Demographics of Ohio's River Otter Population

Joana Donofrio
The Ohio State University
College of Food, Agriculture, and Environmental Science

Advisor: Dr. Stanley Gehrt

June 8, 2009

Abstract

Historically, river otters (*Lontra canadensis*) were abundant in aquatic systems throughout the country. By the 1830's, river otter numbers had been drastically reduced due to unregulated trapping and habitat destruction. By 1977, otters had been reduced to 75% of their historical range and completely eradicated from several states, including Ohio. Improved conditions in potential otter habitat, along with concern over the severe decline of this species led many states to develop plans to restore otter populations. From 1986-1993, Ohio implemented its own reintroduction plan in which 123 river otters were released at four locations in Eastern Ohio. Since 1993, the Ohio Division of Wildlife has used various methods to monitor the otter population and has documented otter presence in 67 of Ohio's 88 counties. This perceived abundance of river otters led management authorities to implement a harvest as a way of controlling population growth and mitigating conflicts. However, more information on Ohio's river otter population is needed not only to ensure the continued success of the reintroduction program, but also because river otters are listed as an Appendix II species by CITES.

The goal of this research was to use carcass data including sex, age and reproductive rates from three harvest seasons (2005-2008) to determine the age distribution and sex ratio of the otter population. The data was used to create a life table and estimate the population growth rate. The observed age structure of harvested otters was also compared to that predicted by a population model created in Missouri to project the growth of an otter population following reintroduction. From 2005-2008, data was collected from 468 otters. The sex ratio did not differ significantly from a population with a 50:50 male to female ratio. The age distribution showed a higher proportion of younger animals which is consistent with a growing population. The percentages of females exhibiting reproductive activity by age class were 6.4% pups, 46%

yearlings, 57% 2-year-olds and 71% of adults. Litter sizes averaged 3.19 young per parous female (n=57). Population growth as determined by a life table was R0=1.54, which also indicates a growing population. Comparing the observed proportions of pups, yearlings and adults from each year and the expected proportions predicted by the Missouri Model resulted in similar percentages. These results indicate a stable age distribution and constant growth rate. We concluded that a limited harvest does not seem to be negatively impacting Ohio's otter population.

Background

At the time of European settlement of North America, river otters (*Lontra canadensis*) were abundant in streams, lakes and reservoirs, wetlands and marine coasts across the country (Boyle 2006). These animals are medium-sized carnivores that are ecologically important as top predators in aquatic systems (Gehrt 2008). In Ohio, river otters were very common, but by the 1830's their numbers were drastically reduced. This reduction was caused by a number of factors including unregulated trapping and habitat destruction such as channelization and riparian habitat loss, increased siltation and agricultural pesticides (Boyle 2006). By 1977, otters had been reduced to 75% of their historical range and completely eradicated from several states, including Ohio (Gehrt 2008). Also during the 1970's, concern began to increase regarding the severe decline of this species (Raesly 2001). By this time, many conditions had changed to allow for the potential of reintroducing river otters into their former habitats. Some of these changes included reforestation, improved water quality, restoration of beaver populations, regulation of trapping and new management techniques (Dwyer). Improved conditions in potential otter habitat along with concern over the decline of this species led wildlife management agencies to develop plans to restore or augment otter populations (Raesly 2001).

The first state to undertake a river otter reintroduction program was Colorado in 1976 and by 1990, 17 states had used reintroduction to restore or enhance otter populations (Raesley 2001). In Ohio, a study was conducted in the 1980's to determine the feasibility of reintroducing river otters. From 1986-1993, 123 river otters from Arkansas and Louisiana were released at four locations in Eastern Ohio, including the Grand River, Killbuck Creek, Stillwater Creek and Little Muskingum River (Dwyer). Due to the popularity of reintroduction programs, the International Union for Conservation of Nature (IUCN) created guidelines identifying four phases to a successful reintroduction program: a feasibility study, a preparation phase, a release phase and a follow-up phase (Gehrt 2008).

At the conclusion of any release program, the follow-up phase in which the population is monitored is necessary and extremely important to determine the fate of the otter population. A follow-up phase can be difficult because river otters are not easy to monitor and tend to inhabit areas that are not easily accessed by humans (Gehrt 2008). At the end of Ohio's release program, the population and range expansion of river otters was monitored using qualitative methods such as public observation reports, road-killed otters, incidentally trapped otters and conflict reports and quantitative methods such as snow-track surveys, bowhunter surveys and bridge surveys (Dwyer). Based on all of these observations, otters have been observed and reported in 67 of Ohio's 88 counties (Figure 1). Based on information from other states surrounding Ohio in which reintroduction programs were also implemented, it seems that these programs have greatly aided in the recovery of this species (Dwyer). River otters observed in non-release sites could be due to the dispersal of otters (which are known to disperse great distances) from eastern Ohio, West Virginia, Kentucky and Indiana (Dwyer). A population model created in Missouri to

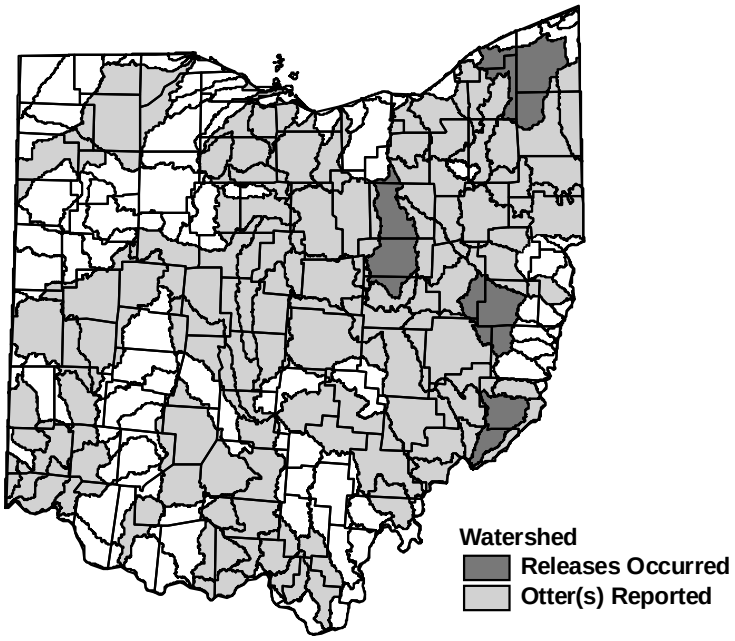

Figure 1. Watersheds of Ohio in which otters were originally released and watersheds in which otters have been detected based on qualitative and quantitative reports from 2002-2005.

monitor the population growth of river otters has been used in Ohio to estimate the increase in river otters based on the original released animals (Dwyer).

Due to the perceived abundance of river otters in Ohio, a harvest was implemented in 2005 as a management strategy to control population growth and mitigate conflicts. River otters are listed as an Appendix 11.2.b species in the Convention on International Trade in Endangered Species of Flora and Fauna (CITES) (Dwyer). Otters are managed by states but because of their status, the Federal Wildlife Permit Office of the U.S. Fish and Wildlife Service must make sure that the export of river otter pelts won't be harmful to the survival of this species or cause otters to become endangered (Dwyer). Because of the CITES listing, harvests are highly regulated and require the check-in and tagging of otter carcasses with the Division of Wildlife (Gehrt 2008). In order to receive approval for CITES export tags, states must be able to show that harvests will

not be harmful to river otters through the gathering of population information (Gehrt 2008). Harvests provide a means with which to study population trends because they basically present a snapshot of the population during a certain time period (the harvest season). There are drawbacks to using harvest data for this purpose because the number of animals harvested may be affected by factors not related to otter abundance, such as the price of pelts and the weather during trapping season (Gehrt 2008). Despite this, harvests are still advantageous to other methods such as live trapping because river otters can be difficult to find and catch as eluded to earlier. Although the river otter population has been monitored using many different methods, more information is still needed to ensure the continued success of the reintroduction program and because river otters are listed as an Appendix II species by CITES. We propose using carcass data collected from harvests to create a profile of Ohio's river otter population based on age, gender and reproductive rates. The harvest data will also be compared to a predicted population structure produced by a population model created for river otters.

Approach

River otter harvests are highly regulated and require the check-in and tagging of carcasses with the Division of Wildlife. Data including CITES number, sex, age and number of embryos present were obtained from the Ohio Division of Wildlife for three harvest seasons (2005-2006). Ages were estimated using cementum annuli layers in the root of the canine tooth. Juvenile otters do not have cementum annuli and the ratio of the width of the pulp cavity to the width of the canine tooth can indicate age (Gehrt 2008). Juveniles generally have pulp cavities taking up one half or more of the tooth width, while adults have more narrow pulp cavities (Gehrt 2008). Adults were separated into age classes based on inspection of the cementum annuli done by Matson's Laboratory in Montana, a lab that specializes in this type of analysis. Sex was

determined through examination of gross anatomy and verified later by necropsy of the carcass. Reproductive rates were discovered by examination of the reproductive tract for blastocysts, corpora lutea and embryos. Harvest data was used to determine the age distribution and sex ratio of the otter population. These parameters were then used to construct a static life table to estimate population growth rate. This type of life table counts individuals of different age classes at one point in time and assumes there is a stable age distribution and age-specific survivorship and fertility rates remain constant over the years. The observed age structure of the harvested otters was compared to that predicted by the population model created in Missouri. The Missouri Model predicts the growth of an otter population following reintroduction assuming an equal sex ratio and a stable age distribution over time. If the observed and predicted age structures are similar, it follows that the assumptions of the predicted model are true (stable age structure and positive growth rate).

Results

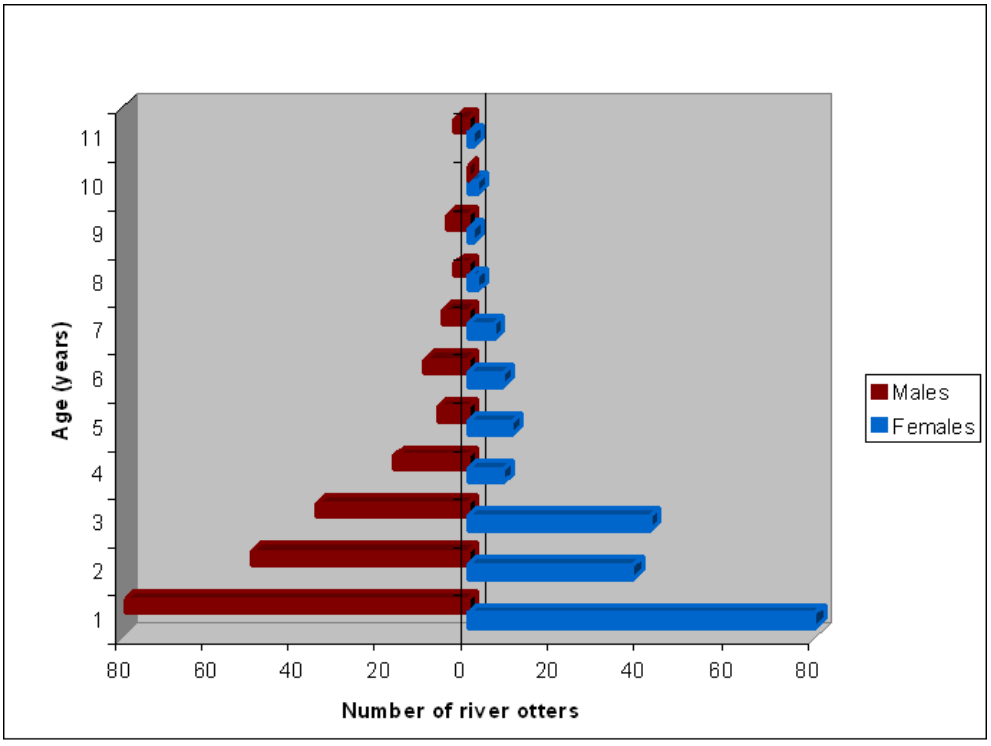

Figure 2. Age distribution of river otters over three harvest seasons.

The following number of river otters was collected for each harvest season: 226 (2005-06), 137 (2006-07) and 105 (2007-08) for a total sample size of 468 otters. There was not a statistically significant difference between the sex ratio of these otters and that of an otter population with a 50:50 male to female ratio (2005: Z= 0.134, p= 0.894, 2006: Z= -0.171, p= 0.864, 2007: Z= -0.195, p= 0.845). Because of the small sample sizes for each individual year, the harvest data for all three years was combined to create an age distribution of the population (Figure 2). There was no significant difference between age distributions across the three harvest seasons (X^2= 4.783, df= 4, p= 0.776). Uteri were inspected for evidence of reproduction (embryos, blastocysts, placental scars). The percentages of females exhibiting reproductive activity by age class were 6.4% pups, 46% yearlings, 57% 2-year-olds and 71% for adults. Litter sizes, as determined from embryo counts pooled across years, averaged 3.19 young per parous female (n= 57). There was little variation in mean litter sizes across years. Using the age and reproduction data, a life table was created to estimate the statewide population dynamics. Age-specific survival rates followed a Type III curve and population growth was R_0= 1.54. The observed proportion of pups, yearlings and adults counted each year was compared the proportions predicted by the Missouri Model and resulted in similar percentages (Table 1). There was no significant difference between the observed and expected numbers for any year.

Age Class	05-06	06-07	07-08	Predicted
Pups	40	39	34	40
Yearlings	19	23	24	23
Adults	41	38	42	37

Table 1. Observed and predicted age distributions for otters harvested during 2 harvest seasons. Numbers represent % of sample for each age class.

Discussion

By 1990, 17 states in the U.S. had implemented reintroductions in an attempt to restore declining or extirpated river otter populations (Raesley 2001). Attempts to gather information about these various programs have found that river otters now occupy at least parts of their historical range in every state (Raesley 2001). All reintroduction projects undertaken in the U.S. have involved some type of follow-up assessment to determine the status of the reintroduced population (Raesley 2001). As of 2001, post-release evaluations have included using information on sightings made by trappers and hunters, radiotelemetry studies, scat or otter sign surveys and observation by wildlife agency personnel (Raesley 2001). Of states in which reintroduction programs were carried out, 15 describe their otter population as growing, while 3 states state their population is stable to growing (Raesley 2001). The results of this project put Ohio in the category of states with growing otter populations following reintroduction. The age structure of the harvested river otters, which contained a high proportion of younger animals, is consistent with that of a growing otter population. Life table analysis yielded a growth rate greater than 1 (R_0= 1.54), which also indicates population growth.

Research on reintroduced otter populations in different states is quite varied. Two years after Ohio's release program ended, Indiana began its own program from 1995-1999 in which 303 otters were reintroduced into 6 watersheds throughout the state (Johnson 2007). Based on carcass evaluation of 64 recovered untagged otters, reproduction information was gathered by the counting of corpora lutea, blastocysts and embryos (Johnson 2007). 50% of yearlings were found to be reproducing along with 88% of adults (Johnson 2007), similar to the percentages seen in harvested Ohio otters (46% yearlings, 57% 2-year-olds and 71% adults). Furthermore, litter size was determined to be 3.25 for Indiana otters (Johnson 2007), which is close to the litter

size of 3.19 calculated in our research. This litter size is also close to the litter size of 3.5 used in the Missouri Model based on research conducted on Missouri otter populations (Dwyer).

The Missouri Model which was created to predict population growth of otters following reintroduction assumes a stable age structure and positive constant growth rate. The fact that the observed age structure of the harvested otters was so similar to the age proportions predicted by the model, leads to the conclusion that the assumptions of stable age structure and constant growth rate are true. This conclusion is further supported by the age distributions not differing significantly over the three harvest years. Research conducted by the Ohio Division of Wildlife since the end of the reintroduction program indicated the otter population is growing and otters are present in many of the watersheds that contain suitable habitat. Harvest data provides another way to look at population dynamics in addition to the many other methods used to monitor otter populations. The results of this project agree with the findings of previous research that showed the Ohio otter population to be expanding, even with the implementation of limited harvests. Continued monitoring of Ohio's otter population along with harvest adjustments will be needed to ensure the continued viability of this population in the future.

Works Cited

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