

## **HORSESHOE LAKE MANAGEMENT COMMITTEE AGENDA**

**5:00 P.M. - THURSDAY, APRIL 12, 2012**

**Woodland Council Chambers**

**100 Davidson Avenue – Woodland, WA 98674**

- I. Call to Order
- II. Minute Approval - March 8, 2012
- III. Continued Business
  - a. Pump Update
    - WSDOT Pump Status Letter and Response
    - 2010 WSDOT Inlet/Outlet Inspection
  - b. Water Sampling
    - WFDW Testing Status Letter and Response
  - c. Decoys
  - d. Otter Population
  - e. Budget
  - f. Goals & Priorities
    - Alum Treatment Report Summary Recommendations (Pages 1-7)
    - Responses and Ranking
  - g. Grant Applications
- IV. New Business
  - a. Letter to Agencies - Contact Information Request
  - b. Letter to Department of Ecology - Walt's Wholesale Meats
- V. Other
  - a. Local Newspaper Articles
- VI. Adjourn - Next Meeting May 10, 2012 at 5:00 P.M.

**CITY OF WOODLAND**  
**HORSESHOE LAKE COMMITTEE MINUTES**  
**MARCH 8, 2012**

The regular meeting of the Horseshoe Lake Management Committee was held on March 8, 2012, at the Woodland City Hall Council Chambers, 100 Davidson Avenue, Woodland, WA 98674.

Chair Tom Golik called the meeting to order at approximately 5:00 p.m. Roll call found the following:

**COMMITTEE MEMBERS:**

Tom Golik, Chairman  
Walt Church  
Mike Curry  
Terry Jones  
Francis Patnode  
Pat Rychel  
Neil Van Horn  
Jeff Sullivan

**MAYOR/COUNCIL:**

Scott Perry, Councilmember

**STAFF:**

Jody Bartkowski, Secretary  
Bart Stepp, Director of Public Works

**WELCOME**

Jeff Sullivan was introduced as the new Committee Member and Bart Steppe as the new Public Works Director. Attendees introduced themselves and gave a brief history of their involvement with the Committee.

**MINUTES**

The February 9 and February 22, 2012 minutes were approved as presented.

**OTHER**

- Discussion ensued regarding the order of agenda items.

*Committee Member Church moved to recommend that Continued Business be discussed before New Business. Committee Member Patnode seconded the motion. Motion carried unanimously.*

Beginning in April 2012 continued business will be discussed prior to new business.

**NEW BUSINESS**

1. **Goals & Priorities:** Discussion ensued regarding the need for creation of a project list. Neil Van Horn distributed a handout of thoughts and ideas. It was determined that a special meeting was not necessary and list items were discussed (see attached). Staff was directed to prepare the list, in no particular order, and provide it to Committee Members for ranking in priority order.
2. **Grants:** It was determined that a priority list of projects would be created prior to researching grant opportunities and completing applications. The Cowlitz

Wahkiakum Council of Governments (Jenifer Keene) will be used as a source for potential grants.

- 3. **Meeting Times:** Discussion was held and the Committee agreed to permanently change the meeting time to 5:00 p.m. All regularly scheduled meeting will be held at 5:00 p.m. in the City Hall Council Chambers at 100 Davidson Avenue.

**CONTINUED BUSINESS**

- 1. **Lake Pump:** Staff reported that a letter had been sent to the Washington State Department of Transportation (WSDOT) requesting a pump update. Discussion ensued regarding to whom the letter was addressed. Background information was provided for Bart Stepp and Jeff Sullivan.
- 2. **Water Sampling:** Staff presented the latest e-mail from Stacie Kelsey at Washington State Department of Fish and Wildlife (WDFW) testing. No data has been sent, but she is working with their lab regarding the best way to use the \$1,200 budget.

In an open discussion, the Committee and Staff gave a historical recap regarding water sampling and testing for new attendees. Further discussion was held regarding fish planting.

- 3. **Decoys:** Members reported that at first the geese appeared to leave, but now seem to be nesting. A suggestion was made to walk the Lake, see where they are nesting, and then place decoys in those locations.
- 4. **Otter Population:** Discussion ensued regarding otter habits, the locations they have been seen in, access to the Lake through the river pump, digging in banks, nutria, and that the last sighting of three was on February 23, 2012. A decision was made to keep an eye out for them and try to reach a consensus of where they are located.
- 5. **Budget:** Staff reported that nothing has changed.

**OTHER**

A question and answer session was held to bring Bart Stepp and Jeff Sullivan up-to-date on the history of pumping capacity and overall health of the lake.

Further discussion was held regarding the moving of sand along the east end of the lake and drainage features along the lakeshore.

**ADJOURNMENT**

The meeting was adjourned at approximately 6:20 p.m. The next regular meeting will be held Thursday, April 12, 2012, at 5:00 p.m. at the Woodland City Hall Council Chambers.

\_\_\_\_\_  
Tom Golik - Chairman

\_\_\_\_\_  
Date

\_\_\_\_\_  
Jody Bartkowski - Secretary

\_\_\_\_\_  
Date

**HORSESHOE LAKE MANAGEMENT COMMITTEE**  
**GOALS & PRIORITIES**  
**March 2011**

- PLEASE RATE THESE ITEMS IN PRIORITY ORDER STARTING WITH 1.
- ADD ADDITIONAL "OTHER" ITEMS AS NECESSARY AND PRIORITIZE AS WELL.

ITEM	PRIORITY 1 = HIGH
Pump repairs by WSDOT	
Testing by WDFW - phosphorus, nitrate, etc. (per sampling plan, as budgeted)	
Testing by WDFW - e-coli (not budgeted)	
Testing by WDFW - carp count, fish health, plant typing	
Pollution control - runoff, storm drainage, etc.	
Otter removal	
Erosion control - shoreline rebuild	
Aeration device installation	
Milfoil monitoring	
Public involvement and education	
Geese damage monitoring	
Septic tank monitoring - involve Clark & Cowlitz Counties as necessary	
Contact list for ex-officio members	
Grant applications - contact CWCOG for assistance	
Signage - consolidation, replacement and new	
Extend inlet pipe further into the Lake - 1,650' per alum study	

Questions, Comments, Etc. - Contact Jody at 225-7999 or bartkowskij@ci.woodland.wa.us



P.O. Box 9  
Woodland, WA, 98674  
www.ci.woodland.wa.us

100 Davidson Avenue  
FAX: (360) 225-1201

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(360) 225-6965

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(360) 225-7999

230 Davidson Avenue  
FAX: (360) 225-7336

Building  
(360) 225-7299

Clerk-Treasurer  
(360) 225-8281

Planning  
(360) 225-1048

March 2, 2012

Washington State Department of Transportation  
Southwest Region  
ATTN: Doug Ficco  
PO Box 1709  
Vancouver, WA 98682-6686

RE: Horseshoe Lake Pump

Dear Mr. Ficco:

The City of Woodland's Horseshoe Lake Management Committee and Department of Public Works have been working with the Department of Transportation over the past three-years to resolve the pumping volume and capacity of the Horseshoe Lake / Lewis River pump. The pump has been pumping one-third of its design capacity.

The pump was removed and supposedly overhauled and re-installed with no apparent improvement. Flowserve was called in to evaluate the system and make recommendations, among which was pulling the pump, inspect, and repair as needed. The pump was removed on December 12, 2011 and is apparently waiting parts. Because of the elapse of time the Committee and Public Works Department are getting concerned. The Lake is at its lowest level in recent years.

The City is requesting a specific date of when we may expect the pump to begin operation. It is imperative the pump begin pumping near its design capacity to prevent further degradation of the lake.

Sincerely,

Grover Laseke  
Mayor

CC: Horseshoe Lake Management Committee  
Department of Public Works  
Don Wagner, WSDOT  
Gene Dotson, WSDOT  
Mike London, WSDOT



**Washington State  
Department of Transportation**  
**Paula J. Hammond, P.E.**  
Secretary of Transportation

**Southwest Region**  
11018 Northeast 51st Circle/P.O. Box 1709  
Vancouver, WA 98668-1709  
360-905-2000/Fax 360-905-2222  
TTY: 1-800-833-6388  
[www.wsdot.wa.gov](http://www.wsdot.wa.gov)

**RECEIVED**

March 12, 2012

MAR 21 2012

Mayor Grover Laseke  
City of Woodland  
PO Box 9  
Woodland, WA 98674

**CITY OF WOODLAND**

Subject: Horseshoe Lake Pump

Dear Mayor Laseke:

We have received your letter regarding the operation of the Horseshoe Lake pump. As you stated in your letter, the pump was removed in December. With the pump available for inspection, Flowserve assessed the feasibility of rehabilitating the damaged parts. When it was determined that they were beyond repair, new parts were ordered. Because these are not common, off the shelf items, new parts had to be manufactured. The anticipated delivery date for the parts is around April 10th. When we have received them, we will reassemble and reinstall the pump as soon as possible. At this time, we estimate that the pump will be functional by April 24th. Should we receive the parts sooner than expected, we will update you on our anticipated delivery date.

If you have any additional questions or concerns, please feel free to contact me at (360) 905-2240.

Sincerely,

Chad Hancock  
Southwest Region Traffic Engineer

cc: File

### **Horseshoe Lake Inlet and Outlet inspection.**

On 1/18/2010 WSDOT Dive Team performed an underwater inspection of the inlet and outlet to Horseshoe Lake. Michael B. Smith and James R. Harding were the divers and Richard M. Pawelka and Darren O. Nebergall were surface support.

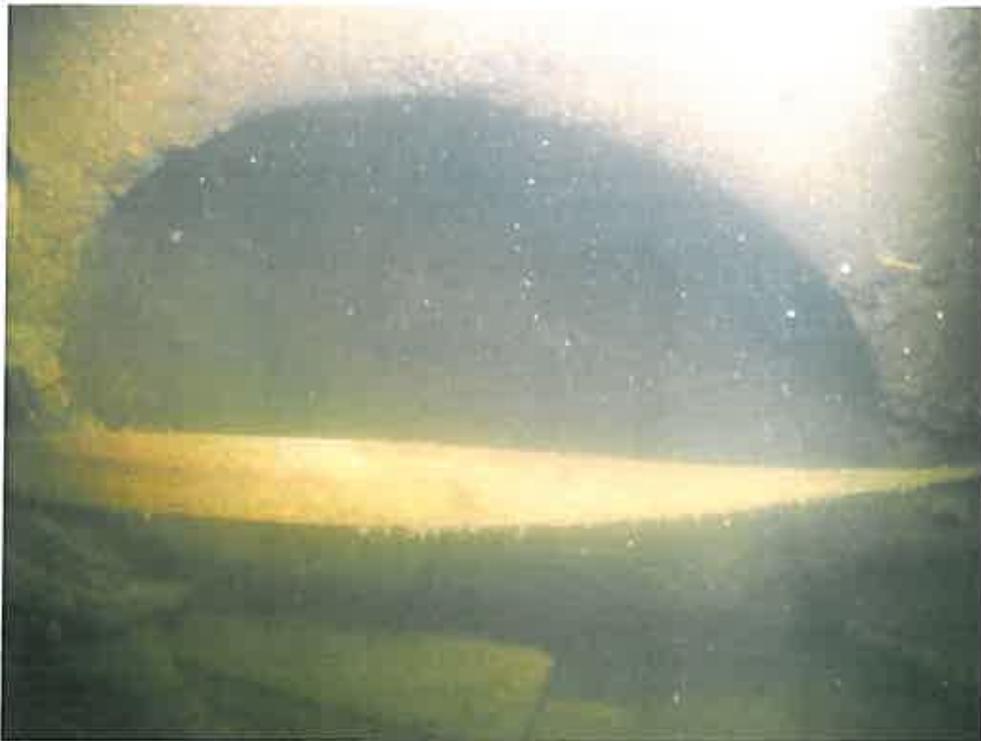
The Inlet for the lake is an 18" diameter steel pipe that has no visible blockages (See Photo #1). The top of the pipe was in five feet of water at the time of the inspection.

The outlet to the lake is a trapezoidal shaped concrete well with the top of the well on the surface and the bottom at a maximum of seven feet of water. There is some construction debris and form work around the outlet but none appears to be impeding any flow (See Photo #2). There is some concrete exfoliation around the lower half of the circular hole at the bottom of the west face (See Photos #2 and #3). The exfoliated area has more than 8" of penetration

We have two quick time videos that show the outside of the well. If the videos are desired please email me at [hardiji@wsdot.wa.gov](mailto:hardiji@wsdot.wa.gov) and I will send them to you.



**Photograph 1: The west end of the inlet to the lake looking east.**

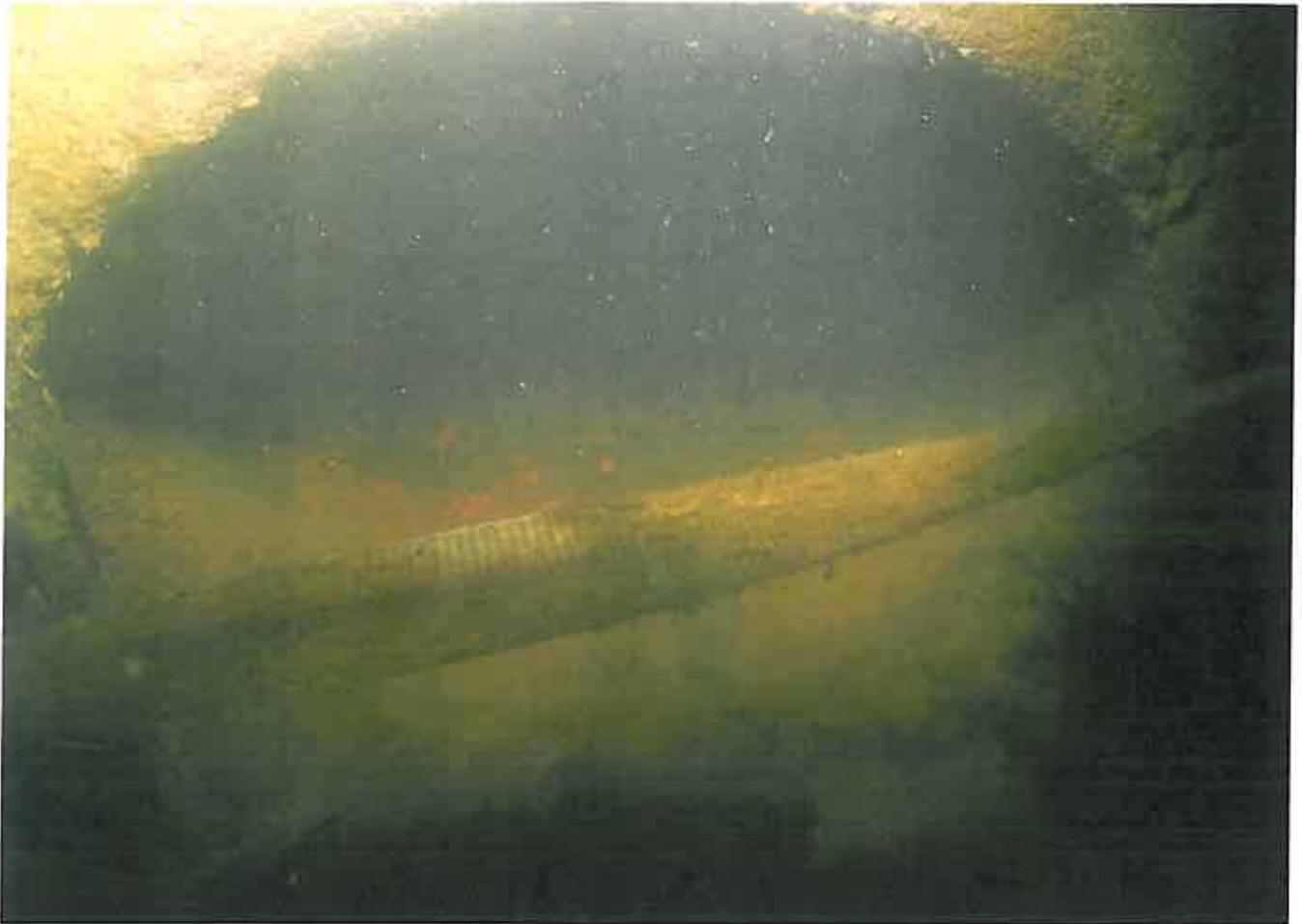


**Photograph 2: Circular hole on the west face of concrete well near mudline looking east.**



**Photograph 3: Concrete exfoliation on the west face at mudline looking east.**







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March 12, 2012

Washington Department of Fish and Wildlife  
ATTN: John Weinheimer  
2108 Grand Boulevard  
Vancouver, WA 98661

RE: Horseshoe Lake Testing

Dear Mr. Weinheimer:

At last night's Horseshoe Lake Management meeting, we created a list of projects and goals we wish to address. At the top of our list is to determine if our lake is capable of sustaining fish. A recent attempt to count grass carp showed minimal life in the lake.

It is our request that the Washington State Department of Fish and Wildlife (WDFW) complete another boat trip and further testing, as soon as possible, to determine the health of Horseshoe Lake. If there is a major problem we want to address it now. If Region 5 resources are not available in a timely period, we request assistance from other regions or the use of outside resources.

We are also requesting an update on review of the Field Manual for Horseshoe Lake Water Quality Protocols that was presented and approved by our Horseshoe Lake Management Committee in November 2011. City Council approved a budget of \$1,200 to begin testing in January 2012.

Thank you in advance for your attention to these requests.

Sincerely,

Bart Stepp, PE  
Public Works Director

CC: Horseshoe Lake Management Committee  
Department of Public Works  
Pat Frazier, WDFW  
Steve West, WDFW  
Stacie Kelsey, WDFW

## Jody Bartkowski

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**From:** Kelsey, Stacie L (DFW) [Stacie.Kelsey@dfw.wa.gov]  
**Sent:** Sunday, March 18, 2012 5:19 PM  
**To:** Jody Bartkowski  
**Cc:** goliktom@yahoo.com; Weinheimer, John (DFW)  
**Subject:** RE: Priority Letter

Jody and Tom -

I have been doing some talking with the warmwater folks and it sounds like our best bet is to wait to do another sampling at the end of April/first of May. That is the time where we do standardized testing for warmwater fish and when they believe that I will best be able to get into the warmwater fish populations in that lake.

We will test for the grass carp at that time again. I was hoping to get back out on Horseshoe to just nose around prior to my surgery date tomorrow, however, for the last two weeks our garage door at our office has been broken and the three big boats including mine have not been able to be removed to do any field work.

In the meantime I am working with Commissioner Misner on opportunities with funding for the lake. I will work out a plan for the \$1200.00 that you budgeted for the project and my expectations are that it will be a modified version of what I am doing with Silver Lake. The plan will be to have the first test day the first of May.

If you have any questions about anything, please do not hesitate to leave me an email or to contact John directly.

Sincerely,

stace

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**From:** Jody Bartkowski [bartkowskij@ci.woodland.wa.us]  
**Sent:** Tuesday, March 13, 2012 3:58 PM  
**To:** Kelsey, Stacie L (DFW)  
**Cc:** goliktom@yahoo.com  
**Subject:** Priority Letter

Hi Stacie -

At the special meeting on the 22nd the group had decided to make a priority list. At last week's meeting testing was listed as the 1st priority. Everyone was concerned about the idea of you not seeing any warm water fish and no one else has seen any carp.

Everyone wants you to know ahead of time, since we work directly with you, that the attached letter was sent today. Keep in touch and take care of yourself, we hope to see you soon!

JODY

**HORSESHOE LAKE MANAGEMENT COMMITTEE  
GOALS & PRIORITIES  
MARCH 2011**

ITEM	MEMBER #1	MEMBER #2	MEMBER #3	MEMBER #4	MEMBER #5	MEMBER #6	MEMBER #7	MEMBER #8	AVERAGE
Pump repairs by WSDOT	1	1	1	1	1	1	1	1	1.0
Testing by WDFW - phosphorus, nitrate, etc. (per sampling plan, as budgeted)	3	3	3	2	3	5	2	2	2.9
Testing by WDFW - e-coli (not budgeted)	4	4	13	4	8	2	3		5.4
Testing by WDFW - carp count, fish health, plant typing	2	5	4	3	4	2	4	3	3.4
Pollution control - runoff, storm drainage, etc.	5	6	5	5	2	7	6	5	5.1
Otter removal	8	16	14	15	9	4	11		11.0
Erosion control - shoreline rebuild	6	12	5	8	11	9	7	4	7.8
Aeration device installation	16	15	11	16	15	15	12		14.3
Milfoil monitoring	7	7	12	7	5	8	9	6	7.6
Public involvement and education	13	13	6	13	10	10	13		11.1
Geese damage monitoring	14	14	8	13	14	13	10		12.7
Septic tank monitoring - involve Clark & Cowlitz Counties as necessary	9	8	7	9	9	11	14		9.6
Contact list for ex-officio members	12	9	2	6	13	3	15		8.6
Grant applications - contact CWCOG for assistance	11	10	10	10	6	6	5	7	8.1
Signage - consolidation, replacement and new	15	11	6	12	12	12	16		12.0
Extend inlet pipe further into the Lake - 1,650' per alum study	10	2	9	11	7	16	8		9.0
*Cormorant study							17		17.0
			**	***		****		*****	

\* Cormorant study. There are 100+ ducks that are out there eating fish like crazy and pooping in the lake.

\*\* Combined pollution and erosion control as one combined issue. Combined public involvement and signage as one combined issue.

\*\*\* Includes two 16's and no 14.

\*\*\*\* Includes two 2's and no 14.

\*\*\*\*\* Only the top seven items were ranked.

- It seems to me that all priorities should be placed below establishing a consistent flow of water into Horseshoe Lake.
- Consider making two priority lists. One of things "we can control" and do with our own resources and the other of things "we cannot control" and have to rely on others to accomplish.  
Or even consider a third list of items that are cost related such as aeration, pipe extension, or ecoli testing and include grant funding with it.
- Could long term projects be divided up and have specific committee members assigned to work on them? One committee member could make a progress report at the monthly meeting if any progress has been made.
- Can monthly agendas and meeting conversations be limited to project progress to limit discussions on things we can not change, allowing for more work time?
- The introduction of grass carp into the lake was a mistake, they represent a real threat to the beneficial aquatic vegetation that is important to the lake's overall health.

**HORSESHOE LAKE MANAGEMENT COMMITTEE  
GOALS & PRIORITIES  
MARCH 2011**

ITEM	RANK
Pump repairs by WSDOT	1.0
Testing by WDFW - phosphorus, nitrate, etc. (per sampling plan, as budgeted)	2.9
Testing by WDFW - carp count, fish health, plant typing	3.4
Pollution control - runoff, storm drainage, etc.	5.1
Testing by WDFW - e-coli (not budgeted)	5.4
Milfoil monitoring	7.6
Erosion control - shoreline rebuild	7.8
Grant applications - contact CWCOCG for assistance	8.1
Contact list for ex-officio members	8.6
Extend inlet pipe further into the Lake - 1,650' per alum study	9.0
Septic tank monitoring - involve Clark & Cowlitz Counties as necessary	9.6
Otter removal	11.0
Public involvement and education	11.1
Signage - consolidation, replacement and new	12.0
Geese damage monitoring	12.7
Aeration device installation	14.3
*Cormorant study	17.0

# CHAPTER 1

## INTRODUCTION AND SUMMARY

### INTRODUCTION

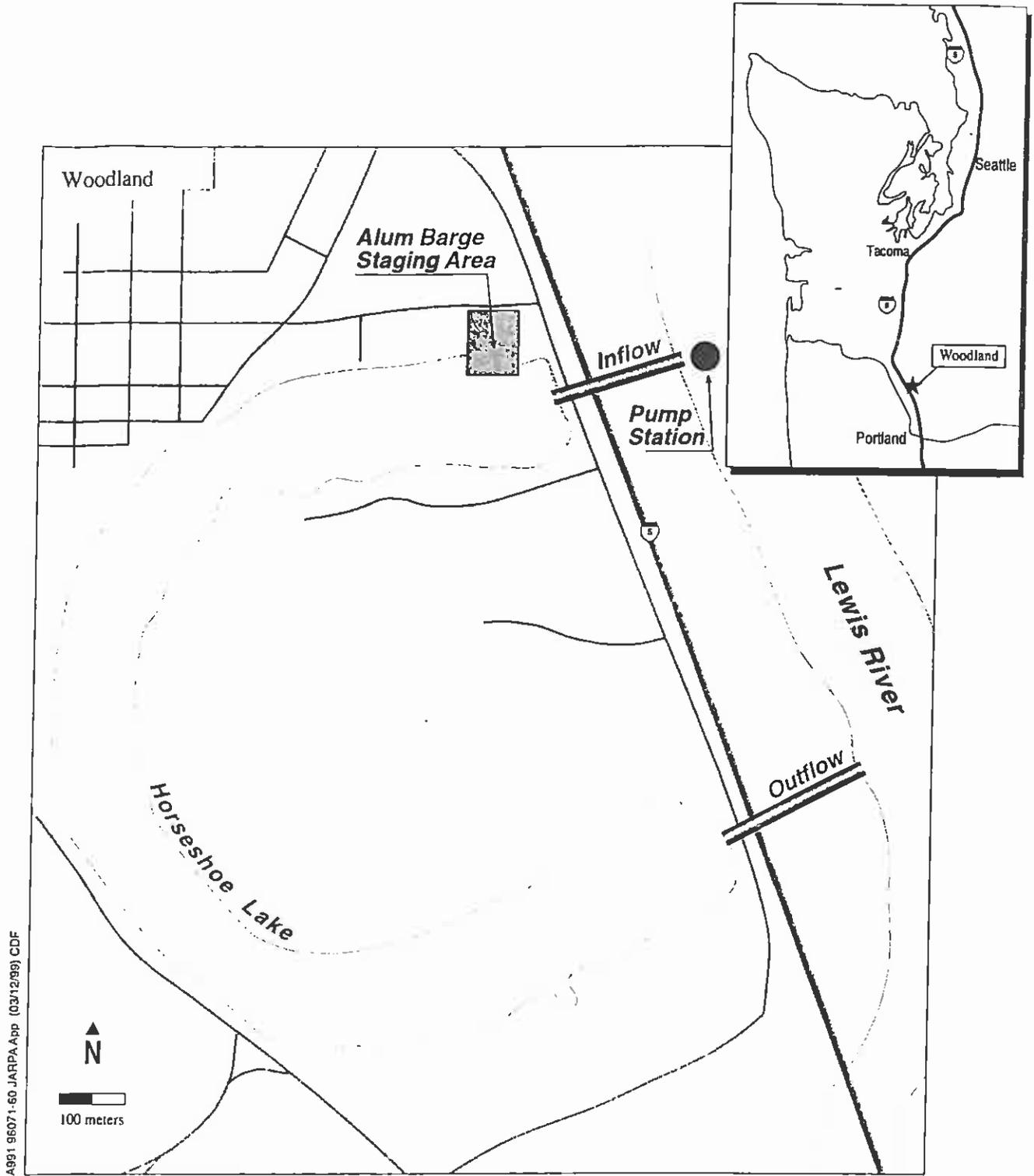
The purpose of this report is to:

- describe Phase II lake restoration implementation activities;
- evaluate the benefits and impacts of implementation activities on lake water quality and ecology;
- evaluate future lake and watershed activities that could lead to more reliable, long-term lake water quality benefits.

Horseshoe Lake is located in Woodland, Washington (**figure 1-1**). The border between Clark and Cowlitz counties runs down the middle of the lake, which was part of the North Fork Lewis River until it was isolated by construction of Interstate 5 (I-5) in 1940. The lake has a surface area of approximately 34.7 hectares (85 acres), a volume of approximately  $12.1 \times 10^5$  cubic meters (980 acre-feet), an average depth of 3.5 meters (11.5 feet), and a maximum depth of 7.2 meters (23.5 feet). Previous fish surveys have identified rainbow trout, brown trout, large-mouth bass, large-scale suckers, brown bullhead, yellow bullhead, carp, squawfish, goldfish, sculpin, and yellow perch in the lake (**Welch et al. 1992**).

In 1992 the University of Washington completed a Phase I lake restoration study for the City of Woodland. The study was titled *Horseshoe Lake Quality, Nutrient Loading and Management*; it was prepared by Eugene B. Welch, Anthony J. Whiley, and Dimitri E. Spyridakis. The purpose of the Phase I study was to develop an understanding of water quality problems in Horseshoe Lake and to recommend corrective actions. Welch et al. (**1992**) recommended three major actions:

- *Whole Lake Buffered Alum Treatment*. Alum is a chemical that chemically binds with phosphorus on lake bottom sediments. The chemical is applied as a liquid over the surface of the lake and settles like a blanket of snow over the lake bottom. The objective of buffered alum treatments is to limit phosphorus release from lake bottom sediments and thereby reduce in-lake algal growth. Reducing in-lake algal growth is desirable because algal blooms have been responsible for poor water clarity and impaired recreational use of the lake since its formation in 1940 (**Welch et al. 1992**).



A991 96071-60 JARPA App (03/12/99) CDF

Figure 1-1  
Project Vicinity

- *Increased Dilution Water from the Lewis River.* Since 1957 the Washington State Department of Transportation has pumped water into Horseshoe Lake from the Lewis River at a rate of approximately 6 million cubic meters per year (about 3,000 gallons per minute) as a means of improving lake water quality. Welch et al. (1992) recommended that the pumping rate be doubled to approximately 12 million cubic meters per year. The objective was to increase the supply of low-nutrient water and thereby reduce in-lake algal growth.
- *Watershed Management Plan.* A final recommendation was made to implement a watershed management plan that would reduce the amount of phosphorus discharged to the lake from stormwater runoff. Again, the overall objective was to reduce in-lake algal growth.

Welch et al. (1992) predicted that the greatest water quality benefit would result from the buffered alum treatment, with additional significant benefits from increased dilution pumping. They predicted post-treatment water quality benefits consistent with the water quality goals shown in table 1-1. They predicted that relatively minor benefits would occur with improved watershed management of stormwater.

Between June 1997 and October 1998, the recommendations of Welch et al. (1992) were implemented. Although the original plan was to perform the buffered alum treatment and install a new dilution pump simultaneously in the fall of 1997, both actions were delayed. Delays in environmental review and permitting and concerns about liquid alum freeze-up with declining water temperatures resulted in a decision to delay the buffered alum treatment until March 1998. Various communications, technical difficulties, and WSDOT staff availability problems also caused a delay in the installation of the new dilution pump until October 1998. The original plan to evaluate the combined effectiveness of the buffered alum treatment and increased dilution rate during the 1998 growing season was not achieved because the new pump was not installed until after the water quality monitoring program was completed in September 1998. The combined effectiveness of the buffered alum treatment and the original dilution program (6 million cubic meters per year) is addressed in this report.

## LAKE TREATMENT RESULTS

Water quality monitoring results demonstrated that the buffered alum treatment combined with the 6 million cubic meter per year dilution program achieved the water quality goals established by the University of Washington—at least during the first summer following treatment (table 1-1).

**INTRODUCTION AND SUMMARY**

Parameter	Pre-Treatment Range	Post- Treatment	Percent Improvement <sup>1</sup>	Water Quality Goals <sup>2</sup>
Total Phosphorus (µg/l)	23.0 to 29.9	18.3	20 to 39	13.0 to 18.0
Chlorophyll a (µg/l)	14.0 to 15.0	8.5	39 to 43	5.4 to 8.3
Secchi Visibility (meters)	1.2 to 1.8	2.1	17 to 75	1.8 to 2.4

1. The range of values is based on a comparison of 1998 post-treatment summer average values with pre-treatment summer average values for 1991 (Welch et al. 1992) and 1997 (this study).
2. Water quality goals established by the University of Washington (Welch et al. 1992).

**Table 1-1** compares pre-treatment and post-treatment results for total phosphorus, chlorophyll a, and Secchi visibility. These are the three water quality parameters most commonly used by lake scientists to evaluate the quality of lakes. Phosphorus is measured because it is the plant nutrient most often responsible for stimulating increased algal growth in lakes. Chlorophyll a is a green plant pigment found in algae (and other green plant tissues) and used as a measure of the concentration of algae in the lake. Secchi visibility is a measure of lake water clarity determined by lowering a black and white disk downward until it is no longer visible. Secchi visibility is inversely proportional to the amount of algal growth in the lake. Secchi visibility decreases when the concentration of algae increases.

The greatest water quality benefit seemed to result from the buffered alum treatment. The dilution program provided mixed results, maintaining desirable water quality during a portion of the summer but adversely affecting water quality during other periods. Lake water quality tended to decline, especially during the last two months of the summer (August and September 1998), due to the introduction of high phosphorus water from the Lewis River. Whenever phosphorus concentrations in the Lewis River exceed lake concentrations, the river is actually stimulating increased algal growth rather than acting as a source of dilution.

An adverse impact of the buffered alum treatment was that as many as 180 fish (mostly suckers) died immediately following treatment. Although some fish kills have been reported in similar aluminum sulfate treatments in Washington, the use of sodium aluminate (a buffering agent) in combination with aluminum sulfate was expected to maintain desirable lake pH and alkalinity and avoid fish kills. However, some fish—mostly suckers—died from the treatment. It may be possible to avoid these impacts with future

lake treatments by attempting to net the suckers and place them in temporary holding tanks, and then release them back to the lake environment after the treatment.

## FUTURE GOALS AND MANAGEMENT

Looking beyond the short-term benefits and impacts of the buffered alum treatment and dilution program, we find it appropriate to:

- a. Assess future lake water quality goals—should they remain the same, or should they be modified?
- b. Evaluate the need for additional lake and watershed management activities—should the City continue implementation of the plan outlined by the University of Washington (Welch et al. 1992), or should it make changes to improve the reliability of water quality benefits?

## Water Quality Goals for Horseshoe Lake

We recommend that future lake water quality goals remain the same for total phosphorus (TP), chlorophyll a, and Secchi visibility (table 1-1). In addition, we recommend establishing an aquatic plant growth area goal of less than 10 lake surface acres since aquatic plant growth could increase with improved water clarity. Excessive aquatic plant growth can interfere with recreational activities and lead to increased internal phosphorus cycling at the time of plant decay.

## Lake and Watershed Management

Although lake water quality goals were met during the summer of 1998, a number of factors could jeopardize lake water quality in future years. Factors affecting water quality and possible interventions are summarized below:

- High phosphorus concentrations occur periodically in the Lewis River and can lead to increased algal growth in the lake. High concentrations may be partially due to increased development and stormwater runoff in the urbanizing areas of the watershed. A monitoring program is needed to determine when river phosphorus concentrations are too high so that dilution pumping can be interrupted until concentrations return to acceptable levels.
- The efficiency of the existing dilution system is reduced by high groundwater seepage losses back to the Lewis River. As much as 50 percent or more of the annual volume of dilution water returns via groundwater flow directly back to the Lewis River without benefit to Horseshoe Lake. Construction of a dilution pipe extension, approximately 1,650 feet further into the lake, will enable dilution water to mix more completely with lake water before returning back to the river.

## INTRODUCTION AND SUMMARY

- High phosphorus groundwater can enter the lake when the lake level is lower than the surrounding groundwater level, leading to increased algal growth. Several actions can reduce the risk of high groundwater phosphorus: (a) control phosphorus sources, (b) implement watershed best management practices, and (c) maintain lake level above surrounding groundwater levels.
- Buffered alum treatments typically last 5 to 10 years. The buffered alum treatment may be repeated every 5 to 10 years to reduce phosphorus loading from lake bottom sediments.
- Stormwater runoff is an existing and potential future source of phosphorus loading to the lake that can contribute to increased algal growth. A combination of new stormwater treatment facilities and watershed best management practices is needed to reduce this source of phosphorus loading to the lake.
- Improved water clarity—resulting from the combined benefits of the buffered alum treatment and dilution pumping—can result in undesirable increases in aquatic plant growth. A volunteer monitoring program and contingency aquatic plant management plan are needed to track and respond to any undesirable plant growth.
- Horseshoe Lake is complex and dynamic and its water quality is ever-changing. A long-term water quality monitoring program is needed to track changes and provide the data necessary to support future adaptive management decision-making.
- No lake management plan can be properly implemented without the support and involvement of the public. A public involvement and education program is needed to maintain active public interest and support.

**Table 1-2** summarizes lake and watershed management activities endorsed by the City of Woodland to address these key water quality issues. Chapter 4 contains a detailed description of each of these options along with planning-level cost estimates.

Following review of the draft report, which was issued in March 1999, the City of Woodland Public Works Department recommended two changes to the proposed lake and watershed management plan. First, the City recommended that extension of the dilution line be adopted as an alternative to sheet pile construction as a means of improving dilution efficiency and minimizing the effects of groundwater short-circuiting. Second, the City recommended that Ecology update the waste discharge permit for the Meat Packing Plant on the south shore of the lake to include groundwater monitoring of phosphorus and other parameters.

These changes are reflected in **table 1-2** and in the more detailed discussion in Chapter 4. Other recommendations presented in the draft report have been adopted by the City largely without modification.

**Table 1-2**  
**Horseshoe Lake and Watershed Management Options**

- 1. Dilution and Management of Lake Level**
    - Operate Dilution Pump All Year Except
      - a. When river flows fall below permit requirements
      - b. When river phosphorus is too high
    - Groundwater Seepage Control – Extend Dilution Line – Reserved<sup>1</sup>
  - 2. Meat Packing Plant**
    - Stormwater Pollution Prevention Plan
    - Sewer Connection or Alternative Wastewater Treatment
    - Update Waste Discharge Permit to Include Groundwater Monitoring
  - 3. Watershed Best Management Practices**
    - Improved On-Site Septic Systems
    - Alternative Landscaping and Residential Lot Restoration
    - Alternative Household Practices
    - Improved Land Development Practices
    - Waterfowl Control
    - Control of Invasive, Non-native Aquatic Plants
  - 4. Repeat Buffered Alum Treatment – Reserved<sup>1</sup>**
    - Construction Documents and Permits
    - Chemical Application
  - 5. Stormwater Treatment**
    - Preliminary Engineering Study
    - Biofiltration Swale Option (Two Swales)
    - Swirl Concentrator Option (Two Concentrators)
  - 6. Aquatic Plant Contingency Plan – Reserved<sup>1</sup>**
    - Stocking Grass Carp
  - 7. Long-term Monitoring**
    - Long-term monitoring would include various water quality (lake, river, groundwater), water level (lake and groundwater), flow (dilution water and river), aquatic plant, and benthic invertebrate data collection and reporting efforts.
  - 8. Public Involvement and Education (PIE)**
    - Future public involvement and education would be led by the Horseshoe Lake Technical Advisory Committee. Various involvement and education tools would be used—including continued use of Woodland School newsletters and additional coordination with outside organizations involved in controlling nonpoint sources of phosphorus loading to the Lewis River.
1. Reserved means that the concept for future action has been endorsed by the City of Woodland, but that a decision to implement has been reserved to a future date.

City decisions to implement a second whole-lake buffered alum treatment and/or the contingency aquatic plant control plan will be based on the results of future monitoring activities and will be “reserved” to a future date.

April 13, 2012

Dept of Natural Resources, Pacific Cascade Region, Eric Wisch, Manager  
PO Box 280, Castle Rock, WA 98611  
Dept of Ecology, SW Region - Sally Toteff, Director  
PO Box 47775, Olympia, WA 98504  
Public Health of Clark County - John Wiesman, Director  
PO Box 9825, Vancouver, WA 98666  
Clark County - Bill Baron, Administrator  
PO Box 5000, Vancouver, WA 98666  
Cowlitz County, Board of County Commissioners - Marc Boldt, Chair  
207 4th Avenue North, Kelso, WA 98626  
Cowlitz County Conservation District - Darin Houpt, District Manager  
2125 8th Avenue, Longview, WA 98632

RE: Horseshoe Lake Management

In 1989, the City of Woodland adopted Resolution No. 309 (see attached) establishing a "Horseshoe Lake Management Committee (HSLMC)" to address problems with Horseshoe Lake. Your agency is listed as an ex-officio member to be a resource in attempting to address issues with our Lake.

With this letter, we are requesting that your agency furnish us with a person or persons, including department, name, phone number, and e-mail address that can be our contact to pursue solutions to issues that we determine to be in your jurisdictions or expertise.

Thank you for your attention to this request.

Sincerely,

Bart Stepp, PE  
Public Works Director

CC: Horseshoe Lake Management Committee  
Department of Public Works

# HORSESHOE LAKE MANAGEMENT COMMITTEE

Effective - March 15, 2012

Members							
Tom Golik, Chair	225-7485		goliktom@yahoo.com	130 Vineyard View Drive	Woodland	WA	98674
Walt Church	225-8897		124church@comcast.net	124 Truth Street	Woodland	WA	98674
Mike Curry	225-3138		mmsoccerfan@yahoo.com	120 South Pekin Road	Woodland	WA	98674
Terry Jones	225-9629		tjswimdad@aol.com	400 Lake Avenue	Woodland	WA	98674
Francis Patnode	225-3939		patnodes@teleport.com	334 Island Aire Drive	Woodland	WA	98674
Pat Rychel	225-7232		prychel@pacifier.com	PO Box 293	Woodland	WA	98674
Jeff Sullivan	225-1750		sullij099@msn.com	130 South Pekin Road	Woodland	WA	98674
Neil Van Horn	225-7445		neilvh02@gmail.com	PO Box 1852	Woodland	WA	98674

Ex-Officio (Nonvoting) Members							
Dept Transportation, SW Region							
Doug Ficco, Asst Regional Admin for Maint & Ops	360-905-2020		ficcod@wsdot.wa.gov	PO Box 1709	Vancouver	WA	98682
Gene Dotson, Region Wide Maint Supervisor	360-905-2200		dotsong@wsdot.wa.gov	PO Box 1709	Vancouver	WA	98682
Mike London	390-905-2206		londonm@wsdot.wa.gov	PO Box 1709	Vancouver	WA	98682
Dept Fish & Wildlife, Region 5							
John Weinheimer, Regional Biologist	360-906-6746		weinhjmw@dfw.wa.gov	2108 Grand Boulevard	Vancouver	WA	98661
Stacie Kelsey, Scientific Technician 3	360-906-6706	360-601-1168	stacie.kelsey@dfw.wa.gov	2108 Grand Boulevard	Vancouver	WA	98661
Dept of Natural Resources, Pacific Cascade Region							
Eric Wisch, Region Manager	360-575-5001		eric.wisch@dnr.wa.gov	PO Box 280	Castle Rock	WA	98611
Dept of Ecology, SW Region							
Sally Toteff, Director	360-407-6307		stot461@ecy.wa.gov	PO Box 47775	Olympia	WA	98504
Cowlitz County Health Department *							
Audrey Shaver, Environmental Health Specialist	360-414-5599 x 6440		shavera@co.cowlitz.wa.us	900 Ocean Beach Hwy, S	Longview	WA	98632
Public Health of Clark County**							
John Wiesman, Director	360-397-8000		public.health@clark.wa.gov	PO Box 9825	Vancouver	WA	98666
Clark County							
Bill Barron, Administrator	360-397-2232			PO Box 5000	Vancouver	WA	98666
Cowlitz County							
Board of County Commissioners-Marc Boldt, Chair	360-577-3020		cowlitz@co.cowlitz.wa.us	207 4th Avenue North	Kelso	WA	98626
Cowlitz County Conservation District							
Darin Houpt, District Manager	360-425-1880		ccddmgr@teamelect.com	2125 8th Avenue	Longview	WA	98632

\*Cowlitz-Wahkiakum Health District - Dissolved about 12-years ago. Now both Cowlitz and Wahkiakum have their own health departments.  
 \*\*SW Washington Health District - Dissolved in 2002. Public Health is now a department of Clark County.

Mayor / Council / Staff							
Grover Laseke, Mayor	360-772-0371	360-225-9022	lasekeg@ci.woodland.wa.us	307 Buckeye	Woodland	WA	98674
Scott Perry, Councilmember	360-921-2306		perrys@ci.woodland.wa.us	180 South Pekin Road	Woodland	WA	98674
Bart Stepp, Public Works Director	360-225-7999		steppb@ci.woodland.wa.us				
Jody Bartkowski, Engineering Tech.	360-225-7999	360-600-7252	bartkowskij@ci.woodland.wa.us				

3-10-12

# 'Party barge' infested with invasive mussels stopped

## Quagga, zebra mussels found on vessel; officials say driver tried to avoid check

By JOHN BRANTON  
*Columbian staff writer*

A Clark County sheriff's deputy Friday intercepted a 40-foot lake "party barge" infested with invasive zebra and quagga mussels after the driver of the truck pulling the vessel allegedly tried to avoid inspection.

The driver had been stopped in Oregon and was told to pull into the Washington State Patrol's Port of Entry truck weight and inspection station along Interstate 5 northbound in Ridgefield, said Corey Turner, a commercial vehicle enforcement officer there.

The driver tried to bypass the scalehouse on a side road, but Deputy James Naramore intercepted the trucker and escorted the truck and boat to the scalehouse Friday

morning. It's under orders to stay until officers with the Washington Department of Fish & Wildlife can have it steam-cleaned, Turner said.

Such mussels are harmful, according to the Arizona Game and Fish Department:

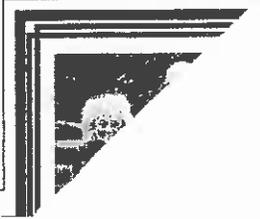
"Quagga mussels were first found in Arizona in Lake Mead in January of 2007. They originally came from Eurasia and became established in the Great Lakes in the 1980s. Since being discovered, these prolific invaders have spread rapidly. A single adult quagga mussel can produce a half-million larvae in a single year.

"They colonize rapidly on hard surfaces and can ruin boat motors and clog water intake structures, such as pipes and

screens, thereby impacting pumping capabilities for power and water treatment plants. Invasive mussels such as quaggas and the closely related zebra mussels have cost industries and businesses in the Midwest hundreds of millions of dollars in maintenance and damage repair."

They also "threaten native fish and wildlife by consuming available food and by smothering native species," says Washington's Department of Fish and Wildlife.

**JOHN BRANTON:** 360-735-4513; [http://www.twitter.com/col\\_cops](http://www.twitter.com/col_cops); [john.branton@columbian.com](mailto:john.branton@columbian.com).



Columbian 4/8/12

## Vancouver Lake, Silver Lake restoration efforts share some challenges



Photo by [Steven Lane](#)

Vancouver Lake is in the midst of a three-year study that aims to fill in data gaps about the lake's water flow and how it functions. The lake remains a popular recreation spot for several groups, including Vancouver Lake Crew.

By [Eric Florip](#)

As of Sunday, April 8, 2012

### VANCOUVER LAKE

Type: natural.

Size: 2,414 acres.

Average depth: 3-5 feet.

Pollutants/problems:

blue-green algae, turbidity, PCBs, dioxins, chlorinated pesticides.

Location: Clark County.

Source: Washington State

Department of Ecology

### SILVER LAKE

Type: reservoir.

Size: 2,300 acres.

Average depth: 6 feet.

Pollutants/problems: blue-green algae, turbidity, phosphorous, very little vegetation.

Location: Cowlitz County.

Source: Washington State

Department of Ecology



The Columbian

Click on map to enlarge



The Columbian

Click on map to enlarge



By Zachary Kaufman

Silver Lake sits a few miles east of Castle Rock in Cowlitz County. The large, shallow body struggles with pollution issues of its own, which some local residents are hoping to reverse.



Columbian files

Vancouver Lake is popular for swimming in the summer months, but blue-green algae has temporarily closed the lake to swimmers in recent years. Here, Nadia Rodrigues, right, and her sister Carmen enjoy the water in June 2010.



Columbian files

Blue-green algae has prompted summertime warnings at Vancouver Lake for years, including when this sign was posted in 2004.



By Zachary Kaufman

Chris Gilley and Anne Fuller, both of Longview, enjoy some quiet fishing time at Cowlitz County's Silver Lake recently. The lake, located a few miles east of Castle Rock, is a popular recreation spot for boating and fishing.



By Steven Lane

Vancouver Lake Crew is among multiple groups that use Vancouver Lake, just west of the city. The lake has struggled with pollution and depth issues for decades, while local advocates continue to fight to improve its health.

SILVER LAKE -- Elmer Nofziger stepped onto a narrow dock, walking stick in hand. Standing under cloudy skies, he peered into cloudy water.

Nofziger has called Silver Lake his home for 16 years and watched it evolve during that time. But the 2,300-acre lake, a sprawling body just east of Castle Rock in Cowlitz County, has not changed for the better.

Nofziger knows the situation well: a large, shallow lake that's popular for recreation, but plagued by pollution, toxic algae blooms and high turbidity.

Sound familiar?

Vancouver Lake suffers many of the same problems, documented through decades of studies, plans, public partnerships and millions of dollars in restoration work. Residents near Silver Lake are in the middle of an effort to diagnose and clean up the ailing water body in their own backyard. And they've looked to Vancouver Lake as an example of what to do -- or what not to do.

Both efforts may hold implications for Clark County. Many see Vancouver Lake as the local treasure, if perhaps an underappreciated one. Silver Lake draws some local recreation of its own, as a gateway for boating and fishing on the way to Mount St. Helens.

The two lakes and their ailments appear to have a lot in common. But similar symptoms don't always point to the same disease.

"A cold looks like a flu," said Ron Wierenga, a manager in Clark County's environmental services department. "The reasons behind those may be very, very different."

## Reaching out

Nofziger's living room makes it clear that Silver Lake is not simply a casual interest for him. More than a dozen white binders, some several inches thick, cover one table with years of history and research. Maps lie strewn across another table. A bookshelf holds more folders and documents, under a neon-yellow "NOFZIGER" sign that used to adorn his old shoe business in Portland.

"I'm not the kind of person that just lets things go by," Nofziger said. "I do my own investigating as much as I possibly can -- as you can see."

Nofziger, 73, was a driving force behind a citizen advocacy group that pushed for better management of the lake and its watershed as early as 2005. That led to the formation of the Silver Lake Watershed Advisory Council, officially recognized by Cowlitz County since 2010.

Last fall, Nofziger and other Silver Lake advocates met with a few players from the Vancouver Lake Partnership, hoping to learn some lessons from the decades-old restoration effort in Clark County. Wierenga said the Vancouver Lake group gave a presentation it's used in local outreach efforts, detailing both past and present work at the lake.

Nofziger called the talk "outstanding." He said it opened his eyes to some of the physical similarities of the two lakes. Both cover well over 2,000 acres with little depth, only a few feet in places. Both have water quality and algae issues that have kept swimmers out of the water at times. Both have a locally led restoration effort pushing for their survival.

But each faces a different fight in a markedly different setting. While the parklike Vancouver Lake is a natural body next door to an urban area, Silver Lake is actually a reservoir, managed by a dam at its east end. Private land mostly surrounds Silver Lake's shores, between two small towns and a landfill to the south.

Ultimately, last fall's meeting left Nofziger discouraged. He listened to everything the Vancouver Lake Partnership has going for it -- decades of research, a Herculean restoration effort in the 1980s, and a broad coalition of public agencies, local organizations and other stakeholders fully behind it. Yet even with all that, he said, the lake still struggles.

At Silver Lake, advocates don't have those kinds of resources at their fingertips.

"That's where I started to wonder," Nofziger said, "whether or not we were going to get this done."

### **Vancouver Lake 'a gem'**

Vancouver Lake's history is one of slow, steady decline. But that doesn't shake the optimism of the people trying to rescue it.

Perhaps the biggest milestone in that effort came in the early 1980s, when a \$17 million restoration project -- the nation's largest -- dredged a huge amount of sediment from the bottom of the lake, and built a channel to flush out contaminants with more water from the Columbia River. The excess sediment created the island that now dots the north side of Vancouver Lake.

The work made an undeniable impact. But it didn't reverse the lake's ultimate course. Sediment has built back up in the past 30 years, accumulating both in the flushing channel and in the lake itself, reducing its already shallow depth.

Crowded by development and agricultural activity around it, the 2,400-acre Vancouver Lake remains plagued by pollutants today -- polychlorinated biphenyls, dioxins and pesticides among them. Toxic blue-green algae blooms have routinely closed the lake to swimming in recent summers.

That doesn't mean past efforts were a failure, Wierenga said. There's no finish line when it comes to restoration work. Vancouver Lake is a complex, ever-changing environment, and there's still more to do, he said.

"The reality is, we are where we are," Wierenga said. "Let's use the history of the lake and the previous restoration effort to help inform us as we move forward."

A \$750,000 study led by the U.S. Geological Survey aims to fill in data gaps on how the lake functions. The three-year study, now in its second year, will in part examine the behavior of its smaller tributaries, including Burnt Bridge Creek and Lake River, looking at how water flows in and out of Vancouver Lake. The end result will help the partnership take a better-informed next step -- in other words, avoid an "expensive mistake," Wierenga said.

Even in ailing health, tranquil Vancouver Lake remains a beloved recreation spot for rowing, sailing and swimming. Alan Stewart's Vancouver Lake Crew club hits the water nearly every day, rain or shine. For those who use it, the lake is a resource worth fighting for, he said.

"In my opinion, it's really a gem to the community and the city," Stewart said. "I've found that many people in the community don't even know it exists."

### **Silver Lake: 'It is home'**

Ask three people the main source of Silver Lake's problems and you might get three different answers.

Some point to speed-boaters and visitors. Others blame nearby development and residents. Many look no further than a Weyerhaeuser-owned industrial landfill, located just south of Silver Lake. (Cowlitz County commissioners recently approved purchasing the landfill site for the county to use.)

"Silver Lake is not just one problem," said Gary Fredricks, director of Washington State University's Cowlitz County extension. "It's a multitude of problems."

At least one turning point is clear: The lake's physical makeup changed dramatically after 1992. That's when state ecology officials introduced grass carp to control heavy vegetation in the shallow water, which some felt hindered recreational use of the lake.

The plan may have worked too well. The fish -- about 83,000 of them -- wiped out virtually all plant life in the water, leaving a barren field of sediment at the bottom of Silver Lake. It hasn't been the same since.

"Whoever came up with the stock rate wildly overestimated what they needed to get the job done," said Kathy Hamel, an aquatic plant specialist with the state Department of Ecology. "Obviously, they got it wrong."

Most of the vegetation never came back, erasing the plants that cling to firm soil and keep the lake bed stable. The loose mud that's left is easily kicked up by boats and wind, making turbidity a chronic problem.

Silver Lake is in the midst of a new diagnosis today, led by the state Department of Fish and Wildlife. In January, officials began collecting water samples to better identify which pollutants are present in the water. They're gauging known problems -- turbidity and phosphorus, for example -- and testing other factors such as pH, water temperature and E. coli. The results should help clarify what's causing some of Silver Lake's problems, said Stacie Kelsey, a scientist with DFW's inland fish program.

As past efforts go, Silver Lake simply hasn't seen the extensive in-water work that Vancouver Lake has. But Cowlitz County leaders over the years have compiled stacks of documents from old studies and plans at Silver Lake, fed by nearby Sucker Creek and Hemlock Creek.

The latest restoration push is in a relatively early stage, and enjoys at least some backing from local government officials. Cowlitz County Commissioner James Misner said the county kicked in about \$18,000 for the two-year water testing work.

The lake remains a magnet for boaters and fishermen, and an economic boost for the businesses and communities that surround it in the shadow of Mount St. Helens. With yearly tournaments, Silver Lake is still considered one of the best bass-fishing spots in the area.

For some, it's much more than that.

"It is home to a lot of people," Misner said. "This was a life investment for them as much as it was a real estate investment."

## Hurdles

Axel Swanson has seen the problems on both lakes first-hand. A Cowlitz County commissioner between 2007 and 2011, he worked extensively on Silver Lake and the effort to improve its health. He now works as a senior policy analyst in the Clark County commissioners' office, where Vancouver Lake is very much on the radar.

Swanson has seen both restoration efforts gain renewed momentum recently. But both still struggle with political and financial hurdles, he said.

"The thing they share most in common is these questions around who's responsible for them," Swanson said. "There really isn't a single parent or guardian for the lakes."

The state ecology department axed its broad lake monitoring program more than a decade ago due to lack of funding. State officials say they're simply not in a position to lead the charge in restoration efforts like the ones happening at Vancouver Lake and Silver Lake.

Advocates on the ground share the same challenge, with grant funds increasingly hard to come by. Many public budgets are thin and getting thinner. And it takes money to go from study to action.

"There's a huge jump," Swanson said, "between diagnosing the problem and implementing the fix for the problem."

Even with resources, advocacy groups at Vancouver Lake and Silver Lake may be fighting a losing battle against the lakes themselves, said Hamel of the ecology department. They may only delay the inevitable, she said.

Any lake goes through a natural life cycle, and a shallow lake filling in with sediment is likely near the end of that cycle, Hamel said. Vancouver Lake fits that profile. Silver Lake resembles a "wetland that's masquerading as a lake," she said.

None of that has stopped both communities from making a push to reverse -- or at least slow -- the downward trend.

"They do fill in. It is natural," Hamel said. "But if you're living around a lake, you really want to turn that clock back."

## Not alone

The problems that beset Vancouver Lake and Silver Lake aren't unique to those spots alone. Swanson pointed to Lake Sacajawea in Longview and Horseshoe Lake as two others in Southwest Washington with ailments of their own. DFW's latest round of water testing at Silver Lake is concurrently studying Horseshoe Lake, which sits on the Clark-Cowlitz county line.

Nofziger has seen it his whole life. He grew up outside Salem, Ore., living near a polluted Willamette River. He spent years in a floating home on the Willamette in Portland, staring down the same problems. Then he moved to the shore of Silver Lake, taking a front-row seat to a new struggle.

In nearby Toutle, Nofziger points to a success story at Harry Gardner Park, where volunteer strength and community spirit helped clean up a local asset. He's hoping for the same spirit at Silver Lake. He's just not sure of the outcome.

"It's certainly not going to be a quick fix," Nofziger said. "And I'm concerned that we may not be able to fix it at all."

Eric Florip: 360-735-4541; [http://twitter.com/col\\_enviro](http://twitter.com/col_enviro); [eric.florip@columbian.com](mailto:eric.florip@columbian.com).

Columbian 4/9/12

## In Our View: Two Lakes Fight for Survival

### Vancouver, Castle Rock residents hope preservation efforts succeed

As of Monday, April 9, 2012

The Pacific Northwest, particularly the seasonally rain-drenched and temperate region west of the Cascades, would seem to be the last place to find lakes fighting for survival. But two dangerous “s” words — shallowness and sediment — could signal the beginning of the end for two beautiful lakes that people have come to love. Residents of Southwest Washington should hope that doesn’t happen to at least two shallow, silted and cherished bodies of water that share numerous similarities.

Vancouver Lake between Fruit Valley and the Columbia River measures 2,414 acres, averages just 3-5 feet deep and for decades has battled multiple natural and man-made pollutants. Silver Lake just east of Castle Rock in Cowlitz County is 2,300 acres with an average depth of just 6 feet. Every year, both lakes confront turbidity problems and invasions of blue-green algae. But they remain scenic treasures in their respective communities and sites for rowing, sailboating, swimming and occasional fishing.

No one — not even any of the experts — is sure what will happen to these two lakes, but that uncertainty is not for lack of trying to find solutions. The worst-case scenario is either or both lakes evolving over many years into swamps. That’s enough to make all of us cheer for the lake-savers.

Despite the similarities of Vancouver and Silver lakes, their respective rescuers come from different sources, one federal and one state. In Vancouver, the latest in a long line of lake examiners is the U.S. Geological Survey, which is in the second year of a three-year, \$750,000 study of the lake and tributaries Burnt Bridge Creek and Lake River, as well as the flushing channel from the Columbia River. At Silver Lake, the state Department of Fish and Wildlife is trying to identify causes of turbidity and pollution.

Vancouver Lake has been studied more than Silver Lake. Among the efforts to resuscitate Vancouver Lake and prevent seasonal algae blooms was a \$17 million project in the early 1980s that included dredging and construction of the flushing channel. At Silver Lake, the problem takes on a greater human dimension as many residents live directly on the lake. In Vancouver, only a few residents are near the lake, but the view is enjoyed by many more.

As the underdog role expands for Vancouver and Silver lakes, we’re glad the experts are not giving up. However, as Eric Florip [reported in Sunday’s Columbian](#), these lakes are in slow, steady decline. Ultimately, if shallowness and sediment cannot be conquered, the long-term prognosis will worsen. “Silver Lake is not just one problem, it’s a multitude of problems,” said Gary Fredricks in Florip’s story. Fredricks is director of Washington State University’s Cowlitz County Extension. Silver Lake preservationist Elmer Nofziger said, “It’s certainly not going to be a quick fix. And I’m concerned that we may not be able to fix it at all.”

More than the obvious natural attributes are threatened. Recreational opportunities and property values also are at stake.

Kudos to Nofziger and public officials who continue their valiant efforts to save Vancouver and Silver lakes. May those efforts pay off someday soon.