG	EM	217.00	246.00	137.39	4	0.77	M	3	0.56
20160324	1830	9.00	Day	16WAUPAW73	ALEWIFE	SOG	IM	222.00	254.00	189.42	7	10.32	M	4	5.45

Date	Time	Hours	Period	Fish Identification	Species	Gate	Status	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Gonad Weight (g)	Sex	Sex Stage	GSI
20160324	1830	9.00	Day	16WAUPAW74	ALEWIFE	SOG	IM	224.00	256.00	173.39	6	12.66	M	4	7.30
20160324	1830	9.00	Day	16WAUPAW75	ALEWIFE	SOG	IM	219.00	252.00	165.16	5	9.22	M	4	5.58
20160324	1830	9.00	Day	16WAUPAW76	ALEWIFE	SOG	IM	214.00	247.00	166.51	4	7.97	M	4	4.79
20160324	1830	9.00	Day	16WAUPAW77	ALEWIFE	SOG	IM	243.00	274.00	211.48	4	27.02	F	5	12.78
20160324	1830	9.00	Day	16WAUPAW78	ALEWIFE	SOG	IM	217.00	251.00	167.68	5	10.36	M	4	6.18
20160325	0730	13.25	Night	16WAUPAW121	ALEWIFE	THG	IM	228.00	261.00	189.46	6	25.97	F	5	13.71
20160325	0730	13.25	Night	16WAUPAW122	ALEWIFE	THG	IM	231.00	264.00	204.51	5	29.67	F	5	14.51
20160325	0730	13.25	Night	16WAUPAW123	ALEWIFE	THG	IM	210.00	242.00	151.16	5	18.14	F	4	12.00
20160325	0730	13.25	Night	16WAUPAW124	ALEWIFE	THG	IM	215.00	245.00	153.70	6	10.51	M	4	6.84
20160325	0730	13.25	Night	16WAUPAW125	ALEWIFE	THG	IM	230.00	264.00	205.75	5	13.24	F	5	6.43
20160325	0730	13.25	Night	16WAUPAW126	ALEWIFE	THG	IM	210.00	242.00	159.98	6	17.77	F	4	11.11
20160325	0730	13.25	Night	16WAUPAW127	ALEWIFE	THG	IM	204.00	235.00	133.05	6	6.73	M	4	5.06
20160325	0830	13.50	Night	16WAUPAW94	ALEWIFE	SOG	IM	233.00	265.00	209.88	5	29.98	F	5	14.28
20160325	0830	13.50	Night	16WAUPAW95	ALEWIFE	SOG	IM	224.00	259.00	202.32	4	25.33	F	5	12.52
20160325	1730	8.25	Day	16WAUPAW105	ALEWIFE	SOG	IM	225.00		160.94	5	8.50	F	4	5.28
20160325	1730	8.25	Day	16WAUPAW106	ALEWIFE	SOG	IM	205.00	237.00	155.52	3	16.16	F	4	10.39
20160325	1730	8.25	Day	16WAUPAW107	ALEWIFE	SOG	IM	217.00		180.59	4	12.17	M	5	6.74
20160325	1730	8.25	Day	16WAUPAW108	ALEWIFE	SOG	IM	208.00	237.00	151.48	4	16.19	F	4	10.69
20160325	1800	10.00	Day	16WAUPAW86	ALEWIFE	THG	IM	223.00	253.00	180.03	6	25.87	F	5	14.37
20160401	0930	12.50	Night	16WAUPAW79	ALEWIFE	SOG	EM	219.00	252.00	124.64	4	2.98	F	3	2.39
20160401	0930	12.50	Night	16WAUPAW80	ALEWIFE	SOG	EM			145.14	5	3.83	F	3	2.64
20160401	0930	12.50	Night	16WAUPAW81	ALEWIFE	SOG	EM			125.96	4	0.95	M	3	0.75
20160401	0930	12.50	Night	16WAUPAW82	ALEWIFE	SOG	EM	235.00	268.00	159.48	7	2.82	F	3	1.77
20160401	0930	12.50	Night	16WAUPAW83	ALEWIFE	SOG	EM	219.00	252.00	116.79	5	0.80	F	3	0.68
20160401	0930	12.50	Night	16WAUPAW84	ALEWIFE	SOG	EM	225.00	256.00	120.21	5	0.31	M	3	0.26
20160401	1100	14.00	Night	16WAUPAW65	ALEWIFE	THG	IM	232.00	267.00	202.78	8	14.59	M	5	7.19
20160401	1100	14.00	Night	16WAUPAW66	ALEWIFE	THG	IM	200.00	239.00	144.98	5	12.98	F	4	8.95
20160401	1700	6.00	Day	16WAUPAW109	ALEWIFE	SOG	IM	221.00	255.00	177.36	5	16.53	F	4	9.32

Date	Time	Hours	Period	Fish Identification	Species	Gate	Status	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Gonad Weight (g)	Sex	Sex Stage	GSI
20160401	1700	6.00	Day	16WAUPAW110	ALEWIFE	SOG	IM	220.00	252.00	167.74	6	8.74	M	4	5.21
20160401	1700	6.00	Day	16WAUPAW111	ALEWIFE	SOG	IM	222.00		172.04	5	18.27	F	4	10.62
20160401	1700	6.00	Day	16WAUPAW112	ALEWIFE	SOG	EM	254.00	291.00	187.36	5	3.01	F	3	1.61
20160401	1700	6.00	Day	16WAUPAW113	ALEWIFE	SOG	EM	199.00	232.00	104.61	4	2.30	M	3	2.20
20160401	1700	6.00	Day	16WAUPAW114	ALEWIFE	SOG	EM	207.00	236.00	132.73	4	14.23	F	4	10.72
20160402	0730	13.50	Night	16WAUPAW58	ALEWIFE	SOG	EM	228.00	262.00	136.05	5	3.68	F	3	2.70
20160402	0730	13.50	Night	16WAUPAW59	ALEWIFE	SOG	EM	223.00	254.00	144.02	7	3.29	F	3	2.28
20160402	0730	13.50	Night	16WAUPAW60	ALEWIFE	SOG	EM	212.00	243.00	114.39	6	3.33	F	3	2.91
20160402	0730	13.50	Night	16WAUPAW61	ALEWIFE	SOG	EM			172.05	5	4.77	F	3	2.77
20160402	0730	13.50	Night	16WAUPAW63	ALEWIFE	SOG	IM	233.00	267.00	201.58	4	28.29	F	5	14.03
20160402	0730	13.50	Night	16WAUPAW64	ALEWIFE	SOG	IM	230.00	259.00	182.68	5	25.78	F	5	14.11
20160402	1800	9.50	Day	16WAUPAW85	ALEWIFE	SOG	EM	217.00	242.00	137.36	7	5.22	M	4	3.80
20160406	0845	13.75	Night	16WAUPAW62	ALEWIFE	SOG	EM	221.00	254.00	106.95	4	0.28	M	3	0.26
20160406	0845	13.75	Night	16WAUPAW69	ALEWIFE	SOG	IM	222.00	255.00	188.30	4	27.65	F	5	14.68
20160406	0845	13.75	Night	16WAUPAW70	ALEWIFE	SOG	IM	233.00		208.80		23.18	F	5	11.10
20160406	0845	13.75	Night	16WAUPAW71	ALEWIFE	SOG	IM	206.00	239.00	141.58	8	6.93	M	4	4.89
20160406	0845	13.75	Night	16WAUPAW72	ALEWIFE	SOG	IM	227.00	260.00	167.53	6	9.96	M	4	5.95
20160406	1845	9.50	Day	16WAUPAW87	ALEWIFE	SOG	EM	221.00	254.00	120.04	6	3.87	F	3	3.22
20160406	1845	9.50	Day	16WAUPAW88	ALEWIFE	SOG	EM	218.00	251.00	122.24	5	8.06	F	4	6.59
20160406	1845	9.50	Day	16WAUPAW89	ALEWIFE	SOG	IM	225.00	260.00	190.87	5	30.00	F	5	15.72
20160406	1845	9.50	Day	16WAUPAW90	ALEWIFE	SOG	IM	242.00	275.00	235.01	4	32.82	F	5	13.97
20160407	0830	13.50	Night	16WAUPAW115	ALEWIFE	SOG	EM	225.00	268.00	147.32	5	1.91	M	3	1.30
20160407	0830	13.50	Night	16WAUPAW116	ALEWIFE	SOG	EM	230.00	265.00	135.32	6	2.85	F	3	2.11
20160407	0830	13.50	Night	16WAUPAW117	ALEWIFE	SOG	EM	223.00	255.00	109.90	4	1.53	M	3	1.39
20160407	0830	13.50	Night	16WAUPAW118	ALEWIFE	SOG	EM	194.00	225.00	96.15	5	1.44	M	3	1.50
20160407	0830	13.50	Night	16WAUPAW119	ALEWIFE	SOG	EM	224.00	259.00	137.87	6	1.63	F	3	1.18
20160407	0830	13.50	Night	16WAUPAW120	ALEWIFE	SOG	EM	225.00	259.00	137.78	5	1.75	M	3	1.27
20160407	1900	9.25	Day	16WAUPAW96	BLUEBACK HERRING	SOG	IM	214.00	246.00	133.02	4	4.68	M	4	3.52

Date	Time	Hours	Period	Fish Identification	Species	Gate	Status	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Gonad Weight (g)	Sex	Sex Stage	GSI
20160407	1900	9.25	Day	16WAUPAW97	BLUEBACK HERRING	SOG	IM	211.00	241.00	134.74	4	7.01	M	4	5.20
20160407	1900	9.25	Day	16WAUPAW98	ALEWIFE	SOG	EM	212.00	244.00	115.57	5	6.29	F	4	5.44
20160407	1900	9.25	Day	16WAUPAW99	ALEWIFE	SOG	EM	229.00	265.00	121.99	4	2.17	F	3	1.78
20160407	1900	9.25	Day	16WAUPAW100	ALEWIFE	SOG	EM	214.00	245.00	125.21	5	1.82	F	3	1.45
20160407	1900	9.25	Day	16WAUPAW101	BLUEBACK HERRING	SOG	EM	215.00	247.00	129.89	4	5.36	M	4	4.13
20160407	1900	9.25	Day	16WAUPAW102	ALEWIFE	SOG	EM	224.00	258.00	122.71	5	2.76	F	3	2.25
20160407	1900	9.25	Day	16WAUPAW103	ALEWIFE	SOG	EM	218.00	253.00	125.82	5	4.57	F	3	3.63
20160407	1900	9.25	Day	16WAUPAW104	ALEWIFE	SOG	EM	215.00	249.00	130.01	4	3.56	M	3	2.74
20160414	1845	7.75	Day	16WAUPAW37	ALEWIFE	SOG	EM	202.00	228.00	89.53	7	0.23	M	3	0.26
20160415	0830	13.25	Night	16WAUPAW31	ALEWIFE	SOG	IM	215.00	243.00	164.91	6	19.54	F	5	11.85
20160415	0830	13.25	Night	16WAUPAW32	ALEWIFE	SOG	IM	212.00	243.00	160.13	7	7.93	M	4	4.95
20160415	0830	13.25	Night	16WAUPAW51	ALEWIFE	SOG	EM	202.00	235.00	109.98	5	0.71	M	3	0.65
20160415	0830	13.25	Night	16WAUPAW52	ALEWIFE	SOG	EM	235.00	266.00	167.92	7	1.07	M	3	0.64
20160415	0830	13.25	Night	16WAUPAW53	ALEWIFE	SOG	EM	243.00	280.00	183.71	6	12.83	F	4	6.98
20160415	0830	13.25	Night	16WAUPAW54	ALEWIFE	SOG	EM	214.00	244.00	129.58	4	2.55	F	3	1.97
20160415	0830	13.25	Night	16WAUPAW55	ALEWIFE	SOG	EM	218.00	253.00	128.09	4	0.83	M	3	0.65
20160415	2015	11.00	Day	16WAUPAW26	ALEWIFE	SOG	EM	225.00	259.00	138.42	8	2.15	F	3	1.55
20160416	0900	12.50	Night	16WAUPAW38	ALEWIFE	SOG	IM	224.00	256.00	171.22	6	10.88	M	4	6.35
20160422	1845	6.75	Day	16WAUPAW40	ALEWIFE	SOG	EM	212.00	238.00	112.56	4	6.84	F	4	6.08
20160422	1845	6.75	Day	16WAUPAW41	ALEWIFE	SOG	EM	231.00	264.00	149.19	6	3.16	F	3	2.12
20160422	1845	6.75	Day	16WAUPAW42	ALEWIFE	SOG	EM	218.00	250.00	131.34	8	2.50	M	3	1.90
20160422	1845	6.75	Day	16WAUPAW43	ALEWIFE	SOG	EM	219.00	252.00	111.20	8	1.25	F	3	1.12
20160422	1845	6.75	Day	16WAUPAW44	ALEWIFE	SOG	EM	222.00	258.00	130.79	8	1.18	M	3	0.90
20160422	1845	6.75	Day	16WAUPAW45	ALEWIFE	SOG	EM	222.00	254.00	134.29	7	1.72	M	3	1.28
20160423	0830	13.50	Night	16WAUPAW34	ALEWIFE	SOG	EM	105.00	125.00	17.81	3				0.00
20160423	0830	13.50	Night	16WAUPAW35	ALEWIFE	SOG	EM	236.00	271.00	156.33	7	10.82	F	4	6.92
20160423	0830	13.50	Night	16WAUPAW36	ALEWIFE	SOG	EM	214.00	244.00	131.29	5	2.75	M	3	2.09

Date	Time	Hours	Period	Fish Identification	Species	Gate	Status	Fork Length (mm)	Total Length (mm)	Weight (g)	Age	Gonad Weight (g)	Sex	Sex Stage	GSI
20160423	1700	7.25	Day	16WAUPAW27	ALEWIFE	SOG	EM	237.00	269.00	144.49	7	3.18	F	3	2.20
20160423	1700	7.25	Day	16WAUPAW28	ALEWIFE	SOG	IM	216.00	248.00	104.67	7	0.23	M	3	0.22
20160423	1700	7.25	Day	16WAUPAW29	ALEWIFE	SOG	IM	228.00	262.00	127.14	8	2.60	F	3	2.04
20160423	1700	7.25	Day	16WAUPAW30	ALEWIFE	SOG	IM	222.00	252.00	115.74	6	1.75	F	3	1.51
20160424	0700	13.50	Night	16WAUPAW46	ALEWIFE	SOG	EM	216.00	246.00	118.39	6	0.38	M	3	0.32
20160424	0700	13.50	Night	16WAUPAW47	ALEWIFE	SOG	EM	226.00		130.92	7	0.62	M	3	0.47
20160424	0700	13.50	Night	16WAUPAW48	ALEWIFE	SOG	EM	221.00	254.00	129.06	5	7.18	F	4	5.56
20160424	0700	13.50	Night	16WAUPAW49	ALEWIFE	SOG	EM	240.00	270.00	145.96	8	1.79	F	3	1.23
20160424	0700	13.50	Night	16WAUPAW50	ALEWIFE	SOG	EM	228.00	261.00	142.97	6	0.93	M	3	0.65
20160424	0800	14.00	Night	16WAUPAW33	ALEWIFE	THG	IM	210.00	243.00	112.31	5	0.47	M	3	0.42
20160429	2100	13.00	Day	16WAUPAW39	ALEWIFE	SOG	EM	234.00	266.00	158.30	5	4.08	F	3	2.58

American Eel Anguilla rostrata captured in sampling pots during the 2015 and 2016 sampling periods at Waupoppin Canal, Lake Mattamuskeet, North Carolina.

Date	Location	Eel Pot Number	Species	Total Length (mm)	Weight (g)
20160319	Downstream	1	American Eel *Anguilla rostrata*	530.00	340.19
20160319	Downstream	2	American Eel *Anguilla rostrata*	400.00	141.75
20160319	Upstream	1	American Eel *Anguilla rostrata*	480.00	226.80
20160325	Downstream	1	American Eel *Anguilla rostrata*	490.00	226.80
20160325	Downstream	1	American Eel *Anguilla rostrata*	382.00	56.70
20160325	Downstream	1	American Eel *Anguilla rostrata*	306.00	56.70
20160325	Upstream	3	American Eel *Anguilla rostrata*	648.00	566.99
20160407	Downstream	1	American Eel *Anguilla rostrata*	340.00	
20160424	Upstream	3	American Eel *Anguilla rostrata*	540.00	425.24

Data collected in Lake Mattamuskeet during nighttime juvenile fish sampling, September 29 and October 8-9 2015, Lake Mattamuskeet, North Carolina. Date, Transect, Time 1 (beginning time), Time 2 (end time), DO 1 mg/L (beginning dissolved oxygen mg/L), DO 2 mg/L (end dissolved oxygen mg/L), DO 1 % (beginning dissolved oxygen %), DO 2 % (end dissolved oxygen %), Sal 1 ppt (beginning salinity ppt), Sal 2 ppt (end salinity ppt), W Temp 1 C (beginning water temperature C), W Temp 2 C (end water temperature C), Cond 1 uS (beginning conductivity uS), Cond 2 uS (end conductivity uS), pH 1 (beginning pH), pH 2 (end pH), Left Flow 1 (beginning flow in left meter), Left Flow 2 (end flow in left meter), Right Flow 1 (beginning flow in right meter), Right Flow 2 (end flow in right meter), Wind 1 km/hr (beginning wind speed km/hr), Wind 2 km/hr (end wind speed km/hr), Depth 1 in (beginning minimum depth inches), Depth 2 in (end minimum depth inches), Species (number of species captured at each transect), Individuals (number of individuals captured at each transect).

Date	Transect	Time 1	Time 2	DO 1 mg/L	DO 2 mg/L	DO 1 %	DO 2 %	Sal 1 ppt	Sal 2 ppt	W Temp 1 C	W Temp 2 C	Cond 1 uS	Cond 2 uS	pH 1	pH 2	Left Flow 1	Left Flow 2	Right Flow 1	Right Flow 2	Wind 1 km/hr	Wind 2 km/hr	Depth 1 in	Depth 2 in	Species	Individuals
20151008	2_1	2022	2025	13.98	14.35	157.2	159.8	0.4	0.4	21	21.9	727	733	5.75	5.75	347424	353398	444277	450096	0	0	36	36	3	34
20151008	2_2	2030	2033	16.78	14.97	186.5	165	0.5	0.5	22.3	22.3	866	891	6	6	353400	359228	450096	456143	0	0	36	36	3	31
20151008	2_3	2042	2045	16.02	15.3	186.2	177.9	0.5	0.5	22.3	22.3	920	915	5.5	6	359226	366268	456142	463464	8	9	36	36	2	49
20151008	2_4	2053	2056	15.25	15.21	176.2	174.1	0.5	0.5	22.6	22.6	900	880	6	5.5	366267	372392	463463	469653	9	8.5	36	36	2	22
20151008	2_5	2104	2107	15.21	13.09	174	150.6	0.5	0.5	22.6	22.6	912	905	5.5	6	372389	378307	469653	475609	8.5	9	36	36	0	0
20151008	3_1	2124	2127	13.09	13.09	150.6	150.8	0.5	0.4	22.6	22.7	905	840	5	5.5	378300	383966	475609	481374	11	10	36	36	2	6
20151008	3_2	2138	2141	13	12.71	151.8	145.2	0.5	0.5	22.6	22.4	902	898	5.5	6	383987	389135	481375	487694	11	11	36	36	4	21

Date	Transect	Time 1	Time 2	DO 1 mg/L	DO 2 mg/L	DO 1 %	DO 2 %	Sal 1 ppt	Sal 2 ppt	W Temp 1 C	W Temp 2 C	Cond 1 uS	Cond 2 uS	pH 1	pH 2	Left Flow 1	Left Flow 2	Right Flow 1	Right Flow 2	Wind 1 km/hr	Wind 2 km/hr	Depth 1 in	Depth 2 in	Species	Individuals
20151008	3_3	2149	2152	14.7	15.62	167.1	177.9	0.5	0.5	22	22	899	891	5.5	5	389132	394337	487695	494115	11	11	36	36	2	9
20151008	3_4	2200	2203	14.76	14.68	166.8	165.5	0.5	0.4	21.6	21.5	857	851	5.5	5.25	394333	393827	494113	500584	10	8.5	36	36	2	10
20151008	3_5	2211	2214	13.36	16.27	153.2	182.8	0.5	0.5	21.4	21.4	864	869	6	5	396823	403328	500584	507397	8	10	36	36	1	3
20151008	3_6	2221	2224	14.41	13.49	161.8	151.1	0.5	0.5	21.3	21.2	863	859	5.5	6	403328	409661	507393	513903	7	9	36	36	2	5
20151008	3_7	2232	2235	14.69	13.52	164.7	151.1	0.4	0.5	21.2	21.2	843	923	5.25	6	409661	415554	513901	520081	4.5	0	36	36	2	8
20151008	3_8	2247	2250	13.58	14.06	155.2	160.3	0.6	0.6	21.2	22	1068	1075	5.75	6	415555	421776	520080	526586	5.5	0	36	36	2	8
20151008	3_9	2300	2303	13.71	12.65	158	144.5	0.5	0.6	22.7	22.3	1045	1050	6	5.5	421771	428220	526586	533331	0	5	36	36	3	21
20151008	4_1	2312	2315	13.43	13.39	150.8	150.9	0.5	0.6	21.4	21.5	979	1052	5.75	5.75	428221	435285	533330	540711	0	0	36	36	2	23
20151008	4_2	2329	2332	15.03	14.71	166.2	163.8	0.6	0.6	20.5	20.8	1029	1125	6.25	6.4	435295	441534	540711	547140	0	0	36	36	3	24
20151008	4_3	2339	2342	15.94	14.31	177.4	159.3	0.5	0.5	20.8	20.9	898	895	6.4	6.25	441535	448148	547139	554169	5.5	4	36	36	3	22
20151008	4_4	2350	2353	15.71	13.87	176.6	155.1	0.5	0.5	21.4	21.3	897	891	6.4	6.25	448152	454828	554169	561192	5.5	8	36	36	2	25
20151008	4_5	2355	2358	14.89	13.64	158.5	154.8	0.5	0.5	21.8	21.9	902	895	6	6.25	454828	461268	561191	568039	9.5	9	36	36	2	13
20151009	4_6	0008	12	15.79	14.93	178	168	0.5	0.5	21.1	21.4	920	939	6	6.25	461267	468176	568034	575448	10	9.5	36	36	2	11
20151009	4_7	18	21	14.56	13.38	164.7	152.4	0.5	0.5	21.7	22.1	896	863	6.25	6.25	468175	476169	575444	583972	10.5	9	36	36	2	231
20151009	4_8	28	31	14.38	12.41	164.3	142.3	0.5	0.4	22.3	22.7	867	837	6.25	6	476167	482899	583965	591097	9	8	36	36	3	444
20151009	5_1	59	102	3.52	12.78	155.7	146.6	0.1	0.5	22.5	22.4	178.4	920	6	6.4	482905	489330	591099	597884	4	10	34	36	3	13
20151009	5_2	111	114	13.81	14.85	155.9	167.6	0.5	0.5	21.6	21.6	1019	1028	6.25	6.25	489331	495792	597893	604734	11	8	36	36	3	30
20151009	5_3	122	125	15.33	13.58	173.6	153.6	0.6	0.6	21.7	21.7	1042	1042	6.25	6	495792	503515	604735	612957	8	9	36	36	2	7
20151009	5_4	133	136	14.93	15.01	167.9	160.8	0.5	0.5	21.4	21.3	1014	1012	6	6	503514	510086	612968	619956	8	6	36	36	2	15
20151009	5_5	144	147	15.68	13.99	175.9	157	0.5	0.5	21.2	21.2	1021	1015	6.4	6.4	510079	517579	619960	627955	7	6	36	36	2	17
20151009	5_6	153	156	16.11	14.24	181.4	159.9	0.5	0.5	21.4	21.3	1014	1012	6.4	6.25	517578	524846	627953	635684	5.5	4.5	36	36	1	12

Date	Transect	Time 1	Time 2	DO 1 mg/L	DO 2 mg/L	DO 1 %	DO 2 %	Sal 1 ppt	Sal 2 ppt	W Temp 1 C	W Temp 2 C	Cond 1 uS	Cond 2 uS	pH 1	pH 2	Left Flow 1	Left Flow 2	Right Flow 1	Right Flow 2	Wind 1 km/hr	Wind 2 km/hr	Depth 1 in	Depth 2 in	Species	Individuals
20151009	5_7	204	207	16.69	14.55	186.4	162.5	0.5	0.6	21	21	986	1052	6.25	6.4	524844	531156	635684	642379	0	4	36	36	2	9
20151009	5_8	216	219	13.59	13.42	154.5	146.6	0.5	0.5	21.9	21.9	927	921	6	6.4	531157	536969	642379	648489	0	0	36	36	3	42
20150929	6_1	1932	1935	13.67	13.27	167.9	165.1	0.6	0.6	27.1	27	1304	1159	5.6	5	283641	289832	377640	384213	5	13	33	36	7	690
20150929	6_2	1957	2000	12.8	12.83	143	144.6	0.6	0.6	26.5	26.5	1200	1214	4.9	4.8	209837	295756	384283	390477	10	11	36	36	2	2
20150929	6_3	2018	2023	12.09	12.04	146.9	149	0.6	0.6	26	25.8	1254	1247	5.8	6.1	295754	302788	390476	397851	10	10	36	36	3	73
20150929	6_4	2031	2036	13.34	13.62	162.9	153.8	0.6	0.6	25.6	25.6	1228	1208	6.1	5.8	302798	309206	397852	404622	10	10	36	36	2	21
20150929	6_5	2045	2050	13.74	13.98	164.5	159.3	0.6	0.6	25.6	25.6	1216	1221	5.3	5.5	309202	315497	404622	411447	10	9	36	36	0	0
20150929	6_6	2052	2102	13.68	14.36	162.6	169.4	0.6	0.6	25.6	25.6	1198	1222	6	6	315499	321894	411448	418265	10	11	36	36	2	5
20150929	6_7	2108	2115	14.44	13.65	167.2	172.4	0.6	0.6	25.7	25.7	1168	1172	5.5	5.2	321901	328834	418266	425111	10	16	36	36	2	9
20150929	6_8	2121	2125	14.82	14.54	190.4	178.8	0.6	0.6	25.7	25.7	1221	1226	5.5	5.6	328840	335163	425451	431925	11	10	36	36	2	15
20150929	6_9	2135	2140	14.17	13.71	180.4	166	0.6	0.6	25.7	25.9	1228	1249	5.6	6.5	335176	341897	431929	438901	9	12	36	34	3	15
20150929	6_10	2147	2151	13.42	12.43	166.3	150.2	0.6	0.6	26.4	26.2	1167	1187	5.6	5.4	341899	347236	438901	444174	10	11	30	29	0	0
20150929	9_1	1855	1858	13.51	12.94	170.5	162.9	0.6	0.6	26.5	26.5	1199	1206	4.7	5.4	276124	283641	369936	377688	15	7	36	36	2	15

Data collected in Lake Mattamuskeet during nighttime juvenile fish sampling, July 27-29 and August 5, 2016, Lake Mattamuskeet, North Carolina. Date, Transect, Time 1 (beginning time), Time 2 (end time), DO 1 mg/L (beginning dissolved oxygen mg/L), DO 2 mg/L (end dissolved oxygen mg/L), DO 1 % (beginning dissolved oxygen %), DO 2 % (end dissolved oxygen %), Sal 1 ppt (beginning salinity ppt), Sal 2 ppt (end salinity ppt), W Temp 1 C (beginning water temperature C), W Temp 2 C (end water temperature C), Cond 1 uS (beginning conductivity uS), Cond 2 uS (end conductivity uS), pH 1 (beginning pH), pH 2 (end pH), Left Flow 1 (beginning flow in left meter), Left Flow 2 (end flow in left meter), Right Flow 1 (beginning flow in right meter), Right Flow 2 (end flow in right meter), Wind 1 km/hr (beginning wind speed km/hr), Wind 2 km/hr (end wind speed km/hr), Depth 1 in (beginning minimum depth inches), Depth 2 in (end minimum depth inches), Species (number of species captured at each transect), Individuals (number of individuals captured at each transect).

Date	Transect	Time 1	Time 2	DO 1 mg/L	DO 2 mg/L	DO 1 %	DO 2 %	Sal 1 ppt	Sal 2 ppt	W Temp 1 C	W Temp 2 C	Cond 1 uS	Cond 2 uS	pH 1	pH 2	Left Flow 1	Left Flow 2	Right Flow 1	Right Flow 2	Wind 1 km/hr	Wind 2 km/hr	Depth 1 in	Depth 2 in	Species	Individuals
20160727	1_1	2045	2048	6.5	6.6	88.6	91.9	0.3	0.3	31.7	32	732	738	8.9	9.2			7382	16342	4	14	36	36	4	81
20160727	1_2	2110	2113	6.9	7.62	93	103.1	0.3	0.3	30.7	30.7	743	740	9.3	9.1					20	13	36	36	3	70
20160728	2_1	1943	1946	7.98	8.32	109.2	111.7	0.3	0.3	31.7	31.3	767	767	9.3	9.3	739470	745873	55144	60000	25	16	36	36	2	27
20160728	2_2	1932	1935	4.67	6.82	64	92.9	0.2	0.2	31.5	31.6	767	763	9.2	9.3					20	20	36	36	2	30
20160727	2_3	2146	2149	8.26	8.75	111.7	116.1	0.3	0.3	30.5	30.6	740	742	9.2	9.2			39991	47252	20	20	36	36	3	37
20160727	2_4	2134	2137	8.32	8.03	111.5	109.4	0.3	0.3	31.1	31.1	751	726	9.2	9.4	718396	725540	32165	39929	35	30	36	36	2	26
20160727	2_5	2122	2125	7.78	8.01	104.3	106	0.3	0.3	31.2	31.1	746	747	9.2	9.2			24309	32166	15	25	36	36	4	55
20160728	3_1	2127	2130	9.18	7.63	124.2	106.2	0.3	0.3	32	33.5	783	785	9	8.9	805221	812620	106582	114327	15	15	36	36	2	10
20160728	3_2	2118	2121	8.8	8.21	120.8	119.9	0.3	0.3	32.3	31.8	784	785	9.2	9.1	798254	805220	101000	106582	15	14	36	36	3	37

Date	Transect	Time 1	Time 2	DO 1 mg/L	DO 2 mg/L	DO 1 %	DO 2 %	Sal 1 ppt	Sal 2 ppt	W Temp 1 C	W Temp 2 C	Cond 1 uS	Cond 2 uS	pH 1	pH 2	Left Flow 1	Left Flow 2	Right Flow 1	Right Flow 2	Wind 1 km/hr	Wind 2 km/hr	Depth 1 in	Depth 2 in	Species	Individuals
20160728	3_3	2109	2112	9.22	9.44	126.8	125.7	0.3	0.3	31.6	31.3	764	760	9.4	9.3	790594	798256			16	14	36	36	3	103
20160728	3_4	2058	2101	9.37	10.83	122.1	139	0.3	0.3	31.4	31.4	729	778	9.3	9.4	783452	790343	94583	99998	15	13	36	36	3	78
20160728	3_5	2051	2054	10.66	9.93	145.2	136.2	0.3	0.3	31.5	31.5	777	776	9.4	9.4	775957	783456	86688	94583	16	15	36	36	3	103
20160728	3_6	2043	2046	10.6	10.61	140.6	139.8	0.3	0.3	31.5	31.5	773	771	9.4	9.3	768744	775956	81974	86688	14	18	36	36	2	169
20160728	3_7	2035	2039	9.92	9.52	137.2	128.6	0.3	0.3	31.7	31.5	777	774	9.5	9.4	760902	768750	74957	81973	16	20	36	36	2	43
20160728	3_8	2028	2031	8.96	9.14	123.1	127.3	0.3	0.3	32.3	32.1	775	778	9.4	9.3	753279	760903	66972	74957	13	20	36	36	3	48
20160728	3_9	2018	2021	6.86	7.43	96.7	103.1	0.3	0.3	33.6	32.8	746	765	9.3	9.3	746034	753282	60000	66972	18	13	36	36	2	6
20160728	4_2	2248	2251	9.07	8.73	124.7	119.4	0.3	0.3	31.7	32	762	774	9	9.2	857632	864774	151473	159000	12	0	36	36	5	41
20160728	4_3	2238	2241	9.63	9.44	128.5	130.7	0.3	0.3	31	31.2	767	767	9.4	9.3	850119	857632	144010	151472	22	11	36	36	3	32
20160728	4_4	2228	2231	9.7	10.31	131.3	119	0.3	0.3	31.3	31.2	768	769	9.1	9.3	843148	850124	141000	144009	13	20	36	36	3	20
20160728	4_5	2217	2220	9.52	10.44	130.3	140.3	0.3	0.3	31.5	31.5	769	770	9.1	9.3	835463	843132	134574	141000	26	22	36	36	2	38
20160728	4_6	2207	2210	9.59	8.55	130.1	117.8	0.3	0.3	31.6	31.6	796	774	9.1	9.1	828011	835450	126557	134565	20	16	36	36	3	55
20160728	4_7	2156	2159	9.55	9.2	124	125.4	0.3	0.3	31.4	31.5	804	676	9.1	9.2	820191	827957	119999	126554	18	20	36	36	5	33
20160728	4_8	2147	2150	8.96	8.97	119	123.4	0.3	0.3	32.1	31.7	775	818	8.8	9.2	812535	820160	114326	119999	10	20	36	36	3	35
20160729	5_2	26	29	10.43	9.93	139.1	132.8	0.4	0.4	30.4	30.5	872	872	9.1	8.9	903019	910547			18	20	36	36	3	32
20160729	5_3	16	19	9.92	10.35	132.8	138.1	0.4	0.4	30.5	30.5	875	871	9.2	9.1	895674	903017	174951	180000	20	16	36	36	3	68
20160729	5_4	6	9	9.65	9.68	128.9	130.1	0.4	0.4	30.5	30.5	874	874	8.8	9.1	887847	895677	170010	174951	22	24	36	36	2	75
20160728	5_5	2355	2358	10.04	9.56	1333.3	128.2	0.4	0.4	30.6	30.6	868	871	8.8	9	880577	887858	166975	170010	20	24	36	36	3	96
20160728	5_6	2342	2345	9.73	10.72	133.2	141.2	0.4	0.4	30.6	30.6	869	864	8.9	8.9	872967	880574	160000	166975	16	22	36	36	5	61
20160728	5_7	2329	2332	8.87	8.5	118	113.5	0.4	0.4	30.7	30.6	878	872	9.1	9	864970	872973	159000	160000	26	18	36	36	3	69
20160729	6_10	55	58	9.18	10.57	123	142.2	0.4	0.4	30.5	30.4	822	824	8.8	8.8	910541	917613	180073	187650	22	22	36	36	3	40
20160729	6_2	229	232	9.37	9.02	125.1	122.6	0.4	0.4	30.5	30.7	915	913	8.9	9	968842	976463	224349	232000	10	14	36	36	3	11
20160729	6_3	219	222	10.1	9.85	134.9	131.2	0.4	0.4	30.4	30.3	901	899	8.9	9	961243	968847	216328	224349	16	14	36	36	4	20
20160729	6_4	209	212	10.06	9.91	134.8	133.8	0.4	0.4	30.4	30.5	887	903	8.7	8.9	954446	961133	211100	216328	12	10	36	36	2	34
20160729	6_5	158	201	9.87	9.92	131.8	128.2	0.4	0.4	30.1	30.2	851	840	8.9	8.8	947023	954463	207000	211100	14	12	36	36	2	33
20160729	6_6	148	151	9.7	9.22	129.9	122.5	0.4	0.4	30	30.1	824	817	8.9	8.9	934330	946973	200000	207000	16	14	36	36	2	74
20160729	6_7	132	135	9.52	9.56	126.5	126.9	0.4	0.4	30.1	30.1	812	811	8.7	8.7	932453	939310	196107	200000	15	13	36	36	2	29

Date	Transect	Time 1	Time 2	DO 1 mg/L	DO 2 mg/L	DO 1 %	DO 2 %	Sal 1 ppt	Sal 2 ppt	W Temp 1 C	W Temp 2 C	Cond 1 uS	Cond 2 uS	pH 1	pH 2	Left Flow 1	Left Flow 2	Right Flow 1	Right Flow 2	Wind 1 km/hr	Wind 2 km/hr	Depth 1 in	Depth 2 in	Species	Individuals
20160729	6_8	119	122	9.62	9.29	122.5	124.8	0.4	0.4	30.2	30.2	822	820	8.6	8.6	925266	931837			22	14	36	36	4	77
20160729	6_9	107	110	10.18	9.14	137.9	125	0.4	0.4	30.4	30.3	827	827	8.6	8.6	917801	925260	187652	195713	15	24	36	36	2	57
20160805	7_1	2026	2029	9.75	9.21	130.9	123.6	0.4	0.4	30.7	30.7	815	812	10.1	10	2684	100097			11	11	33	36	2	7
20160805	7_2	2034	2037	10.1	9.47	134.8	126.1	0.4	0.4	30.3	30.3	844	829	10.2	10.1	10283	17961			12.5	11.5	35	34	2	25
20160805	7_3	2044	2047	9.69	9.52	128.8	126.3	0.4	0.4	30.1	30	839	840	10.1	10.1	17963	25454			12.5	10	36	30	2	26
20160805	7_4	2054	2057	9.89	9.24	130.7	122.5	0.4	0.4	30	30	851	846	10.1	10.2	25538	33153	240200	245000	12	9	36	36	3	28
20160805	7_5	2103	2106	9.6	9.61	127.5	127.6	0.4	0.4	30.1	30.1	820	823	10.1	10.1	33234	41171			13	12	36	36	3	34
20160805	7_6	2111	2114	10.2	9.49	135.7	126.3	0.4	0.4	30.2	30.2	845	846	10.1	10.1	41170	48049	245200	249999	11	10	36	36	2	63
20160805	7_7	2121	2124	9.9	9.65	130.8	127.1	0.4	0.4	30	29.9	843	839	10.1	10.1	48047	55537			9	9	36	36	3	42
20160805	8_1	1937	1940	10.13	10.49	137.1	142.8	0.4	0.4	31.4	31.4	866	866	10.1	9.9	982814	988879			11	11	34	35	2	12
20160805	8_2	1948	1951	9.81	10.31	132.8	139.2	0.4	0.4	31.3	30.9	863	863	9.9	9.8	988873	995437			11	12.5	36	36	1	5
20160805	8_3	1959	2002	10.12	9.73	136	131.1	0.4	0.4	31.1	31	871	868	9.8	9.8	995442	2689			11	9.5	33	32	2	6

Data collected in Lake Mattamuskeet during nighttime juvenile fish sampling, November 1-2, 2016, Lake Mattamuskeet, North Carolina. Date, Transect, Time 1 (beginning time), Time 2 (end time), DO 1 mg/L (beginning dissolved oxygen mg/L), DO 2 mg/L (end dissolved oxygen mg/L), DO 1 % (beginning dissolved oxygen %), DO 2 % (end dissolved oxygen %), Sal 1 ppt (beginning salinity ppt), Sal 2 ppt (end salinity ppt), W Temp 1 C (beginning water temperature C), W Temp 2 C (end water temperature C), Cond 1 uS (beginning conductivity uS), Cond 2 uS (end conductivity uS), pH 1 (beginning pH), pH 2 (end pH), Left Flow 1 (beginning flow in left meter), Left Flow 2 (end flow in left meter), Right Flow 1 (beginning flow in right meter), Right Flow 2 (end flow in right meter), Wind 1 km/hr (beginning wind speed km/hr), Wind 2 km/hr (end wind speed km/hr), Depth 1 in (beginning minimum depth inches), Depth 2 in (end minimum depth inches), Species (number of species captured at each transect), Individuals (number of individuals captured at each transect).

Date	Transect	Time 1	Time 2	DO 1 mg/L	DO 2 mg/L	DO 1 %	DO 2 %	Sal 1 ppt	Sal 2 ppt	W Temp 1 C	W Temp 2 C	Cond 1 uS	Cond 2 uS	pH 1	pH 2	Left Flow 1	Left Flow 2	Right Flow 1	Right Flow 2	Wind 1 km/hr	Wind 2 km/hr	Depth 1 in	Depth 2 in	Species	Individuals
20161101	1_1	2350	2353	8.99	9.11	92.4	93.4	0.2	0.2	17.4	17.5	385.1	380.3	7.4	7.3	145053	152864			4.3	7.4	36	36	2	11
20161101	2_1	2331	2334	9.98	9.44	102.4	96.9	0.2	0.2	17.2	17.2	422.1	421.5	7.5	7.5	137757	145057			7	6.5	36	36	4	16
20161101	2_2	2321	2324	9.69	9.34	99.9	97.4	0.2	0.2	17.4	17.4	409.5	405.7	7.4	7.4	130733	137757			8.5	8.8	36	36	3	14
20161101	2_3	2313	2316	9.57	9.56	98.5	98.2	0.2	0.2	17.3	17.4	419	419.4	7.3	7.3	124177	130731			7	9	36	36	1	7
20161101	2_4	2305	2308	9.39	8.49	96.6	88.8	0.2	0.2	17.4	17.4	420	41809	7.2	7.3	116773	124163			7	9.1	36	36	2	4
20161101	2_5	2257	2300	8.33	8.95	86.2	93.1	0.2	0.2	17.7	17.8	388.8	397.9	7.3	7.2	109933	116770			4.7	5.5	36	36	1	2
20161101	3_1	2238	2241	9.2	8.89	95.6	92.9	0.2	0.2	17.9	17.8	395.7	399.7	7.5	7.4	102586	109936			6.8	8.5	36	36	2	10
20161101	3_2	2229	2232	9.52	9.49	98.4	98.3	0.2	0.2	17.6	17.6	412.6	412.9	7.6	7.5	95430	102581			5.5	7.8	36	36	3	5
20161101	3_3	2219	2222	9.49	9.26	98	95.7	0.2	0.2	17.6	17.6	407.7	403.5	7.8	7.7	88174	95425			9	7.5	36	36	1	7

Date	Transect	Time 1	Time 2	DO 1 mg/L	DO 2 mg/L	DO 1 %	DO 2 %	Sal 1 ppt	Sal 2 ppt	W Temp 1 C	W Temp 2 C	Cond 1 uS	Cond 2 uS	pH 1	pH 2	Left Flow 1	Left Flow 2	Right Flow 1	Right Flow 2	Wind 1 km/hr	Wind 2 km/hr	Depth 1 in	Depth 2 in	Species	Individuals
20161101	3_4	2209	2212	9.07	9.59	100.1	99.4	0.2	0.2	17.5	17.5	426.8	429.7	7.8	7.8	80968	88168			8.2	6.5	36	36	1	7
20161101	3_5	2200	2203	9.67	9.59	99.7	99.9	0.2	0.2	17.5	17.5	437.8	435.1	7.6	7.8	73927	80970			6.8	8	36	36	2	10
20161101	3_6	2152	2155	9.71	9.81	99.5	101	0.2	0.2	17.4	17.4	439	436.3	7.5	7.6	66705	73923			7.3	6.8	36	36	1	10
20161101	3_7	2142	2145	9.41	9.57	96.4	98.8	0.3	0.3	17.4	17.5	447.7	449.9	7.4	7.5	59787	66713			6	7	36	36	2	11
20161101	3_8	2132	2135	9.47	9.46	97.5	97.8	0.2	0.3	17.4	17.5	428.1	442.4	7.3	7.4	53155	59790			0	5.3	36	36	1	5
20161101	3_9	2123	2126	9.62	9.46	99.6	97.8	0.2	0.2	17.6	17.6	430	428.8	7.5	7.4	46516	53154			6	6	36	36	2	3
20161101	4_2	2103	2106	10.61	10.58	109.4	109.7	0.3	0.3	17.4	17.6	452.3	447.4	7.7	7.6	39667	46509			0	10.5	36	36	2	6
20161101	4_3	2055	2058	10.63	10.65	110.1	110.5	0.3	0.3	17.7	17.7	453.2	454.5	7.5	7.7	32881	39677			7.5	0	36	36	1	9
20161101	4_4	2047	2050	10.57	10.62	110.2	110.2	0.2	0.3	17.9	17.8	442.2	452.1	7.3	7.4	26206	32886			5	7.5	36	36	2	13
20161101	4_5	2038	2041	10.44	10.22	108.5	106.3	0.2	0.2	17.7	17.8	412.2	413.7	7.1	7	19393	26211			0	7	36	36	2	8
20161101	4_6	2030	2033	10.04	10.07	104.6	105.4	0.2	0.2	18	17.9	398	405.7	7	7	12795	19396			0	0	36	36	1	6
20161101	4_7	2020	2023	10.25	9.98	107.2	104.9	0.2	0.2	18.1	18.1	397.3	397	7.1	7	6473	12797			0	0	36	36	1	4
20161101	4_8	2010	2013	10.25	10.23	106.8	106.6	0.2	0.2	18	18	403.8	400.2	6.8	7.1	0	6480			0	0	36	36	1	12
20161102	5_2	2307	2310	9.9	10.2	109	111	0.3	0.3	19.5	19.5	483	485	7.4	7.4	299358	306482			7.5	8.5	36	36	1	15
20161102	5_3	2318	2321	10.8	10.7	116	114	0.3	0.3	18.4	18.3	502	503	7.8	7.8	306499	313382			8	9	36	36	1	2
20161102	5_4	2328	2331	11	10.3	116	109	0.3	0.3	18	18	509	509	8.3	8.3	313381	320670			9	9	36	36	2	5
20161102	5_5	2337	2340	11.2	10.7	118	114	0.3	0.3	17.9	18	507	505	8.5	8.5	320668	327233			8	8	36	36	2	2
20161102	5_6	2347	2350	11	11.2	117	118	0.3	0.3	17.9	18	503	503	9	9	327233	334139			10	10.5	36	36	2	6
20161102	5_7	2357	0	10.9	10.7	116	113	0.3	0.3	18	18	499	507	8.9	8.9	334204	340613			11.5	10	36	36	2	2
20161102	6_1	2047	2050	11.1	10.9	118	116	0.3	0.3	18.1	19.3	502	519	9.5	9.4	228372	235489			6.5	7.8	36	36	2	4
20161102	6_10	2237	2240	10.8	10.5	117	115	0.3	0.3	19.1	19.1	516	515	9.9	9.8	291996	299355			7	7	36	36	2	6
20161102	6_2	2123	2126	10.4	10.4	115	114	0.3	0.3	19.9	19.2	521	514	9	9.1	235521	242500			6.3	8	36	36	2	8
20161102	6_3	2131	2135	11	10.8	117	116	0.3	0.3	18.5	18.5	513	512	9.6	9.8	242499	249452			0	7.2	36	36	1	3
20161102	6_4	2141	2144	10.9	10.4	115	111	0.3	0.3	18.6	18.6	513	513	9.9	9.9	249456	256408			4.8	0	36	36	1	9
20161102	6_5	2150	2153	10.8	10.8	116	116	0.3	0.3	18.6	18.5	509	514	10	9.9	256405	263443			5.1	6.5	36	36	1	4
20161102	6_6	2159	2202	11.1	10.5	118	114	0.3	0.3	18.6	18.4	514	512	9.9	10	263440	271295			4.5	5.5	36	36	2	5

Date	Transect	Time 1	Time 2	DO 1 mg/L	DO 2 mg/L	DO 1 %	DO 2 %	Sal 1 ppt	Sal 2 ppt	W Temp 1 C	W Temp 2 C	Cond 1 uS	Cond 2 uS	pH 1	pH 2	Left Flow 1	Left Flow 2	Right Flow 1	Right Flow 2	Wind 1 km/hr	Wind 2 km/hr	Depth 1 in	Depth 2 in	Species	Individuals
20161102	6_7	2208	2211	11	10.8	118	116	0.3	0.3	18.5	18.5	514	515	9.9	10	271294	278054			4	8	36	36	1	5
20161102	6_8	2219	2222	10.5	10.4	113	111	0.3	0.3	18.6	17.9	515	510	9.9	10	278060	285006			5.5	6	36	36	2	5
20161102	6_9	2228	2231	11.1	10.9	120	118	0.3	0.3	19.1	19	518	517	9.9	9.9	285003	291997			2	5	36	36	2	6
20161102	7_1	1913	1916	10.51	11.18	114.9	121.3	0.3	0.3	19.9	19.8	517	517	8.5	8.5	181091	187725			5.5	8.5	36	36	3	11
20161102	7_2	1924	1927	11.31	10.97	122.9	120.1	0.3	0.3	19.8	19.7	520	519	8.7	8.8	187729	194381			5.4	5.7	36	36	2	8
20161102	7_3	1943	1946	11.61	11.31	127	124	0.3	0.3	19.8	19.7	517	516	8.7	8.9	194397	201191			11	9.5	36	36	1	8
20161102	7_4	1952	1955	11.71	11.37	128	124	0.3	0.3	19.6	19.5	519	518	8.9	10	201215	208251			12.5	12	36	36	1	4
20161102	7_5	2003	2006	11.9	11.8	128	127	0.3	0.3	18.9	18.8	517	519	10	10.1	208250	214839			10.5	10.5	36	36	1	2
20161102	7_6	2016	2019	11.5	10.8	124	120	0.3	0.3	18.9	19.1	521	520	10	10.1	214850	221622			8.5	10.3	36	36	1	7
20161102	7_7	2026	2029	11.4	11.4	123	123	0.3	0.3	18.7	18.9	519	518	10	9.7	221644	228362			11.2	0	36	36	2	10
20161102	8_1	1834	1837	10.95	10.8	114.2	118.4	0.3	0.3	18.7	20.2	545	548	7.7	7.8	167870	172685			10.5	7.5	36	36	1	27
20161102	8_2	1845	1848	10.38	9.8	111.7	105.2	0.3	0.3	18.5	18.3	548	550	8	8	172681	174423			10.2	8.7	36	36	1	14
20161102	8_3	1855	1858	11.46	10.72	119.2	114.9	0.3	0.3	18.1	19.4	554	539	8.2	8.2	174483	181046			7.5	8	36	36	1	11
20161102	8_4	1824	1827	6.58	9.75	66.3	102	0.3	0.3	17.3	19.2	521	530	8.1	7.6					2	7.5	36	36	4	74

Data collected in Lake Mattamuskeet during nighttime juvenile fish sampling, June 12 and 21, 2017, Lake Mattamuskeet, North Carolina. Date, Transect, Time 1 (beginning time), Time 2 (end time), DO 1 mg/L (beginning dissolved oxygen mg/L), DO 2 mg/L (end dissolved oxygen mg/L), DO 1 % (beginning dissolved oxygen %), DO 2 % (end dissolved oxygen %), Sal 1 ppt (beginning salinity ppt), Sal 2 ppt (end salinity ppt), W Temp 1 C (beginning water temperature C), W Temp 2 C (end water temperature C), Cond 1 uS (beginning conductivity uS), Cond 2 uS (end conductivity uS), pH 1 (beginning pH), pH 2 (end pH), Left Flow 1 (beginning flow in left meter), Left Flow 2 (end flow in left meter), Right Flow 1 (beginning flow in right meter), Right Flow 2 (end flow in right meter), Wind 1 km/hr (beginning wind speed km/hr), Wind 2 km/hr (end wind speed km/hr), Depth 1 in (beginning minimum depth inches), Depth 2 in (end minimum depth inches), Species (number of species captured at each transect), Individuals (number of individuals captured at each transect).

Date	Transect	Time 1	Time 2	DO 1 mg/L	DO 2 mg/L	DO 1 %	DO 2 %	Sal 1 ppt	Sal 2 ppt	W Temp 1 C	W Temp 2 C	Cond 1 uS	Cond 2 uS	pH 1	pH 2	Left Flow 1	Left Flow 2	Right Flow 1	Right Flow 2	Wind 1 km/hr	Wind 2 km/hr	Depth 1 in	Depth 2 in	Species	Individuals
20170612	2_2	2028	2031	9.4	9.3	121	108	0.3	0.3	27.8	24	586	562	9.1	9.5	340067	347032			14	15	50	51	3	26
20170612	2_3	2042	2045	9	9.1	114	113	0.3	0.3	27.5	28.1	473	563	9.3	9.3	347000	353806			12	15	53		4	26
20170612	2_4	2053	2056	9.1	8.8	118	114	0.3	0.3	28.7	28.7	572	567	9.1	9.2	353807	357709			24	20	62		4	26
20170612	3_2	2111	2113	7.9	7.8	101	100	0.3	0.2	28	27.9	558	556	9	9.1					14	19	48		4	31
20170612	3_3	2125	2128	8.7	8.4	111	106	0.3	0.3	27.9	27.9	573	571	9.1	9.2	362113	367138			16	11	43		4	128
20170612	3_4	2135	2138	8.6	8.6	109	109	0.3	0.3	27.6	27.4	579	584	9.2	9.2	367410	371930			17	13	59		1	81
20170612	3_5	2147	2150	8.7	8.7	111	110	0.3	0.3	27.5	27.5	583	583	9.2	9.2	371900	377634			13	16	59		1	95
20170612	3_6	2158	2201	8.6	8.7	107	108	0.3	0.3	27.2	27.1	579	577	9.2	9.2	377643	383794			12	14	59		2	66
20170612	4_3	2219	2222	8.9	9.4	114	112	0.3	0.3	27.4	26.9	588	579	9.2	9	383800	390117			12	8	37		1	3

Date	Transect	Time 1	Time 2	DO 1 mg/L	DO 2 mg/L	DO 1 %	DO 2 %	Sal 1 ppt	Sal 2 ppt	W Temp 1 C	W Temp 2 C	Cond 1 uS	Cond 2 uS	pH 1	pH 2	Left Flow 1	Left Flow 2	Right Flow 1	Right Flow 2	Wind 1 km/hr	Wind 2 km/hr	Depth 1 in	Depth 2 in	Species	Individuals
20170612	4_4	2230	2233	9	8.5	114	115	0.3	0.3	27.4	27.5	584	584	9.1	9.2	390000	394377			9	15	46		3	128
20170612	4_5	2240	2243	8.6	8.1	110	103	0.3	0.3	27.3	27.1	572	573	9.1	9.3	394380	400857			13	14	55		2	80
20170612	4_6	2254	2257	8.1	8.2	102	102	0.3	0.3	27	27	572	572	9.2	9.2	400000	403878			15	15	44		3	154
20170612	4_7	2301	2304	8	7.9	100	100	0.3	0.3	27.1	27	573	572	9.3	9.3	404000	406494			11	11	46		3	10
20070621	5_3	2306	2309	8.3	8.1	103	101	0.3	0.3	24.6	25.3	602	605	8.2	8.3	486000	492523			20		42		3	91
20070621	5_4	2318	2321	7.9	8	98	99	0.3	0.3	25	25.2	607	604	8.3	8.3	493000	499854			22		48		4	100
20070621	5_5	2337	2340	7.8	7.8	97	99	0.3	0.3	24.7	24.9	612	614	8.2	8.2	500000	505633			15		45		3	286
20070621	5_6	2353	2356	7.9	7.7	97	95	0.3	0.3	25	26.1	604	608	8.1	8.1	505050	510417			18		52		4	126
20070621	5_7	0005	0008	8.1	8	100	98	0.3	0.2	24.9	24.7	614	595	8.2	8.1	510000	515322			16		45		3	159
20070621	6_3	2115	2118	9.2	8.7	115	108	0.3	0.2	24.5	24.8	612	477	8.8	8.8	444444	448955			15	15	36		4	76
20070621	6_4	2127	2130	8.5	8.4	106	105	0.2	0.1	24.6	24.5	438	311	8.8	8.5	448944	454663			20	18	46		4	58
20070621	6_5	2139	2142	8.4	8.6	105	107	0.3	0.3	24.6	24.6	569	603	8.4	8.7	454545	459120			19		41		6	62
20070621	6_6	2151	2154	8.1	8.5	102	106	0.2	0.3	24.8	24.2	535	601	8.6	8.6	460000	466301			19		40.5		4	33
20070621	6_7	2202	2205	8.1	8.5	101	103	0.3	0.3	24.4	24.7	601	588	8.6	8.6	466621	471455			21		45		4	77
20070621	6_8	2113	2216	7.9	7.8	98	97	0.3	0.3	24.6	24.5	589	594	8.5	8.3	470000	476917			20		48		4	41
20070621	6_9	2225	2228	7.9	7.9	98	99	0.3	0.3	24.6	24.5	547	601	8.2	8.3	480000	485250			19		42		3	77
20070621	7_3	2009	2012	9.2	9.2	116	115	0.3	0.1	25.9	26.9	608	548	9.1	9	424242	430216			25	32	36	36	4	25
20070621	7_4	2024	2027	9.2	9	115	112	0.3	0.3	25.4	25.5	611	611	9.1	9	430000	436005			25	26	42		3	28
20070621	7_5	2042	2045	9.1	9	113	111	0.3	0	24.7	24.7	613	612	8.8	8.8	436000	442725			25	25	39		3	92
20070621	8_2	1930	1933	10	10	125	126	0.2	0.3	26.6	26.3	589	571	9.1	9.1	416935	423514			20	24	36	36	0	0

Average water velocity (fps) at the bottom center of the sampled side-opening and top-hinged gate at Waupoppin Water Control Structure during the March 26 through May 7, 2015 sampling period, Lake Mattamuskeet, North Carolina.

Date	Time	Location	Velocity (fps)
20150326	1030	SOG	0.775
20150326	1030	THG	0.36
20150326	1945	SOG	0.31
20150326	1945	THG	0.51
20150327	745	SOG	0.25
20150327	745	THG	0.18
20150327	1730	SOG	0.3475
20150327	1730	THG	0.66
20150328	1000	SOG	0.755
20150328	1000	THG	1.38
20150403	1830	SOG	0.7925
20150403	1830	THG	1.39
20150404	830	SOG	0.4575
20150404	830	THG	1.21
20150404	1845	SOG	-1.3475
20150404	1845	THG	1.19
20150405	830	SOG	0.26
20150405	830	THG	1.1
20150405	1900	SOG	0.34
20150405	1900	THG	1.56
20150410	1045	SOG	0.4485
20150410	1045	THG	1.33
20150410	1900	SOG	0.6775
20150410	1900	THG	1.08

20150411	700	SOG	0.63
20150411	700	THG	1.19
20150411	1800	SOG	0.3175
20150411	1800	THG	0.63
20150416	2000	SOG	0.4575
20150416	2000	THG	1.2
20150417	700	SOG	0.3525
20150417	700	THG	0.43
20150417	1700	SOG	0.7525
20150417	1700	THG	1.52
20150418	700	SOG	0.3475
20150418	700	THG	1.26
20150423	730	SOG	0.43
20150423	730	THG	1.43
20150423	1830	SOG	0.2525
20150423	1830	THG	0.08
20150424	700	SOG	0.625
20150424	700	THG	1.66
20150424	1830	SOG	0.4975
20150424	1830	THG	0.38
20150506	700	SOG	0.58
20150506	700	THG	0.88
20150506	1845	SOG	0.63
20150506	1845	THG	0.82
20150507	930	SOG	0.05
20150507	930	THG	0.05

Average water velocity (fps) at the bottom center of the sampled side-opening and top-hinged gate at Waupoppin Water Control Structure during the February 25 through May 1, 2016 sampling period, Lake Mattamuskeet, North Carolina.

Date	Time	Location	Velocity (fps)
20160225	1400	sog	0.1475
20160225	1400	thg	0.7400
20160226	1100	sog	0.0500
20160226	1100	thg	0.5100
20160301	2100	sog	0.3300
20160301	2100	thg	0.2800
20160302	830	sog	0.2900
20160302	830	thg	0.3100
20160302	1900	sog	0.2500
20160302	1900	thg	0.2900
20160303	1100	sog	0.4500
20160303	1100	thg	0.3500
20160310	830	sog	0.2800
20160310	830	thg	0.5300
20160310	1800	sog	0.3100
20160310	1800	thg	0.5400
20160311	730	sog	0.3900
20160311	730	thg	0.6800
20160318	1600	sog	0.1969
20160318	1600	thg	0.1640
20160319	830	sog	0.2297
20160319	830	thg	0.1969

20160319	1800	sog	0.2297
20160319	1800	thg	0.2297
20160320	745	sog	0.4265
20160320	745	thg	0.4265
20160324	900	sog	0.4265
20160324	900	thg	0.1969
20160324	1900	sog	0.2625
20160324	1900	thg	0.3609
20160325	830	sog	0.2297
20160325	830	thg	0.3609
20160401	1100	sog	0.3281
20160401	1100	thg	1.3123
20160401	1815	sog	0.5249
20160401	1815	thg	1.4764
20160402	1045	sog	0.7546
20160402	1045	thg	1.5748
20160406	915	sog	0.4921
20160406	915	thg	1.3451
20160406	1915	sog	0.6890
20160406	1915	thg	1.6076
20160407	1000	sog	0.6890
20160407	1000	thg	1.4108
20160414	1915	sog	0.4921
20160414	1915	thg	0.2625
20160415	930	sog	-0.2953
20160415	930	thg	0.0000
20160415	2015	sog	0.5577
20160415	2015	thg	1.3780
20160422	1930	sog	0.5249
20160422	1930	thg	0.5906

20160423	1100	sog	0.5906
20160423	1100	thg	0.5577
20160429	2100	sog	0.0000
20160429	2100	thg	0.0098
20160430	1000	sog	0.0328
20160430	1000	thg	0.0000
20160430	1745	sog	0.0000
20160430	1745	thg	0.0000

Water quality data collected at Waupoppin Water Control Structure March 26 to May 7, 2015, Lake Mattamuskeet, North Carolina.

Date, time, location, salinity ppt, temperature C, dissolved oxygen %, dissolved oxygen mg/L, and conductivity uS.

Date	Time	Location	Salinity ppt	Water Temperature C	Dissolved Oxygen %	Dissolved Oxygen mg/l	Conductivity uS
20150326	1030	Soundside	0.3	17.5	57	5.61	577
20150326	1030	Lakeside	0.3	17.8	79.6	8.72	573
20150326	1945	Soundside	0.3	17.2	65.1	6.85	580
20150326	1945	Lakeside	0.3	17.2	76.6	8.1	582
20150327	0745	Soundside	0.4	17.1	67.2	6.44	623
20150327	0745	Lakeside	0.4	17.9	85.4	6.81	630
20150327	1730	Soundside	0.5	16	36	3.47	773
20150327	1730	Lakeside	0.4	16.4	73	7.27	746
20150328	1000	Soundside	0.6	10.9	99.4	10.31	937
20150328	1000	Lakeside	0.6	10.2	110	12.31	908
20150403	1830	Soundside	0.6	11.5	99.1	10.5	1100
20150403	1830	Lakeside	0.6	11.8	85.5	7.7	1090
20150404	0830	Soundside	0.7	18.6	78	9.47	1175
20150404	0830	Lakeside	0.7	18.4	82.9	9.28	1166
20150404	1845	Soundside	0.7	19.8	104.1	12.4	1174
20150404	1845	Lakeside	0.7	19.7	108.7	10.14	1190
20150405	0830	Soundside	0.7	23.2	198.8	16.1	1345
20150405	0830	Lakeside	0.7	23.4	198.7	16.9	1349
20150405	1900	Soundside	0.7	23.4	158.2	14.08	1336
20150405	1900	Lakeside	0.7	23.3	177.2	14.58	1339
20150410	1045	Soundside	0.7	22.2	120.1	9.61	1330

20150410	1045	Lakeside	0.7	22.2	130.2	10.48	1330
20150410	1900	Soundside	0.7	22	125.2	9.88	1335
20150410	1900	Lakeside	0.7	22.1	127.4	10.25	1305
20150411	0700	Soundside	0.7	20.1	128.5	9.99	1195
20150411	0700	Lakeside	0.7	19.1	110	9.97	1192
20150411	1800	Soundside	0.6	23.8	101	11.3	1263
20150411	1800	Lakeside	0.7	23.5	127.6	10.16	1314
20150416	2000	Soundside	0.7	22.8	105.2	9.98	1302
20150416	2000	Lakeside	0.7	22.2	110.8	10.1	1298
20150417	0700	Soundside	0.6	18	93.8	9.21	1108
20150417	0700	Lakeside	0.6	18	94.6	9.01	1105
20150417	1700	Soundside	0.5	23.7	143.4	12.31	894
20150417	1700	Lakeside	0.5	23.4	118	10.08	894
20150418	0700	Soundside	0.7	21.8	107	9.19	1224
20150418	0700	Lakeside	0.7	21.8	103.9	9.27	1225
20150423	0730	Soundside	0.6	19.6	101.6	9.39	1095
20150423	0730	Lakeside	0.6	19.6	94.2	9.42	1091
20150423	1830	Soundside	0.6	21.4	173.8	13.82	1207
20150423	1830	Lakeside	0.6	21.4	176	15.5	1213
20150424	0700	Soundside	0.7	18	195.8	18.81	1138
20150424	0700	Lakeside	0.7	18	171	17.64	1138
20150424	1830	Soundside	0.7	19.7	172.8	17.8	1181
20150424	1830	Lakeside	0.7	19.5	143.2	14.28	1183
20150506	0700	Soundside	0.6	19	170.1	17.4	1181
20150506	0700	Lakeside	0.6	19.1	144	14.4	1182
20150506	1845	Soundside	0.6	19.6	172	17.5	1100
20150506	1845	Lakeside	0.6	19.5	142.1	14.2	1109
20150507	0930	Soundside	0.6	20.8	101.1	9.8	1201
20150507	0930	Lakeside	0.6	20.7	95.5	9.4	1189

Water quality data collected at Waupoppin Water Control Structure February 25 to May 1, 2016, Lake Mattamuskeet, North Carolina.

Date, time, location, salinity ppt, water temperature C, dissolved oxygen %, dissolved oxygen mg/L, and conductivity uS.

Date	Time	Location	Salinity ppt	Water Temperature C	Dissolved Oxygen %	Dissolved Oxygen mg/L	Conductivity uS
20160225	1400	Soundside	0.4	14	190	19.5	683
20160225	1400	Lakeside	0.4	13.9	178	17.81	676
20160226	1100	Soundside	0.4	10.4	122	14.06	573
20160226	1100	Lakeside	0.4	10	129	13.84	568
20160301	2100	Soundside	0.4	12	125	14.5	580
20160301	2100	Lakeside	0.4	12.5	128	14.7	592
20160302	0830	Soundside	0.4	14	112	11.64	658
20160302	0830	Lakeside	0.4	13.8	117.4	11.74	649
20160302	1900	Soundside	0.4	14.1	113	11.5	652
20160302	1900	Lakeside	0.4	13.7	115.2	11.7	655
20160303	1100	Soundside	0.3	11.9	102.8	11.23	526
20160303	1100	Lakeside	0.4	12	109.9	11.77	598
20160310	0830	Soundside	0.4	17.5	113.1	10.4	708
20160310	0830	Lakeside	0.4	17.5	108	10.26	708
20160310	1800	Soundside	0.4	17.4	112	10.2	701
20160310	1800	Lakeside	0.4	17.4	107	10.4	689
20160311	0730	Soundside	0.4	17.6	109.5	10.2	716
20160311	0730	Lakeside	0.4	17.6	103.8	9.45	731
20160318	1600	Soundside	0.4	20.4	105.1	9.6	749
20160318	1600	Lakeside	0.4	20.3	128.7	11.68	749
20160319	0830	Soundside	0.4	17.8	119.2	11.81	680

20160319	0830	Lakeside	0.4	17.8	107.3	10.2	691
20160319	1800	Soundside	0.3	18	85.7	8.14	557
20160319	1800	Lakeside	0.3	18	81.08	8.83	593
20160320	0745	Soundside	0.4	16.8	124.6	11.93	715
20160320	0745	Lakeside	0.4	16.8	107.7	10.7	724
20160324	0900	Soundside	0.4	14.2	106	11.17	675
20160324	0900	Lakeside	0.4	14.7	104	11.21	667
20160324	1900	Soundside	0.4	19.5	109.8	9.9	770
20160324	1900	Lakeside	0.4	19.7	106.5	9.76	720
20160325	0830	Soundside	0.4	17.6	69.2	6.58	660
20160325	0830	Lakeside	0.4	17.6	88.7	8.25	665
20160401	1815	Soundside	0.4	20.2	107.8	9.6	734
20160401	1815	Lakeside	0.4	20.2	99.5	9.01	735
20160402	1045	Soundside	0.4	19.9	106	10	746
20160402	1045	Lakeside	0.4	19.9	100	9	746
20160406	0915	Soundside	0.3	9.1	140.1	15.87	427
20160406	0915	Lakeside	0.3	9	140.2	17.6	427.3
20160406	1915	Soundside	0.2	15.1	110.1	11.11	417
20160406	1915	Lakeside	0.2	15.1	111.4	11.24	399
20160407	1000	Soundside	0.3	14.7	95.9	9.67	460
20160407	1000	Lakeside	0.3	14.7	106.5	10.7	472
20160414	1915	Soundside	0.4	15.3	129.5	13.03	631
20160414	1915	Lakeside	0.4	15.4	128.7	13.02	627
20160415	0930	Soundside	0.3	13.2	90.3	9.77	540
20160415	0930	Lakeside	0.3	13.2	84.9	9.24	536
20160415	2015	Soundside	0.4	16.7	157	15.63	681
20160415	2015	Lakeside	0.4	16.8	130	12.82	683
20160422	1930	Soundside	0.4	25.5	99	9.65	830
20160422	1930	Lakeside	0.4	23.4	119	10.06	877
20160423	1100	Soundside	0.4	20.9	93	8.31	794

20160423	1100	Lakeside	0.4	20.6	91	7.97	789
20160429	2100	Soundside	0.4	23.6	98	8.33	744
20160429	2100	Lakeside	0.4	23.9	103	9.36	689
20160430	1000	Soundside	0.4	21.8	133	12.04	744
20160430	1000	Lakeside	0.3	21.3	102	9.31	640
20160430	1745	Soundside	0.4	23	126	11.2	775
20160430	1745	Lakeside	0.3	22.3	81.9	7.34	672