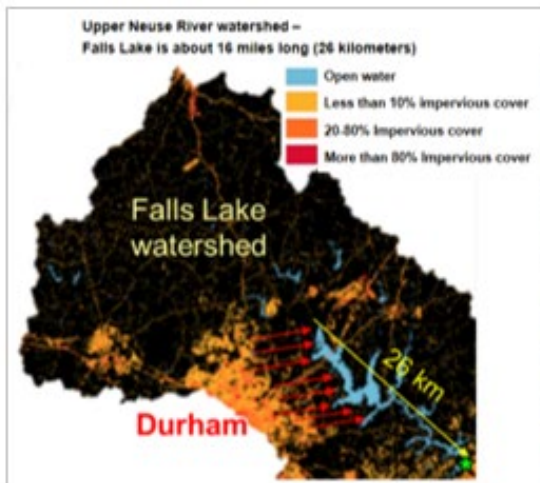## Summer Program Materials

Handout – Introduction to Falls Lake and its Watershed (2 pp.)
(also explains how to assess lake health using background environmental conditions, water quality, and biota characteristics.)

FALLS LAKE – most important drinking (potable) source-water for the City of Raleigh, which supplies water to Garner (actually an artificial or human-constructed lake, also called a reservoir or an impoundment)
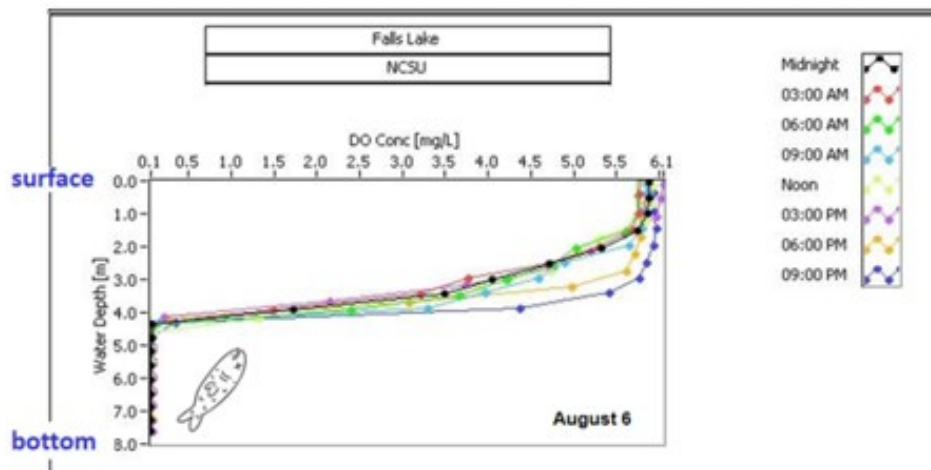
Upper Neuse River watershed –
Falls Lake is about 16 miles long (26 kilometers)

- Open water
- Less than 10% impervious cover
- 20-80% impervious cover
- More than 80% impervious cover

Falls Lake watershed

26 km

Durham

Falls Lake provides drinking water to about half a million people, and the CAAE is one of the groups that keeps track of how healthy Falls is.

And, used by more than 750,000 people each year for recreation

Assessing aquatic ecosystem health

Background environmental conditions

Water temperature – hotter or colder than normal stresses beneficial aquatic life

Oxygen – produced by algae and plants, and diffuses in from the air; worst conditions at depth, and just before dawn ("sag")

Falls Lake

NCSU

DO Conc [mg/L]

| Midnight |
| 03:00 AM |
| 06:00 AM |
| 09:00 AM |
| Noon |
| 03:00 PM |
| 06:00 PM |
| 09:00 PM |

surface

Water Depth [m]

August 6

bottom

$pH =$ $-\log [H^+]$ = minus the $\log_{10}$ of the hydrogen ion (H^+) concentration; exponential (logarithmic or log-base-10 scale):

Log scale - a small change in pH is equal to a LARGE change in acidity
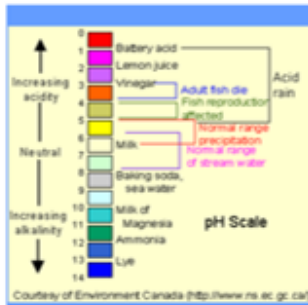
Acidic = less than 7

Neutral = 7

Basic = greater than 7

pH – *master variable* for the chemical state of an aquatic ecosystem because it is a reliable indicator of whether the system is able to protect or *buffer* itself from sudden acidic or basic pollution; and because almost any process (physical, chemical or biological) affects pH either directly or indirectly.

<u>Water quality indicators</u> – example, cultural eutrophication:

Nutrient (N, P) concentrations and algae as "first responders" (biomass or abundance, indicated by the chlorophyll *a* concentration)

high nutrient pollution

↓

high algal biomass (indicator, chlorophyll *a*)

<u>Other biological indicators</u> (higher trophic levels in the food web)