Sediment Phosphorus Release Rate Data for Butternut Lake, Price County, Wisconsin

Prepared by
Bill Rose and Dale Robertson

US Geological Survey
Middleton, Wisconsin

August 2007

Collection and analysis of data contained in this summary were partially funded by Wisconsin Department of Natural Resources Lake Planning Grant LPL-820-02

Sediment cores were collected at six sites in Butternut Lake in August 2004 (fig. 1). Cores were collected using a Wildco KB Sediment Core Sampler (Wildco Wildlife Supply Co.), equipped with 4.5 cm diameter by 50 cm long acrylic sleeves, which received the relatively undisturbed sediment columns and overlying water (figs. 2 and 3). After retrieval, core liners were immediately sealed with rubber stoppers and stored in a protective container for shipping to WSLOH. Samples were delivered to Wisconsin State Laboratory of Hygiene (WSLOH) for analysis within 24 hours of sampling. WSLOH analyzed the cores using sediment core incubation techniques (James and Barko 1991).

In all, eighteen cores were collected and analyzed. At each site duplicate cores were collected and analyzed for phosphorus-release rates under aerobic water conditions. At Sites 2, 4, and 5 an additional set of duplicate cores were collected and analyzed for release rates under anaerobic water conditions.

The average of the duplicate aerobic cores ranged from 0.343 to 1.531 $mg/m^2/day$. The average of the duplicate anaerobic cores ranged from 5.491 to 6.320 $mg/m^2/day$. On average, anaerobic core release rates were about 7.5 times greater than the average for the aerobic cores. Release-rate results are summarized in table 1 and figure 4.

These sediment release-rate data will be used to determine the relative importance of the phosphorus loading from the sediments to the annual phosphorus budget of Butternut Lake in a study being conducted by the U.S. Geological Survey (Protection Grant LPT-198-03).

Table 1 Summary of phosphorus-release rates for bed sediment in Butternut Lake, Price County, Wisconsin

[mg/m^2/day, milligrams per square meter per day]

Site location number	Core sample identification	Aerobic or Anaerobic conditions	Release Rate mg/m^2/day	Average Release mg/m^2/day	% Relative Difference
1	Core 1A	Aerobic	0.300	0.343	0.248
	Core 1B	Aerobic	0.385		
2	Core 2A	Aerobic	1.244	1.531	0.374
	Core 2B	Aerobic	1.817		
	Core 2C	Anaerobic	5.231	5.555	0.117
	Core 2D	Anaerobic	5.879		
3	Core 3A	Aerobic	0.668	0.629	0.124
	Core 3B	Aerobic	0.590		
4	Core 4A	Aerobic	1.016	0.769	0.644
	Core 4B	Aerobic	0.521		
	Core 4C	Anaerobic	7.509	6.320	0.376
	Core 4D	Anaerobic	5.130		
5	Core 5A	Aerobic	0.713	0.551	0.590
	Core 5B	Aerobic	0.388		
	Core 5C	Anaerobic	4.777	5.491	0.260
	Core 5D	Anaerobic	6.205		
6	Core 6A	Aerobic	1.023	0.779	0.628
	Core 6B	Aerobic	0.534		

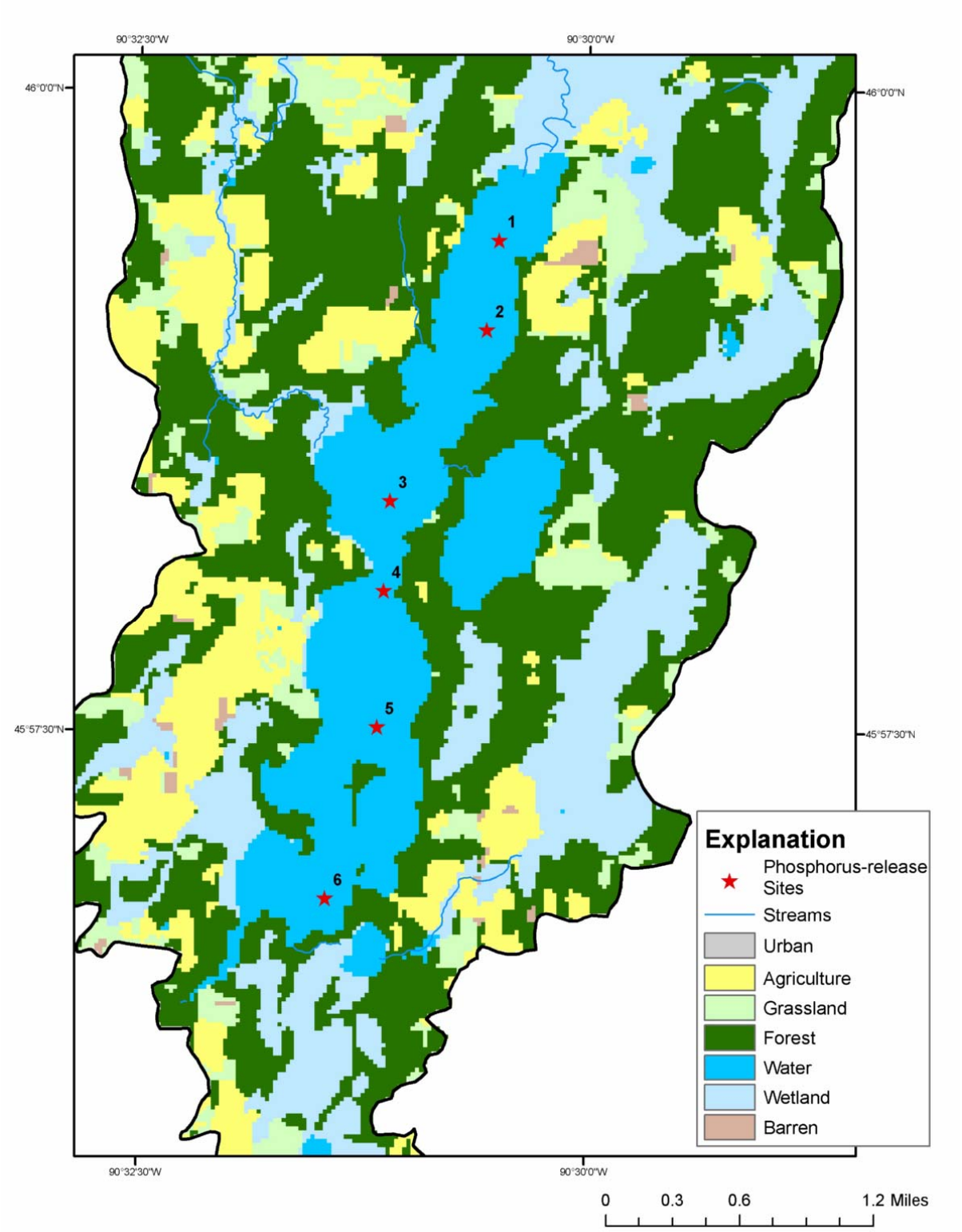

Figure 1. Locations of sediment-core (phosphorus-release) sampling sites in Butternut Lake, Price County, Wisconsin.

Figure 2. Core sampler readied for lowering into lakebed of Butternut Lake.

Figure 3. Sediment core from Butternut Lake.

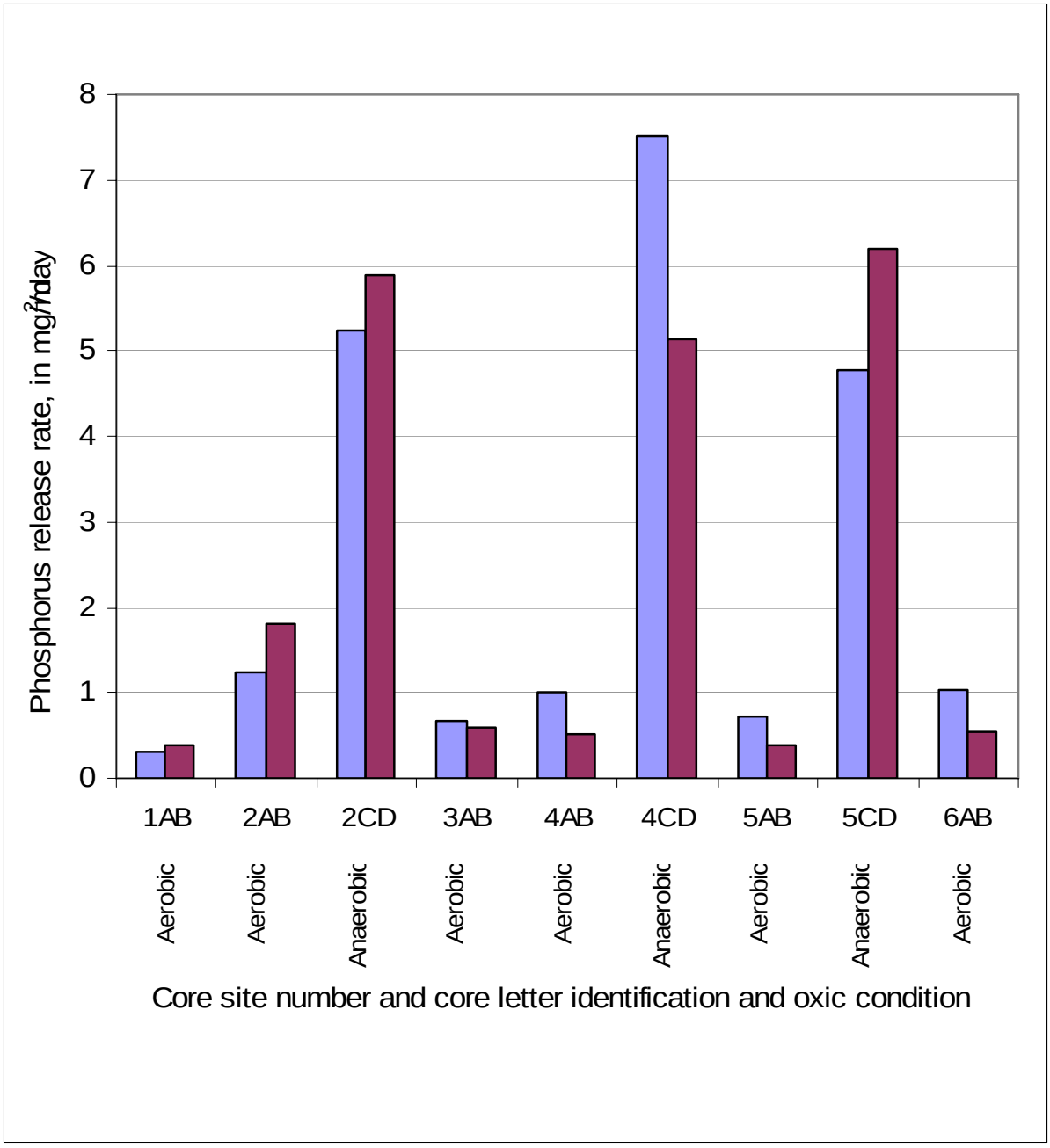

Figure 4. Sediment phosphorus release rates from duplicate cores collected from Butternut Lake, Price County, Wisconsin.