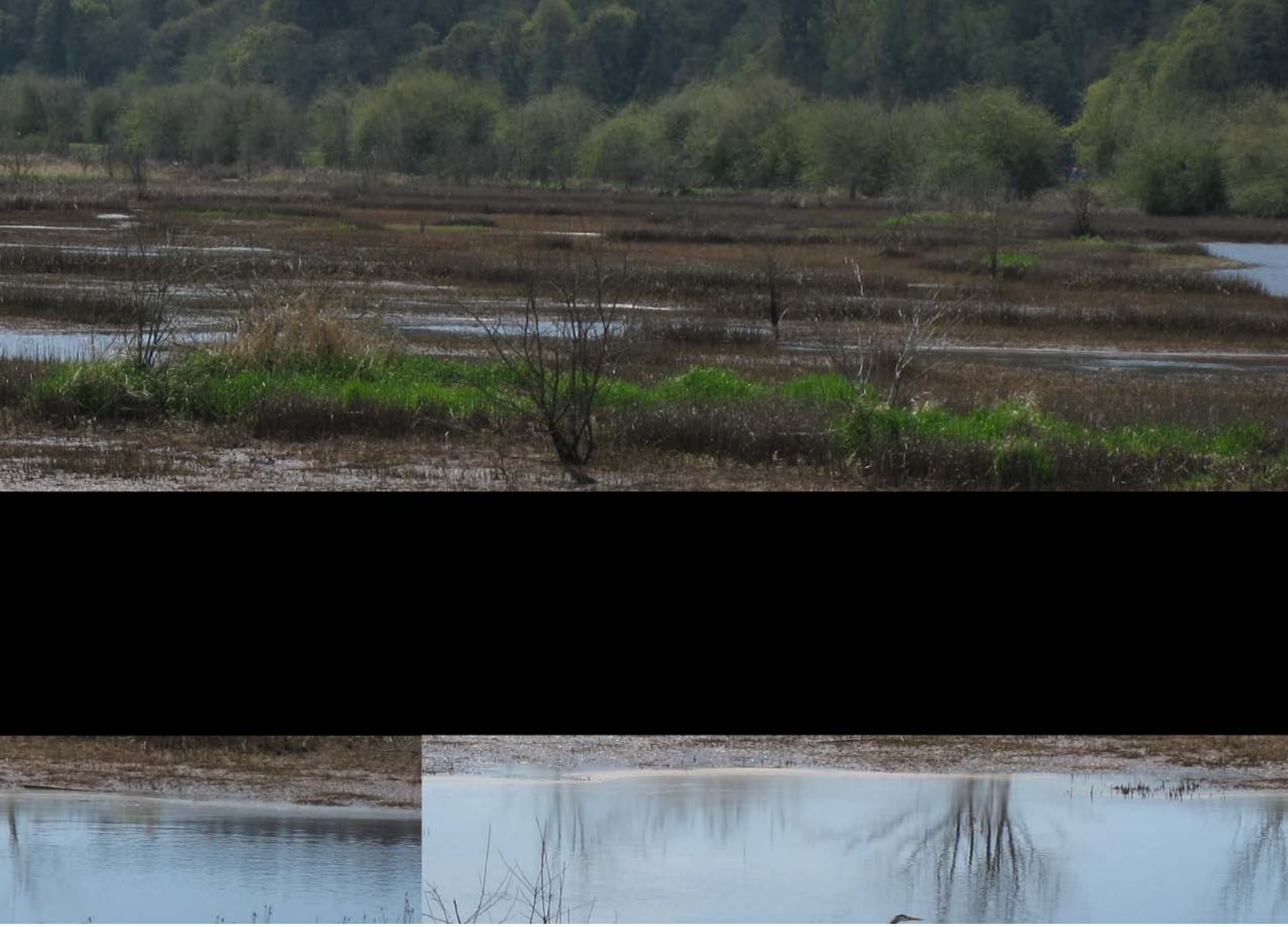


National Flood Insurance Program
Community Rating System

CRS Credit for Habitat Protection

2010

FEMA

A community interested in more information on obtaining flood insurance premium credits through the Community Rating System (CRS) should have the *CRS Application*. This and other publications on the CRS are available at no cost from

Flood Publications
NFIP/CRS
P.O. Box 501016
Indianapolis, IN 46250-1016
(317) 848-2898
Fax: (317) 848-3578
NFIPCRS@iso.com

They can also be viewed and downloaded from FEMA's CRS website, http://training.fema.gov/EMIWeb/CRS/index.htm

Contents

Acknowledgements

This guidance document was developed by Region X of the Federal Emergency Management Agency, as part of its continuing effort to improve floodplain management practices and assist communities in meeting the requirements of the Endangered Species Act.

It was prepared under the guidance of a special advisory committee that included representatives from:

- City of Auburn
- City of Carnation
- City of Everett
- Jefferson County
- King County
- City of Lacey
- Lummi Nation
- City of Monroe
- Pierce County
- San Juan County
- Snohomish County
- City of Tukwila
- Washington State Department of Ecology
- Whatcom County
- The National Marine Fisheries Service
- The Community Rating System Task Force Natural Functions Committee

This document was drafted by French & Associates, Ltd., Steilacoom; ESAAdolfson, Seattle; and PBS&J, Seattle; through an arrangement with the Insurance Services Office and the Community Rating System.

Introduction

The National Flood Insurance Program

The National Flood Insurance Program (NFIP) was created in 1968 as a way to offer an alternative to disaster assistance for properties subject to flood damage. In return for Federally supported flood insurance, local governments had to agree to regulate development in their floodplains in accordance with the Program's criteria. Since 1979, the program has been administered by the Federal Emergency Management Agency (FEMA).

The NFIP has proven very effective as a way to shift the cost of flood damage from taxpayers to insurance policy holders. It has also slowed the development in floodplains and set construction standards for development that is allowed.

As an insurance driven program, the NFIP is funded by insurance premiums, not tax dollars. The program is focused on protecting all new and substantially improved buildings. It sets minimum development standards that protect new buildings and, under the floodway concept, prevents development from substantially increasing flood damage on other properties. As a result, buildings in the floodplain that meet the NFIP standards suffer 80% less flood damage than buildings constructed before the requirements went into effect.

This Snoqualmie home was elevated according to the NFIP criteria and did fine during the 2006 flood.

One shortcoming of the minimum requirements of the NFIP is that they do not address many floodplain management concerns other than protecting buildings. For example, the NFIP rules would allow a developer to alter a channel, fill an area, and/or construct a levee if such projects do not adversely affect flood heights. However, it is possible that such projects could adversely affect habitat, water quality, and other natural functions of floodplains.

The Community Rating System

FEMA recognizes that due to its legal basis, the NFIP cannot mandate floodplain management practices that go beyond the scope of its purpose and authority. Because of this, FEMA has always stated that the NFIP development criteria are minimums and the NFIP regulations state

> Any community may exceed the minimum criteria under this Part by adopting more comprehensive flood plain management regulations… Therefore, any flood plain management regulations adopted by a State or a community which are more restrictive than the criteria set forth in this part *are encouraged and shall take precedence*. [44 CFR 60.1.d, italics added]

FEMA also recognizes that communities implementing higher regulatory standards and other activities that exceed the NFIP minimum criteria will have better floodplain management programs and fewer flood losses. FEMA created the Community Rating System (CRS) to provide an insurance premium benefit for those communities that do this.

The CRS is modeled on the fire rating system that has been used by the insurance industry for over 100 years − the better the community's program, the lower the insurance premiums. Both the fire and flood rating systems have 10 classes. Class 1 requires the most credit points and gives the largest premium reduction, up to 45% off a flood insurance policy's premium. Class 10 receives no premium reduction. Both programs have been shown to be an effective incentive to improve and maintain local fire and flood protection programs.

A community receives a CRS classification based upon the credit points it receives for its activities. It can undertake any mix of activities that reduce flood losses through better mapping, regulations, public information, flood damage reduction and/or flood warning and preparedness programs.

Currently there are 31 Washington communities in the CRS. They account for 47% of the NFIP policies in the State. For the most part, they are receiving credit for things that they consider good and appropriate practices to best protect their residents from flooding.

Auburn	5	Monroe	5
Bellevue	5	Mount Vernon	7
Burlington	6	North Bend	6
Centralia	5	Orting	6
Chehalis	6	Pierce County	3
Clark County	5	Renton	6
Ephrata	8	Skagit County	4
Everson	7	Snohomish County	5
Fife	5	Snoqualmie	5
Index	6	Sultan	7
Issaquah	5	Sumas	7
King County	2	Thurston County	5
La Conner	8	Wahkiakum County	8
Lewis County	7	Westport	6
Lower Elwha Ind. Reserv.	7	Whatcom County	6
		Yakima County	8

Washington CRS Communities and Their CRS Classes (as of 10/1/2009)

All but two Washington CRS communities require that new buildings must be built at least one foot higher than the minimum NFIP elevation. Nineteen of the 30 have higher protection standards for critical facilities, 25 regulate the amount of stormwater runoff that can leave new developments, and 29 receive credit for preserving parts of their floodplains as open space.

Many communities in Washington and around the country are receiving CRS credit for preserving natural areas from development and for regulations that are primarily aimed at protecting natural functions, but that have secondary flood protection benefits. For example, requiring construction sites to set up erosion control measures reduces water pollution, but it also keeps sediment from running into streams and reducing channels' flood carrying capacity.

The CRS provides an incentive to exceed the NFIP criteria, even if those criteria are required by a state or Federal law. For example, State law requires that "there shall be in effect in all counties and cities the state building code" (RCW 19.27.031). All Washington cities and counties in the CRS receive credit for adopting and enforcing the building code, even though it is already a legal requirement.

The Endangered Species Act

CRS recognition of going above and beyond the minimum requirements of the NFIP includes requirements from Federal agencies other than FEMA. The Endangered Species Act of 1973 (ESA) is one such example. The ESA was enacted to protect plants and animals that are threatened with extinction. Many of those plants and animals live or breed in rivers or the adjacent riparian areas that are found in floodplains. The National Marine Fisheries Service and the US Fish and Wildlife Service are charged with administering the ESA.

On September 22, 2008 the National Marine Fisheries Service issued a Biological Opinion that clarified the ESA requirements for implementing the NFIP as a result of formal consultation with FEMA under Section 7 of the ESA. The Opinion noted that by enforcing only the minimum NFIP requirements, development has been allowed to alter streams to such a degree that habitat needed by threatened salmon has been seriously impaired. A threat to salmon means a threat to the endangered killer whales that rely on salmon as a primary food source. Such development is in violation of the ESA.

This kind of development can be compliant with the minimum criteria of the NFIP, but may violate the Endangered Species Act by destroying protected habitat.

In response to the Biological Opinion, FEMA has prepared a new NFIP-ESA Model Ordinance that recommends regulatory provisions that allow communities to have one set of rules that meet the requirements of both the NFIP and the ESA. This model ordinance can be found at [www._____.

This Guide

This guidebook is designed for local officials and others who work with the NFIP and its floodplain construction standards, but may not be familiar with the Endangered Species Act and its requirements or the Community Rating System and its benefits. The next section is an introductory explanation of the types of habitat that are found in floodplains. Following that is a summary of how development adversely affects these habitats.

The balance of this guidebook reviews the many good floodplain management practices that can protect habitat and help reduce and prevent flood damage. Each section identifies where Community Rating System credit can be provided to communities that implement these practices.

Aquatic and Riparian Habitat

A "habitat" is a specific area or environment in which a particular type of plant or animal lives. Different species have developed over the years in different habitats and they cannot survive for long if their habitats are destroyed or significantly altered. While some species adapt to change and can live with human development, others cannot.

Salt and brackish waters and their adjacent floodplains host habitats that are vital to estuarine and marine animals, including fish, shellfish, waterfowl, and mammals. These habitats are dependent on the quality and temperature of the water, salinity levels, and the availability of food.

Freshwater floodplains have two major types of habitat that are not found anywhere else: aquatic and riparian habitats. Freshwater aquatic habitats include rivers, streams, ponds, lakes and reservoirs that are above the influence of tides and are relatively free of salt water.

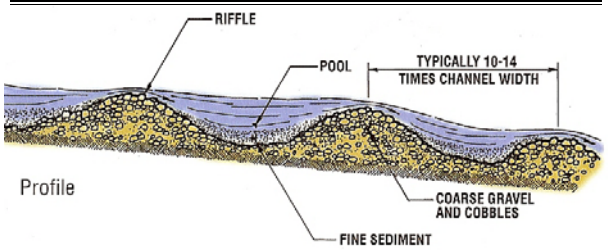
The quality of freshwater aquatic habitats is also dependent on the quality and temperature of the water, and availability of food sources. In addition, riverine habitat needs pools and riffles. These are, in turn, dependent on rock and woody debris that form the pools and riffles and the vegetation and woody debris that offer refuge for small animals and food for others.

A riparian habitat area is defined by the Washington Department of Fish and Wildlife as "the area adjacent to aquatic systems with flowing water (e.g., rivers, perennial or intermittent streams, seeps, springs) that contains elements of both aquatic and terrestrial ecosystems which mutually

"Floodplains may contain the only suitable environment for growth of some species of vegetation and for the breeding/spawning of many species of fish and wildlife. Riparian habitats are among the most important vegetative communities for western wildlife species." *(The Natural and Beneficial Functions of Floodplains, p. 2-7)*

This harbor seal is a Puget Sound resident whose marine habitat can be threatened by development.

Source: NOAA Photo Library



Pools and riffles

Washington riparian habitat

Source: Department of Ecology

influence each other." The Department also notes "The riparian habitat area encompasses the entire extent of vegetation adapted to wet conditions as well as adjacent upland plant communities that directly influence the stream system." The term "riparian habitat" is inter-changeable with the commonly used terms "riparian area," "riparian ecosystem," and "riparian corridor."

There is no clear line that separates salt water, freshwater, aquatic and riparian habitats because they are interdependent. Vegetation near and along stream banks slow and filter stormwater runoff that enters the stream. Streams carry fresh water to estuaries, replenishing the supply of brackish water. Riparian trees and bushes are dependent on the water provided by the stream. They, in turn, shade the pools and eventually become the woody debris that creates them. Their roots stabilize the streambanks, reducing erosion and sedimentation. The aquatic habitats nurture flora and fauna that are eaten by the residents of the riparian habitats and the insects and other wildlife that grow on land are eaten by the fish and frogs that live in the water, which are in turn eaten by waterfowl that nest on the land.

Habitat Conservation Area

All habitats are important to the plants and animals that live in them. However, some areas are more deserving of protection. The Federal government designates "critical habitat" as habitat important for threatened or endangered species.

In addition to areas designated for protection under Federal or State programs, the Washington State Growth Management Act (WAC 365-190-080) identifies "Fish and Wildlife Habitat Conservation Area." This includes habitats of local importance and other areas that deserve protection. The NFIP-ESA Model Ordinance uses the State's definition:

> Lands needed to maintain species in suitable habitats within their natural geographic distribution so that isolated subpopulations are not created. These areas are designated by the _____ *[name of community]* pursuant to the Washington State Growth Management Act (WAC 365-190-080).

Alteration of Habitat

Habitats change as rivers, shorelines, and floodplains change. The following alterations can have significant impacts on habitat:

- Relocating channels
- Destroying pools and riffles
- Disrupting the continuity of the habitat along a stream
- Removing natural debris and rock that form instream shelters
- Erecting dams or other barriers to flow and fish passage
- Constructing levees to prevent channel migration or seawalls to stop erosion
- Reducing stream flow

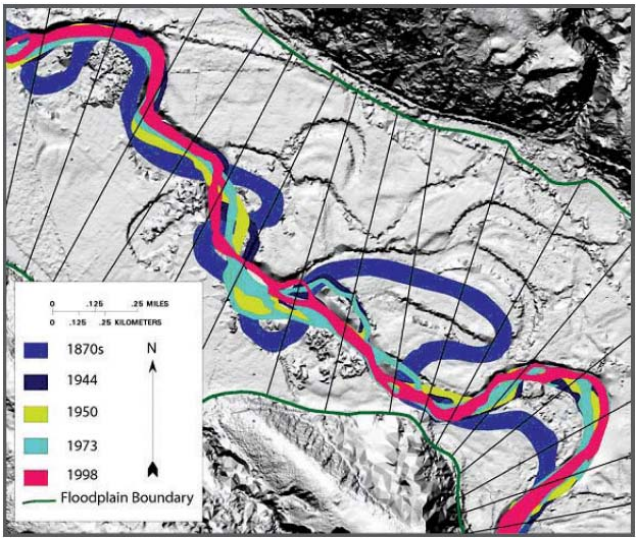
- Clearing banks or removing tree canopy
- Disturbing rooted plants on the banks
- Armoring banks and shorelines
- Increasing flow velocity
- Increasing sediment in the water

These changes can be caused by nature, such as a flood, or by people. While both forces can change habitat, there is a difference between natural and human caused alterations.

Natural Alteration

Rivers and streams build, erode, and modify the landscape. Floodplains are not static features, they are always changing (some changes are more obvious right after a flood). These changes are wrought by eroding of channel banks and bottoms by fast moving water and by depositing of rock, sediment, and debris by slower moving water. These materials come from runoff and from scouring of the banks, i.e., the riparian areas.

The results of these forces include new pools, sand bars, and undercut banks. The most impressive of these changes is channel migration, i.e., moving the channel to a new path.



Historical channel migration paths of the Quinault River
Source: *Living with the River*, p. 31

Even if some features are destroyed or moved, they usually reappear elsewhere and new habitat often emerges in the new location. Natural alterations of streams and riparian areas do not permanently destroy habitat, they just change its location as the forces of nature continue to work.

Human Alteration

Human activity, such as land development, can cause the alterations listed on the previous page. Here are some typical examples:

- Forestry has resulted in clear cut riparian areas, increased sedimentation, and reduced supplies of large woody debris needed for aquatic and riparian habitats.
- Farming causes a demand for levees and other flood control barriers to reduce flooding on productive fields. Runoff from farm fields carries sediment and chemicals into the streams.

- Roads and railroads obstruct natural drainage patterns, bridges can become dams at higher flows, and stormwater running off pavements contribute to water pollution.
- Urban development has cleared floodplains and resulted in calls for levees, dams, and channel straightening projects to protect homes and businesses.
- Shorelines and trees are cleared to gain access to the waterfront or to erect a levee, disturbing rooted plants on the banks.
- Dams are built for flood control, water storage, or power generation. These can reduce flows and upset seasonal flow conditions.
- Channels are relocated or straightened to increase their flood carrying capacity or to get them out of the way of development (see example to the right). Such projects destroy pools and riffles and remove debris and rock that form instream shelters, sometimes replacing a natural stream bottom with concrete.

Compare what humans did to the Puyallup River with the map of what rivers do naturally on the previous page.

- Urban development of the watershed brings impervious areas, such as rooftops and roads, and filling of wetlands and floodplains. The result is more rain water running off, fewer places to store it in, and, therefore, higher and faster flows in the channels. Another result is lower and warmer flows during the summer and early fall.
- Higher flows mean more bank erosion and scouring of streambeds.
- Urban runoff picks up sediment that is dropped in the pools and other areas of lower velocity. With the sediment comes pollutants, such as road oil and trash, that degrade water quality.
- Increased stormwater runoff means more water leaves the watershed instead of percolating into soils and recharging groundwater levels. With less groundwater, there are lower flows in streams during dry periods.
- Government regulations have often had counter productive impacts. For example, in order to remove a property from the NFIP's floodplain development regulations, property owners often fill riparian areas to raise the elevation of the ground above the regulatory flood elevation. This can kill the natural vegetation, reduce floodplain storage capacity (which increases velocities), and often change stream alignments.
- Flood protection programs commonly view debris in the channel as potential dams, so maintenance crews remove fallen trees and rootwads that are needed for aquatic habitat. Channelization projects remove the riffles so the stream will flow faster.

The main difference between the natural and human causes of habitat alterations is that the natural changes allow habitat to be created in another area. Human development in urban areas, on the other hand, does not offer alternatives. When a stream is straightened and leveed, it is constrained. There are no other places for pools and riffles to form or banks where trees are allowed to grow. If the floodplain is filled or urbanized, the riparian habitat is destroyed, not moved.

Example: Chinook Salmon Habitat

Chinook salmon require different habitats during different phases of their life. Adult Chinook salmon spawn in freshwater streams in the late summer and fall. Spawning habitat typically consists of gravel and cobbles in stream riffles and the edges of stream pools. This rock layer ("substrate") provides a sheltered place for the eggs and the flowing water provides oxygen.

Source: www.scv-habitatplan.org/

Chinook fry emerge in the late winter and early spring. Young Chinook grow in the lower main stem of rivers and tributaries for a year or more before entering the estuaries and salt marshes. They feed and seek refuge from predators in channel, off-channel, and riparian wetland habitats which have woody debris and overhanging vegetation. Within a year, they smolt, and need to move from a freshwater to a saltwater habitat. Most Chinook spend from two to four years feeding in the North Pacific before they return to spawn. When they're ready, they swim back to the streams they were born in and die after spawning.

Chinook salmon has been an important commercial and sport fish. It accounted for the majority of the Columbia River harvest in the late 1800s. While overfishing contributed to its decline, that isn't the only reason why Chinook salmon are protected by the Endangered Species Act.

The river habitats of the Chinook salmon have been subjected to the adverse effects noted on the previous pages. The floodplains on the streams that drain into Puget Sound, the Columbia River, and the Pacific Ocean have been logged, farmed, and built on. The rivers have been channelized and leveed, destroying the pools, riffles, vegetation, and bank protection. Some have been dammed. Floodplains have been filled. Runoff from farms and urbanized areas brought increased sediment that settled in the gravel and cobbles, reducing oxygen and refuge for fry.

As a result, the population of the Chinook salmon has decreased dramatically over the years. In the early 1990's NMFS listed the Chinook salmon is a threatened species in various areas on the West Coast. In 1999, it listed the Puget Sound Chinook as threatened and the Upper Columbia River Chinook salmon as endangered. In its designation, NMFS noted

> Their current threatened status cannot be explained by natural cycles in ocean and weather conditions. NMFS has concluded that threatened Chinook, coho, chum, sockeye, and steelhead are at risk of

extinction primarily because their populations have been reduced by human "take." West Coast populations of these salmonids have been depleted by take resulting from harvest, past and ongoing destruction of freshwater and estuarine habitats, hydropower development, hatchery practices, and other causes….

Although the primary purpose of state, local, and other programs is generally to further some activity other than conserving salmon, such as maintaining roads, controlling development, ensuring clean water or harvesting trees, some entities have adjusted one or more of these programs to protect and conserve listed salmonids. NMFS believes that with appropriate safeguards, many such activities can be specifically tailored to minimize impacts on listed threatened salmonids … *[50 CFR 223, July 10, 2000]*

In its September 2008 Biological Opinion, NMFS concluded:

As the human population in the action area continues to grow, the burden on land presently used for agricultural, commercial, or residential development is also likely to grow. As land-uses shift from natural, to rural, to suburban, the watershed functions related to processing precipitation decrease. The ability of land to accept and slowly transport water to streams and aquifers decreases in the upper watershed as does the flood storage capacity in the lowlands.

The watershed functional changes mentioned above result in several of the habitat affecting processes mentioned earlier in this Opinion. The result of these process changes include induced flood damage, increased flood stages, increased volume of instream flows, increased velocity of instream flows, and erosion and sedimentation…

As the human population in the action area continues to grow, new development is likely to further reduce the habitat function in watersheds through water withdrawals, storm water quality and quantity degradation, loss of riparian functions, and encroachment in channels and floodplains.

Cumulative effects of actions that destabilize fluvial systems are harmful to salmon. Channelization is an immediate and complete disruption of the riparian and aquatic communities that colonize rivers. In many cases, biological communities will reestablish themselves within channelized reaches. However, maintenance dredging, removing vegetation along channel walls, and adding riprap and concrete can completely prevent restoration of biological communities and lead to long-term or permanent disruption. *[Biological Opinion pages 142 – 143]*

This streamside trail in Redmond is a good example of an urban recreational development that protects aquatic and riparian habitat.

Good Practices to Protect Habitat

This section reviews what communities can do to protect habitat *while they are implementing flood protection measures*. All of these good practices are above and beyond the minimum requirements of the NFIP, encouraged by FEMA, and credited by the Community Rating System. They are credited because they prevent or reduce flood losses, and are listed here because they also protect habitat and natural floodplain functions.

Planning

The best way to start addressing flood and habitat protection measures is with a plan. Most communities have comprehensive plans or land use plans. The CRS credits a **floodplain management plan** which follows a ten-step process that

- Describes the local flooding problem,
- Identifies concerns about and opportunities in the floodplain,
- Reviews alternative approaches to address the problems, concerns, and opportunities, and
- Specifies an action plan of things to do.

There are six general categories of alternative approaches (see box) that need to be considered for full credit. Not only should natural resource protection be included in the planning process, other measures, especially structural projects and development standards, should be reviewed with their impact on habitat in mind.

Floodplain Management Categories

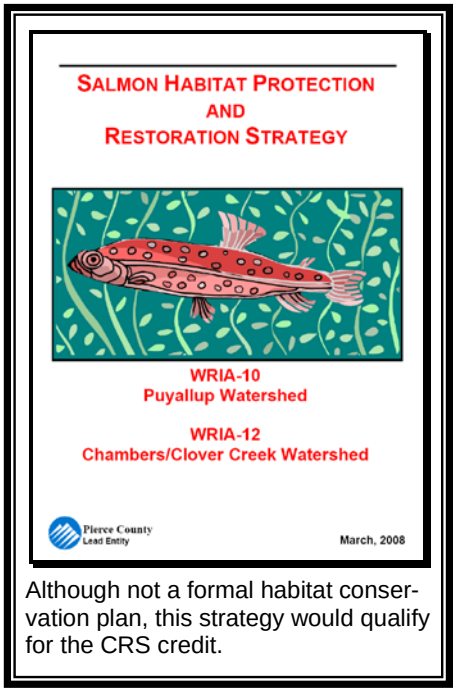
- ✓ **Preventive** activities that keep problems from getting worse (e.g. zoning areas for low intensity development)
- ✓ **Property protection** activities (e.g., relocation and elevation of buildings)
- ✓ **Natural resource protection** activities that preserve or restore natural areas or the natural functions (e.g., wetlands protection and erosion and sediment control)
- ✓ **Emergency response** measures that are taken during an emergency to minimize its impact (e.g., flood warning)
- ✓ **Structural projects** that keep floodwaters away from an area (e.g., levees, drainage improvements)
- ✓ **Public information** activities that advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the

CRS credit: Up to 294 points can be obtained for a floodplain management plan under Section 511.a in the *CRS Coordinator's Manual*. The average score in Washington is 184. It should be noted that many communities have submitted hazard mitigation plans for this credit. Generally they do not receive very many points (unless the ten step process was included in the planning work) and often they do not include protection of natural functions as a mitigation consideration.

Another kind of plan is a **habitat conservation plan**. These are community-level documents that identify steps that reduce conflicts between land development activities and the need to protect threatened or endangered species. They can prove very useful in providing ways for developers to comply with the Endangered Species Act and to reduce the costs of conservation activities on individual property owners.

There is guidance on preparing a habitat conservation plan that is recognized by the Fish & Wildlife Service or NMFS. The plan needs to identify:

- The species in need of protection,
- The impact of new development on their habitat,
- Actions that could be taken to protect that habitat,
- What actions are recommended to protect that habitat and why they were selected from the alternatives, and
- How the recommendations will be funded.



Although not a formal habitat conservation plan, this strategy would qualify for the CRS credit.

CRS credit: 10 points are provided for a plan that includes the items listed above, 15 points if the plan has been accepted as a Habitat Conservation Plan by the US Fish and Wildlife Service or the National Marine Fisheries Service. The credit criteria are in Section 511.c in the *CRS Coordinator's Manual*. Average Washington score: 10.

Information and Education

The more people know about flooding and habitats, the easier it is to introduce and implement protection measures. A basic piece of information is the location of the floodplain. Providing and publicizing a **map information service** can be very valuable to property owners and builders. The CRS provides credits for helping people read and understand the community's Flood Insurance Rate Map and related flood hazard data. Communities are encouraged to provide additional information, such as the rules for developing a property in the floodplain and the presence of any critical habitat.

CRS credit: 140 points for providing and publicizing a map information service under Section 321 in the *CRS Coordinator's Manual*. Average Washington score: 140.

Instead of waiting for inquiries, a community should reach out to residents and businesses and notify them about the flood hazard, areas worthy of protection, and what individuals can do to protect themselves and habitats. This can be done via a variety of media, including flyers, brochures, newsletters, newspaper articles, presentations at public meetings, mailings, and signs.

The CRS credits four types of **outreach projects**:

- Outreach projects to the whole community, such as newsletters or stuffers in utility bills,
- Outreach projects to floodplain properties via direct mailings,
- Additional outreach projects, such as presentations to neighborhood groups, signs, cable TV notices, school projects, and brochures made available at public places, and

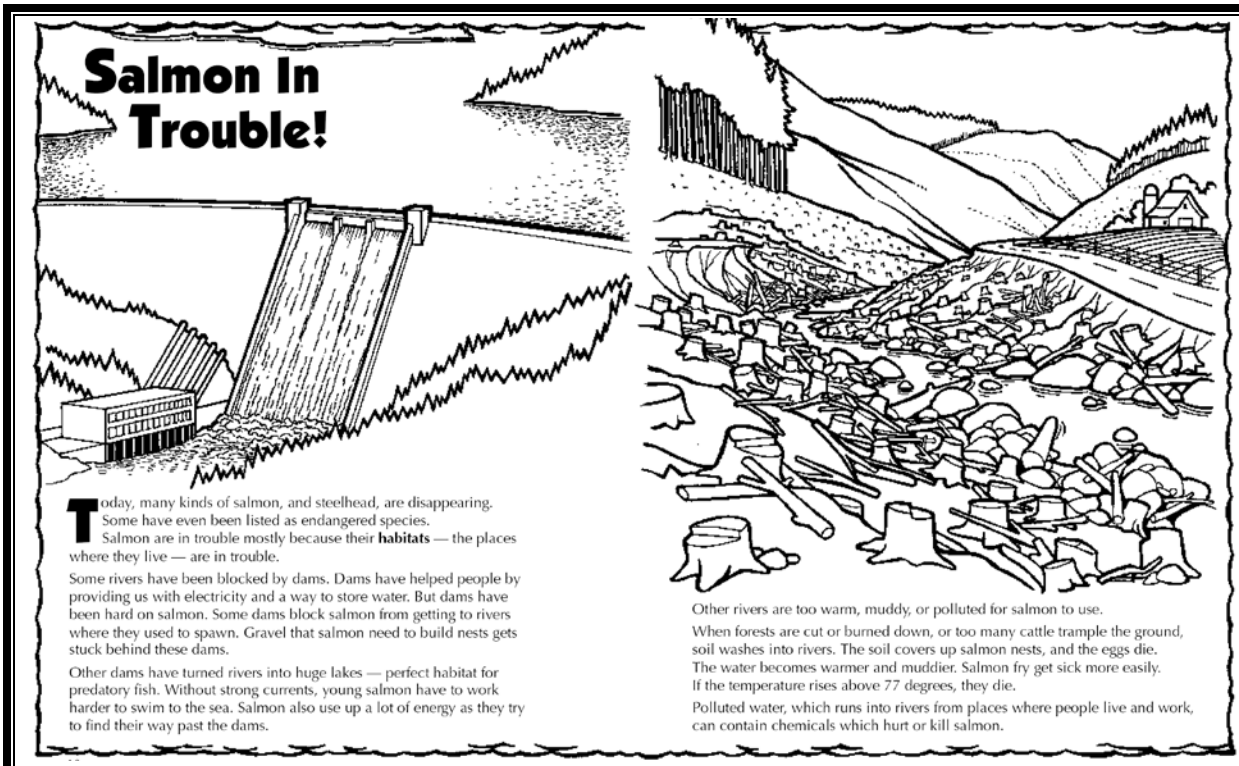
– A public information program strategy, a master plan of projects prepared by a team of interested parties. A strategy could be included as part of a floodplain management plan.

CRS credit: The following points are explained in Section 331 of the *CRS Coordinator's Manual*.

– Outreach projects to the community: up to 60 points. Average Washington score: 33.
– Outreach projects to the floodplain: up to 130 points. Average Washington score: 88.
– Additional outreach projects: up to 60 points. Average Washington score: 17.
– Public information program strategy: up to 125 points. Average Washington score: 100.

Disclosing the hazard to a prospective purchaser can be very helpful. Sometimes, the disclosure can inform the buyer of other natural features on the property, such as a wetland, or restrictions on the property related to past permits. Section 4.2.H of the NFIP-ESA Model Ordinance is an example of a legal requirement for flood hazard disclosure.

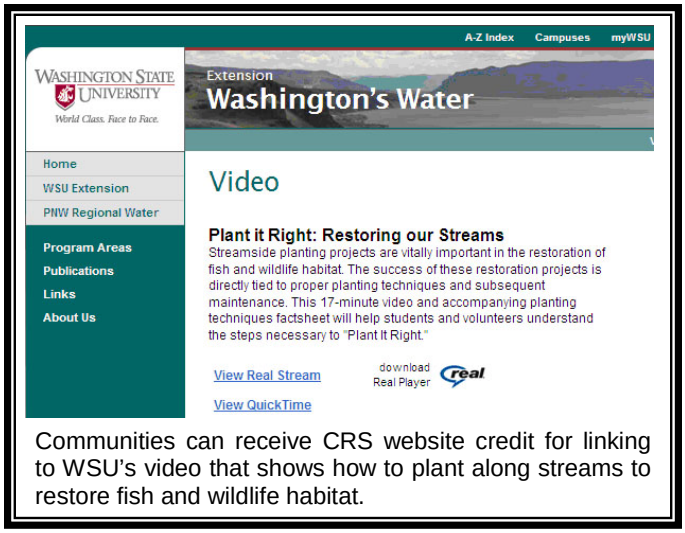
CRS credit: Section 341 of the *CRS Coordinator's Manual* provides credit for flood hazard disclosure measures, with the greatest amount of credit for real estate agents advising house hunters whether a property is in the regulated floodplain. Up to 81 points. Average Washington score: 13.



This coloring book for grades 4 – 8 was prepared by the US Fish and Wildlife Service. If schools use these or similar materials to educate students on floodplain management and habitat protection topics, their communities can receive credit for them as additional outreach projects.

Outreach projects can only provide a limited amount of general information. Communities should make more **detailed information and references** available to those who want to know more. There are several ways that this can be done:

- The **public library** should have relevant references cataloged. These could include Federal and State flood and habitat protection books (e.g., *Living with the River*), the Flood Insurance Rate Map, and local ordinances and plans.
- The community's **website** should have one or more pages on floodplains, the local hazards, and ways to protect natural floodplain functions. There are many area and national sites that can be linked to, so local officials don't have to reinvent the wheel.



Communities can receive CRS website credit for linking to WSU's video that shows how to plant along streams to restore fish and wildlife habitat.

- Some communities respond to requests for **technical assistance** or visits to residents who want to know why they are being flooded and what they can do to protect themselves. This work should include identifying important habitat on or near the property and advising the owners on how to preserve it.

NFIP/CRS **CRS credit:** The following credits are explained in the *CRS Coordinator's Manual* as noted:

- Flood protection library, Section 351.a: up to 30 points. Average in Washington: 26.
- Flood protection website, Section 351.b: up to 72 points. Average in Washington: 32.
- Flood protection assistance, Section 361: up to 71 points. Average in Washington: 57.

Managing Floodplain Development

The first step in managing development in an area is to accurately map the area and provide the **flood hazard data** that is needed to set protection criteria. The NFIP's mapping criteria are specified in *Guidelines and Specifications for Flood Hazard Mapping Partners*. As with other NFIP criteria, these are minimums. Communities are encouraged to map areas outside the FEMA mapped Special Flood Hazard Area and to use higher standards when preparing floodplain maps.

There are four ways communities can exceed the NFIP's minimum mapping criteria. All of them are recommended in the NFIP-ESA Model Ordinance and are credited by the CRS. The last three are explained in more detail in *Regional Guidance for Hydrologic and Hydraulic Studies.*

- Developing or requiring permit applicants to develop base flood elevations, floodway delineations, and other data not provided on the FIRM, e.g. in approximate A Zones.

New buildings will not only be better protected, they will receive lower flood insurance premiums. This is covered in Sections 3.5.C and D of the NFIP-ESA Model Ordinance.

- Mapping and regulating an area outside the FIRM's floodplain. This may happen under Section 3.4 of the NFIP-ESA Model Ordinance, where the riparian habitat zone or the channel migration zone boundaries extend beyond the Special Flood Hazard Area (see the graphic on the next page).
- Mapping the floodplain using higher standards than *Guidelines and Specifications*. The NFIP standard is to map the hazard based on existing development conditions. The *Regional Guidance for Hydrologic and Hydraulic Studies* and the Biological Opinion recommend using future conditions, i.e., calculating runoff based on expected future land uses. The result is usually a larger base flood discharge and a larger regulatory floodplain. See also Section 3.5.E of the NFIP-ESA Model Ordinance.
- Basing the floodway delineation on a standard higher than FEMA's one foot allowable surcharge (noted in the NFIP-ESA Model Ordinance commentary to Section 3.5.D).

CRS credit: The following credits for additional flood data are explained in the *CRS Coordinator's Manual* as noted. Credit for all of these elements is up to 690 points. The average score in Washington is 140 points.

- Providing flood data where none is provided on the FIRM and regulating outside the Special Flood Hazard Area, Section 411.a.
- Basing the regulatory floodplain boundary on future development conditions, Section 411.c.
- Using a higher floodway mapping standard, Section 411.d.

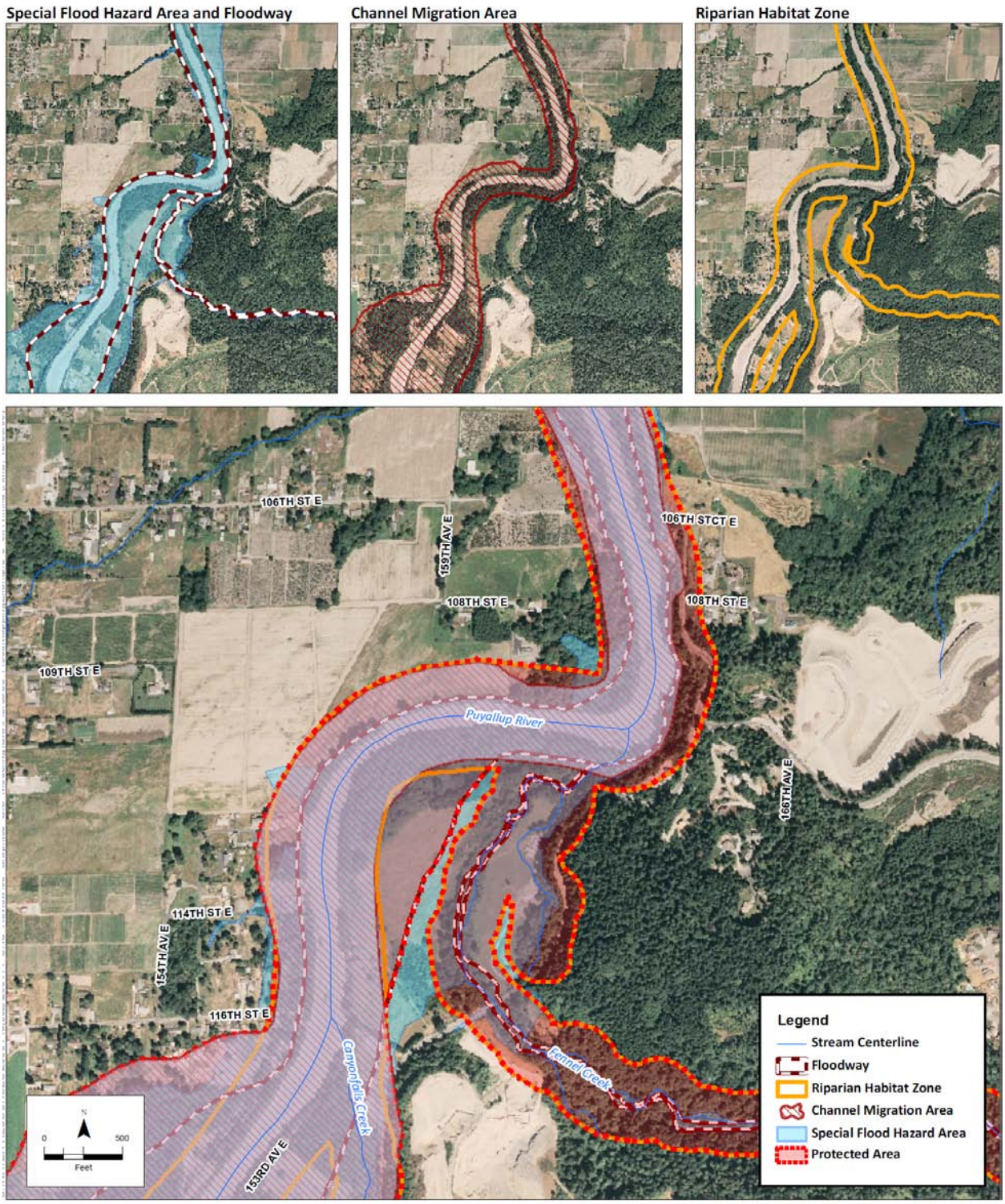
Note: Average CRS scores in this guide are without the growth adjustment. Growing communities' scores will be higher in the 400 series of activities.

Once the area of concern is delineated, the best way to protect properties from flooding and to preserve habitat is to preserve the area as **open space**. If there are no buildings in the floodplain, there's no flood damage to insurable buildings. Areas kept open allow the natural stream processes that support habitats, such as meandering and collection of woody debris.

There are various ways to preserve areas in their undeveloped condition:

- Acquisition by a public agency,
- Ownership by a private organization dedicated to keeping the area open, such as a church camp or hunters' club,
- Requiring developers to set aside the floodprone portions of their subdivision,

Preserving floodplain open space allows natural processes, such as beavers building dams, to proceed without harming human development



This graphic shows the relative locations of the floodway, riparian habitat zone, and the channel migration area, the determinants of the Protected Area. Note that in some locations, the Protected Area extends beyond the Special Flood Hazard Area mapped by FEMA.

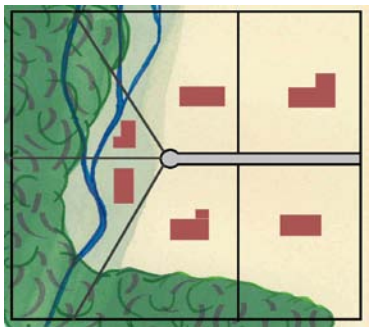
Source: Pierce County, 2007, GeoEngineers, 2005; USDA, 2006 (Air Photo)

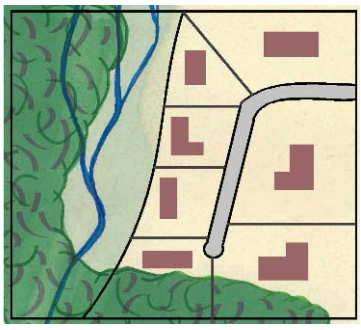
– Zoning floodprone areas for uses that do not allow filling or buildings (provided the owners still retain some economic use of their property, such as pasture or recreation).

CRS credit: The following credits are explained in the *CRS Coordinator's Manual* as noted:

- Preserving open space, Section 421.a: up to 725 points. Average in Washington: 213.
- Attaching deed restrictions to open space parcels, Section 421.b: up to 75 points additional credit. Average in Washington: 7.5.
- Preserving open space that is in its natural state or serves a natural floodplain function, such as habitat for a threatened species, Section 421.c: up to 100 points additional credit. Average in Washington: 24.

Often, property owners don't want to give up their lands, even if it's purchased for a public purpose. Often, communities don't have the funds to purchase all the land they'd like to preserve. One way to approach these situations is to work with developers to minimize what they do in the floodplain. The example to the right shows what can be done with regulations that allow **planned unit or cluster developments** and when communities and developers are willing to work out arrangements that are mutually beneficial.





In the standard zoning approach (left), the developer considers six equally-sized lots without regard for the flood hazard. Two properties are subject to flooding and the natural stream is disrupted. An alternative, flexible, approach is shown on the right. The floodplain is dedicated as public open space. There are seven smaller lots, but those abutting the floodplain have the advantage of being adjacent to a larger open area. Four lots have riverfront views instead of two. These amenities compensate for the smaller lot sizes, so the parcels are valued the same. The developer makes the same or more income, the future residents are safer, and the floodplain is preserved as open space.

The NFIP-ESA Model Ordinance has specific development standards and does not specify the type of arrangement described above. However, it does have the following provisions:

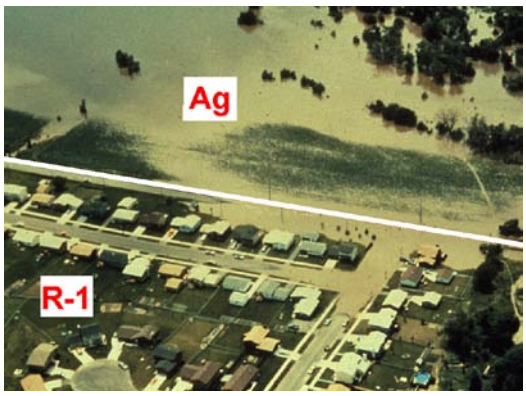
- Sections 5.1.B and 5.2.A call for **locating buildable sites outside the floodplain** for all new subdivisions**.**
- Section 5.4 requires critical facilities (like water treatment plants and hazardous materials sites) to stay out of the floodplain "to the extent possible."
- Section 7.5.A.2 prohibits new residential structures within designated floodways, which is a requirement of State law (WAC 173-158-070).
- Section 7.8 requires an applicant for a permit that could adversely affect flooding, water quality, riparian vegetation or habitat to prepare a plan to mitigate the negative impacts.

While this doesn't prohibit development, the requirement will discourage some developments and those that do proceed will have minimal adverse effects.

- Section 7.4 limits removal of native vegetation.

CRS credit: The techniques described above to encourage preserving floodplain open space are credited in Section 431LD.a of the *CRS Coordinator's Manual* and provide up to 100 points. Average in Washington: 37 points.

Another way to minimize floodplain development is through density restrictions in a **zoning** ordinance. Floodplain lots can be zoned for conservation, agriculture or "rural estates," requiring minimum lot sizes of 5 – 20 acres or more. The result is less disruption in the floodplain and more room to avoid riparian areas or critical habitat.



A zoning ordinance can designate wetlands and floodprone areas for agricultural, conservation, or other uses that suffer minimal damage from a flood.

CRS credit: Credit for low density zoning is based on the minimum lot size as explained in Section 431LD.b of the *CRS Coordinator's Manual.* The maximum possible credit is 600 points. Average score in Washington: 265 points.

In some cases, developers will not preserve the floodplain as open space. It is also difficult to prevent construction on the remaining lots in an area already developed. In these cases, the best thing to do is set some **higher regulatory standards** than the NFIP minimums to get better flood protection and protection of sensitive areas. In addition to the usual building protection criteria that are in the NFIP-ESA Model Ordinance, like freeboard, here are some higher flood protection regulatory standards that also protect habitat:

- Prohibiting all filling or requiring that filling be compensated for by removing an equivalent amount, required in Section 7.6 of the NFIP-ESA Model Ordinance.
- Requiring new buildings to be constructed on flow-through foundations rather than fill (which is encouraged by the compensatory storage requirement in Section 7.6).
- Prohibiting hazardous materials from the floodplain (Section 5.3).
- Keeping water wells out of the floodway (Section 6.7.B and Washington Administrative Code 173-160-171).


Construction on elevated flow-through foundations is much less disruptive than filling a building site.
(Chehalis River, 2007)

CRS credit: The higher regulatory standards listed above are credited in Sections 431.f and g of the *CRS Coordinator's Manual.* The maximum possible credit is 120 points. Average score in Washington: 98 points.

Managing Runoff

Most of the water that enters a stream does not come from the floodplain. It is runoff from the entire watershed. As noted earlier, unmanaged stormwater runoff from urban areas adversely affects habitat in three ways. It

- Imports pollutants from the land surface,
- Increases flow volume and velocity, causing channel scour,
- Increases sediment loads in the water, and
- Decreases infiltration, reducing dry weather flows in streams.

The most common way to manage stormwater is by requiring or constructing **storage basins** that retain or detain the runoff. Retention basins do not release the excess runoff to the stream. Rather, they hold the runoff to recharge groundwater supplies or divert it to other uses, such as irrigation. Detention basins release the runoff slowly over a period of time.

Most storage basins and other drainage facilities have typically been constructed solely to manage water quantity. They can and should be designed to **manage water quality**, too. Simply holding the "first flush" of a storm long enough to allow the sediment and other pollutants to settle out before the water is released can do a lot. Using grass filter strips and other "best management practices" can also help reduce pollutants and recharge groundwater.

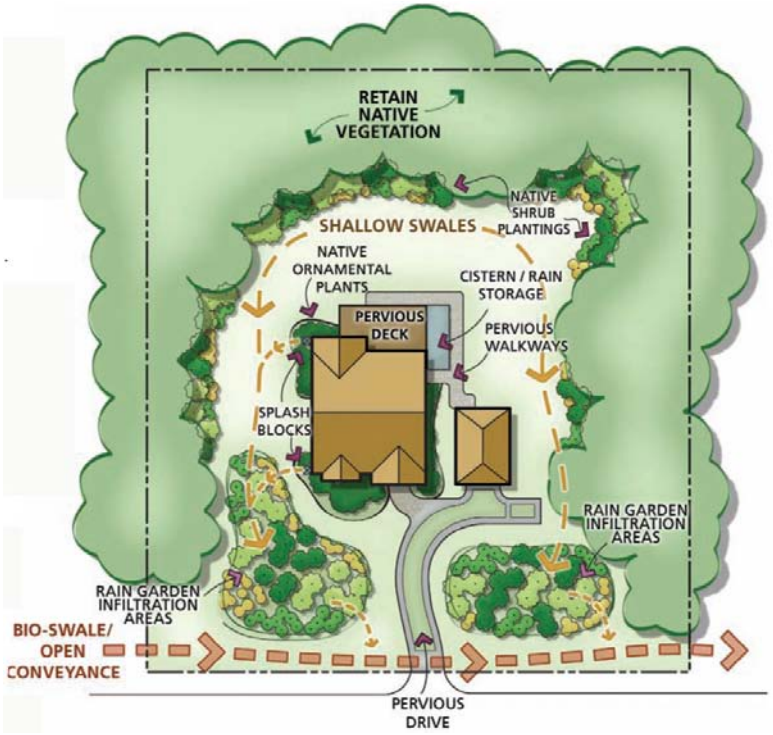
The drainage channel on the left is a typical "quantity only" approach, while the one on the right incorporates water quality features, too. It is also less expensive to maintain over the long run.

One of the greatest sources of sediment is construction sites. Construction projects typically lay the ground bare until the project is completed. This means that the land can be exposed to erosion for months. Without management, sedimentation will gradually fill in channels, lakes, and retention basins, diminishing their ability to carry or store floodwaters, reducing water quality, and filling in the spaces in the gravel used as refuge by small fish. **Erosion and sedimentation control regulations** require the builder to catch or retard the sediment laden runoff and keep it on the site.

All of these measures can be incorporated into developments as small as individual lots. However, they do not match the flood frequency, timing, and duration of storm events, differences that can have adverse effects on various species life stages, particularly juvenile salmon. **Low Impact Development** is a term for a variety of approaches that manage stormwater at the site and minimize runoff by approximating natural conditions. The graphic summarizes many of these techniques.

The Puget Sound Action Team has identified four key strategies to implement low impact development techniques:

1. Conserve and restore vegetation and soils,
2. Design sites to minimize impervious surfaces,
3. Manage stormwater close to where the rain falls, and
4. Provide maintenance and education.



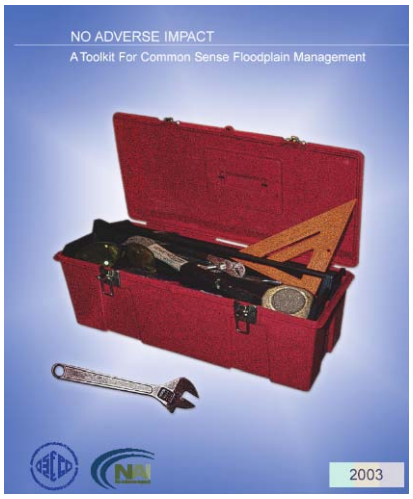
Low impact development practices
Source: Puget Sound Action Team,

NFIP-ESA Model Ordinance Section 5.2.B requires all new development in the floodplain to "be designed and located to minimize the impact on flood flows, flood storage, water quality, and habitat." Low impact development techniques are specifically recommended. However, it is recommended that communities adopt such a requirement for their entire watershed, not just the floodplain.

CRS credit: The following credits are explained in the *CRS Coordinator's Manual* as noted:

- Requiring new developments to include stormwater storage basins, Section 451.a: up to 225 points. Average in Washington: 126. This is considered a starting point for local stormwater management. To effectively deal with water quality and runoff volume issues, the following credits are needed, too.
- Requiring new stormwater management facilities to incorporate best management practices for water quality, Section 451.e: up to 25 points. Average in Washington: 25.
- Requiring erosion and sedimentation control measures on construction sites, Section 451.d: up to 35 points. Average in Washington: 34.

There are some floodplain development provisions that can help manage runoff, primarily by ensuring that riparian areas closest to the water remain vegetated, so they filter and slow up the stormwater flows. These **riparian buffers** can vary in width, but the wider they are, the more effective they will be. In the NFIP-ESA Model Ordinance, a project cannot remove native vegetation in the riparian habitat zone (Section 7.4.A) and the developer must show that other activities in the riparian habitat zone do not have an adverse effect on habitat (Section 7.7).



The Association of State Floodplain Managers' *No Adverse Impact Toolkit* provides guidance and many good examples of measures that exceed the NFIP minimum criteria.

CRS credit: The following credits are explained in the *CRS Coordinator's Manual* as noted:

- Requiring new developments to include buffer zones along streams, Section 431LD.a: up to 100 points. Average in Washington: 37.
- Requiring construction projects to prohibit hazardous materials and/or to avoid or minimize disruption to shorelines, stream channels and their banks, Section 431.g: up to 25 points. Average in Washington: 24.

Restoring Damaged Areas

The good practices addressed so far have focused on not making things worse by informing people and managing new development to minimize their adverse effects on habitat. This last section looks at modifying existing development to reduce flood losses and to improve aquatic and riparian habitat.

One tenet of floodplain management is that the most effective flood protection measure is to remove damage-prone structures from harm's way. The Federal government supports this approach to such an extent that Congress has authorized five FEMA mitigation grant programs and the US Army Corps of Engineers to **purchase and clear floodprone buildings**. Many communities and states (including Washington) also fund such projects.

More information on funding for floodplain acquisition can be found at several locations:

- FEMA mitigation grants: www.fema.gov/government/grant/fs_mit_grant_prog.shtm (note that a prerequisite for these grants is a hazard mitigation or floodplain management plan, such as the ones credited by the CRS under Section 511).
- US Army Corps of Engineers' flood protection programs: www.nws.usace.army.mil/PublicMenu/Menu.cfm?sitename=waterres&pagename=projects
- Washington state Flood Control Assistance Account Program: www.ecy.wa.gov/programs/sea/grants/fcaap/index.html Note that the law creating this program directs the Washington Department of Ecology to "give strong preference to local governments that have: 1) Implemented, or are in the process of implementing, an ordinance that

establishes a floodplain policy that is substantially more stringent than minimum federal requirements; 2) completed a comprehensive flood control plan…"

- King County's buyout program is at www.kingcounty.gov/environment/waterandland/flooding/buyout.aspx

The best use of acquired lands is to restore them to their natural conditions. Properties acquired with FEMA funds must be preserved as open space for as long as the property remains in the floodplain. King County will not convert purchased lands to parks, so that there will be no need to protect facilities from flooding or channel migration.

Aerial photo of a King County buyout project underway on the Cedar River. Since this photo was taken, all but one property has been purchased and cleared.

The Nisqually River, adjacent to a levee removal project

CRS credit: The *CRS Coordinator's Manual* provides two large point credits:

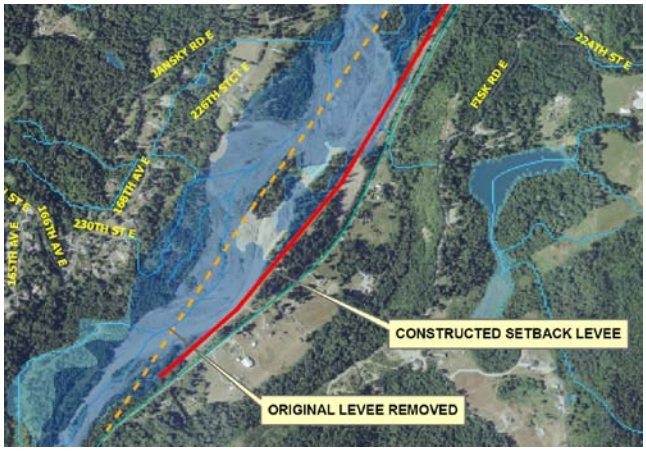
- Acquiring and clearing buildings, especially repetitive loss buildings, in the floodplain, Section 521: up to 3,200 points. Average in Washington: 106 points.
- Preserving the acquired lands as open space, Section 421a: up to 725 points. Average in Washington: 213 points.

Buildings aren't the only items of human development that could be cleared out of a floodplain. Levees and channelization projects have also done damage to habitat. Removing levees or at least moving them back away from the channel bank can greatly help restore the natural stream functions. There have been several **restoration projects** in recent years as more communities realize their benefits.

In 2008, King County bought the final parcels of land that allowed it to clear a swath of Cedar River floodplain, remove a levee, and build a lower, setback levee near the parcel boundaries. The project goals incorporated both flood protection and habitat restoration:

- Remove repeatedly flood-damaged homes from highest hazard areas;
- Reconnect the river and its floodplain to restore natural and self-sustaining riverine processes and functions including flood conveyance and storage, and sediment transport and deposition;
- Increase the quantity and quality of instream, riparian and off-channel habitat for fish and wildlife and contribute to the recovery of ESA-listed species; and
- Maintain existing levels of flood protection for remaining homes and infrastructure.

CRS credit: The CRS does not credit construction of new levees or any levee constructed after the program began in 1990. It may be that some floodprone buildings would have to be removed to make room for the setback levee and the area between the new levee and the river should be preserved as open space. In those cases, CRS credit would be provided as discussed in the previous section.

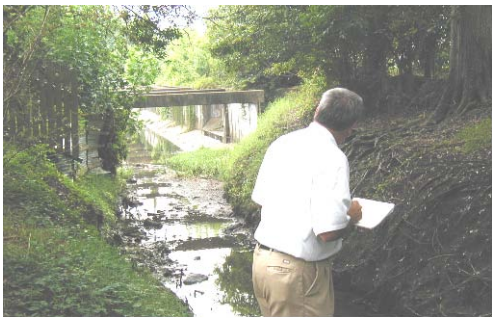


Site of a Pierce County levee setback project on the Puyallup River

It should be clarified that the CRS does have a Levee Safety credit (Section 620). This credit is only for levees that existed before 1991, that meet strict construction and maintenance standards, where the residents are advised of the potential of a levee failure, and where the community has adopted, and periodically tests, a levee failure emergency response plan.

In Section 530, the CRS credits flood protection projects, such as channel improvements and reservoirs. These must pass a careful environmental review, including documenting that the meet all requirements of the Endangered Species Act.

Properly done, a **drainage system maintenance** program can ensure that streams stay clear of unwanted debris (shopping carts, garbage, etc.) that can obstruct floodwaters and damage habitat. Many communities do some of this work with volunteers.


A good drainage system maintenance program has periodic inspections of channels and basins to identify debris and obstructions before they contribute to a flood.

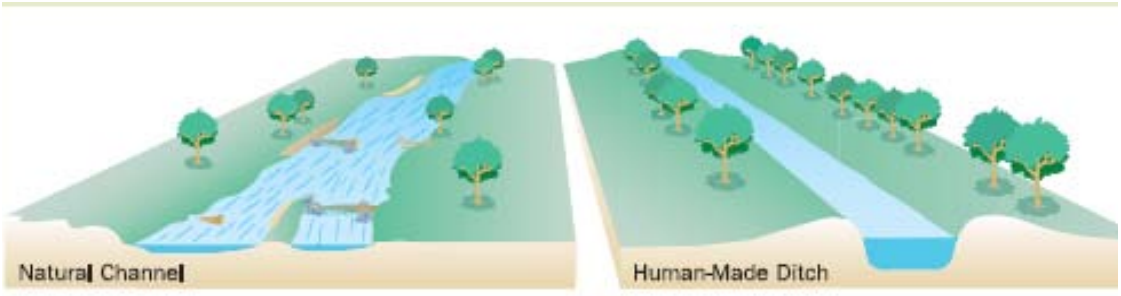
CRS credit: Section 541.a in the *CRS Coordinator's Manual* explains the credit for drainage system maintenance, which is up to 300 points. Average in Washington: 241 points. There is often a concern that the CRS credit for drainage system maintenance encourages communities to remove every item of vegetation from a channel and its banks. Section 540 clearly states that

> Communities must be aware of all environmental laws and regulations that affect their ability to conduct maintenance operations, including the Endangered Species Act of 1973. Credit will not be approved for any procedures that are not consistent with those requirements. (Page 540-3)

The guidance documents for this CRS activity recommend that communities catalog their streams, such as differentiating between natural streams and human-made ditches. As illustrated in the graphic below, natural channels can absorb downed trees and other natural obstructions without increasing flooding elsewhere. Many human-made ditches, on the other hand, need to be treated differently − if they were built like the example on the right in the graphic below, they have to be kept clear to do their jobs.

> A drainage maintenance program should not treat natural channels and human-made ditches the same. The natural channel has a wider area in which to flow. Trees and small log or debris jams can be accommodated by minor diversions of flow without causing any problems. In fact, vegetation and minor obstructions that cause riffles and pools are desired in many natural streams because they improve habitat and water quality. (*CRS Credit for Drainage System Maintenance*, page 9.)

More and more communities are designing drainage features to include both water quantity and water quality benefits. They may look like a hybrid of the two examples above. In any case, maintenance procedures need to take into account the desire to prevent flooding, the need to protect habitat, and the requirement to follow Federal, state, and local laws.



Every community should have clearly written stream maintenance procedures that differentiate between natural and human-made channels.

References

"Endangered Species Act − Section 7 Consultation, Final Biological Opinion," National Marine Fisheries Service, September 22, 2008

Model Ordinance for Floodplain Management Under the National Flood Insurance Program and the Endangered Species Act, FEMA, 2009.

CRS Coordinator's Manual, FEMA, 2007. www.fema.gov/business/nfip/crs.shtm.

CRS Credit for Higher Regulatory Standards, FEMA, 2007. http://training.fema.gov/EMIWeb/CRS/

Guidelines and Specifications for Flood Hazard Mapping Partners, FEMA, 2003. www.fema.gov/plan/prevent/fhm/gs_main.shtm

Habitat Conservation Planning Handbook, US Fish & Wildlife Service and National Marine Fisheries Service, 1996, http://www.fws.gov/endangered/hcp/hcpbook.html

Living with the River − A Guide to Understanding Western Washington Rivers and Protecting Yourself from Floods, Washington State Department of Ecology, 2007

Low Impact Development - Technical Guidance Manual for Puget Sound, Puget Sound Partnership, 2005, http://www.psp.wa.gov/downloads/LID/LID_manual2005.pdf

No Adverse Impact, A Toolkit For Common Sense Floodplain Management, Association of State Floodplain Managers, 2003, www.floods.org/NoAdverseImpact/NAI_Toolkit_2003.pdf

Protecting Floodplain Resources - A Guidebook for Communities, FEMA 268, 1996

Regional Guidance for Hydrologic and Hydraulic Studies in Support of the Model Ordinance for Floodplain Management under the National Flood Insurance Program and the Endangered Species Act, FEMA Region X, 2010, www.fema.gov/about/regions/regionx/NFIP_ESA/hydrologicandhydraulicstudies.pdf

Regional Guidance for Floodplain Habitat Assessment and Mitigation, FEMA Region X, 2010, www.fema.gov/about/regions/regionx/NFIP_ESA/habitatassessmentandmitigation.pdf

The Natural and Beneficial Functions of Floodplains − Reducing Flood Losses By Protecting and Restoring The Floodplain Environment, A Report for Congress by the Task Force on the Natural and Beneficial Functions of the Floodplain, FEMA 409, 2002.

The Economic Value of Nature's Services in the Puget Sound Basin, Earth Economics, 2008, http://www.eartheconomics.org/A_New_View_of_the_Puget_Sound_Economy.pdf

Landscape Planning for Washington's Wildlife: Managing for Biodiversity of Developing Areas, Washington Department of Fish and Wildlife, 2009, http://wdfw.wa.gov/hab/phsrecs.htm