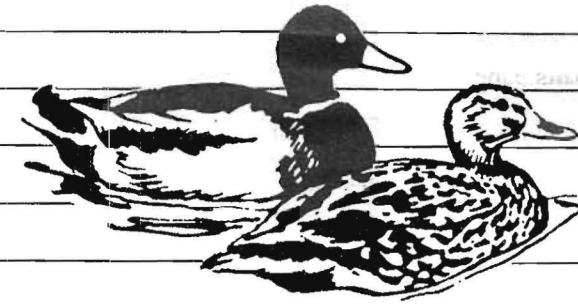
Research



Information bulletin

U.S. DEPARTMENT OF THE INTERIOR
NATIONAL BIOLOGICAL SURVEY

NO. 39
DATE 1994

Chlorophyll-*a* Related to Bird Use in Freshwater Wetlands

About 80% of the continental population of redheads (*Aythya americana*) winters along the Gulf coast of southern Texas and northern Tamaulipas. While in southern Texas, redheads rely upon freshwater wetlands for dietary fresh water. Fresh water is used to compensate for the salt redheads ingest while feeding on seagrass rhizomes in the frequently hypersaline (up to 60–70 ppt) Laguna Madre. Only a few freshwater wetlands are available to serve the approximately 300,000–600,000 wintering redheads in southern Texas. During drought many of these wetlands go dry, and those that remain are extremely important to redheads. One pond (Pond A) in southern Texas has experienced overcrowding by more than 10,000 birds during past winters of dry years. To find out if large concentrations of redheads significantly affect this wetland, we investigated the effect of heavy bird use on water quality.

Water Samples Analyzed for Chlorophyll-*a*

We obtained water samples for 2 years at 6–8 week intervals from two freshwater wetlands, one receiving heavy bird use (Pond A), and the other receiving light bird use (Pond B). The number of birds on each wetland was estimated within 1–2 days of each water sampling trip. To estimate phytoplankton density, water samples were analyzed for chlorophyll-*a* by passing water samples through a glass fiber filter (1.2-µm pore size), extracting the pigments from the filter, and then determining chlorophyll-*a* concentration using a spectrophotometer.

Redheads Influenced Chlorophyll-*a* Levels

Our findings indicate that birds can significantly influence the phytoplankton density of a wetland. We found that during periods of heavy bird use, Pond A had high levels of chlorophyll-*a* (Fig. 1), whereas Pond B, receiving light bird use, did not experience elevated levels of chlorophyll-*a* (Figure 2). From early December 1990 to early January 1991, bird use was heavy at Pond A. During this period, redheads made up about 90% of all birds present on Pond A. In February 1991, bird use of Pond A declined sharply and remained low for the rest of the study. This drop in bird use coincided with the onset of 2.5 years of unusually frequent rainfall. This prolonged increase in rainfall lowered the salinity of the Laguna Madre to below 30 ppt, apparently alleviating the redheads' need for freshwater wetlands. Only when redheads were present on Pond A in large numbers were chlorophyll-*a* levels unusually high. This suggests that the redheads enriched the water by means of their feces, triggering the growth and proliferation of phytoplankton.

Because most of our research was conducted during a period of unusually high rainfall, the effect of prolonged heavy bird use on the water quality of

this pond is unknown. However, given these results after only 1 month of heavy bird use, we hypothesize that continued fecal deposition by large groups of birds would probably lead to eutrophication of this wetland and to subsequent abandonment by redheads.

Management Implications

Increased eutrophication and related reduction of wetland water quality may force redheads to seek other areas containing wetlands with good water quality. To maximize habitat quality for wintering waterfowl in southern Texas, managers should encourage private landowners to protect freshwater wetlands through programs such as the North American Waterfowl Management Plan and to develop freshwater wetlands on public landholdings.

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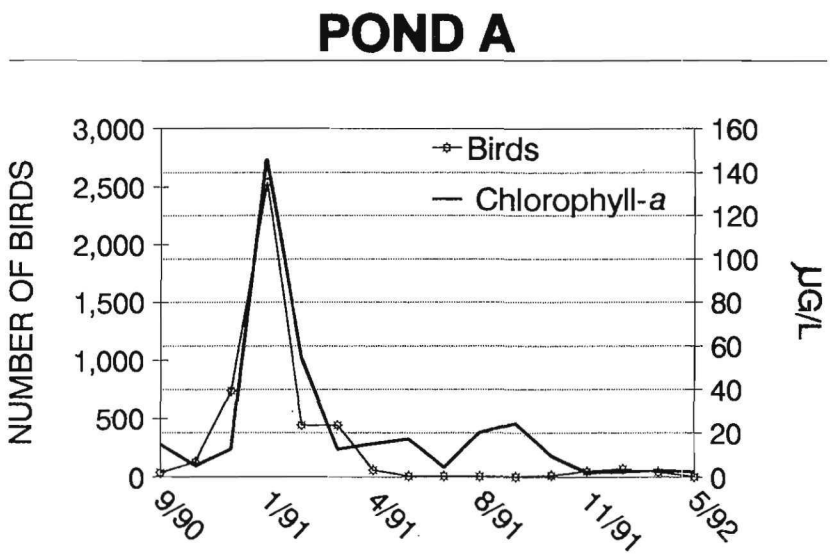

Fig. 1. Relation between chlorophyll-*a* concentrations (µg/L) and number of birds on Pond A.

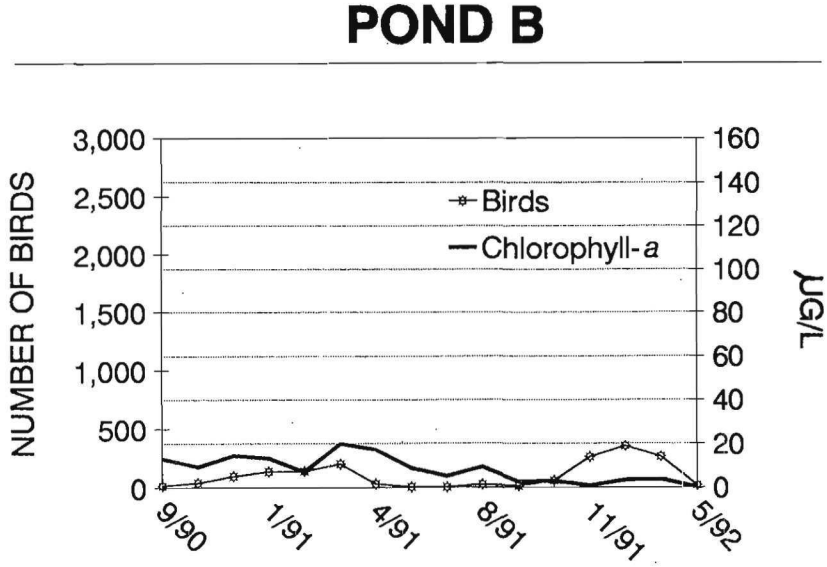

Fig. 2. Relation between chlorophyll-*a* concentrations (µg/L) and number of birds on Pond B.