Deep Creek Lake Baseline Condition Assessment

This newsletter summarizes the baseline health assessment produced in 2011 by EcoCheck for Friends of Deep Creek Lake in preparation for production of future annual lake report cards. A unique assessment framework and preliminary data analysis results are presented, along with suggestions for future work and action items for concerned citizens. The full assessment document can be found at www.friendsofdcl.org.

Legend:
- Residential
- Commercial/Industrial
- Agriculture
- Forest
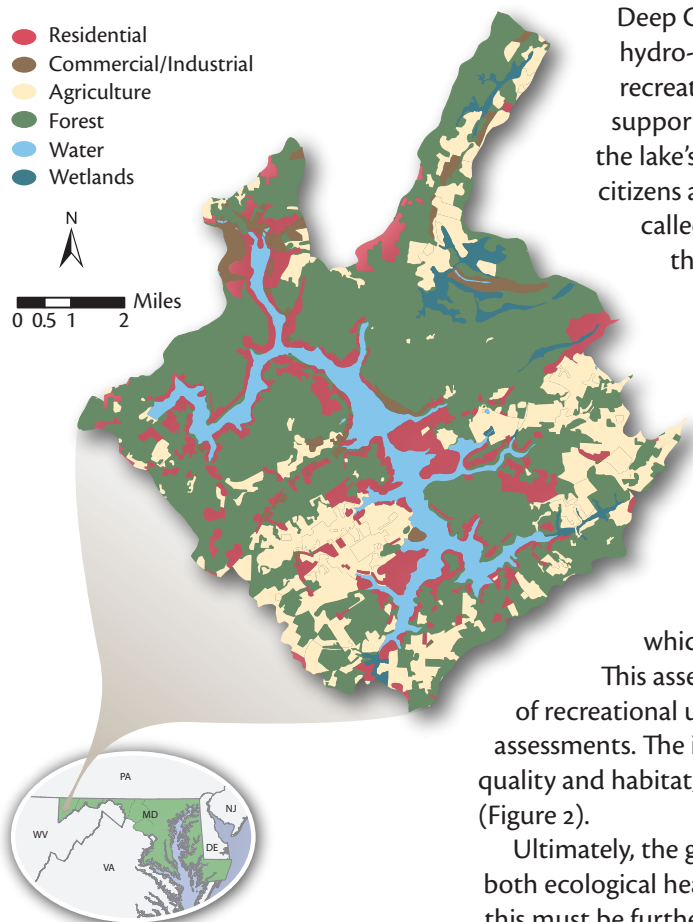- Water
- Wetlands

N

0 0.5 1 2 Miles

Figure 1. Deep Creek Lake is located in Garrett County in western Maryland.

Deep Creek Lake, located in Maryland's Allegheny Highlands, was formed by a hydro-electric dam in 1925. Over time, the lake has evolved into a four season recreational area, attracting over one million tourists to the region annually, and supporting approximately 60% of total employment in Garrett County. Given the lake's popularity and economic significance to the region, it is important for citizens and policy-makers alike to understand how the lake is aging (a process called eutrophication), issues that may be affecting this process, and actions that are needed to preserve and protect this valuable natural resource.

To this end, a comprehensive and unique assessment framework was developed to evaluate the health of Deep Creek Lake with respect to both lake and watershed condition—the health of the lake is influenced by processes happening in the watershed around it. There are more than 100 miles of streams that feed into the lake, and the health of these streams may be affected by land use in the watershed, which varies regionally (Figure 1). The southern portion of the watershed contains most of the region's agricultural activities, while the northern portion has more forested areas and higher concentrations of urban land uses, particularly in the Town Center area in McHenry, which is highly developed.

This assessment framework incorporates indicators of ecological health, and of recreational use, which are not traditionally incorporated into ecological health assessments. The indicators chosen for Deep Creek Lake represent measures of water quality and habitat, swimming, and boating in the lake, and stream health in the watershed (Figure 2).

Ultimately, the goal is to develop an annual report card of lake quality with respect to both ecological health and recreational quality. Several of the indicators required to achieve this must be further developed; the current report focuses on what can be understood using currently available data, and has acknowledged limitations in scope. This current assessment should be viewed as a baseline, upon which to build and measure against in the future.
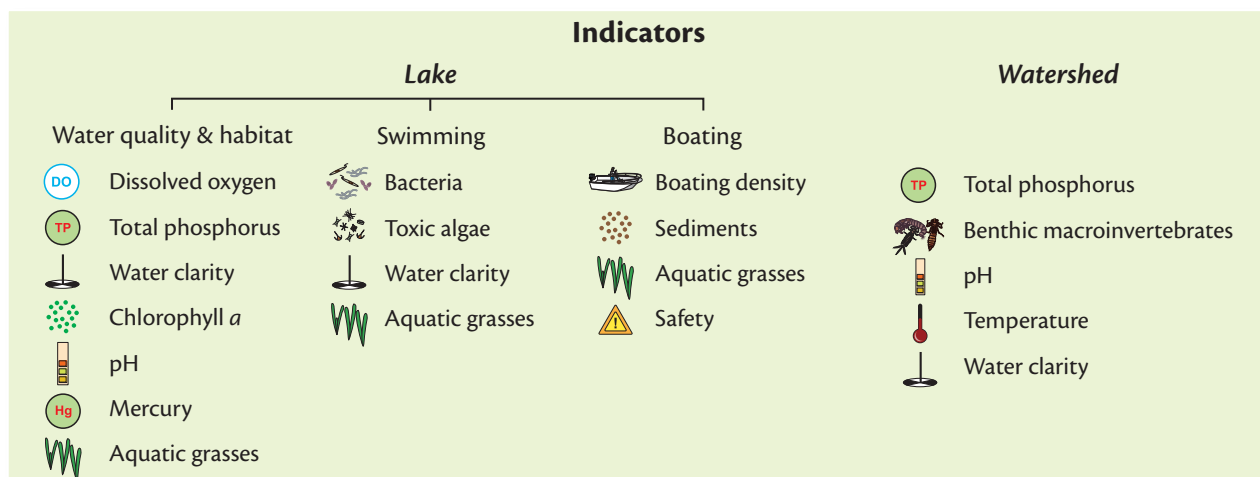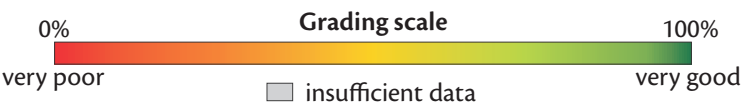
Indicators

Lake

Water quality & habitat
- DO — Dissolved oxygen
- TP — Total phosphorus
- Water clarity
- Chlorophyll *a*
- pH
- Hg — Mercury
- Aquatic grasses

Swimming
- Bacteria
- Toxic algae
- Water clarity
- Aquatic grasses

Boating
- Boating density
- Sediments
- Aquatic grasses
- Safety

Watershed
- TP — Total phosphorus
- Benthic macroinvertebrates
- pH
- Temperature
- Water clarity

Figure 2. Necessary indicators for fully assessing the health of Deep Creek Lake and its surrounding watershed.

Preliminary results are incomplete

The three reporting regions for Deep Creek Lake were determined by looking at land use patterns in the lake's sub-watersheds (Figure 3). Since activities in the watershed ultimately affect lake water quality, it was thought that land use differences might account for differences in scores between the regions.

Below are the grades for all lake and watershed indicators. The data used in this assessment were collected between 2008 and 2009 by the Maryland Departments of Natural Resources (MD DNR), Environment (MDE), Health and Mental Hygiene (DHMH).

- low density residential
- medium density residential
- high density residential
- commercial/industrial
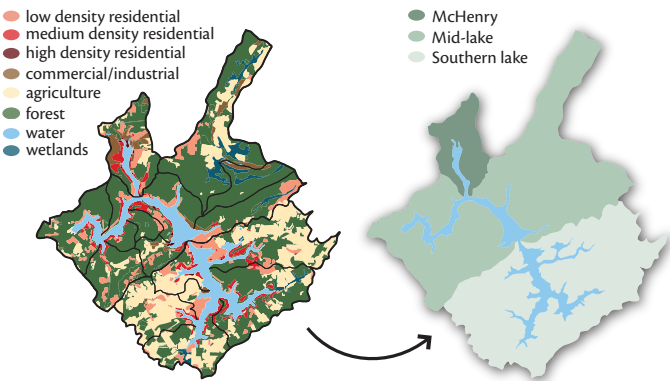- agriculture
- forest
- water
- wetlands

- McHenry
- Mid-lake
- Southern lake

Figure 3. Reporting regions for Deep Creek Lake were determined by looking at land use patterns in sub-watersheds.

Grading scale

0% very poor — 100% very good

☐ insufficient data

Water quality & habitat indicators	McHenry	Mid-lake	Southern lake	Overall
DO Dissolved oxygen	93	79	93	87
TP Total phosphorus	100	95	81	88
Water clarity	67	83	69	74
Chlorophyll *a*	64	73	65	68
pH	100	100	99	100
Hg Mercury	n/a	n/a	n/a	n/a
Aquatic grasses	n/a	n/a	n/a	n/a

Swimming indicators	McHenry	Mid-lake	Southern lake	Overall
Bacteria	100	100	98	99
Toxic algae	n/a	n/a	n/a	n/a
Water clarity	n/a	n/a	n/a	n/a
Aquatic grasses	n/a	n/a	n/a	n/a

Boating indicators	McHenry	Mid-lake	Southern lake	Overall
Boating density	n/a	n/a	n/a	n/a
Sediments	n/a	n/a	n/a	n/a
Aquatic grasses	n/a	n/a	n/a	n/a
Safety	n/a	n/a	n/a	n/a

Watershed indicators	McHenry	Mid-lake	Southern lake
TP Total phosphorus	n/a	99	92
Benthic macroinvertebrates	fair	poor	poor
pH	n/a	87	94
Temperature	n/a	96	100
Water clarity	n/a	71	26

Scores for all available water quality parameters were either in the "good" or "very good" range, which is in keeping with findings from other annual water quality reports for Deep Creek Lake. Data for shallow areas was limited, and information on mercury and aquatic grass coverage was not available.

Scores for bacteria were all very good, suggesting the lake is generally safe for swimming. Currently, there are either no data or no established swimming thresholds with which to assess toxic algae, water clarity, or aquatic grasses.

There are either no data or no established methods for evaluating the desired boating indicators.

Watershed data were limited—the only indicator that could be scored in all three regions was benthic macroinvertebrates. Those results rate stream health as relatively poor throughout the watershed. The data for all other indicators generally had good scores, except for water clarity, which had poor scores in the southern lake region.

Questions about watershed and lake health remain because of data limitations

Scores for watershed data show that most indicators receive a passing grade, however, sampling sites are not well distributed throughout the watershed regions.

Of the 31 watershed sites sampled in 2008 and 2009, only 10 sites measure total phosphorus, pH, temperature, and water clarity, and these are unevenly distributed—seven are in the middle region, three are in the south region, and zero are in the McHenry region (Figure 4). This uneven distribution means that definitive conclusions about the status of these indicators cannot be made.

Sampling locations for benthic macroinvertebrates (organisms that live on the stream bottom and are good indicators of overall stream health) *are* well distributed and the scores suggest reason for concern about stream health, especially in the middle and southern watershed regions (see Table on page 2).

Similarly, most of the water quality and habitat indicators are sampled in the main channel of the lake, not in shallow water areas. The effects on lake water quality from stream input will likely be seen first in these shallow areas, and the overall good scores for the lake indicators may not reflect this. As described below, there is evidence that some problems are currently occurring in these areas.

- ■ Benthic macroinvertebrates
- ▢ Stream water quality
- ▣ Benthic macroinvertebrates & stream water quality
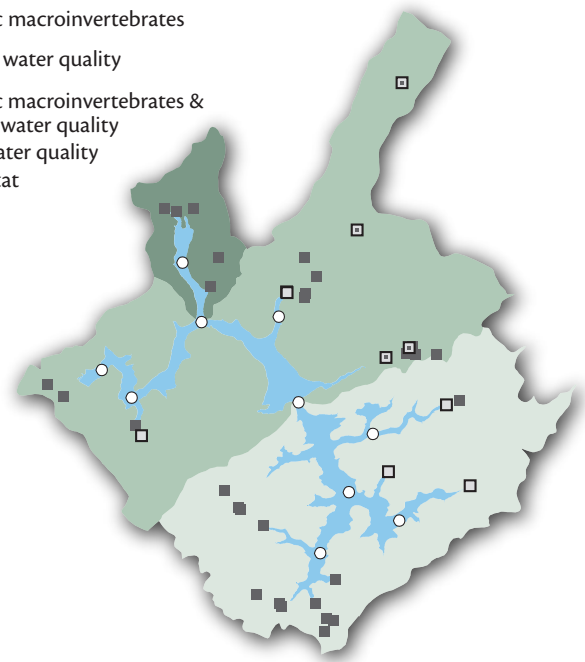- ○ Lake water quality & habitat

Figure 4. Sampling locations of all watershed and lake water quality and habitat indicators.

Future work should target specific issues

Based on existing water quality data, the lake appears to be generally healthy, but data are limited in shallow areas. Some issues in these areas should be investigated further, including:

- shoreline erosion and sedimentation of lake headwater areas,
- restrictions to dock access from sedimentation, excessive growth of aquatic grasses, and lake drawdown, and
- blooms of potentially harmful algae.

Evidence from irregular sampling and photo documentation suggests that these problems are occurring, but their extent and severity is largely unknown because of the distribution of sampling locations. Assessments of these issues and impacts in shallow water areas will require increasing the number and distribution of sampling locations in these areas of the lake.

In 2010, MD DNR began measuring sedimentation rates in shallow headwaters areas, and aquatic grasses throughout the lake. This will provide important information about both the ecological health of the lake, and how these issues relate to boating access and recreation.

Assessment of watershed health and its impacts on lake water quality would also benefit from increased collection of data. Similar to limitations in lake data availability, current watershed sampling programs are not able to provide the amount of information necessary to evaluate all desired watershed parameters. Supplemental sampling by a volunteer-based monitoring program could provide crucial information about the state of the watershed and subsequent effects on lake health.

Additional data analysis will also be required to complete the development of recreational indicators for a future report card, including the missing boating and swimming indicators. For instance, a carrying capacity study scheduled for 2011 will provide boating density information for the entire lake, but more work needs to be done to create measurable indicators from it.

Friends of Deep Creek Lake

Shoreline erosion can contribute to poor water clarity.

Friends of Deep Creek Lake

Lake drawdown reduces or eliminates access to shallow lake areas.

Friends of Deep Creek Lake

Algal blooms can produce toxins that are harmful to humans and wildlife.

Homework: what you can do

LANDSCAPE RESPONSIBLY

- Do not mow down to the shoreline—planting native grasses, shrubs, and trees in the critical buffer zone between your property and the lake will help prevent erosion, preserve habitat for wildlife, and can even increase your property value. All plantings and/or improvements in this buffer zone area must be approved by DNR Lake Management—contact their office at 301-873-4111.
- Get a soil test to optimize fertilizer usage for your lawn and garden, and never apply before rain or use fertilizers containing phosphates.
- Create a winding path to the lake, plant rain gardens, and install permeable surfaces (i.e., driveways, walkways, and patios) to reduce stormwater runoff.

MAINTAIN YOUR SEPTIC SYSTEM

- Have your system pumped regularly—standard tanks need to be pumped at least every three years.
- Apply to MDE for a free upgrade of your septic system.
- Use natural, non-toxic household cleaning products—chlorine and other harsh chemicals can kill the good bacteria in the system.
- Conserve water by fixing leaky faucets and pipes, installing low-flow shower heads and toilets, and running your dishwasher only when it is full.

GET INVOLVED

- Volunteer to participate in lake and stream monitoring programs run by Friends of Deep Creek Lake.
- Encourage local businesses and neighborhood/homeowners associations to get involved in lake stewardship efforts.
- Participate in shaping lake policies by attending MD DNR Policy and Review Board meetings.

Chicago Botanical Garden

Responsible landscaping along the lake shoreline has many benefits.

Darr's Cleaning Inc.

Regular septic tank maintenance prevents sewage leaks from entering the lake.

Friends of Deep Creek Lake

Volunteers participating in a stream monitoring program.

What Friends of Deep Creek Lake is doing

Friends of Deep Creek Lake promotes stewardship, conservation, and restoration of the lake and watershed. With volunteers, we work to realize our mission through lake and watershed monitoring, identification of research needs, compilation and integration of existing research, identification and resolution of non-compliance activities, community education, and public policy advocacy.

To assure a bright future for such a wonderful natural resource, join your neighbors in giving back and become a Friend of Deep Creek Lake. It's a good investment.

Visit www.friendsofdcl.org for more information.

IN 2011, FRIENDS OF DEEP CREEK LAKE WILL BE ORGANIZING THE FOLLOWING PROGRAMS AND ACTIVITIES FOR VOLUNTEERS:

- Stream sampling during the spring in conjunction with MD DNR's Stream Waders program.
- Water monitoring and observation of nearshore and headwater lake areas during the summer months.
- A culvert and stormdrain assessment project to locate and document sources of runoff entering the lake.
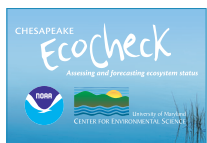- Numerous community education activities.

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