From: Elaine Stewart
To: Yvonne Vallette
Date: 4/21/2005 10:25:37 AM
Subject: Project proposal for plant work

Hi Yvonne,

Here is the first, much-delayed project proposal. This is for the plant work at Smith-Bybee. It is the largest of the three that I'm breaking out for submission to you. The others will be for fish monitoring and another interpretive panel.

The total request for the plant work with PSU is $60,400. This is for 2 years of work. If you can find partial funding, we can continue searching for other funders to make up the difference.

Thanks for your help, and I hope to send the other two pieces to you this week.

-Elaine

Elaine Stewart
Natural Resource Scientist
Metro
600 NE Grand Avenue
Portland, OR 97232-2736

Tel 503.797.1515
Fax 503.797.1849
stewarte@metro.dst.or.us

Achieving Desired Plant Community Changes with Hydrologic Management of a Tidal Floodplain Wetland

(Smith and Bybee Wetlands Natural Area, Portland, Oregon)

Summary of Project:

This project documents and verifies plant community responses to hydrologic management designed to control invasive plants and re-establish native plants. The 800-ha Smith-Bybee wetland system historically functioned as a seasonal marsh in the Columbia River floodplain near the mouth of the Willamette River. A new water control structure implemented at Smith-Bybee in late 2003 allows the capture and retention of winter floodwaters through the spring growing season. The three principal objectives in managing the Smith-Bybee structure are to control reed canarygrass (RCG), support native plant communities and provide habitat for juvenile salmonids. The goal of this project is to evaluate the implementation success of the first two management objectives.

I. Project Background

Over recent decades, the Smith-Bybee wetland system has been profoundly altered and degraded by the construction of local and regional dams and dikes, deposition of dredge spoils and the introduction of exotic plants and animals. A new water control structure, completed in December 2003, enables water level management to restore functions and values to this wetland complex.

Water control structures are increasingly common tools for wetland restoration. They are used in our region to flood and control invasive species, encourage the growth of native emergent and bottomland hardwood plant communities and provide wetland habitat for a variety of fish and wildlife. The Columbia and Willamette rivers' hydrographs have been radically altered with the installation of dams to generate hydropower, to provide water for irrigation and to control flood events. One of the biggest changes has been the loss of the spring freshet, which occurred in most years when melting snowpack combined with spring rains to produce a significant flood event, typically in late May or early June. Broad expanses of floodplain wetlands were flooded annually by the freshet.

The native plants in these floodplain ecosystems are adapted to life with a spring freshet. Most are cool-season plants that do not emerge or break bud until June or July, when floodwaters would have receded. The loss of the spring freshet resulted in earlier drying of wetlands, often very early in the spring. The current hydrologic regime favors the non-native and invasive reed canarygrass (RCG), a cool-season plant that begins growing as early as February. RCG becomes well-established before native plants begin growing, and thus out-competes them to produce vast monotypic stands in wetland systems such as Smith-Bybee.

The preferred method for restoring wetland systems in the lower Columbia River is to restore the historic hydrologic regime; however, this is not feasible. Water control structures are an alternative approach for wetland managers to mimic historic flooding patterns to the extent possible. The new structure at Smith-Bybee allows the capture and retention of winter floodwaters through the spring growing season to control RCG growth. Because storm events and water releases from upstream reservoirs are unpredictable, and large releases in late spring

are uncertain, management at Smith-Bybee is focused on capturing water from all events through winter and spring and holding as much water as possible until late May or early June.

The conceptual plan for water level management at Smith-Bybee is:

- Capture and retain water during winter and through spring to provide high water during the spring freshet time of late May and early June.
- Draw down water in the wetlands from late spring through summer, finishing in August.
- Leave the structure open to tidal flow from late summer through fall.
- In late fall (typically November), close the structure to capitalize on high-water events and begin the cycle again.

Preliminary results from the first year of operation demonstrate control of reed canarygrass with sufficient inundation, as well as increases in many of the less-common native emergent wetland plants at Smith-Bybee. An M.S. thesis documenting these results will be completed in May 2005. The current water year has been considerably drier than last year. As a result, the water control structure is holding less water in the wetlands this year than last year. We need to explore the results of hydrologic manipulation under different conditions to determine whether the management approach should vary or whether the conceptual management plan is robust enough to provide guidance for all years. The goals of the current proposal are to evaluate whether the first-year results are repeatable, and to evaluate relationships between water quality changes with hydrologic management and plant community changes. We will accomplish this goal via a partnership with Portland State University (PSU).

II. Key Project Objectives:

1. Verify the effects of the change in water regime on the distribution of reed canarygrass that was documented during the first year of operation.
2. Verify the response of native plant communities to the change in water regime that was observed in the first year of operation.
3. Evaluate changes in water quality parameters and examine relationships between water quality changes and plant community changes at Smith-Bybee.

III. Work Plan: Monitoring the effects of the new water regime on reed canarygrass and native plant communities.

Estimated Work Years: 0.45 FTE/year (graduate student) plus 0.1 FTE/year (project manager and partners)
Timeline: 7/1/05 – 6/30/07
Amount: $85,410 total ($60,429 EPA and $24,981 match)
Deliverables: M.S. thesis from a graduate student at Portland State University; also an expectation of at least 1 paper published in a peer-reviewed journal as a result of this work.

Task A. Sample vegetation along transects to determine distribution and extent of RCG, other exotics, and native plants.

Due: December 1 each year for three years; final sampling to be completed in 2006.

Description: Measure vegetation along each of 30 transects using the line-intercept method. Transects were located randomly within the range of elevations where it should be possible to

manage vegetation with water-level manipulation. The transects are perpendicular to the "shore" and follow an elevation gradient from the late-fall water level to the anticipated maximum water elevation. The transects range in length from 20 to 280 m, depending on local gradient. Plant composition will be determined at 0.1 m intervals for all heights, capturing all vertical layers. Water level loggers installed as part of a fish monitoring study will allow us to correlate flooding regime changes with plant community structure and composition changes. Successful water level management should eventually reduce the total cover of RCG by half and replace the RCG with native plants.

Task B. Evaluate changes in water-quality parameters and determine any relationships with plant community changes.

Due: June 30, 2007.
Description: Two sources of water-quality data are available for Smith-Bybee: surface-water grab samples and hydrolab samples. The hydrolab located in Bybee Lake takes continuous measurements of four water quality parameters (dissolved oxygen, temperature, pH and conductivity) when that wetland is flooded. Surface water samples are tested for an array of nutrients, metals and other water quality indicators. Data from hydrolab and grab samples are available for dates prior to and following the construction and operation of the water control structure. These data will be compared with each other and with vegetation survey results to evaluate relationships between the water control structure's operation and water quality, as well as relationships between water quality and plant community changes.

Task C. Report findings.

Due: June 30, 2007.
Description: A graduate student at Portland State University will use this project for a thesis. One student completed the baseline survey in fall 2003 and compared those results with the 2004 vegetation survey for his thesis (to be completed in May 2005). This work provided an initial response of the plant species composition and in particular RCG to inundation. The M.S. student to be funded by this proposal will continue the work in 2005 and 2006 to develop a long-term understanding of RCG and overall plant community response to seasonal flooding and water quality changes, and will account for interannual variability in climate and Columbia River water management.

IV. Joint Evaluation of Performance:

The grantee welcomes feedback from EPA on all reports submitted as part of the work plan components. If the EPA has any concerns regarding progress on this project, then grantee will work with EPA to achieve a resolution.

V. Quality Assurance:

Quality assurance will be provided in several ways. Academic oversight of the vegetation monitoring will ensure a well-designed and well-supervised work plan component. Theses and published papers resulting from this work will undergo rigorous review.

VI. Roles and Responsibilities of EPA in Carrying Out Project Components:

Work plan commitments are the responsibility of the grantee and project partners. EPA will monitor progress as needed to ensure project completion.