



EcoSummary

Lucas Lake, Washington County

August 11, 1999



Lake Condition Index: A developmental biological assessment tool used by FDEP biologists to indicate ecosystem health and identify impairment in Florida Lakes.

Purpose

Lucas Lake was selected as a candidate reference lake in Lake Region 65-03 (Greenhead Slope) as part of a statewide effort to develop biological criteria for lake environments. Data collected from the best attainable lakes in each lake region may be used to establish standards for least impacted lakes in a given region and as benchmarks for all similar lakes in that particular region.

Background

Lucas Lake is located in a rural area of southern Washington County, approximately 15 km south of Vernon. This region of south Washington County has sandy ridges (relict dunes) of coarse, porous sands. The primary land use in these well-drained soils of low fertility is silviculture. This lake is approximately 450 acres and is situated in a karst area with a high density of depression and solution lakes. There is no outflow from this lake resulting in a long residence time for the water. Residential development is restricted to the slopes on the south end of the lake. The remaining surrounding land near the lake is low and swampy, providing a good buffer in the watershed. The littoral zone is relatively undisturbed with cypress and St. John's-wort the dominant woody vegetation. The primary use of this lake is swimming and fishing.

Results

This lake assessment included physical, chemical and biological analyses to characterize the condition of this watershed. Nutrient analyses indicated this lake is oligotrophic (infertile). Nitrite-nitrate was below detection of 4 ug/L as well as total phosphorus, minimum detection limit 15 ug/L. Orthophosphate was below minimum detection of 4 ug/L, as was ammonia (minimum detection limit of 10 ug/L). Reflective of the paucity of nutrients, chlorophyll a was below detection limit of 1.12 ug/L. The limited nutrients were reflected by the algal growth potential assay (AGP) that was below detection of 0.1 mg dry wt/L. This lake was well-mixed from top to bottom and had good dissolved oxygen (DO) concentrations throughout the water column (>7.0 mg/L); the water temperature was 31.5 C from the surface to 3.6 m (near bottom). Typical for lakes in this region, the water was soft (alkalinity <1.0 mg/L) and acidic (pH 4.5 SU). Specific conductivity was low (24 umho/cm) reflective

of the good water quality. Water was clear, laboratory analysis found the color was below 5 PCU and turbidity was quite low, 0.35 NTU. The benthic macroinvertebrate community was sampled using a petite ponar. Twelve grabs were collected from the sublittoral zone (defined as that region of water depth between 2-4 m). These 12 grabs were from equal twelfths distributed across the lake. The benthos was diverse, Shannon-Wiener diversity was 4.5 and evenness was 0.88 (evenness is a measure of how well (evenly) the community population is distributed among the different taxa). Another biological indicator of a healthy lake is the worm to midge ratio. This metric was 1: 7.6, indicating a good balance between these taxa. Of the total 35 taxa identified, over 25 % are either Class A or Class B pollution sensitive organisms as defined by the Hulbert Index. Lake sediments consisted primarily of coarse to medium sand (>60 %); only 1 % of the sediment sample was organic. The sample areas also consisted of submerged aquatic vegetation and coarse particulate organic matter. Much of the lake sediments collected while sampling the benthos were anaerobic, having the characteristic hydrogen sulfide odor. The biological oxygen demand was below detection of 0.2 mg/L. Total and fecal coliforms were low, 20 and 4 colonies/100 mL, respectively.

Significance

Lucas Lake is biologically diverse and has good water quality. Perhaps the only foreseeable threat to the biological integrity and water quality is from residential sources. However, if the density remains low, and good buffer vegetation and properly functioning septic tanks are maintained, the overall health of this lake will likely not be threatened. These data provide baseline reference information that may be useful for early detection of water quality decline, or as reference data for lakes of similar type.

Suggestions

Maintenance of riparian zone vegetation where housing exists, as well as establishment where it has been removed, is a significant practice to maintain good water quality and provide habitat for wildlife. Also, maintenance and service of septic systems is paramount to avoid organic enrichment to this oligotrophic environment. Periodic monitoring is encouraged for early detection of environmental degradation.

For more information, please contact:
Randall Payne
DEP Northwest District 160 Government Center Pensacola, FL
32501
(850) 595-8300
email: randall.payne@dep.state.fl.us

Published by the Florida Department of Environmental Protection,
Tallahassee, FL.
For more information on the DEP Bioassessments program, please
visit our website at <http://www2.dep.state.fl.us/water/Slerp/bio/>