Compliance of Boaters with the Big Lake Voluntary Avoidance Area, Pool 4, Upper Mississippi River National Wildlife and Fish Refuge-Winona District

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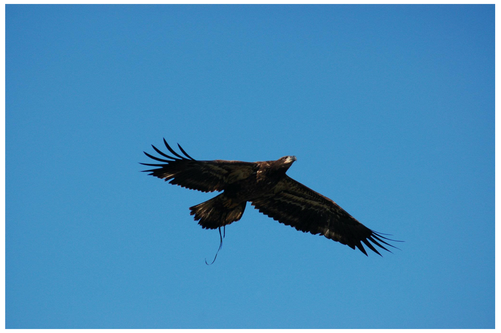


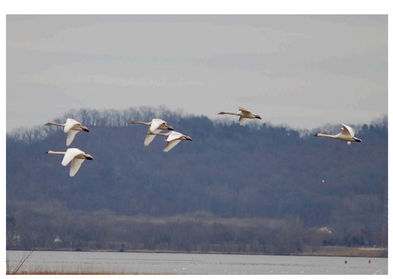
This young Bald Eagle was friendly all fall. It was raised in a nest located just behind the tower.

Abstract:

Big Lake in Pool 4 of the Mississippi River is closed to waterfowl hunting during the Wisconsin waterfowl hunting season. This closed area (2,461 acres) also becomes a voluntary avoidance area for boaters beginning October 15, to reduce disturbance to feeding and resting waterfowl during fall migration. The objectives of this study were 1) to assess boater compliance with the voluntary avoidance regulation during the 2011 waterfowl hunting season, and 2) to determine the level of response of waterfowl to boat intrusions into the avoidance area. The area was monitored (20 different observers, 76 daytime observation periods) from an observation tower on the northeastern shore of the lake during 28 days between September 24 and December 3, 2011. Boat movements were recorded and levels of waterfowl disturbance (no disturbance, <1000 birds disturbed [minor disturbance], >1000 birds disturbed [major disturbance]) were noted. Numbers of waterfowl using the lake were recorded on each observation date. Fifty-nine boats were observed on the lake during the study period, with most (71%) observed prior to October 15. Boat counts exceeded 5/day prior to October 15 and <1/day after that date (significant decline, t_{25}=2.98, P=0.02). Waterfowl numbers increased dramatically (3-4 X) after October 15 and remained high through December 3 (significant increase after October 15, t_{23}=6.24, P<0.001). Prior to October 15, waterfowl were disturbed by 57% of boat intrusions, but disturbance rate increased to 94% after October 15. Major waterfowl disturbances were associated with 21% of boat intrusions before October 15, but with 53% of intrusions after October 15. On two dates (October 29, November 3) when >20,000 waterfowl were present on Big Lake, 12 boat intrusions all disturbed waterfowl, with six intrusions producing major disturbances. Boater compliance with the voluntary avoidance regulation on Big Lake during 2011 generally was good, with 58% of days without any boat intrusions and/or waterfowl disturbance (likely aided by cold weather and windy conditions). However, periodic warm weather led to increased boat traffic and multiple, major waterfowl disturbances per day.

Background:

In 2009, the United States Fish and Wildlife Service changed the 2,461 acre Big Lake from an open area to a closed area (voluntary avoidance area). October 15 is the date that the voluntary avoidance begins and it remains through March, although hunting is not allowed year-round. This was done to allow waterfowl to rest and feed in this large pool with minimal disturbance. However, the area is still open to fishing and recreation. The area is area is monitored to ensure that major human disturbances do not exceed the threshold of >1 per day. If that happens, the USFWS will create more restrictive regulations.



Tundra Swans (*Cygnus columbianus*) were a common site from the observation tower

Objective:

The objective of this study was to monitor the Big Lake closed area near Nelson, Wisconsin, and determine boater compliance with the voluntary avoidance area during the waterfowl hunting season. In addition, waterfowl response to disturbances was monitored.

View of waterfowl from the observation tower

Methods:

- During the 2011 waterfowl hunting season, 28 dates were randomly selected and split up into two or three time frames per day
- On the randomly selected days, volunteers and USFWS employees overlooked Big Lake near Nelson, Wisconsin, 30 minutes after sunrise to 30 before sunset
- Observers recorded waterfowl and other common migrant numbers by species each hour
- Each boat that entered the avoidance area was recorded, noting the time, type of disturbance, and activity of the boater
- Data were split into two sets (Sept. 24-Oct. 15 and Oct. 16-Dec. 3) and broken up by weeks instead of days
- Two-tailed t-tests were used to compare before and after starting voluntary avoidance (October 15)

Results:

- Percentage of intrusions that were major disturbances more than doubled after October 15 (**Figure 1**), but the number of major disturbances per day were not significantly different (**Table 1**)
- Numbers of both puddle ducks and diver ducks per day were much higher after October 15 (**Table 1**)
- Waterfowl counts started to started to quickly rise as the voluntary avoidance area was put into effect (**Figure 2**)
- Seems to be correlation between number of birds present and percentage of major disturbances (**Figure 1 and 2**)
- All disturbances declined after October 15, except for small spike in week 6 (**Figure 3**)

Table 1. Comparison between before and after the voluntary avoidance is put into effect with t-test p-values.

	# of Intrusions	Major Disturbances/day	# Puddle Ducks/day	# Diver Ducks/day
Sept. 24- Oct. 15	42	1.5	834	51
Oct. 16-Dec. 3	17	0.45	3688	6726
Difference (p-value)	YES (p<0.001)	NO (p=0.149)	YES (p=0.017)	YES (p<0.001)

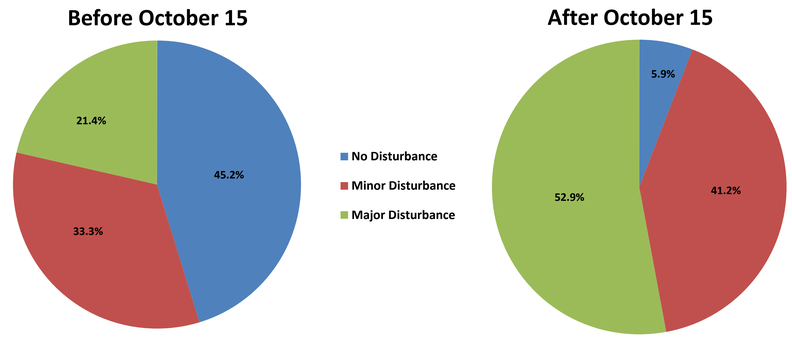


Figure 1. Percentage of disturbance types (no disturbance, major disturbances [>1000 birds disturbed], and minor disturbances [<1000 birds disturbed]) before and after October 15 during the fall of 2011.

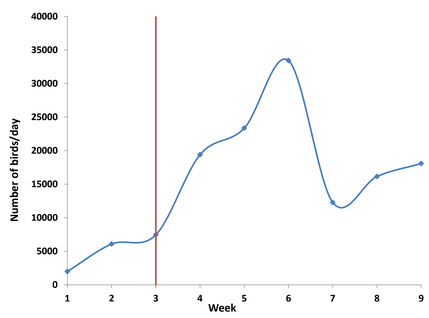


Figure 2. Peak number of birds using Big Lake per day, 2011. Red line indicates start of voluntary avoidance.

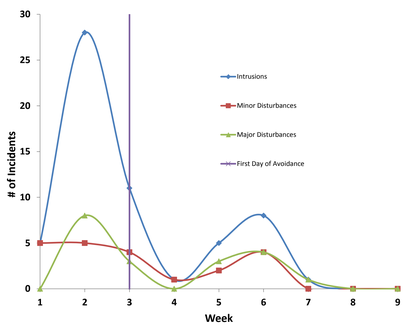
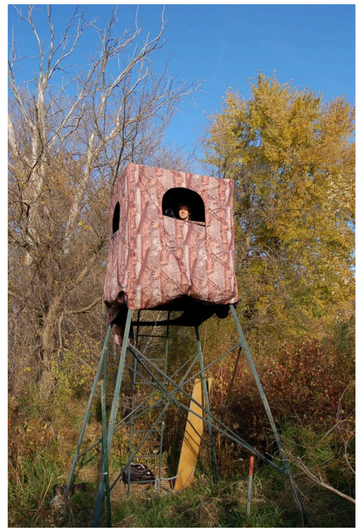


Figure 3. Number of incidents each week, 2011.



Volunteer Neil Skoog in observation tower over Big Lake

Conclusions:

- The majority of birds observed occurred after the voluntary avoidance was put into place, possibly indicating that waterfowl migration peaks after October 15.
- Due to higher waterfowl numbers after October 15, the likelihood of an intrusion causing a major disturbance is much higher.
- Weather conditions may account for random spikes in intrusions or the sudden drop off after week 3.
- In past study years of this area, boater activity was mixed, but during this study fishing was almost always the purpose for intrusion.
- Overall, the public avoided disturbing waterfowl on the Big Lake area well.
- Threshold of >1 major disturbances per day was not exceeded, more restrictive regulations will not be placed.

American Coot (*Fulica americana*) were by far the most common waterfowl noted, sometimes exceeding 20,000 in one count

Acknowledgements:

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