Summary of Double-Crested Cormorant Diet Samples Collected in 2007 from Leech Lake

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This report summarizes the findings of double-crested cormorant diet samples collected in 2007. These samples were collected to augment the efforts conducted in 2004, 2005, and 2006 under a Tribal Wildlife Grant from the US Fish and Wildlife Service to evaluate the effects of cormorant predation on fish populations in Leech Lake. Efforts will be made to incorporate this data into the consumption model that the University of Minnesota is currently working on for us.

Numerous diet studies have found that cormorants eat a wide variety of fish species, but in order for them to meet their daily energy requirements they concentrate their efforts on species that are very abundant and easy to catch. This is the same trend we have seen on Leech Lake over the past three years of intensive sampling and, prior to that, in limited sampling efforts.

Diet samples were collected using two methods. As in past years, we contracted with USDA Wildlife Services to collect the adult birds for us. The first was to collect birds that were returning to the nesting colony after foraging. These birds usually had fish in their crop and stomach and since the fish were recently consumed, they were usually in fairly good condition. The exception to this is some of the smaller, soft-bodied species like shiners that are more rapidly broken down. Cormorants collected are primarily mature adults that are nesting, but a percentage of them are also 1+ and 2+ age juveniles that may not be mature enough to breed. Throughout the rest of this report, these birds are collectively called adults as opposed to the young-of-the-year bird that are referred to as nestlings.

Birds collected using this method have their upper digestive tracts preserved with 10% buffered formalin before being frozen. These birds are later dissected in the lab, and the contents of their digestive tracts removed and further preserved for identification. Unlike previous years, the contents of the stomach that were already very digested and difficult, if not impossible, to identify were not retained. For this reason this years samples may be biased against the smaller and more easily digested species, while the larger and heavily scaled species like perch and walleye may be overrepresented.

This year, due to time constrains of having our biologist examine fish samples we lumped all shiner species together with the exception of spot-tailed shiners. This makes little if any difference in the outcome as these numbers were also combined in previous years for the purpose of analysis. The graphs in Figures 1, 2, and 3 show the breakdown of fish species by numbers for the three years of intensive sampling.

The second collection method was to gather regurgitated diet samples from nestling cormorants. From about one week after hatching, until they leave the nest, the young cormorants will often regurgitate the contents of their crop upon being approached. These samples are picked up, preserved, and taken back to the lab for later examination. The graph in Figure 4 shows the breakdown of fish by numbers found in regurgitated samples in 2007. This information was not available for the samples collected using this method in 2005 and 2006 at the time of the preparation of this report.
Figure 1. Breakdown of fish species by number found in cormorants in 2005

Figure 2. Breakdown of fish species by number found in cormorants in 2006

Figure 3. Breakdown of fish species by number found in cormorants in 2007
As can be seen from the pie charts yellow perch continues to be the most abundant species in the diet with shiner species the second most abundant species. Perch were also found to be a more prevalent food item in the diet of nestlings than adult birds, even when you consider that the nestling diet sampling is only conducted over about a two-month period, compared to six-month period for adults. It is unlikely that the adults are feeding the young more perch, but that the smaller, more digestible fish, of other species are being digested and absorbed in the adults before they feed the young. These species are probably also less likely to be regurgitated by the young, if they were ever fed them, for the same reason.

Although the disparity in diet consumption between nestling and adults is of interest to us, it will probably be of more interest to other researchers who are using only regurgitated sampling to assess adult cormorant diet composition and consumption rates. Based on what we are finding there can be disparities by using this method without other sampling methods or correction factors.

From a fish management perspective, as well as an angler perspective, it is the number of fish consumed by cormorants that is of most interest, as it reflects the number available in the lake for human harvest. From the bird’s perspective, and from a researcher who is doing biogenetics modeling, the breakdown of fish consumed by weight is of most interest. From the cormorant’s perspective, some fish, like lake herring, have a higher caloric (energy) value so they can consume fewer numbers of them while still attaining their energy requirements. This condition appeared in 2006 when hot mid-summer conditions stress lake herring, which tends to congregate them and make them more vulnerable to predation. These conditions did not appear in 2007, or a large year class of suitable sized herring was not present, so they showed up in lower numbers than in 2006.

The breakdown of fish consumed by cormorants by weight from 2005, 2006, and 2007 is found in Figures 5, 6, and 7. Figure 8 is the breakdown by weight for nestlings.
Figure 5. Breakdown of fish species by weight found in cormorants in 2005

Figure 6. Breakdown of fish species by weight found in cormorants in 2006

Figure 7. Breakdown of fish species by weight found in cormorants in 2007
As in the previous years of this study yellow perch make up a significant proportion of the diet from both a numbers and weight perspective. This finding is even more pronounced in the nestling samples. Walleye did show up as a great proportion of the diet this year, at 3.3 percent by numbers, but this is to be expected due the very large year classes present in the lake. The 2005 and 2006 year classes appear to be some of the highest ever recorded for the lake. Not only do the high numbers make encounters with cormorants more frequent, but the pressure all these walleye exert on the forage base is likely of force shifts by all predatory species to other prey species and sizes to meet their energy requirements.

As in previous reports we have prepared on this study, we discourage people from jumping to conclusions as to whether or not cormorant predation is having an effect on the walleye population in Leech Lake. We are still awaiting the results of the modeling efforts that are underway at the University of Minnesota to give us a better understanding of this question. In the mean time it appears that walleye populations in Leech Lake are doing well, and if anything, they maybe high enough that they are suppressing subsequent walleye year classes or other species.

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