Vancouver Lake Research Plan

Vancouver Lake Watershed Partnership

December 16, 2009

Vancouver Lake Research Plan

Serves as a tool for selecting studies to inform management decisions

Identifies

1) key research

2) critical paths

3) associated costs

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Research Areas Identified

Water Dynamics

Nutrients

Sediment

Food Web

Toxic Contaminants

Fish, Wildlife, and Habitat

Lake Water Quality Model

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Water Dynamics

Water Dynamics Studies	
Study task	***Description***
Task 1.1: Physical Bathymetry	Mapped by Corps
Task 1.2: 1-D Model	Completed by Corps. Boundary conditions?
Task 1.3: 2-D Model	Completed by Corps. Boundary conditions?
Task 1.4: Collect Water Balance Data	1. Precipitation 2. Evaporation 3. Groundwater 4. Surface Waters

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Nutrients

Nutrient Budget Studies	
Study task	***Description***
Task 2.1: Analyze Existing Data	What's already known? Conduct data gap assessment.
Task 2.2: Nutrient Budget Study	Collect water chemistry data in the lake and at major inputs and outputs to the system.
Task 2.3: Data Analysis and Reporting	1. Identify main inputs/outputs of phosphorus and nitrogen. 2. Describe in-lake recycling of nutrients. 3. Evaluate relationships between lake chemistry and plankton populations evaluated for Task 4.1.

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Sediment

Sedimentation Rate Studies	
Study task	***Description***
Task 3.1: Analyze Existing Data	What's already known?
Task 3.2: Conduct Sediment Studies	a: Sediment traps: sedimentation rate. (USGS) b: Conduct surface sediment grabs to: 1) estimate sediment suspension from wind; 2) measure release of phosphorus from sediments; 3) estimate the pool of available phosphorus. c: Tributary input of suspended sediments.
Task 3.3: Evaluate Mechanisms of Internal Phosphorus Input	a: Physical: Phosphorus release from sediment resuspension by wind. b: Chemical/Microbial: Sediment phosphorus release by chemical dissolution and microbial decay. c: Biological: Internal phosphorus input from decaying plants, bio-turbation, waterfowl (Task 6 tie-in).
Task 3.4: Investigate Lake History	Sediment cores to look at: • Changes in water quality/cyanobacteria composition over the past century • Relationship of lake changes to changes upstream in the watershed • Sediment accumulation rates.

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Food Web

Food Web Interactions	
Study task	***Description***
Task 4.1: Study Planktonic Assemblages	(1) determine the abundance, distribution, composition of plankton (2) Investigate factors (grazers, temperature) influencing blooms (3) Look for spatial/temporal patterns and trends in abundance.
Task 4.2: Determine Rate Processes	Determine rate processes—the growth and death rates of cyanobacteria — and effects of nutrient concentrations.
Task 4.3: Broader Food Web Study	Link lower levels of the lake's food web to higher trophic levels, such as fishes (Task 6.4), as well as to the benthic community of invertebrates (Task 6.2.b).

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Toxic Contaminants

Toxic Contaminants Studies	
Study task	***Description***
Task 5.1: Analyze Existing Data.	Summarize existing toxics data. Identify data gaps.
Task 5.2: Identify Additional Toxic Contaminant Studies	If data gaps identified, determine necessary supplemental studies.

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Fish, Wildlife, and Habitat

Fish, Wildlife, and Habitat Investigations	
Study task	***Description***
Task 6.1: Analyze Existing Data.	What's already known? .
Task 6.2: Aquatic Species Survey	a: Aquatic plants: nutrient uptake/inputs. b: Benthic invertebrates. c: Habitat conditions for lake critters. d: Waterfowl population surveys (tie in Task 2.3)
Task 6.3: Fish Community Study	Who's where and at what time of year? Fish gut analysis (who's eating what?)
Task 6.4: Salmonid Genetic Study	Identify origins of salmon using the lake at various life stages. (Vancouver Lake's role in larger ecosystem.)

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Lake Water Quality Model

Lake Water Quality Model	
Study task	***Description***
Task 7.1: Water Quality Model	Review models available/data needs for predicting effectiveness of management options. Select appropriate model for Vancouver Lake.
Task 7.2: Develop Hydrodynamic Component	Develop hydrodynamic component model based on water dynamic studies (Tasks 1.1 – 1.3)
Task 7.3: Develop Quality Model	Develop, calibrate, and run the Vancouver Lake Water Quality Model for two years of data collected for Tasks 1 – 6.
Task 7.4: Evaluate Management Options	Use model to evaluate effectiveness of various management options. Watershed model?


Questions?