

RECOMMENDED POLICIES AND ACTIONS FOR THE MIDDLE GREEN RIVER SUBWATERSHED

The majority of

existing Chinook salmon spawning in WRIA 9 occurs in the

Middle Green River

Subwatershed. Juvenile Chinook salmon and other

salmonids also use Middle

Green River habitats extensively for

rearing. The subwatershed extends from

Howard Hanson Dam (river mile 64.5) to river mile

32 just east of Auburn. It has two major tributaries –

Soos Creek and Newaukum Creek – and numerous

smaller tributary streams. Much of the area is

unincorporated, but it also includes the growing

cities of Covington, Maple Valley, Black Diamond,

and Enumclaw. A significant portion of Kent also

lies within the Soos Creek basin. The major land

uses in the subwatershed are residential, forestry,

and agriculture. Two Agricultural Production

Districts are in the Middle Green River

Subwatershed and the largest concentration of

dairy farms in King County is on the Enumclaw

Plateau. Several state and local parks abut the river,

preserving mostly forested lands, and providing

popular recreational opportunities for boaters,

anglers, picnickers, and campers. The two upstream

dams, revetments/training levees, flow diversions,

and residential and agricultural land uses have had

adverse effects on salmon habitat in the Middle

Green. These changes include flow regime altera-

tions, reduced sediment recruitment, loss of side

channels and wetlands, loss of floodplain connec-

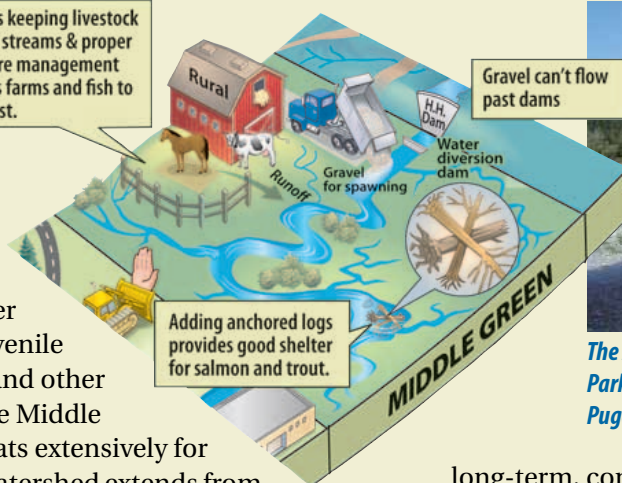
tivity, degraded riparian areas, loss of large woody

debris, and barriers to fish passage. (See Chapter 4

for a more detailed description of conditions in the Middle Green River Subwatershed.)

Some of the actions listed in this subsection are part of the Middle Green River “Blueprint,” which is a planning effort by King County Water and Land Resources Division with the goal of developing a

Fences keeping livestock out of streams & proper manure management allows farms and fish to co-exist.



Gravel can't flow past dams

Adding anchored logs provides good shelter for salmon and trout.



The Middle Green River, shown here at O'Grady Park, is one of the best salmon river reaches in the Puget Sound. August 2003 photo.

long-term, comprehensive approach to recovering ecosystem processes in the section of the Green River that extends from the outlet of the Green River Gorge (river mile 46) downstream to about the eastern city limits of Auburn (river mile 32).

The following portfolio of policies and actions is designed to:

- Protect and restore habitat that provides refugia (particularly side channels, off channels, and tributary access) and habitat complexity (particularly pools) for juvenile salmon over a range of flow conditions and at a variety of locations (e.g., mainstem channel edge, river bends, and tributary mouths);
- Enhance natural sediment recruitment (particularly spawning gravels) by reconnecting sediment sources to the river;
- Protect and restore spawning and rearing habitat in lower Newaukum and Soos Creeks; and
- Maintain regional groundwater recharge and base flows to the mainstem Green River.

For the first ten years of the Plan, the priority for implementation of projects will be first to implement projects on public lands, secondly to implement projects on lands within the Rural and Urban Growth Areas, and third to implement projects on lands within the Agricultural Production District (see “Approach to Habitat Project Implementation in the Agricultural Production Districts of WRIA 9” in Chapter 8).

POLICIES



PROGRAMS



PROJECTS





Policy MG1:

For habitat restoration projects calling for the addition of large woody debris, particularly in the mainstem, placement of wood should be done in a way that minimizes any risk to river users such as boaters and swimmers.



Program M-1: *Enumclaw Plateau Dairy Nutrient Management Program*

Protect water quality in agricultural areas by creating markets for manure. This would be done by facilitating the export of manure from dairy farms and off the Enumclaw Plateau, to prevent excess nutrient runoff into waterways, and to improve nutrient management on farms.

The program could rely on a biogas digester, composting system, or other technologies. A biogas digester would capture energy that could be marketed as green power. Either process could produce an end product that could be used for fertilizer and would have lower risk of nutrient runoff than unprocessed manure applied to fields. In addition to benefits to water quality, this program could benefit farmers who are currently constrained by the amount of land needed to manage manure. Other benefits include converting waste to a resource and the potential to reduce emissions of greenhouse gases.

This program would be run by the King County Department of Natural Resources and Parks in conjunction with King Conservation District, Natural Resource Conservation Service, King County Solid Waste Division, and private dairy farmers. The King County Agriculture Program has done a feasibility study and (at the time of publication) is soliciting proposals for this program. Dairy farmers in the Enumclaw Plateau have expressed interest in this program.

LINKAGES

Conservation Hypotheses Addressed

- *Protecting water quality (All-1)*

Habitat Management Strategies

- *Protect water quality from further modification where State standards are being met or exceeded*
- *Restore degraded water quality conditions to meet or exceed State standards*

Insert Figure 7-2 Here



Program M-2: **Middle Green River Gravel Supplementation Program**

The U.S. Army Corps of Engineers, Tacoma Public Utilities, King County, and other local governments should continue gravel supplementation in the Middle Green River on an annual basis or in conjunction with specific projects.

In 2003, the U.S. Army Corps of Engineers and Tacoma Public Utilities initiated a program of annual gravel placement in the channel reach immediately below the Tacoma Headworks, which is located at river mile 61. The quantity of gravel placed is 3,900 cubic yards annually for a duration of 50 years. In addition, approximately 8,000 cubic yards of gravel supplementation on an annual basis is planned as part of Howard Hanson Dam operations for the next 50 years under the terms of the Additional Water Storage Project. The quantity of gravel placed would be approximately equal to the bedload deposited annually in the Howard Hanson reservoir (approximately 12,000 cubic yards per year). In addition, it is recommended that 272,000 tons of gravel be distributed through the zone of existing sediment depletion. This gravel would be

LINKAGES

Conservation Hypotheses Addressed

- *Protecting and restoring natural sediment recruitment (MG-3)*

Habitat Management Strategies

- *Substitute sediment recruitment through gravel supplementation*

intended to make up the deficit resulting from four decades of operation of Howard Hanson Dam. Gravel would be placed between the Tacoma Headworks and Flaming Geyser Bridge (river mile 43). Finally, gravel placement is recommended in conjunction with the proposed Middle Green “Blueprint” projects between river miles 45 and 32 (Projects MG-3, MG-4, MG-12, and MG-18).



Program M-3: **Middle Green River Large Woody Debris Supplementation Program**

The U.S. Army Corps of Engineers, Tacoma Public Utilities, King County, and other local governments should continue large woody debris placement or supplementation in the Middle Green River on an annual basis or in conjunction with specific projects.

This Howard Hanson Dam operations project would place large wood in the mainstem river to provide the basis for formation of specific logjam types. Large woody debris would be placed at approximately 73 sites within the mainstem Green River between the Tacoma Headworks and the city of Auburn. In addition, bar apex log jams or engineered log jams are planned as a part of the Middle Green “Blueprint” projects between river miles 45 and 32 (Projects MG-3, MG-4, MG-12, and MG-18).

LINKAGES

Conservation Hypotheses Addressed

- *Protecting and creating/restoring habitat that provides refuge, habitat complexity (MG-1)*

Habitat Management Strategies

- *Substitute loss of slow water areas by creating new off-channel habitats and/or placement of large woody debris along banklines*
- *Substitute ecological processes with habitat features*



Program M-4: Side Channel Reconnection Program

Initiate a side channel rehabilitation/reconnection program that concentrates efforts from river miles 45 to 32. Side channels and other off-channel habitat would be created or enhanced by excavation in the currently functioning floodplain. Side channels would be excavated at strategic locations listed below. Because these efforts would occur over a long period of time and would require monitoring and maintenance, a programmatic approach is necessary.

Projects in the short term (first 10 years) could include:

- River mile 40.4 (right bank);
- River mile 38.6 (left bank);
- River mile 37.7 (left bank); and
- River miles 34.6 to 34.0 (across from Porter Levee) (right bank).

LINKAGES

Conservation Hypotheses Addressed

- *Protecting and creating/restoring habitat that provides refuge, habitat complexity (MG-1)*

Habitat Management Strategies

- *Rehabilitate hydrologic processes to create off-channel habitat and maintain hydrologic connection to mainstem channel*



Project MG-1:

Middle Green River Side Channel Restoration/Rehabilitation at RM 60

Project Description

This project has two goals: 1) Restore natural ecosystem processes of sediment supply and transport to side channels (and the mainstem) at two locations, and 2) Restore natural ecosystem processes of large woody debris recruitment, transport, and structure in the side channels (and mainstem) in the vicinity of river mile 60.

This project would construct pool/riffle habitat sequences within the designated side channels to increase channel complexity, create salmon spawning habitat, and enhance rearing habitat for juvenile salmonids. Lateral and bar apex jams would be constructed.

Additional components of this project include:

- Underplanting the riparian corridor with native conifers;
- Constructing a large logjam at the head of one of the side channels;
- Altering flow regulation at Howard Hanson Dam to provide suitable flows in side channels during the salmon spawning and incubation seasons;
- Constructing supply bars of spawning-sized gravel at the upstream ends of side channels; and
- Additions of large woody debris to be transported to and within side channels by existing river hydraulics until conifer underplantings mature and provide a source of naturally recruited large woody debris.

This is a Green/Duwamish Ecosystem Restoration Project.

Opportunities and Constraints

- This project depends on voluntary participation by property owners through easement, sale, or other incentives.



Project area showing the lack of suitable spawning gravel. Photo courtesy of U.S. Army Corps of Engineers.

LINKAGES

Conservation Hypotheses Addressed

- Protecting and improving riparian vegetation (All-2)
- Protecting and improving access to tributaries (All-3)
- Protecting and creating/restoring habitat that provides refuge, habitat complexity (MG-1)

Habitat Management Strategies

- Rehabilitate riparian areas by establishing suitable native vegetation along banks of the mainstem and tributaries
- Substitute loss of slow water areas by creating new off-channel habitats and/or placement of large woody debris along banklines
- Substitute habitat features to create pools and collect sediment
- Substitute ecological processes with habitat features



Project MG-2:
Brunner Slough (Kanaskat North)
Off-Channel Habitat Construction near RM 58 (Right Bank)



Project area showing the existing swale. Photo courtesy of U.S. Army Corps of Engineers.

LINKAGES

Conservation Hypotheses Addressed

- Protecting and creating/restoring habitat that provides refuge, habitat complexity (MG-1)

Habitat Management Strategies

- Rehabilitate hydrologic processes to create off-channel habitat and maintain hydrologic connection to mainstem channel
- Substitute loss of slow water areas by creating new off-channel habitats and/or placement of large woody debris along banklines
- Substitute habitat features (e.g., large woody debris) to create pools and habitat complexity

Project Description

This project would excavate a 3,600 linear foot channel in a currently existing swale to create a new channel approximately 10 feet wide. At the upper end of the channel, ground water would be daylighted and gravel would be placed to construct a french drain for the ground water to drain through to the channel. An 18-inch layer of gravel would be placed on the bottom of the channel throughout its length to encourage spawning. Large tree trunks with root wads would be placed throughout the channel but especially at the mouth to provide cover. Areas disturbed during construction would have riparian plantings. The rest of the site is covered in native trees so no addition planting would be needed.

The goal of this project is to provide off-channel winter and summer rearing and refuge habitat.

This is a Green/Duwamish Ecosystem Restoration Project.

Opportunities and Constraints

- Much of the property is in public ownership.



Project MG-3:

Flaming Geyser Floodplain Reconnection, Side Channel Connection, and Habitat Restoration Between RM 45.1 and RM 44.3 (Right Bank)

Project Description

This project would excavate a portion of the floodplain to reconnect the floodplain with the river between river miles 45.1 and 44.3, right bank. The project would excavate a connection between the wall-base side channel inlet and the mainstem and construct logjams to reinstate channel migration. This project also includes gravel addition, eradication of Japanese knotweed and other invasive species, and planting riparian vegetation.

This project is part of the Middle Green River “Blueprint” proposed by King County and is a Green/Duwamish Ecosystem Restoration Project.

Opportunities and Constraints

- The property is in public ownership.
- Because of high use of this reach by recreational boaters, logjams would need to be engineered and placed in a manner that minimizes risks to boater safety.
- Projects MG-3 and MG-4 may be combined for cost savings and efficiency.
- Proper sequencing of projects MG-3 and MG-4 would need to be considered.



Flaming Geyser State Park showing a portion of the project area on right (north) bank of the Green River. August 2004 photo.

LINKAGES

Conservation Hypotheses Addressed

- *Protecting and improving riparian vegetation (All-2) Allowing natural disturbance type flows in unconstrained river channels (All-4)*
- *Protecting and creating/restoring habitat that provides refuge, habitat complexity (MG-1)*
- *Protecting and restoring natural sediment recruitment (MG-3)*

Habitat Management Strategies

- *Restore areas with some functioning off-channel habitat; restore lateral channel migration to create off-channel habitat*
- *Restore lateral channel migration to recruit sediments*
- *Restore natural cycle of succession and plant diversity of riparian areas*
- *Substitute sediment recruitment through gravel and large woody debris supplementation*



Project MG-4:

Flaming Geyser Side Channel Construction, Floodplain Reconnection, near RM 44 (Right Bank)



Flaming Geyser State Park in the general vicinity of the project area. May 2005 photo.

LINKAGES

Conservation Hypotheses Addressed

- *Protecting and improving riparian vegetation (All-2)*
- *Allowing natural disturbance type flows in unconstrained river channels (All-4)*
- *Protecting and creating/restoring habitat that provides refuge, habitat complexity (MG-1)*
- *Protecting and restoring natural sediment recruitment (MG-3)*

Habitat Management Strategies

- *Restore areas with some functioning off-channel habitat; restore lateral channel migration to create off-channel habitat*
- *Restore lateral channel migration to recruit sediments*
- *Restore natural cycle of succession and plant diversity of riparian areas*
- *Substitute sediment recruitment through gravel and large woody debris supplementation*

Project Description

This project would construct a side channel to increase the amount of off-channel habitat near river mile 44, right bank. The project would excavate portions of the surrounding floodplain to connect side channels with floodplain and mainstem and construct logjams to reinstate channel migration.

This project also includes gravel addition, eradication of Japanese knotweed and other invasive species, and planting riparian vegetation.

This project is part of the Middle Green River “Blueprint” proposed by King County.

Opportunities and Constraints

- The property is in public ownership.
- Because of high use of this reach by recreational boaters, logjams would need to be engineered and placed in a manner that minimizes risks to boater safety.
- Projects MG-3 and MG-4 may be combined for cost savings and efficiency.
- Proper sequencing of projects MG-3 and MG-4 would need to be considered.



Project MG-5: **Flaming Geyser Slide Sediment Management at RM 43 (Left Bank)**

Project Description

The project goal is to eliminate a large source of fine sediment from this reach of the river, improving downstream spawning success and juvenile habitat for salmonids. How this project would be carried out has not yet been determined.

The slide, located just downstream of Flaming Geyser Park at river mile 43 on the south side (left bank) of the Green River, has recently contributed significant quantities of fine sediments to the river.

Currently the slide has a face that is several thousand feet long and approximately 300 feet high and in any given year can place thousands of cubic yards of fine material in the Green River. The slide activity, releasing fine sediments that choke the spawning gravel and significantly reduce the flow of water and oxygen getting to the salmon eggs, may have a negative impact on Chinook spawning and rearing.

This is a Green/Duwamish Ecosystem Restoration Project.

Opportunities and Constraints

- The slide is large and potential solutions will be complex.



*Aerial view of landslide. Green River is at top of picture.
Photo courtesy of U.S. Army Corps of Engineers*

LINKAGES



Conservation Hypotheses Addressed

- *Protecting water quality (All-1)*



Habitat Management Strategies

- *Restore degraded water quality conditions*



Project MG-6:

Newaukum Creek Restoration Between Creek Miles 0.0 and 14.3 (Both Banks)



Newaukum Creek showing lack of mature native trees and shrubs. Photo courtesy of U.S. Army Corps of Engineers.

LINKAGES

Conservation Hypotheses Addressed

- *Protecting water quality (All-1)*
- *Protecting and improving riparian vegetation (All-2)*
- *Protecting and creating/restoring habitat that provides refuge, habitat complexity (MG-1)*
- *Preserving and restoring spawning and rearing habitat in lower Newaukum and Soos Creeks (MG-4)*

Habitat Management Strategies

- *Rehabilitate riparian areas by establishing suitable native vegetation along banks of the mainstem and tributaries*
- *Substitute loss of slow water areas by creating new off-channel habitats and/or placement of large woody debris along banklines*
- *Substitute ecological processes with habitat features*

Project Description

The project goal is to restore process-based ecological functions that include wetland and riparian restoration on the Enumclaw Plateau. This project would improve riparian habitat with the following actions:

- Enhance and expand the degraded plateau wetlands adjacent to Newaukum Creek by constructing wetlands and removing invasive plants and re-planting with native vegetation, which will provide structural diversity for the wetlands and increase flow attenuation;
- Enhance and expand the riparian vegetation zone of the plateau section of Newaukum Creek to provide a strip of healthy riparian vegetation up to 200 feet wide;
- Protect stream buffer areas to exclude livestock through fencing; and
- Restore and create connections to off-channel wetland habitats for salmonids.

This is a Green/Duwamish Ecosystem Restoration Project.

Opportunities and Constraints

- This project depends on identifying suitable properties and landowners willing to participate in restoration projects.



Project MG-7: Big Spring Creek Restoration

Project Description

This project would re-locate a major section of Big Spring Creek (tributary to Newaukum Creek) from the current ditched system into a channel consistent with its historic route. The stream re-alignment will reduce pollution coming from road ditches and a dairy and connect the stream and wetland to improve off-channel rearing areas. Placement of large woody debris pieces will promote process formation and improve instream habitat complexity. The project will enhance riparian conditions by planting conifers and creating off-channel wetland connections to the stream, especially the pastured wetland to the south of Southeast 424th Street. The project also would fence areas adjacent to the stream to exclude livestock and protect riparian vegetation.

This is a Green/Duwamish Ecosystem Restoration Project.

Opportunities and Constraints

- This project depends on voluntary participation by property owners through easement, sale, or other incentives.



Big Spring Creek showing lack of mature native trees and shrubs. Photo courtesy of U.S. Army Corps of Engineers.

LINKAGES

🔗 Conservation Hypotheses Addressed

- Protecting water quality (All-1)
- Protecting and improving riparian vegetation (All-2)
- Protecting and creating/restoring habitat that provides refuge, habitat complexity (MG-1)

🔗 Habitat Management Strategies

- Rehabilitate riparian areas by establishing suitable native vegetation along banks of the mainstem and tributaries
- Substitute loss of slow water areas by creating new off-channel habitats and/or placement of large woody debris along banklines
- Substitute ecological processes with habitat features



Project MG-8:

Newaukum Creek Mouth Restoration Between Creek Miles 0.0 and 4.3 (Both Banks)



Newaukum Creek at the confluence with the Green River, just downstream of the project area. May 2005 photo.

LINKAGES

Conservation Hypotheses Addressed

- *Protecting and improving riparian vegetation (All-2)*
- *Protecting and creating/restoring habitat that provides refuge, habitat complexity (MG-1)*
- *Preserving and restoring spawning and rearing habitat in lower Newaukum and Soos Creeks (MG-4)*

Habitat Management Strategies

- *Restore riparian areas by establishing suitable native vegetation along banks of the mainstem and tributaries*
- *Restore stream processes to create better functioning spawning and rearing tributary habitat*

Project Description

This project has two components: 1) placing large woody debris and planting native trees along the lower 4.3 miles of the creek, and 2) reconfiguring the lower 1,800 feet of the creek near the mouth.

In the first component, large woody debris would be strategically placed along the length of this reach, with a goal of approximately 500 pieces of large woody debris per stream mile. Large woody debris would be sized to the stream, flows, and gradient. Within 200 feet of each bank, underplant conifer trees among existing deciduous trees to serve as a source for future large woody debris recruitment. Approximately 400 trees per acre would be planted. The project would control invasive species, especially Japanese knotweed (small infestations) along this reach.

In the second component, in the lower 1,800 feet of Newaukum Creek, an in-channel project would restore channel and floodplain conditions by restoring a historic meander, setting back a berm, and naturalizing the floodplain area to allow the creek to be more mobile, form deep pools, and help establish a variety of diverse habitats.

The project would also include the following:

- Reconnect an historical side channel (Plemmons Meanders) to Newaukum Creek and install large woody debris and boulder debris jams; and
- Place large woody debris into key positions in Newaukum Creek in a three mile stretch above the Whitney Hill Bridge stream crossing.

Opportunities and Constraints

- This reach is actively used by Chinook for spawning and rearing.
- This project depends on identifying suitable properties and landowners willing to participate in restoration.



Project MG-9: ***Lones Levee Removal near RM 38 (Right Bank)***

Project Description

The goal of this project is to restore natural channel migration processes, consistent with current flow regimes of the Green River, by removing Lones Levee at river mile 38, right bank. With the levee removal, the Green River would be allowed to re-occupy and reset old meander bends and channel migration zones, improving the diversity of habitat for salmonids and other species.

The project would be implemented through the following activities:

- Remove Lones Levee to match the existing ground elevations;
- Construct a setback revetment/levee on the terrace just above the old meander bend to protect private property from potential channel migration;
- Realign lower Burns Creek, if needed;
- Install engineered log jams and large woody debris near the upper end of the levee removal area and within the old meander bend/channel-migration zone; and
- Remove the existing access road that crosses the old meander bend.

This is a Green/Duwamish Ecosystem Restoration Project.

Opportunities and Constraints

- Remaining farm land behind the site would need to be protected from erosion.
- Easements for project construction currently exist for this property.



Lones Levee, looking downstream. Some large trees grow on the levee. Burns Creek flows in from right. September 2002 photo.

LINKAGES

Conservation Hypotheses Addressed

- *Protecting and improving riparian vegetation (All-2)*
- *Allowing natural disturbance type flows in unconstrained river channels (All-4)*
- *Preventing new bank/shoreline armoring and fill and removing existing armoring (All-6)*
- *Protecting and creating/restoring habitat that provides refuge, habitat complexity (MG-1)*
- *Protecting and restoring natural sediment recruitment (MG-3)*

Habitat Management Strategies

- *Restore lateral channel migration*
- *Restore stream processes to create better functioning spawning and rearing tributary habitat*
- *Restore natural cycle of succession and plant diversity of riparian areas*



Project MG-10: ***Burns Creek Rehabilitation at RM 38 (Right Bank)***

LINKAGES

Conservation Hypotheses Addressed

- *Protecting water quality (All-1)*
- *Protecting and improving riparian vegetation (All-2)*
- *Protecting and improving access to tributaries (All-3)*
- *Protecting and creating/restoring habitat that provides refuge, habitat complexity (MG-1)*

Habitat Management Strategies

- *Restore tributary access*
- *Rehabilitate riparian areas by establishing suitable native vegetation along banks of the mainstem and tributaries*
- *Substitute loss of slow water areas by creating new off-channel habitats and/or placement of large woody debris along banklines*

Project Description

The project goal is to enhance salmonid habitat in Burns Creek while reducing property damage associated with flooding and filling of the channel with fine sediments from an adjacent landslide.

The project would improve riparian vegetation, increase in-stream habitat complexity, provide additional riparian cover, and manage fine silt through the following actions:

- Planting native riparian vegetation;
- Installing large woody debris;
- Fencing to prevent livestock access to the creek and riparian areas;
- Removing invasive plant species; and
- Removing fine sediment.

At present, the creek, impacted by a slope failure (Bell Ravine), is deficient in habitat diversity, in-stream woody debris, riparian vegetation, and spawning gravels. Pools and spawning gravels have filled with sand and the dredging of these sediments to maintain driveways crossing the creek has taken place.

This is a Green/Duwamish Ecosystem Restoration Project.

Opportunities and Constraints

- This project depends on voluntary participation by property owners through easement, sale, or other incentives.
- Controls of the slide are unknown.



Project MG-11: ***Turley Levee Setback at RM 37 (Right Bank)***

Project Description

The goal of this project is to reconnect the floodplain area of the Green River allowing natural processes to be re-established including creation of side channel habitat.

This project would allow the river to re-establish access to over 1,300 feet of additional river edge and allow it to create additional side channel and main channel habitat at river mile 37, right bank. The project would add native vegetation and place large woody debris.

The project requires the construction of setback levees to protect the existing farmland and hard points to protect properties behind the site from erosion.

This is a Green/Duwamish Ecosystem Restoration Project.

Opportunities and Constraints

- Remaining farm land behind the site would need to be protected from erosion.
- This project depends on voluntary participation by property owners through easement, sale, or other incentives.

LINKAGES

🔗 Conservation Hypotheses Addressed

- *Protecting and improving riparian vegetation (All-2)*
- *Protecting and creating/restoring habitat that provides refuge, habitat complexity (MG-1)*

🔗 Habitat Management Strategies

- *Rehabilitate riparian areas by establishing suitable native vegetation along banks of the mainstem and tributaries*
- *Substitute loss of slow water areas by creating new off-channel habitats and/or placement of large woody debris along banklines*
- *Substitute ecological processes with habitat features*



Project MG-12:

Levee Setback to Reconnect Floodplain and Allow Channel Migration near RM 36-35.3 (Right Bank)



Project area shown in center of photo to left of river bend. SE Green Valley Road runs through center of photo. July 2004 photo.

LINKAGES

Conservation Hypotheses Addressed

- *Protecting and improving riparian vegetation (All-2)*
- *Allowing natural disturbance type flows in unconstrained river channels (All-4)*
- *Preventing new bank/shoreline armoring and fill and removing existing armoring (All-6)*
- *Protecting and creating/restoring habitat that provides refuge, habitat complexity (MG-1)*
- *Protecting and restoring natural sediment recruitment (MG-3)*
- *Maintaining regional groundwater recharge and base flows to the mainstem Green River (MG-5)*

Habitat Management Strategies

- *Restore areas with some functioning off-channel habitat; restore lateral channel migration to create off-channel habitat*
- *Restore lateral channel migration to recruit sediments*
- *Restore natural cycle of succession and plant diversity of riparian areas*

Project Description

This project would remove a levee to reconnect the floodplain and allow channel migration. A revetment would be constructed at the edge of the project area to protect against undesired erosion. The project would remove Japanese knotweed and revegetate riparian areas.

This project is part the Middle Green River “Blueprint” proposed by King County.

Opportunities and Constraints

- This project depends on voluntary participation by property owners through easement, sale, or other incentives.
- A portion of this project would occur on land enrolled in the Farmland Preservation Program and thus may be constrained.
- This project would need to ensure protection of adjacent property and road as part of the levee setback.



Project MG-13:
Hamakami Levee Breach at RM 36 (Right Bank)

Project Description

The goal of this project is to re-connect the floodplain of an existing forested wetland to the river, providing refuge and rearing for salmonid species.

This project would enhance the forested wetland by connecting it with inflow and outlet channels and providing off-channel habitat, which would significantly enhance fish usage of this site. Large woody debris placement in the channels and wetland may be phased following the stabilization of sediment input and the establishment of a coniferous riparian cover.

This is a Green/Duwamish Ecosystem Restoration Project.

Opportunities and Constraints

- This project depends on voluntary participation by property owners through easement, sale, or other incentives.

LINKAGES

🔗 Conservation Hypotheses Addressed

- *Protecting and improving riparian vegetation (All-2)*
- *Protecting and creating/restoring habitat that provides refuge, habitat complexity (MG-1)*

🔗 Habitat Management Strategies

- *Rehabilitate riparian areas by establishing suitable native vegetation along banks of the mainstem and tributaries*
- *Substitute loss of slow water areas by creating new off-channel habitats and/or placement of large woody debris along banklines*
- *Substitute ecological processes with habitat features*



Project MG-14:
Kaech Side Channel Rehabilitation at RM 35 (Right Bank)

LINKAGES

🔗 Conservation Hypotheses Addressed

- *Protecting water quality (All-1)*
- *Protecting and improving riparian vegetation (All-2)*
- *Protecting and creating/restoring habitat that provides refuge, habitat complexity (MG-1)*

🔗 Habitat Management Strategies

- *Rehabilitate riparian areas by establishing suitable native vegetation along banks of the mainstem and tributaries*
- *Substitute loss of slow water areas by creating new off-channel habitats and/or placement of large woody debris along banklines*
- *Substitute ecological processes with habitat features*

Project Description

The goal of this project is to re-habilitate natural processes by re-connecting side channel and wetland refuge and rearing habitat to the river.

This project would enhance the side channel corridor at river mile 35, right bank, by planting and fencing a native plant riparian area. The project would include a log and rock weir that would allow fish passage at all elevations and maintain a constant pond level.

This is a Green/Duwamish Ecosystem Restoration Project.

Opportunities and Constraints

- This project depends on voluntary participation by property owners through easement, sale, or other incentives.



Project MG-15:

Neely and Porter Levees Setback and Floodplain Reconnection Between RM 35.5 and 34.5 (Left Bank)

Project Description

This project would set back Neely and Porter Levees between river miles 35.5 and 34.5 (left bank) to reconnect the river to its floodplain and allow channel migration and the conduct of related restoration. This project would also include the addition of logjams and other large woody debris, removal of Japanese knotweed and other invasive species, and planting of riparian revegetation.

Benefits of the project include improved floodplain connection, better access to side channel habitat, and enhanced productivity and spatial structure for Chinook spawning and rearing.

This project is part of the Middle Green River “Blueprint” proposed by King County.

Opportunities and Constraints

- This project would need to ensure protection of the adjacent property and road as part of the levee setback.
- This project depends on voluntary participation by property owners through easement, sale, or other incentives.
- A portion of this project could occur on land enrolled in the Farmland Preservation Program, which could partially constrain the extent of project.
- Project involves replacing the Neely bridge with a wider span and lowering the elevation of terraces that constrain channel migration downstream of the bridge.

LINKAGES

🔗 Conservation Hypotheses Addressed

- *Protecting and improving riparian vegetation (All-2)*
- *Allowing natural disturbance type flows in unconstrained river channels (All-4)*
- *Preventing new bank/shoreline armoring and fill and removing existing armoring (All-6)*
- *Protecting and creating/restoring habitat that provides refuge, habitat complexity (MG-1)*

🔗 Habitat Management Strategies

- *Restore areas with some functioning off-channel habitat; restore lateral channel migration to create off-channel habitat*
- *Restore lateral channel migration to recruit sediments*
- *Restore natural cycle of succession and plant diversity of riparian areas*



Project MG-16: **Ray Creek Restoration at RM 34.2 (Right Bank)**



Middle Green River near the confluence with Ray Creek, which flows in from the right. May 2005 photo.

LINKAGES

Conservation Hypotheses Addressed

- Protecting water quality (All-1)
- Protecting and improving riparian vegetation (All-2)
- Protecting and improving access to tributaries (All-3)
- Protecting and creating/restoring habitat that provides refuge, habitat complexity (MG-1)

Habitat Management Strategies

- Restore tributary access
- Rehabilitate riparian areas by establishing suitable native vegetation along banks of the mainstem and tributaries
- Substitute ecological processes with habitat features
- Substitute loss of slow water areas by creating new off-channel habitats and/or placement of large woody debris along banklines

Project Description

This project would enhance the stream corridor throughout the entire length of Ray Creek with plantings of native vegetation, control of invasive plant species, fencing of livestock from riparian areas, creation and re-establishment of connections to off-channel habitats for salmonids, and removal of the fine sediments and pollutants from the stream. Ray Creek is a small tributary to the Green River.

These actions would reduce sediment impacts, improve water quality, and connect additional wetland habitat to the stream.

This is a Green/Duwamish Ecosystem Restoration Project.

Opportunities and Constraints

- This project depends on voluntary participation by property owners through easement, sale, or other incentives.



Project MG-17:

Porter Levee Setback and Floodplain Reconnection Near RM 34 (Left Bank)

Project Description

Remove the existing training levee and set back the levee to the toe of the Southeast Green River Valley Road. The river adjacent to the levee currently provides excellent spawning habitat for Chinook. The project site behind the breached training levee is routinely flooded in the spring and provides refuge from high flows for multiple species in an old slough that was recently reconnected to the river. The site also provides over-wintering habitat for juveniles.

This project would reconnect 45 acres of floodplain; large woody debris placement and riparian plantings could be part of the project.

This is a Green/Duwamish Ecosystem Restoration Project.

Opportunities and Constraints

- The property is in public ownership.



Porter Levee project showing the old slough that is periodically inundated. The training levee is behind the trees to the left. April 2000 photo.

LINKAGES

Conservation Hypotheses Addressed

- Protecting and improving riparian vegetation (All-2)
- Allowing natural disturbance type flows in unconstrained river channels (All-4)
- Preventing new bank/shoreline armoring and fill and removing existing armoring (All-6)
- Protecting and creating/restoring habitat that provides refuge, habitat complexity (MG-1)
- Protecting and restoring natural sediment recruitment (MG-3)

Habitat Management Strategies

- Restore lateral channel migration
- Restore stream processes to create better functioning spawning and rearing tributary habitat
- Restore natural cycle of succession and plant diversity of riparian areas



Project MG-18:

Setback and Removal of Fenster and Pautzke Levees to Reconnect the Floodplain and Allow Channel Migration near RM 32 (Left Bank)



Green River just upstream from Pautzke Levee showing major log jam. April 2004 photo.

LINKAGES

Conservation Hypotheses Addressed

- *Protecting and improving riparian vegetation (All-2)*
- *Allowing natural disturbance type flows in unconstrained river channels (All-4)*
- *Preventing new bank/shoreline armoring and fill and removing existing armoring (All-6)*
- *Protecting and creating/restoring habitat that provides refuge, habitat complexity (MG-1)*
- *Protecting and restoring natural sediment recruitment (MG-3)*

Habitat Management Strategies

- *Restore lateral channel migration*
- *Restore areas with some functioning off-channel habitat; restore lateral channel migration to create off-channel habitat*
- *Restore lateral channel migration to recruit sediments*
- *Restore natural cycle of succession and plant diversity of riparian areas*

Project Description

This project would remove levees, lower the elevation of terraces, and construct engineered logjams to reinstate floodplain connectivity and channel migration. The project would restore relic side-channels and reconnect them to the river and off-channel sloughs. The project also would remove Japanese knotweed and other invasives and revegetate riparian and floodplain areas with native plants.

This project is part the Middle Green River “Blueprint” proposed by King County and a Green/Duwamish Ecosystem Restoration Project.

Opportunities and Constraints

- The property affected by levee removal is publicly owned by King County and the City of Auburn.



Project MG-19:

Protection of Functioning Habitat along the Middle Green River Mainstem

Project Description

Seven locations in the Middle Green River Subwatershed were identified as priority areas to protect currently functioning habitat. These locations consist of multiple parcels of riverfront, streamfront, floodplain, and upland and tributary properties, and the areas range in size from 46 to over 200 acres.

Protection of these habitats could occur through acquisition, conservation easements, or through tax incentive programs. Alternative protection measures could include education and informational workshops for interested property owners.

The seven locations of high value habitat to be protected are:

- Kanaskat (river miles 60 to 58) parcels totaling 46 acres;
- Green River Gorge additions (river miles 55 to 45) riverfront parcels totaling 164 acres;
- Green River Natural Area additions (river miles 40 to 35) totaling 228 acres;
- Lower Newaukum Creek (creek miles 0 to 4) streamfront parcels totaling 200 acres;
- Middle Newaukum Creek (creek miles 4 to 8.5) streamfront/aquatic (wetland) parcels totaling 100 acres;
- Lower Soos Creek (creek miles 1 to 3) undeveloped floodplain properties totaling 44 acres; and
- Lower Green River Valley (river miles 35 to 32) floodplain and upland tributary property totaling 65 acres.

Opportunities and Constraints

- This project depends on voluntary participation by property owners through easement, sale, or other incentives.



Habitat protection efforts are intended to protect high quality riparian habitat like this shown here near Flaming Geyser State Park. May 2005 photo.

LINKAGES

Conservation Hypotheses Addressed

- Protecting and improving riparian vegetation (All-2)
- Preventing new bank/shoreline armoring and fill and removing existing armoring (All-6)
- Protecting and creating/restoring habitat that provides refuge, habitat complexity (MG-1)
- Protecting and restoring natural sediment recruitment (MG-3)
- Preserving and restoring spawning and rearing habitat in lower Newaukum and Soos Creeks (MG-4)

Maintaining regional groundwater recharge and base flows to the mainstem Green River (MG-5)

Habitat Management Strategies

- Protect areas with functioning mainstem, tributary, and off-channel habitats for spawning and rearing
- Protect areas where the river is exhibiting natural rates of channel migration and contains habitat complexity
- Protect areas where sediment recruitment are currently functioning
- Protect functioning riparian areas and plant diversity
- Protect cool clean water from surface and groundwater sources

