King County

Department of
Natural Resources and Parks
Director's Office
King Street Center
201 South Jackson Street, Suite 700
Seattle, WA 98104-3855

December 13, 2011

Bob Everitt, Region 4 Director
Washington Department of Fish and Wildlife
16018 Mill Creek Boulevard
Mill Creek, WA 98012-1541

Dear Mr. Everitt:

This letter serves to memorialize the agreement between King County and the Washington State Department of Fish and Wildlife (WDFW) regarding facilitated review of hydraulic projects for drainage maintenance activities on specified waterways and ditches on privately held agricultural lands in King County.

King County, WDFW, farmers, and other involved parties have been working for the past two years to facilitate the process by which farmers apply to WDFW for a Hydraulic Project Approval (HPA) to maintain drainage in streams and ditches on their agricultural fields. The mutual goal is to make the permit process more predictable, efficient, and cost-effective while minimizing negative impacts to fish life and water quality.

Applicants for an HPA to conduct drainage maintenance activities will be able to expect that WDFW staff will facilitate the HPA review process, provided the applicant follows the requirements developed by King County and agreed to by WDFW and described in the Agriculture Drainage Assistance Program (ADAP). A copy of these requirements in their current form is attached. The requirements may be reviewed and updated from time to time according to protocols to be developed between King County and WDFW.

The King County Department of Natural Resources and Parks (DNRP) staff has classified all waterways and ditches on King County agriculture lands as natural, modified, or artificial and determined the expected presence of salmon as high, moderate, or low. WDFW staff have reviewed this classification and concur with the determinations as provided. DNRP has also developed requirements and best management practices to be applied to these waterways and ditches to maintain drainage according to these waterway classes. To be eligible for the facilitated HPA review process, farmers will need to agree to these requirements and best management practices.

DNRP has determined that the following types of streams will not be eligible for the facilitated HPA review process:

- natural waterways (i.e., have not been straightened) and
- waterways having 20 cubic feet per second (cfs) or higher mean annual flow.

(See "Which Waterways are omitted from the Streamlined Agricultural Drainage Assistance Program" attached.")

Through the ADAP, King County agrees to:

- Provide engineering assistance to the farmers to evaluate their drainage issues;
- Recommend solutions that incorporate the requirements and best management practices;
- Conduct fish removal and exclusion as described in the ADAP, and
- Provide some financial assistance for revegetation plantings.

When WDFW receives an application for an HPA Joint Aquatic Resource Permit Application (JARPA) that specifies concurrence with the best management practices of the ADAP, and WDFW agrees the application is appropriate for participation in the facilitated ADAP, WDFW will:

- Accept the implementation of the best management practices described in the ADAP as meeting the requirements of RCW 77.55.021 (2)(b) and (c),
- Accept the SEPA determination for the ADAP as meeting the SEPA requirement as per RCW 77.55. 021 (2)(d), and
- Facilitate the HPA review process to minimize the time necessary to issue the HPA.

There is no right to appeal WDFW's decision as to whether an application is appropriate for participation in the facilitated ADAP review process.

Modifications of the Letter of Agreement may be incorporated at any time with the written consent of both parties. Either party may terminate participation in this agreement with 60 days written notice.

If RCW 77.55.021 is amended to change the current requirements for a complete application, WDFW and King County will revise their agreement as documented in this letter as necessary. Your countersignature below will indicate your concurrence with the facilitated HPA review process as described above.

We greatly appreciate the opportunity to work with WDFW to develop and implement this innovative program that will create efficiencies and preserve natural resources. King County very much looks forward to working with WDFW on this effort.

Attachments (10)

Date 12/13/2011

Christie True, Director
King County Department of Natural Resources and Parks

Date 12/20/2011

Bob Everitt
Region 4 Director
Washington State Department of Fish and Wildlife

cc: David Brock, Regional Habitat Program Manager, Washington Department of Fish and Wildlife (WDFW)
Stewart Reinbold, Assistant Regional Habitat Program Manager, WDFW
Randy Sandin, Division Director, Land Use Services Division, Department of Development and Environmental Services
Joanna Richey, Assistant Division Director, Water and Land Resources Division (WLRD), Department of Natural Resources and Parks (DNRP)
Jane Lamensdorf-Bucher, Special Projects Coordinator, WLRD, DNRP
Brian Sleight, Supervising Engineer, Stormwater Services Section, WLRD, DNRP

Requirements for a Farm Landowner to Conduct A King County Streamlined Agricultural Drainage Maintenance Project

To conduct a drainage maintenance project under King County's streamlined agricultural drainage assistance program (ADAP) that can include receiving a facilitated Hydraulic Project Approval from the Washington Department of Fish and Wildlife (WDFW), the farm landowner is required to do the following:

1. Develop a farm plan with the King Conservation District.

   A clearing and grading permit is not required from King County Department of Development and Environmental Services if 1) the maintenance work is done in accordance with an approved farm plan, 2) best management practices are employed, and 3) the work is inspected by either King County Department of Natural Resources and Parks, King Conservation District, or WDFW.

2. Contact the King County drainage maintenance program to discuss the drainage problem(s).
3. Allow a King County engineer to conduct an engineering survey to evaluate the drainage problem.
4. Discuss survey results with the King County engineer and agree on plan of action.
5. Fill out and submit a Joint Aquatic Resource Permit Application (JARPA) form to the WDFW (Olympia) for a Hydraulic Project Approval (HPA) permit for projects in modified waterways*. Provide plan of action and planting plan, and include prepared letter of coverage under ADAP programmatic State Environmental Policy Act (SEPA) review. [Examples of these will be made available to the farm landowner or their agent.]
6. Participate in a preconstruction meeting with King County to understand schedule, equipment needed, and required best management practices. If a contractor is hired, he/she must attend the preconstruction meeting.
7. Submit and sign agreement to cost-share revegetation plantings with King County.
8. Allow King County Roads Division to remove and relocate fish from the project site prior to and during construction activities.
9. Conduct drainage maintenance using best management practices per ADAP manual and preconstruction meeting with King County engineer.
10. Revegetate according to HPA, streamlined ADAP requirements, and cost-share agreement.
11. Allow site inspection by King County, WDFW, or the King Conservation District after the project is completed.
12. Maintain plants for at least three years.

NOTES:

*To comply with King County code, landowners will need to follow streamlined ADAP best management practices where salmonids are found, including in artificial waterways.

The streamlined ADAP can be applied on artificial and modified waterways in King County Agricultural Production Districts (APDs). Application may be made on a case-by-case basis for projects outside the APDs on land zoned agriculture.

Which Waterways Are Omitted from the Streamlined Agricultural Drainage Assistance Program

King County has developed a waterway classification system that uses the state's hydraulic code channel designations (natural, modified, and artificial) as well as known or expected level of use by salmon (high, moderate, low). These classifications are used to determine appropriate best management practices to maintain agricultural drainage.

However, some waterways may not be appropriate for the proposed streamlined Agricultural Drainage Assistance Program (ADAP). This does not necessarily prohibit farmers from applying to conduct drainage maintenance. Rather, such projects may need a grading permit and/or would need to be performed on an individual basis and might require additional or different best management practices (BMPs) as well as possibly additional mitigation.

Below are criteria and rationale for determining which waterways are not eligible for King County's streamlined agricultural drainage assistance program. These were developed by King County and agreed to by Washington Department of Fish and Wildlife as guidelines to determine whether projects are eligible for a facilitated Hydraulic Project Approval (HPA).

- **20 cubic feet per second (cfs) or higher mean annual flow** – this is the cut-off under the Shoreline Management Act; such waterways likely have too high flow in summer to follow the streamlined ADAP bypass BMPs. These are also the waterways most likely to have more than rare or infrequent use by Endangered Species Act-listed Chinook. Examples: Harris Creek, Cherry Creek, Griffin Creek, Patterson Creek, Newaukum Creek, Coal Creek, and Boise Creek.

- **Classified as natural in King County's waterway classification system** – such waterways have high ecological value and may require BMPs other than dredging as well as additional mitigation. Examples: Harris Creek, East Fork Patterson Creek, and Patterson Creek.

- **Waterways having fish-construction-window flows higher than can be handled by one 4-inch pump** will need more pumping capacity and will fall outside streamlined ADAP and require individual permits. Example: Lower reaches of Tuck Creek.

Note about waterways that have different classifications for different segments: Where a single waterway has different classifications for different segments, the streamlined ADAP may be used in the modified segments, while the natural segments may require individual attention and possibly additional BMPs. Examples: Ames Creek, Cherry Creek, Sikes Lake Creek, Mill Creek, Mullen Slough, and North Fork Newaukum Creek.

Pre-Construction Vegetation Removal Best Management Practices

SURVEYING

In order to perform a survey of a proposed project, vegetation may have to be removed or trimmed. This can generally be done using hand tools to have little impact to the system. Surveying requires access to the channel at least every 500 feet to survey cross sections, every 100 feet for centerline profile shots, and access to any points of interest that should be documented (culverts, beaver dams, obstructions, etc.).

For reed canary grass-choked channels, no vegetation removal is generally necessary. The survey equipment can shoot over the top of the vegetation.

For channels that have blackberries covering the banks, access points need to be cut into the vegetation. Access for cross sections must allow access from one side of the channel and extend at least to the high water mark on the opposite bank. Access for centerline points must allow access from one side of the channel and extend to the center of the channel.

For channels that have a mixture of vegetation, the access requirements are the same as for a blackberry-lined channel.

Best Management Practices (BMPs) for Vegetation Removal to Be Able to Survey

For all means of vegetation removal, minimize removal of and damage to native vegetation. Native vegetation should be retained. Native vegetation larger than 3 inches diameter at breast height (dbh) shall not be removed.

For hand removal of vegetation (e.g., machete), no additional BMPs are required.

For removal by hand-held mechanical means (e.g., weedeater), do not operate the equipment below the water surface.

For mechanical removal (e.g., by heavy equipment), vegetation removal shall not disturb dirt on the bank or the slope or in the water, and shall avoid and minimize removal of native vegetation to the maximum extent possible.

The survey corridor for each cross section shall not exceed 5 feet in width. Access points for centerline shots shall not exceed 5 feet in width and shall extend only to the toe of the opposite bank.

FISH RELOCATION

In order to properly remove fish from a construction area, de-fishers must have access to the water column. Different types of fish relocation require different types of vegetation removal. For example, trapping needs "holes" of open water to place the traps but electrofishing needs room for at least two people to be in the channel with no vegetation on the banks that will hinder movement of the electrofishing unit. Vegetation removal BMPs will be tailored to channel characteristics. In addition to the actual fish relocation needs, there must be a 2-3 foot wide section at the upstream end of the project and at the downstream end of the project to install fish

block nets. The area cleared for the nets must allow the nets to span the entire wetted channel width and extend to the bottom of the channel.

BMPs for Vegetation Removal to Conduct Fish Relocation

The following practices are the minimum requirements for site preparation for fish relocation. However, if more cost effective or time efficient, all vegetation that needs to be removed for construction and planting, excepting native vegetation, can be removed at one time. In all cases, vegetation removal shall not disturb dirt on the bank or the slope or in the water, and shall avoid and minimize removal of native vegetation to the maximum extent possible. Conditions that may favor removal of all non-native vegetation include avoiding duplication of effort for the contractor and avoiding excessive costs of having to rent equipment twice to remove vegetation for defishing and again for construction.

Reed Canary Grass

If reed canary grass has not filled the entire channel and there is room for de-fishers to walk up the middle of the channel (2.5 feet wide), access points into the channel will be cleared every 100 feet, no more than 5 feet in width.

If reed canary grass has filled the entire channel, the grass needs to be removed from the channel to create a 2.5 foot wide clear area to facilitate fish removal. To remove the reed canary grass, mowing equipment shall not be operated below the water surface, shall not disturb dirt on the bank or the slope, and shall avoid and minimize removal of native vegetation to the maximum extent possible. If the waterway is dry during mowing, the mowing equipment shall also not disturb the bed of the waterway.

For hand removal of reed canary grass, the grass will be removed from the channel and placed above the ordinary high water mark for later disposal.

For mechanical removal by heavy machinery, a thumbed bucket or rock picker shall be used. Vegetation shall be grabbed above the sediment level and lifted straight up and placed above the ordinary high water mark for later removal. After removal from the bottom of the channel, vegetation shall be removed from the waterway as quickly as possible and shall not be shaken above flowing water. Work from upstream to downstream.

Blackberries

For channels where the waterway is fairly clear of vegetation but access is restricted by blackberries, the blackberries shall be removed from one side of the channel and cleared from the other side of the channel to the point that they will not hang into or over the water. The blackberries shall be removed without entering the water or disturbing the dirt.

For hand removal, cleared vegetation shall be placed above the ordinary high water mark for later disposal.

For both hand-held and heavy-equipment mechanical removal, the machine shall not be operated below the water surface. A net or other collection system shall be placed downstream to collect

material that falls in the channel. All collected material shall be placed above the ordinary high water mark for later disposal.

Knotweed

Reed canary grass is considerably more common in King County Agricultural Production Districts than knotweed. However, in case there may be knotweed present, the following steps will be taken. During the initial survey, county staff will try to note whether knotweed is present and notify the farmer accordingly. If knotweed is present, special precautions must be taken. The farmer will need to contact King County Noxious Weeds Program for removal BMPs: http://your.kingcounty.gov/dnrp/library/water-and-land/weeds/BMPs/Knotweed-Control.pdf. These will likely include following Washington Department of Fish and Wildlife (WDFW) requirements in a pamphlet Hydraulic Project Approval (HPA) and meeting King County requirements of hand or light mechanical removal according to BMPs approved by the Noxious Weed Board.

Native Vegetation

For channels where reed canary grass or blackberry is not the predominant plant species, reasonable efforts shall be made to preserve as much native vegetation as possible. Desirable and native trees and shrubs shall be identified and marked prior to vegetation removal.* Where possible, access points shall be cut through the vegetation to the bottom of the channel, then hand removal and hand-held mechanical removal shall take place from the channel. If hand removal or hand-held mechanical removal is not feasible, heavy-equipment mechanical removal should utilize the longest reach boom available to reduce disturbance of the bank vegetation. Mechanical removal shall not take place below the water surface. A net or other collection system shall be placed downstream to collect material that falls in the channel. All collected material shall be placed above the ordinary high water mark for later disposal.

Herbicides

Where property owners wish to use herbicides for vegetation removal, regardless of the type of vegetation to be removed, a licensed herbicide applicator shall apply the herbicides in accordance with current herbicide application requirements. Dead vegetation shall be removed from the channel and placed above the ordinary high water mark for disposal. Herbicides must be applied far enough in advance for them to work and for the vegetation to be removed prior to defishing. As required in state statute, the Aquatic Plant and Algae Management General Permit must be applied for at least 60 days in advance of use to remove vegetation plants from the water or where chemicals could enter the water. In addition, if the herbicides could enter the water, a National Pollution Discharge Elimination System (NPDES) project permit will be required from the WA Department of Ecology. Check the WA Department of Ecology website http://www.ecy.wa.gov/programs/wq/pesticides/final_pesticide_permits/aquatic_plants/permitdocs/permit021611.pdf for latest information on permit requirements, deadlines, and herbicide application timing. A licensed applicator should know this information or how to find it to be sure to allow sufficient time to obtain permits, apply herbicides, and remove vegetation prior to defishing.

* Note: King County has asked and will discuss with the King Conservation District whether they could help identify and mark native vegetation as part of helping the farmer design a planting plan.

Removing and Relocating Fish from ADAP Project Sites

As noted in an earlier attachment, King County has developed a waterway classification system that uses the state's hydraulic code channel designations (natural, modified, and artificial) as well as known or expected level of use by salmon (high, moderate, low). Fish relocation techniques and requirements will vary according to the waterway classification. King County Roads Services Division staff who are qualified according to NOAA guidelines will lead fish relocation activities for ADAP projects consistent with training and protocols they follow under the Endangered Species Act section 4(d) exemption for road maintenance. Note: The state does not require a Hydraulic Project Approval (HPA) in artificial waterways; however, to comply with King County code, landowners will need to follow these protocols where salmonids are found.

1. For waterways classified as artificial low, qualified King County Roads Division staff will set overnight traps to determine whether salmon and other fish are in the waterway and possible abundance:
   a. If no fish are trapped, qualified King County Roads Division staff will use additional information (i.e., visual detection of fish that may not have been susceptible to trap capture and assessment of water flow and quality) and their best professional judgment to determine whether to conduct additional fish relocation.
   b. If fish are trapped, the protocol under #2 below shall be followed.
   c. In addition, if the farmer or contractor sees fish during construction, they shall stop the project and call qualified King County Roads Division staff to conduct fish relocation. There will be no penalty to the farmer for this, and doing so will allow drainage maintenance to occur with minimal harm to fish.
   d. The waterway classification will be revised if appropriate based on the fish relocation data.

2. For waterways classified as artificial moderate, modified low, and modified moderate, qualified King County Roads Division staff will set overnight traps to relocate caught fish outside of the project area. Qualified King County Roads Division staff will then perform at least one pass using other fish relocation methods (electrofishing, seine netting, etc.) and may use other county staff or non-county technicians who are trained in fish relocation to assist.

3. For moderate and artificial waterways classified as high, qualified King County Roads Division staff will conduct fish relocation according to training and protocols they follow under the Endangered Species Act section 4(d) exemption for road maintenance.

4. Qualified King County Roads Division staff will be on-site during dewatering to relocate any fish that may not have been captured and moved earlier.

5. Projects in natural waterways (i.e., those not straightened or modified) are not normally included in the streamlined ADAP.

NOTE: NOAA is the National Oceanic and Atmospheric Administration, in which the National Marine Fisheries Service is the agency that oversees salmonid listings under the Endangered Species Act.

Construction Best Management Practices

FISH WINDOW FOR CONSTRUCTION ACTIVITIES

- Standard fish window is July 1 – September 30.
- If Chinook are present, then the fish window is July 1 – September 1 or 15, depending on the waterway. Chinook show up early in September in waterways lower in the systems.
- Non-fish-bearing stream work window is June 15 – September 30.

GENERAL BEST MANAGEMENT PRACTICES (BMPs)

Construction BMPs will be dependent on whether there is enough water flowing in the waterway to reasonably support fish. If water is flowing in sufficient quantity and quality to support fish, then a bypass system will be used and the project will begin at the upstream end of the project and proceed down the channel. If water is not present in sufficient quantity and quality to support fish, then the project will start from the downstream end and proceed upstream with sediment control BMPs at the downstream end of the project. The goal of the BMPs is to minimize or eliminate the discharge of sediment or fill in waterways and/or wetlands.

The following BMPs apply to all projects:

Sediment shall not be excavated deeper than the historic bottom of the channel as determined by a change in the color of the material in the bottom of the channel, a change in consistency in the material in the bottom of the channel, or other means determined by the ADAP engineer.

Side slopes of the channel shall not be changed except to preserve the ditch from future failure or decline and where the capacity of the channel is controlled by a downstream section of channel or culvert. Where side slopes are reshaped, their final slope shall not exceed 2h:1v.

Projects may proceed from downstream to upstream or upstream to downstream. For projects that move upstream, a sediment control measure shall be installed at the downstream end of the project and 100 feet upstream from the end of the project. The channel between the sediment control measures shall remain untouched until the end of the project when it will be the last section to be cleaned. For projects that move downstream, a sediment control measure shall be installed at the downstream end of that day's work and 100 feet downstream, leaving the channel between sediment control measures untouched. The sediment control measures shall be moved downstream at the beginning of the next construction segment.

Turbidity measurements[1] shall be made upstream of the project before the start of construction each day and recorded on the Water Quality Monitoring Data Sheet. The upstream turbidity measurement shall be the baseline measurement. Turbidity shall also be measured at least 15 minutes after the start of construction at a point at least 100 feet downstream from the most downstream sediment control measure but not more than 1000 feet downstream. If the turbidity measurement after construction starts does not exceed state water quality standards, construction can proceed and the turbidity shall be measured hourly on the first day of construction. Current state water quality standards are defined as not to exceed the baseline turbidity measurement by

[1] King County will review valid methods to measure turbidity with the landowner or contractor prior to start of construction.

more than 5 Nepholemetric Turbidity Units (NTU) for baseline turbidity measurements below 50 NTU and to not exceed the baseline turbidity measurements by more than 10 percent for baseline turbidity measurements above 50 NTU. If any turbidity measurement exceeds state water quality standards, construction shall stop and existing sediments control BMPs shall be modified or additional sediment control BMPs shall be added to the project. After alterations or additions of sediment control BMPs are completed, construction can proceed and another turbidity measurement will be taken at least 15 minutes after construction has recommenced.

On subsequent construction days, if there have been no exceedence of water quality standards, then turbidity measurements shall be taken three times during the day -- at least 15 minutes after the start of construction, midway through the day, and within an hour of the end of the day. If any turbidity measurement exceeds water quality standards, work shall stop, existing sediment control BMPs shall be modified or additional sediment control BMPs shall be added to the project, and turbidity measurements shall be taken hourly for the rest of the day. If three successive turbidity measurements exceed water quality standards, work shall stop and the contractor shall contact the ADAP engineer for guidance.

Whenever water is pumped into the downstream channel, energy dissipation measures shall be in place to minimize erosion and re-suspension of sediment at the outfall. Common energy dissipation measures are to pump onto a sheet of plastic extending across the entire channel or pumping into a large bucket or container placed on its side with the opening pointing upstream and allowing water to overflow the container.

Spoils may be spread in the adjoining fields in a single lift no higher than six inches. Spoils shall be placed in active production areas (crop areas or pasture areas). If no active production areas are available, spoils can be placed on site outside of wetlands. If spreading the spoils in the adjoining field is not feasible, the spoils shall be removed from the site and disposed of at an approved disposal site. If spoils are disposed of offsite, a construction entrance equivalent to that detailed in the King County Surface Water Design Manual, or equivalent measures, shall be installed to prevent material from being tracked onto the public road.

BYPASS BMPs

The bypass system generally consists of two coffer dams (steel plates are commonly used) and two pumps (the bypass pump and the dirty water pump). The installation sequence for a bypass is as follows:

1) Setup up the bypass pump and start pumping.
2) Install the first coffer dam just upstream of the discharge point for the bypass pump.
3) Install the second coffer dam just downstream of the bypass pump intake.
4) Setup the dirty water pump and start pumping the water in the channel between the coffer dams into the adjoining fields at a location where it cannot flow back into the channel prior to having the suspended sediments removed.
5) Defish the channel between the coffer dams as the water level drops.
6) Begin sediment removal.

During bypass installation, operation, or removal, the downstream channel must always have water flowing in it. The channel cannot be allowed to dry out or have such a small amount of water flowing as to harm fish that were not removed.

BYPASS REMOVAL

When the sediment between the coffer dams is removed and the project is being shut down for the day, the bypass system shall be removed or the bypass pump will be operated continuously until construction starts again the next day. The sequence for bypass removal is as follows:

1) Start bypass removal by slowly removing the upstream coffer dam.
2) Reduce the capacity of the bypass pump or cycle its operation to allow the cleaned channel to fill with water.
3) Continue to operate the bypass pump until the water upstream from the downstream coffer dam is clear. The dirty water pump can speed this process by pumping dirty water into the adjoining fields.
4) When the water at the remaining coffer dam is as clean as the water flowing into the cleaned ditch, slowly remove the remaining coffer dam and turn the pumps off.

BYPASS LEAPFROGGING

When the sediment between the coffer dams is removed, if the project will continue that day, the bypass will be moved downstream by leapfrogging one coffer dam over the other. The sequence for moving the bypass is as follows:

1) Slowly remove the upstream coffer dam.
2) Reduce the capacity of the bypass pump or cycle its operation to allow the cleaned channel to fill with water.
3) Continue to operate the bypass pump until the water upstream from the downstream coffer dam is clear. The dirty water pump can speed this process by pumping dirty water into the adjoining fields.
4) When the water upstream of the coffer dam is clear move the discharge of the dirty water pump into the channel just downstream of the coffer dam.
5) Move the bypass pump down to the remaining coffer dam and start pumping from above the coffer dam to the end of the next construction segment.
6) When the bypass pump is setup and operating again, turn off the dirty water pump.
7) Install the downstream coffer dam upstream from the bypass pump discharge point.
8) Setup the dirty water pump and start pumping the water in the channel between the coffer dams into the adjoining fields at a location where it cannot flow back into the channel prior to having the suspended sediments removed.
9) Relocate fish (according to ADAP fish relocation protocols) from the channel between the coffer dams as the water level drops.
10) Begin sediment removal.

NON-BYPASS BMPs

When there is not enough water flowing in the waterway to reasonably support fish, construction can proceed without a bypass. The sequence for construction without a bypass is as follows:

1) Install approved sediment control measures downstream of the end of the project if possible or within the last 100 feet of channel. Approved sediment control measures include silt fences, coir logs, culvert obstruction, or silt dam.
2) Leave the lowest 100 feet of channel undisturbed and begin the project working from downstream to upstream.
3) If groundwater starts to enter the cleaned channel and causes turbidity measurements to be higher than state water quality standards, add additional sediment control measures in the cleaned section of the channel. As noted in the earlier section on general BMPs, current state water quality standards are to not exceed the baseline turbidity measurement by more than 5 NTU for baseline (pre-construction) turbidity measurements below 50 NTU and to not exceed the baseline turbidity measurements by more than 10 percent for baseline turbidity measurements above 50 NTU.
4) If water starts to enter the channel from field tiles, follow the procedures for groundwater entering the channel or temporarily plug the field tiles.
5) Continue sediment removal to the upstream end of the project.
6) Move to the downstream end of the project and clean the last 100 feet of starting at the downstream end and working upstream.
7) If any water is flowing in the channel after sediment removal, allow channel to flow for at least 24 hours with sediment control measures in place.
8) Remove accumulated sediment from in front of sediment control measures.
9) If sediment is still moving in the channel, repeat steps 7 and 8.
10) Remove sediment control measures.

Beavers and Agricultural Drainage

Although not based on empirical data, anecdotal evidence suggests that beaver populations in King County have been rising since the early 2000s. Currently no public agency is responsible for removing beavers that are impacting private property.

In general, King County encourages property owners to find ways to live with beavers rather than removing them. Beaver dams create habitat for many animals and plants and provide essential habitat for juvenile salmon, particularly coho. In addition, beaver ponds collect and slowly release stormwater and are a natural means of flood control and groundwater recharge. In many situations, it may make more sense to accommodate beavers and their dams rather than attempt to remove them. Property owners can minimize beavers' impacts by using beaver deceivers or flow levelers to regulate water levels.

King County does not consider trapping to be a long-term solution to beaver problems. If beavers are removed from preferred habitat, it is usually just a matter of time before another beaver moves in. However, if property owners choose removal for their method of control, they need to hire a licensed trapper to perform the removal. Landowners can contact the local office of the Washington Department of Fish and Wildlife (WDFW) to find licensed trappers in their area. If beavers are removed from an area, their dams can be notched according to BMPs below to lower water levels to prevent unacceptable flooding while maintaining beneficial fish and wildlife habitat.

In some cases when beaver dams cause unacceptable flooding to agricultural fields, dam removal may be necessary. For effective removal of beaver dams, follow the BMPs below.

General Best Management Practices (BMPs)

- These beaver dam removal BMPs apply only to beaver dams that have been in place for one year or less. An individual Hydraulic Project Approval (HPA) outside the streamlined ADAP is needed for removing older beaver dams.
- These beaver dam removal BMPs apply only to hand removal of beaver dams. Hand tools such as saws may be used but no mechanized equipment.
- These beaver dam removal BMPs should only be implemented in low-flow periods of the year so gradual removal of the dam does not cause peak flow rates above the capacity of the downstream conveyance system.
- The time window when dam removal can occur is based on waterway classification. Dams needing removal outside the work window require prior contact with the WDFW Area Habitat Biologist and King County Department of Development and Environmental Services (DDES). Dams removed outside the work window should also be performed according to these BMPs.
- Prior to lowering any part of the dam and creating turbulence or velocity in the water, remove as much dirt and sediment from the upstream face of the dam as possible.
- Begin dam removal by creating a two-foot wide by six-inch to one-foot deep notch in the dam, depending on the size of the dam. Wait for water level behind dam to fall to the bottom of the notch before continuing.

- After water level has dropped to the bottom of the notch, deepen the notch another foot. While the water level is dropping to the new level of the notch, remove the top foot of the dam.
- Because of the way beaver dams are built with sticks intertwining with each other, removal of only one foot is difficult. The goal, however, is to only remove that portion of the dam that is above the upstream water surface.
- Repeat above sequence until the dam is removed to the original stream bed.
- The sound of running water and the velocity of water trigger a beaver's damming instincts. Remove a wide enough section of dam so water does not accelerate as it passed through the removed section.
- A good tool to remove a beaver dam is a potato fork that has three or four tines.
- Material removed from the dam should not be placed in the water. Material should be placed on the bank above the high water mark or removed from the area.
- Removal of existing riparian vegetation should be minimized.
- Wait for the water to drain and the land behind the dam to dry out before removing material from the formerly submerged areas. Use sediment control BMPs as needed.
- When removing multiple beaver dams, start with the most upstream dam first to utilize the sediment control benefits of the downstream dams.
- If beavers are not removed prior to dam removal, it is typical for the beaver to rebuild the dam within a day or two. It may take several cycles of removal and rebuilding before the beaver does not rebuild the dam and then it is typical for the beaver to just move upstream or downstream to a new location to build a dam.

Culvert Replacement

Past ADAP projects have shown that sometimes replacing an undersized or damaged culvert is an integral part of the solution.

Culvert replacement best management practices (BMPs) apply to projects in the ADAP. Culvert replacement projects that do not go through the ADAP would require all otherwise applicable federal, state, and local permits.

Culvert replacement would only be allowed if there is no water flowing in the ditch or if a bypass system is in place.

New culvert would be limited in length to that of the existing culvert. Projects that want to extend the length of the culvert would be required to get an individual permit.

Culvert size will be determined using the current Washington Department of Fish and Wildlife (WDFW) Road Culvert Sizing Manual available at http://wdfw.wa.gov/publications/00049/wdfw00049.pdf .

Culverts will be installed according to WDFW guidelines and ADAP construction BMPs.

Post-Construction Erosion Control Best Management Practices

Post-construction erosion control best management practices (BMPs) are needed to reduce the amount of sediment that flows into the recently cleaned channel and to reduce the movement of loose material within the channel. Use the following BMPs on ADAP projects:

1) Minimize the area of disturbed soil over the course of the project. Undisturbed areas can reduce the cost of site stabilization and potentially revegetation.
2) Leave a sediment barrier in place at the downstream end of the channel for at least 24 hours after the reintroduction of water into the channel. Sediment barriers can be silt fences, coir logs, sediment dams, and/or short sections of the channel that have not yet been dredged.
3) Remove sediment collected upstream of the sediment barrier prior to removing the barrier.
4) Re-shape side slopes to eliminate vertical sides.
5) Spread grass seed on all exposed areas from the water surface to the top of the channel. If exposed areas beyond the top of the channel can flow into the channel, spread grass seed on the exposed areas or grade them to slope away from channel. Follow supplier's recommendations for application rate, rolling, and watering requirements.
6) Place half an inch to an inch of straw, mulch, or similar biodegradable product over grass seed from the water surface to the top of the channel. If installation occurs before September 1, the straw or mulch covering above the jute fabric is not needed but may still be included to reduce irrigation needs to establish grass seed germination and establishment.
7) Place jute fabric over the straw starting at the water surface and stake or staple to ground according to manufacturer's requirements. Jute fabric shall extend a minimum of three feet up the slope from the water surface or to the top of the channel whichever is less. If grass seed is not spread before October 1, extend jute fabric to the top of the channel with the higher row of jute fabric overlapping on top of the lower row by one foot.
8) Alternatively, a commercially available erosion control blanket or mat may be used in place of the straw and jute fabric for the lower three feet of the channel or top of the channel if installed after October 1.
9) For fields that are subject to flooding, extend the jute fabric or erosion control blanket to the top of the slope for all low areas in the banks where water will flow back into the channel as flood waters recede.
10) Alternatively, all exposed areas above the high water mark can be hydroseeded with no additional jute fabric or straw/mulch required.
11) Inspect erosion control measures after significant rainfall. If erosion control measures are not preventing erosion and the eroded material is entering the channel, repair/replace the existing erosion control measures and/or implement additional erosion control BMPs.

Revegetation Best Management Practices

Primary Goals of Revegetation

- To protect the stream bank against erosion, over both the short and long term
- To reduce the need for drainage maintenance in the future
- To prevent the invasion of noxious and invasive weeds
- To provide shade to reduce regrowth of weeds and reed canary grass in the channel
- To reduce heating of the waterway
- To filter sediment, dissipate overland flow, and increase infiltration away from the waterway
- To replace cover and food sources for fish.

Additional Goals

- To develop the riparian area into an integral part of the farm ecosystem
- To maximize limited resources by prioritizing revegetation requirements according to the waterway classification system
- To minimize on-site impacts by using established best management practices (BMPs) during construction
- To encourage farmers, whether voluntarily or through grant funding, to plant more functional native tree and shrub buffers than required through the streamlined ADAP on waterways that are high watershed priority for salmon habitat and water quality improvements.

Objectives for Revegetation

The following objectives would be used to meet the goals stated above:

- Eighty percent of the plantings survive after three years (as required under state law)
- The over-hanging canopy covers 80 percent of the waterway after three to five years.[1]

General Best Management Practices (BMPs)

Banks are generally revegetated after waterway maintenance activities, particularly if the bank vegetation has been removed. If there is no streamside vegetation, planting the bank is often the most cost-effective stabilization technique and will also help limit the regrowth of reed canary grass while creating better fish habitat. Plant roots help to hold the bank material together. Grass does not typically root deep enough to provide much stabilization, while native trees and shrubs typically will.

However, trees and shrubs take time to produce enough root growth to stabilize and protect the bank. Until the woody material becomes established, seeding grass (as described in the post-construction erosion control BMPs) will provide faster cover. Note that grass can be very competitive with the woody species, so it needs to be controlled in the area around the planted shrubs or trees since woody vegetation provides stronger bank protection against slumping. To improve establishment of plantings and reduce maintenance costs, the use of weed fabrics is

[1] Landowners are not expected to measure the overhanging canopy; rather, government agencies would measure when assessing the agricultural drainage maintenance program.

recommended prior to planting. In some cases, it may be necessary to use interim non-plant protection measures, such as biodegradable or synthetic geotextiles.

To obtain cost-shared funding from King County for revegetation, a planting plan is required that shows where and what type of plants will be planted along the waterway after construction has been completed. Examples of planting plans are available from King County. The King Conservation District may be able to provide advice on what to plant. Information on native plants is also available at http://green.kingcounty.gov/gonative and http://www.kingcounty.gov/sites/environment/stewardship/nw-yard-and-garden/native-plant-resources-nw.aspx.

Two possible methods of revegetation are live staking and container or bare root planting.

BMPs for Live Staking

Cuttings from several woody plants are often readily available and easy to install. This is referred to as 'live staking.' Live staking is used in many bio-engineering practices to stabilize soil and the banks of the waterway. The best time for harvesting and stake installation is the late fall or early spring. Get professional advice when considering planting at other times.

Practices

- Generally, willow species, red osier dogwood, and cottonwood are all capable of re-growing from stakes
- Install between October 15th and March 15th (the earlier the better within this timeframe)
- The lowest row of stakes should be placed as close as practical to the ordinary high water mark—not at the top of the bank
- Plantings in each row should be generally 3 feet apart
- Live stakes also work well when combined with other erosion control BMPs (described in the post-construction BMPs) such as jute fabric
- The stake should be no smaller than the diameter of a thumb or index finger, 0.5-1.5 inches, and at least 4 feet long
- If planting in reed canary grass, choose longer stakes, 5 to 6 feet long, in order for them to be able to outgrow the grass
- Be sure to protect the plant material from drying out between the harvesting and planting by placing bundles of stakes in the waterway and assuring they are secured so that they don't float away
- Try to plant the stakes within 24 hours of taking cutting and keep moist until installed
- Soaking cuttings 24 to 72 hours before planting has been shown to increase plant survival rates
- Spacing will depend on the plant type and eventual size of the plant
- Cut the bottom of the cutting at a 45° angle and always plant the angled end down
- Push the stake in by hand or tap it in gently with a soft mallet until about 2 feet or at least 1/3 of the stake (preferably ½) is below the ground
- To prevent damage to the cutting, a probe should be used to create a pilot hole, and is essential if the soil is very hard.
    - The pilot hole should be slightly smaller than the diameter of the cutting to ensure good soil-plant contact

- If the hole is larger than the cutting, pour a slurry of water and native soil into the hole with the cutting
- In all cases, tap the soil around the base of the planted cutting with your boot to collapse any air pockets near the cutting
- Irrigate after planting and throughout the first 1-3 dry seasons if possible
- It may be helpful to install grow tubes on the stakes for more rapid growth and to protect from wildlife.

BMPs for Planting of Container or Rooted Stock

Container-grown and bare root stock can be purchased from nurseries or transplanted from areas away from the slope. Pre-rooted plant material can offer a faster but more expensive solution to some slope stabilization projects than live staking. It is often used when rapid root establishment is required or where cuttings of desired species do not easily root.

Practices

- Planting is best October 15-March 15, with the optimal period in October 15-November 30.
- For a diagram of how to plant, see http://www.soundnativeplants.com/PDF/Planting%20diagram.PDF
- The row of plants closest to the waterway should be placed as close as practical to the ordinary high water mark—not at the top of the bank
- Plantings in each row should be generally 3 feet apart
- Containers should be at least 9 cubic inches in volume and 8 inches in depth (1 gallon pot).
  1. Take the plant out of its pot or burlap to view its root size. Keep the roots wet.
  2. Dig a saucer-shaped hole 2-3 times the width of the root mass, and about as deep. Fill hole with water and let drain.
  3. Build a mound of soil at the bottom of the hole.
  4. Loosen bound roots and shake off excess potting soil (not into the planting hole).
  5. Gently spread the roots evenly over the soil mound. The roots should not circle in the hole.
  6. Place the plant so the root flare (where the roots join the stem) is at the soil surface.
  7. Replace soil into the hole so it fills the space between the roots.
  8. Water generously and add more soil to fill the hole up to the root flare.
  9. Create a soil berm around the planting hole to retain moisture.
- The plants should be monitored and irrigated until the root system is well-established, up to three years depending on how dry the summers are that follow the project.

Specific BMPs by Waterway Classification

Revegetation requirements are prioritized according to the waterway classification system. Waterways that are expected to have higher numbers of salmon during the project construction window have higher requirements for revegetation to maximize limited resources to benefit fish habitat and water quality. Conversely, waterways that are expected to have no or low numbers of salmon during the project construction window have lower or no requirements for revegetation. When the drainage project is conducted, if actual incidence of fish is found to differ from the designated waterway class, revegetation requirements will be adjusted accordingly, and the waterway will be reclassified for future reference.

Natural waterways will not be covered under the streamlined ADAP; farmers should work directly with the Washington Department of Fish and Wildlife (WDFW) on drainage projects in these waterways. A King County grading permit will be required.

Below is a standardized practice to address the objectives for revegetation. In all cases, the first row should be planted as close as practical to the ordinary high water mark to create over-hanging canopy that will shade the waterway as quickly as possible. In addition, fast-growing native trees and shrubs are necessary to achieve the objective of 80 percent canopy cover within three to five years. Over-planting may help ensure survivability. Examples of the three plant groups referred to in the matrix below can be found in a table that follows.

Farmers may choose to request an alternate planting proposal from the matrix below; however, if the King County templates are not used, it may take more time to obtain the Hydraulic Project Approval (HPA) permit from WDFW and approval of the cost-share agreement. For example, if more slower growing plants are chosen, then additional interim maintenance will be necessary to keep the reed canary grass and other invasive species from returning before the plantings provide sufficient shade to inhibit their return.

Planting additional rows of native trees and shrubs is encouraged (but not required) to achieve the ADAP revegetation goals.

Standardized Plantings by Waterway Class to Address Revegetation Goals and Objectives

Waterway Class	*High*	*Moderate*	*Low*
Natural	Not applicable (N/A)	N/A	N/A
Modified	3 rows of native trees/shrubs on each side of the waterway: • At least 60% from Group 1 in row close to ordinary high water mark, of which at least half (30% of total) are the fastest growing (such as willow); remainder from Group 1 or 2 • 2nd row from any of the groups as long as no more than 5% comes from Group 3	2 rows of native trees/shrubs on each side of the waterway: • At least 60% from Group 1 in row close to ordinary high water mark, of which at least half (30% of total) are the fastest growing (such as willow); remainder from Group 1 or 2 • 2nd row from any of the groups as long as no more than 5% comes from Group 3	2 rows of native trees/ shrubs on each side of the waterway: • At least 60% from Group 1, of which at least half (30% of total) are the fastest growing (such as willow); remainder from Group 1 or 2 • 2nd row from any of the groups
Artificial	2 rows of native trees/shrubs on each side of the waterway: • At least 60% from Group 1 in row close to ordinary high water line, of which at least half (30% of total) are the fastest growing (such as willow); remainder from Group 1 or 2	1 row of native trees/shrubs on each side of the waterway: • At least 60% from Group 1 in row close to ordinary high water line, of which at least half (30% of total) are the fastest growing (such as willow); remainder from Group 1 or 2	No plantings required

	• 2nd row from any of the groups as long as no more than 5% comes from Group 3		

Specific trees and shrubs may be added to or deleted from the lists below over time as more is learned about their success rates on King County waterways in achieving the goals and objectives of revegetation. At least 60 percent of the row closest to the ordinary high water line should be from Group 1, the fastest growing and tallest plants, in order to quickly provide shade to limit regrowth of reed canary grass and replace lost habitat. Plants from the third group should be limited to 5 percent of what is planted because they are the shortest and slowest growing. Ornamental or hybrid species should not be used.

Examples of Trees/Shrubs for Waterway Revegetation	
Common Name	***Scientific Name***
Group 1 *(At least 60% of total plants in row close to ordinary high water line; at least half [30% of total] of these should be the fastest growing, such as willow)*	
Red osier dogwood	*Cornus stolonifera*
Sitka willow	*Salix sitchensis*
Pacific willow	*Salix lasiandra*
Scouler willow	*Salix scouleriana*
Black cottonwood	*Populus trichocarpa*
Red alder	*Alnus rubra*
Group 2	
Black twinberry	*Lonicera involucrata*
Pacific ninebark	*Physocarpus capitatus*
Red elderberry	*Sambucus racemosa*
Beaked hazelnut	*Corylus cornata var. californica*
Vine maple	*Acer circinatum*
Oregon ash	*Fraxinus latifolia*
Sitka spruce	*Picea sitchensis*
Bitter cherry	*Prunus emarginata*
Pacific crabapple	*Malus fusca*
Group 3 *(Limited to 5% of total plants)*	
Salmonberry	*Rubus spectabilis*
Nootka rose	*Rosa nutkana*
Snowberry	*Symphoricarpos albus*

Voluntary Plantings and Links to Larger Landscape-scale Habitat Improvements
Farmers are encouraged to work with non-profit stewardship groups, the King Conservation District, and others to conduct voluntary waterway plantings that will improve fish habitat and water quality, particularly on land that may be too wet to be productive for farming. Some of these efforts can be linked to watershed- and basin-scale priorities of salmon habitat plans and federal and state grant programs for possible funding assistance. We look forward to linking

these programs to ADAP as a means of achieving increased benefits beyond the minimum required plantings and to obtain assistance for more drainage projects to keep King County farm lands productive.

Additional Actions Related to the King County Agricultural Drainage Assistance Program

Project-Specific Actions

Inspection of ADAP projects

King County Water and Land Resources Division (KC WLRD) expects to conduct inspections on projects implemented in 2011 and possibly 2012 as follows:

- First day of construction, start of setting up bypass and implementing construction BMPs
- Removal of bypass
- Goal is to be on-site during about 20 percent of the project
- County staff inspecting will be certified as a Certified Erosion and Sediment Control Lead (CESCL).

Beyond 2012, inspection may change pending availability of funding.

Enforcement

Assumption is that regulatory agencies will continue level of enforcement as currently implemented, i.e., conducting random spot checks and responding to complaints.

Monitoring

Assumption is that monitoring will continue according to current Hydraulic Permit Approval (HPA) requirements, i.e., that 80 percent of plantings survive up to 3 years. KC WLRD expects to require some documentation during the first year if the farmer has signed an agreement with King County for cost-shared funding of plantings. Monitoring would likely also be required for projects that receive grant funding.

Future or Ongoing Actions

Annual updates to waterway classification system

KC WLRD will develop a protocol to update the waterway classification system annually to incorporate new data and information learned during project implementation, from documented sources, and from other appropriate methods.

Manual

KC WLRD is working with WSU Extension on a manual of ADAP best management practices (BMPs) that will adhere to what is agreed to in discussions with regulatory agencies. The format is expected to be step-by-step descriptions in text, diagrams, and photos. The manual will be made available on the web and in hard copy.

Training

KC WLRD expects to develop and offer training on ADAP BMPs for contractors. KC WLRD will educate farmers about streamlined ADAP through opportunities such as annual open houses, and other meetings and venues. In addition, KC drainage engineering staff will meet individually with project proponents (farmers and/or their contractors) to explain engineering survey results, recommend drainage maintenance options, and discuss how to implement BMPs.

Annual meeting on upcoming ADAP projects

Once the streamlined ADAP is in place for a few years and farmers and their contractors become more familiar with it, KC WLRD expects the number of requests to implement ADAP projects

will increase. When a critical mass is reached, it may be useful to conduct a meeting of prospective project proponents, KC WLRD, the King Conservation District, and regulatory agencies to discuss implementation and possible larger landscape-scale coordination of efforts, including revegetation.