



## **Cormorant Enumeration on Leech Lake**

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Cormorants, like any other free-ranging species that can be found in large concentrations, can be a challenge to count. Over the past few years, biologists with the Leech Lake Reservation, Division of Resources Management (DRM) have employed a number of methods to address this issue and believe we have come up with fairly accurate counts of cormorants on Leech Lake. Not only is this number of interest to the general public, but it is also an important component that is needed for the Diet Study Model that we are working on with the University of Minnesota.

Simply trying to make a visual count of a large group of any species is difficult and often results in over or under counting depending on the species and circumstances under which they are being counted. This is frequently the case with cormorants. Aerial counts from aircraft are also used, but were found to give us low count numbers because the birds tended to spend much of the day at the colony site and not out on the lake. Nest counts at the colony site were used, and this method provides high precision for nesting birds but it is more difficult to use on non-nesting birds. It is also more difficult when culling operations are taking place because nests are abandoned if one of the pair is killed and if the surviving bird re-pairs, a new nest will be initiated. Ground counts of cormorants at the nest site by biologist located within a blind at the colony are also used with some success. This method is very labor intensive as it takes many hours for the birds to return. It is a pretty good method for estimating the percentage of sub-adults in the population and a good way of ground truthing aerial nest counts, however.

The method that proved to be the most successful is to use high resolution aerial photographs of the colony sites on Little Pelican Island and Gull Island and make counts using Geographic Information System (GIS) software. This method is very accurate and allows one to separate birds at a nest from birds loafing on the beach or rocks.

The question that arises with this method is: How do we know that the majority of the birds were present at the colony site at the time the photo was taken? We addressed this issue in several ways. The first was the observation that cormorants on Leech Lake spend a great deal of time at the colony site. They typically make a foraging flight early in the morning and return before noon to feed the chicks. From 11:00 AM to 1:00 PM, there is not much movement of birds to or away from the colony so this is when the photos are taken. We also avoid the weekends when boat traffic is more prevalent and there is a higher risk of the birds being disturbed off the nest site by a passing boat. We also have the aerial flight crew check the area for any boats that may have disturbed the colony site to the point that the birds had not returned by the time the flight was made. We have also been flying the main part of Leech Lake looking for birds that might be out foraging. On one occasion did we find a foraging flock and it was also photographed and counted. Using aerial photographs we are also able to account for non-breeding individuals.

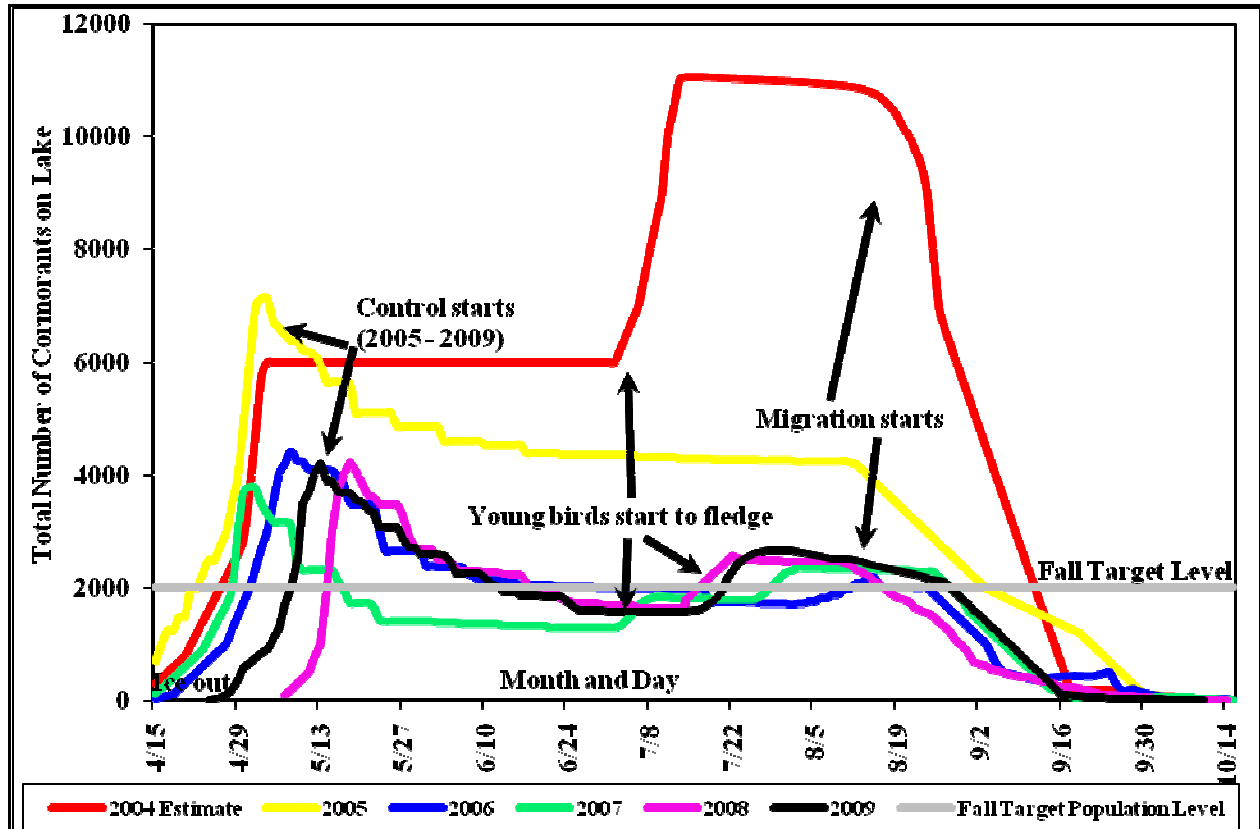
Large numbers of migrating cormorants that spend an extended period of time on a lake can also be an issue. Since the diet study and control efforts have been under way, we have not observed large numbers of migrants in either the spring or fall. Lingering migrants in the spring are not believed to be much of an issue because most birds that are headed to their breeding grounds will do so as quickly as possible so they have a better chance of securing the best breeding sites.

Fall migrants can also be an issue similar to spring migrants and in locations where cormorants stage in large numbers they contribute to overall fish mortality. Leech Lake does see some fall migrants, but we have not

seen them in large numbers or for extended periods of time. The fish consumption model does incorporate spring and fall migrants into the calculations.

Using aerial photo count numbers along with the numbers of birds killed as part of the control effort allowed us to back-calculate to establish the peak number of birds present on the lake. For instance if we knew that 3,000 birds had been removed as part of the control effort and an aerial photo taken after these birds were removed showed 1,000 birds, we knew by simple math we had to have had 4,000 birds at an earlier date. These numbers could, in some instances, be compared to late summer ground counts to see if they were realistic. Although there is no perfect method for counting large numbers of wild, free-roaming organisms, we believe that the methods outlined above give us a very realistic count of cormorants on the lake throughout the open water season. The graph below shows cormorant numbers on Leech Lake from 2004 to 2009.

In addition to enumerating the number of cormorants that are currently utilizing Leech Lake since they started re-colonizing it 1992, there was also a need to determine their historical presence on the lake. Historical information indicates that cormorants were present on the lake in the 1800s, and this information, along with current and historical information on all the other colonial waterbirds that are found on the lake, has been recently documented (Mortensen and Ringle, *The Loon*. 2007. Volume 79 Number 3, pages 130-142).



Graph of cormorant numbers on Leech Lake from 2004 to 2009 (Data from LL Res. DRM)