Watershed Masters Nov. 8, 2022

Washington Forestry Best Management Practices (BMPs)

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Image Source: N. Kunz, 2021

Nick Kunz - District Forester

BS Forestry and Natural Resources with a concentration in Geology
- minor in Water Science: California Polytechnic State University

Forest inventory, prescribed fire, silviculture research (UC Blodgett Forest Research Station)

Forest and rangeland water quality policy and grants (CA State Water Resources Control Board)

Reforestation and tree improvement (Quinault Indian Nation)

Forest management, wetland delineation, remote sensing and spatial analysis (Consulting Forester)

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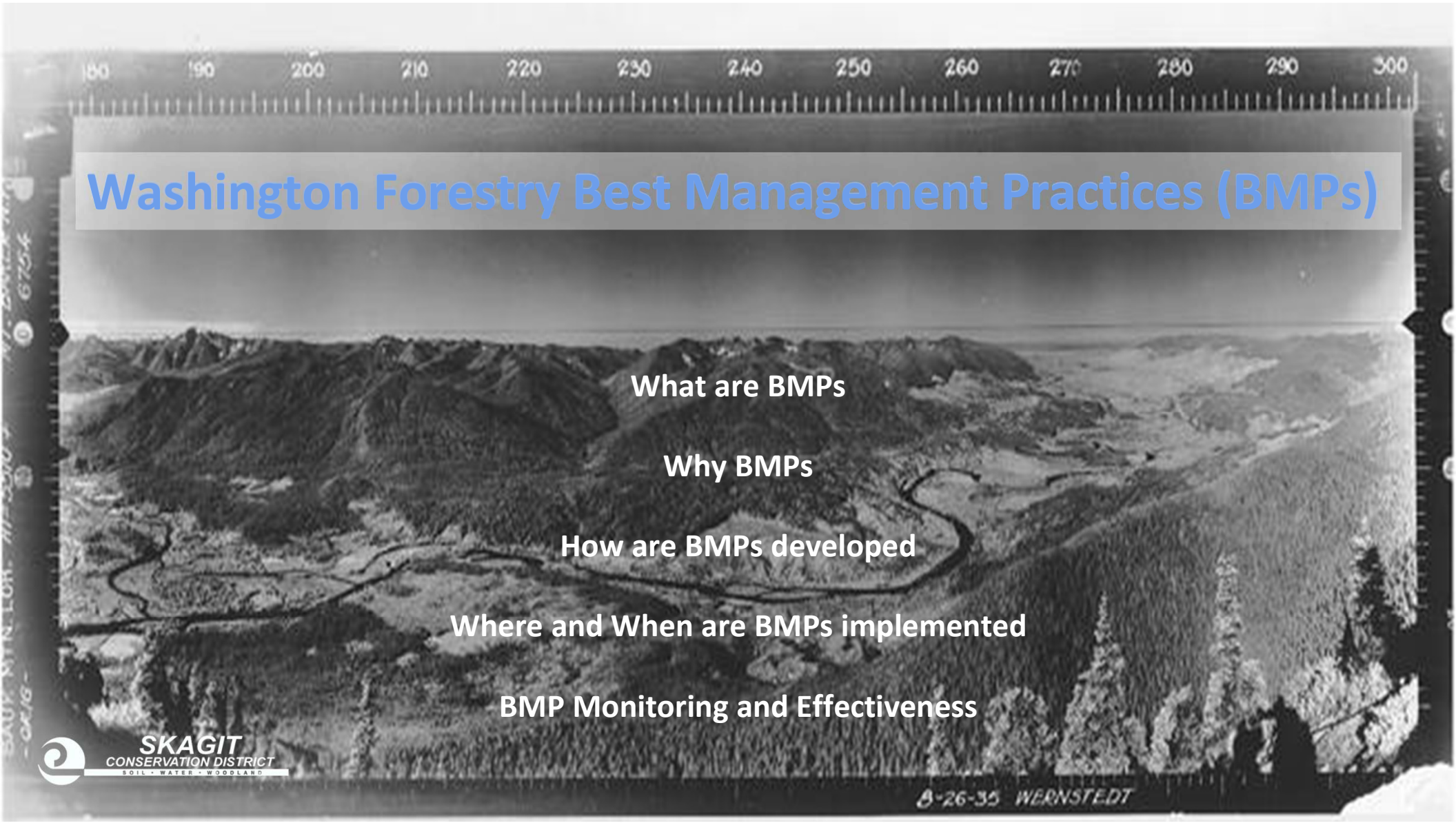
Image Source: N. Kunz, 2019



Washington Forestry Best Management Practices (BMPs)

What are BMPs

Why BMPs

How are BMPs developed

Where and When are BMPs implemented

BMP Monitoring and Effectiveness

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Image Source: N. Kunz, 2018

1958 DNR Est.

Year Est.	State and Federal Environmental Law	Administered by this Agency
1947	Federal Insecticide, Fungicide & Rodenticide Act	Environmental Protection Agency
1949	Hydraulics Code Guidelines	Wash. Dept. of Fish & Wildlife
1969	National Environmental Policy Act	Environmental Protection Agency's Council on Environmental Quality
1970	Federal Clean Air Act	Environmental Protection Agency
1971	Wash. Clean Air Act	Wash. Dept. of Natural Resources, Wash. Dept. of Ecology
1971	State Environmental Policy Act	Wash. Dept. of Ecology
1971	State Shorelines Management Act	Wash. Dept. of Ecology
1971	Wash. Pesticide Control Act	Wash. Dept. of Agriculture
1972	Federal Clean Water Act	Environmental Protection Agency
1973	State Water Pollution Control Act	Wash. Dept. of Ecology
1973	Federal Endangered Species Act	U.S. Fish & Wildlife Service, NOAA Fisheries
1974	State Forest Practices Act	Wash. Dept. of Natural Resources' Forest Practices Board

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Table Source: https://www.wfpa.org/forests-fish-law/environmental-law/
Image Source: N. Kunz, 2018

Modern BMP's are the result of decades of research and ever expanding demand on forest resources:

- **Wood/Minerals**
- **Water**
- **Fish and Wildlife**
- **Recreation/Scenic**
- **Cultural/Spiritual**

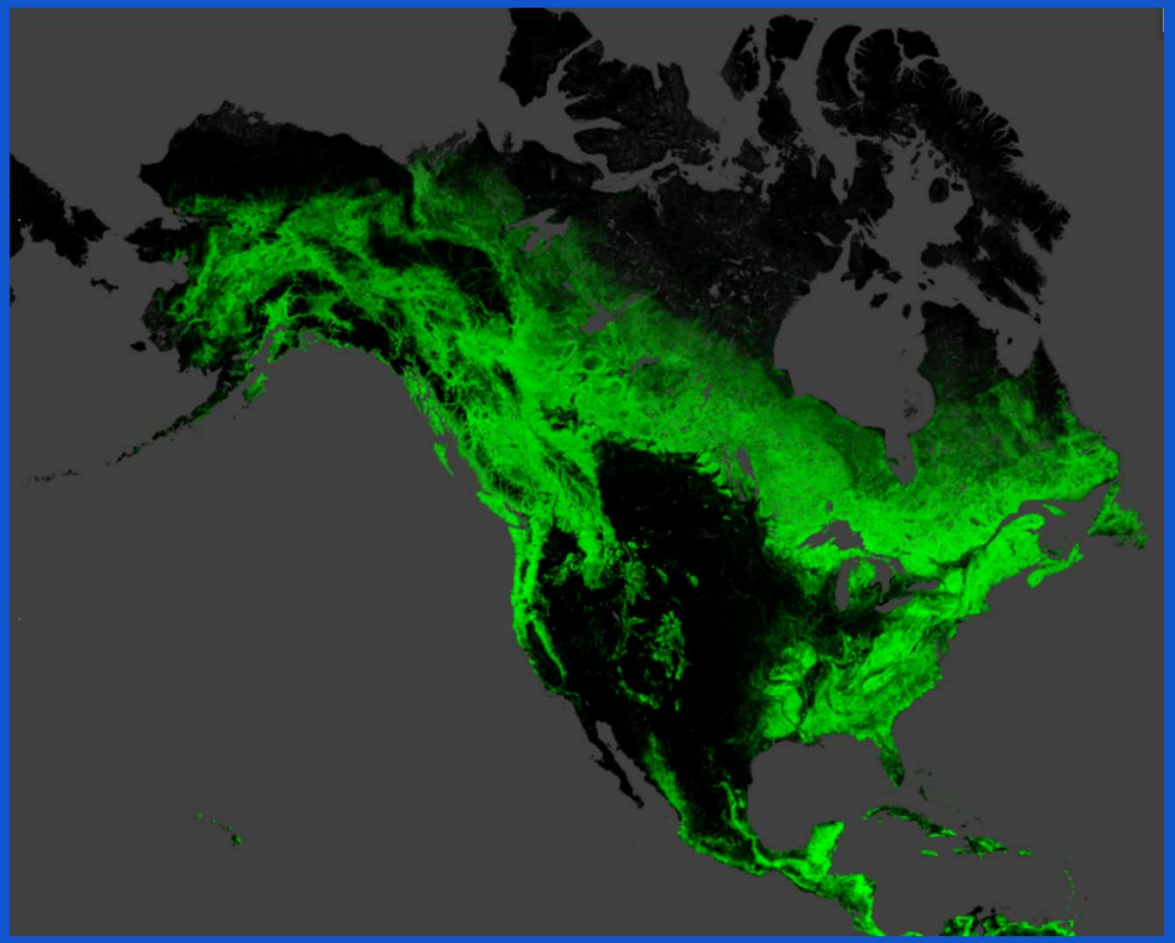

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Image Source: https://earthenginepartners.appspot.com/science-2013-global-forest

Forest BMPs are important because:

- Habitat for terrestrial and aquatic organisms
- Drinking water to millions, water for irrigated Ag
- Fishing, Swimming, Boating
- Hydroelectric, Navigation

Image Source: https://storymaps.arcgis.com/collections/4e450a6c7ed24f0cbae4abc1c07843b7?item=1

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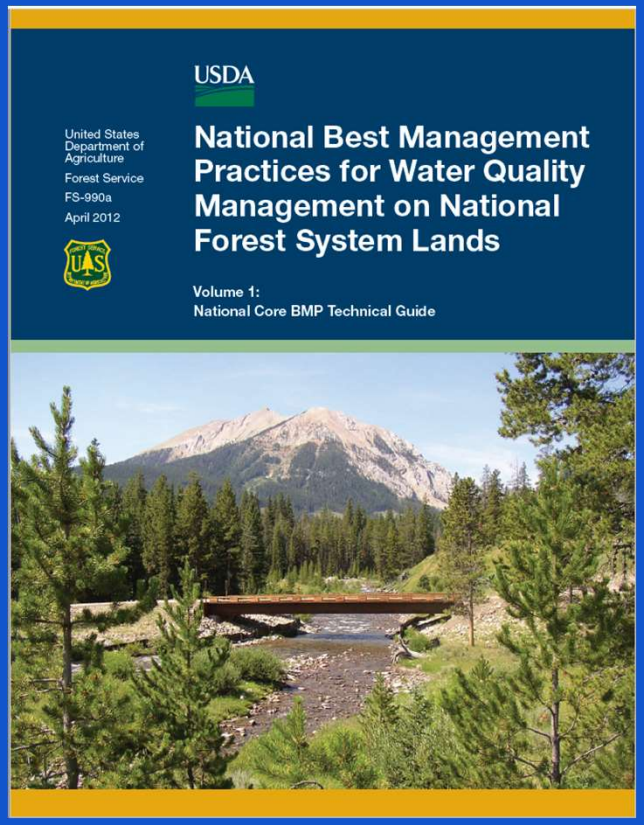
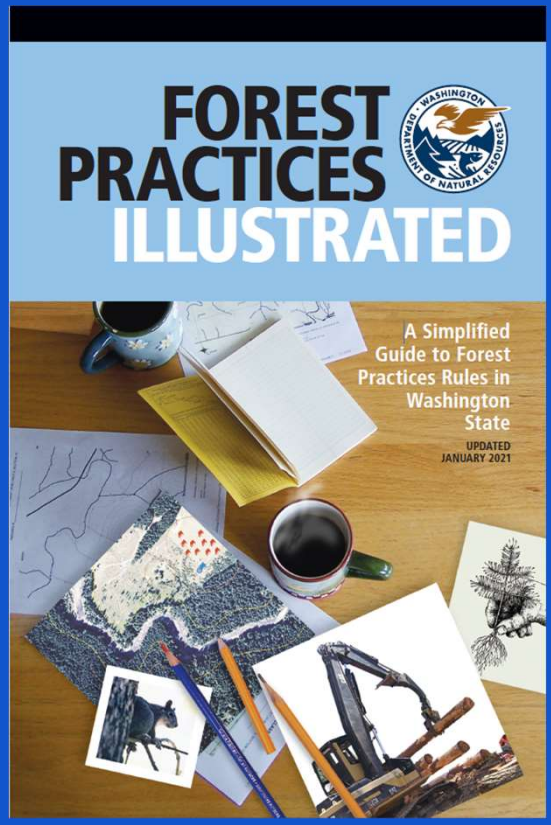
1902 Yolt Burn (Clark County)

Image Source: https://crosscut.com/2019/09/finding-hints-our-future-epic-blazes-northwests-past



(National Forest Land)



(State and Private Forest Land in WA)

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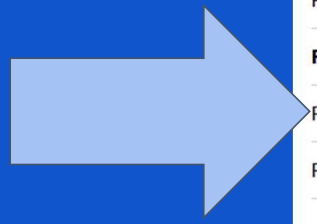

WASHINGTON STATE DEPARTMENT OF
NATURAL RESOURCES
HILARY S. FRANZ | COMMISSIONER OF PUBLIC LANDS

Translate

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PROGRAMS AND SERVICES | ABOUT | MANAGED LANDS | EMPLOYMENT | COVID-19 INFO

Home | Boards and Councils | Forest Practices Board | Rules and Guidelines

- Forest Practices Rules
- **Forest Practices Board Manual**
- Forest Practices Rule Making
- Forest Practices Rule Archive

Forest Practices Board Manual

The Forest Practices Board Manual is an advisory technical supplement to the Washington State forest practices rules (Title 222 WAC). The Forest Practices Board — an independent agency — adopts forest practices rules to set standards for timber harvesting, road construction, forest chemical application and other forest practices. (See Forest Practices Rules)

Board Manual Development
DNR, in cooperation with the departments of Fish and Wildlife, Ecology, and other agencies, affected Indian Tribes, or interested stakeholders having appropriate expertise, prepares and submits board manual revisions to the Board.

FOREST PRACTICES BOARD MANUAL

To download a section of the board manual, right-click on the link, select "save target as" or "save as" from the short-cut menu and save the file to your computer or tablet. Then open the file using portable document software, such as Adobe Acrobat Reader, not your browser.

Download all sections of the Forest Practices Board Manual

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RELATED LINKS

Forest Practices Act (Chapter 76.09 RCW)

Examples of Hydraulic Plans can be Found on the Forest Practices Forms and Instructions Webpage

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Resources for Small Forest Landowners

DNR Small Forest Landowner Office 'SFLO' provides:

Regulation assistance foresters

Washington Farm Forestry Association provides: Support for small forestland owners in policy

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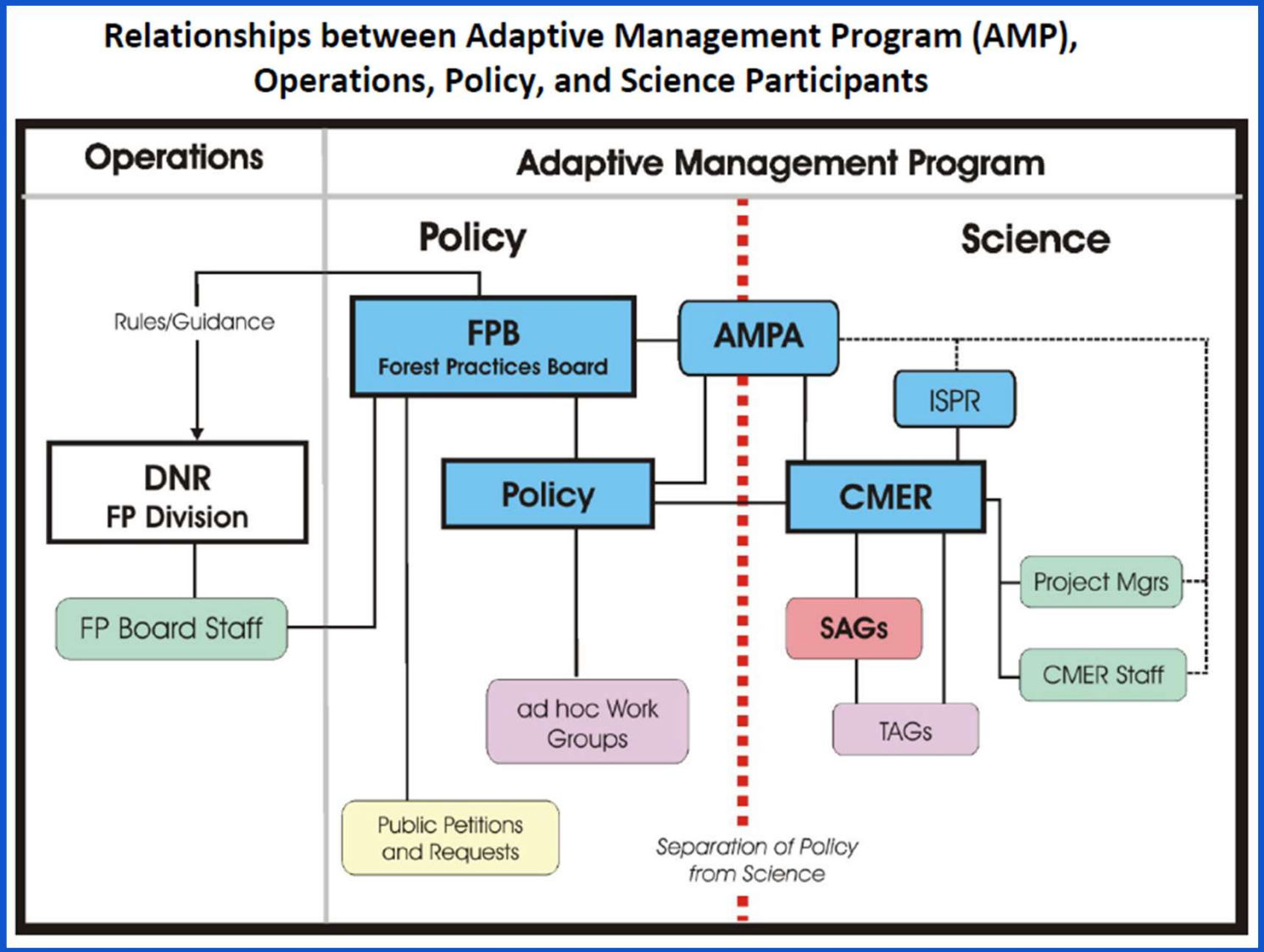

Forest Practice Rules Differ Between East and Westside

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Of all the non-point sources of pollution associated with forest disturbance: Sediment, from roads, makes up the vast majority of water quality impacts.

Thus much of the early emphasis on Forest BMPs were on roads and road crossing

now increasingly there are concerns about stream temperature…

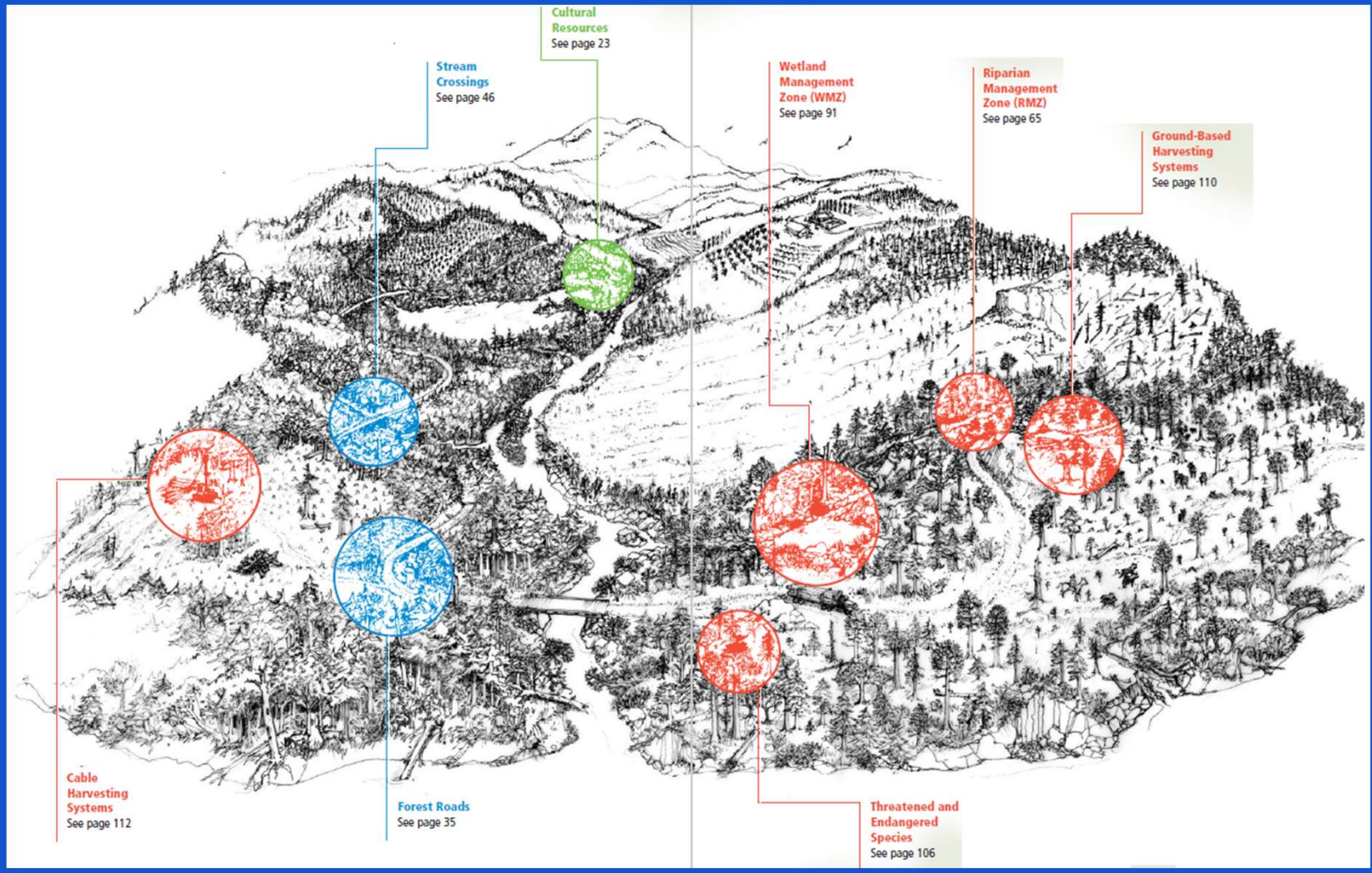

Image Source: https://www.dnr.wa.gov/forest-practices-illustrated

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Each section provides the process and methods for determining how a given BMP is to be implemented

Certain specialized tools may be required, such as:

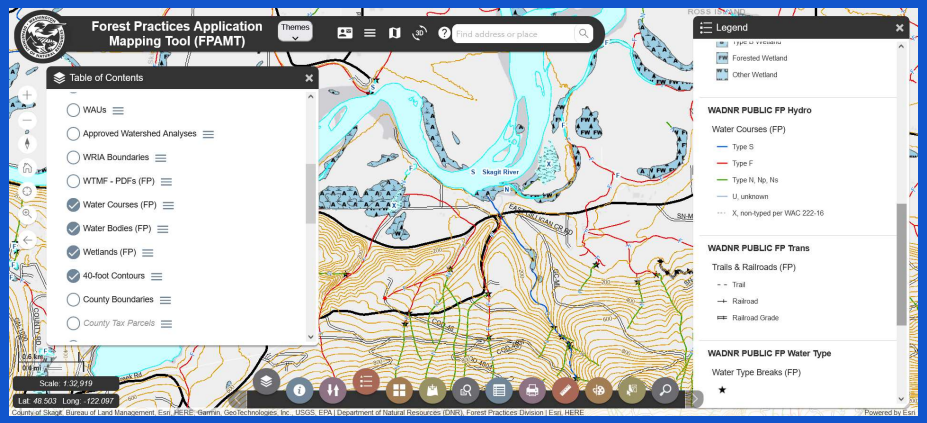
- **Spherical Densiometer***
- **Range Finder**
- **Length & Diameter Tape…**

Download individual sections of the manual:

Cover & Table of Contents
Section 1: Method for Determination of Adequate Shade Requirements on Streams
Section 2: Standard Methods for Identifying Bankfull Channel Features and Channel Migration Zones
Section 3: Guidelines for Forest Roads
Section 4: Guidelines for Clearing Slash and Debris from Type Np and Ns Water
Section 5: Guidelines for Forest Practices Hydraulic Projects
Section 6: Guidelines for Determining Acceptable Stocking Levels
Section 7: Guidelines for Riparian Management Zones (RMZ) (Measuring Widths and Tree Counts)
Section 8: Guidelines for Wetland Delineation
Section 9: Guidelines for Wetland Replacement by Substitution or Enhancement
Section 10: Non-Native Wetland Plant Species
Section 11: Standard Methodology for Conducting Watershed Analysis
Section 12: Guidelines for Application of Forest Chemicals
Section 13: Guidelines for Determining Fish Use for the Purpose of Typing Waters
Section 14: Survey Protocol for Marbled Murrelets
Section 15: Guidelines for Estimating the Number of Marbled Murrelet Nesting Plaforms
Section 16: Guidelines for Evaluating Potentially Unstable Slopes and Landforms
Section 17: Guidelines for the Small Forest Landowner Forestry Riparian Easement Program
Section 18: Guidelines for Rivers and Habitat Open Space Program
Section 19: Guidelines for Hardwood Conversion
Section 20: Guidelines for Financial Assurances
Section 21: Guidelines for Alternate Plans
Section 22: Guidelines for Adaptive Management Program
Section 23: Guidelines for Field Protocol to Locate Mapped Divisions Between Stream Types & Perennial Stream Identification
Section 24: Guidelines for the Interim Modification of Bull Trout Habitat Overlay
Section 25: Guidelines for Bull Trout Presence Survey Protocol
Section 26: Guidelines for Large Woody Debris Placement Strategies

Image Source: https://www.dnr.wa.gov/about/boards-and-councils/forest-practices-board/rules-and-guidelines/forest-practices-board-manual

Water Course Types are found online



Water Type Classifications

The following table provides a general description of forest practices water type classifications currently in use.

Type	Description
Type"S"= Shoreline	Streams and waterbodies that are designated "shorelines of the state" as defined in chapter 90.58.030 RCW. **(formerly type 1)**
Type "F" = Fish	Streams and waterbodies that are known to be used by fish, or meet the physical criteria to be potentially used by fish. Fish streams may or may not have flowing water all year; they may be perennial or seasonal. **(formerly type 2 or 3)**
Type"Np"= Non-Fish	Streams that have flow year round and may have spatially intermittent dry reaches downstream of perennial flow. Type Np streams do not meet the physical criteria of a Type F stream. This also includes streams that have been proven not to contain fish using methods described in Forest Practices Board Manual Section 13. **(formerly type 4)**
Type"Ns"= Non-Fish Seasonal	Streams that do not have surface flow during at least some portion of the year, and do not meet the physical criteria of a Type F stream. **(formerly type 5)**

Type X is a symbol on DNR maps that identifies various water features (for example: irrigation ditches, sanitation ponds, pipeline, etc.) which are not part of the above classifications. Type U is a symbol on DNR maps that identifies unknown water features that need to be verified and identified on proposed forest practices activity maps.

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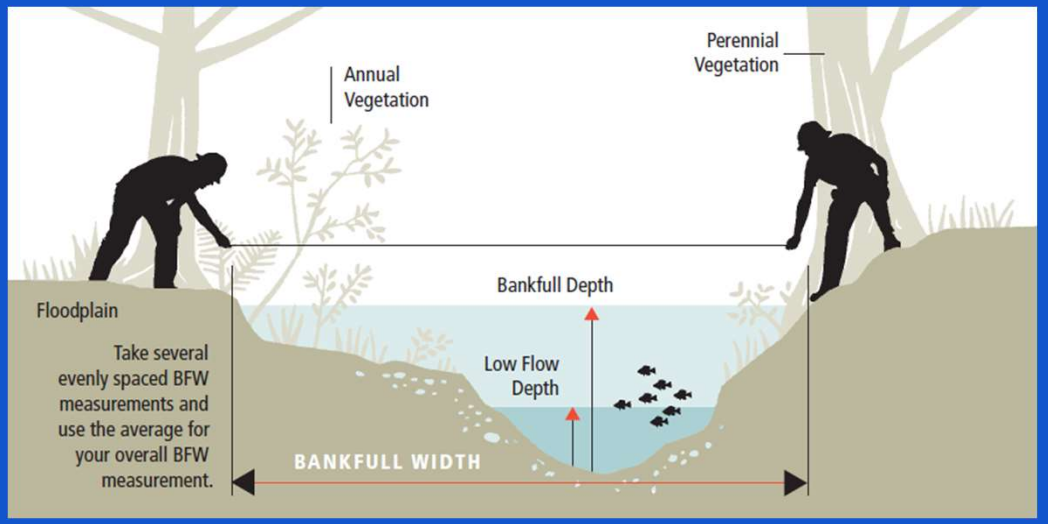
Washington Forest Practices Rules: Identifying and Measuring the Bankfull Channel Width: Part 1 (video)

Importance of Determining Bankfull

1. Water Typing
2. Used to determine where shade measurements are made
3. Where Riparian Management Zones begin and end
4. Stream Crossing Design



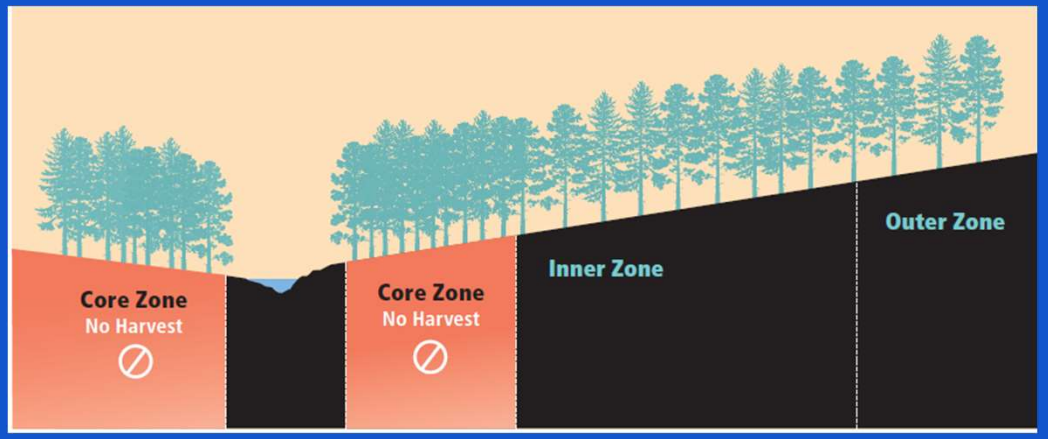


Image Source: https://www.dnr.wa.gov/forest-practices-illustrated

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Bank Full Indicators

1. Stream bank Shape
2. Vegetation
3. Stream Bank and Channel Sediments

http://www.youtube.com/watch?v=G8D_731_KIc

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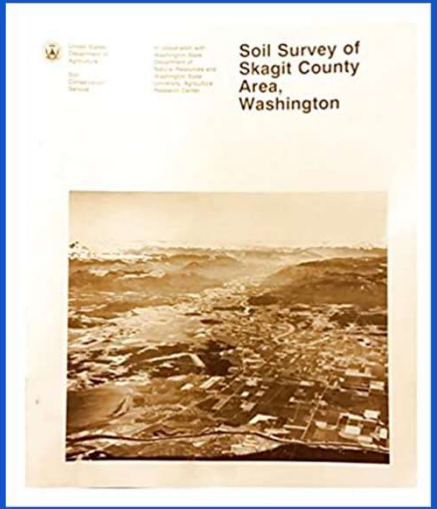
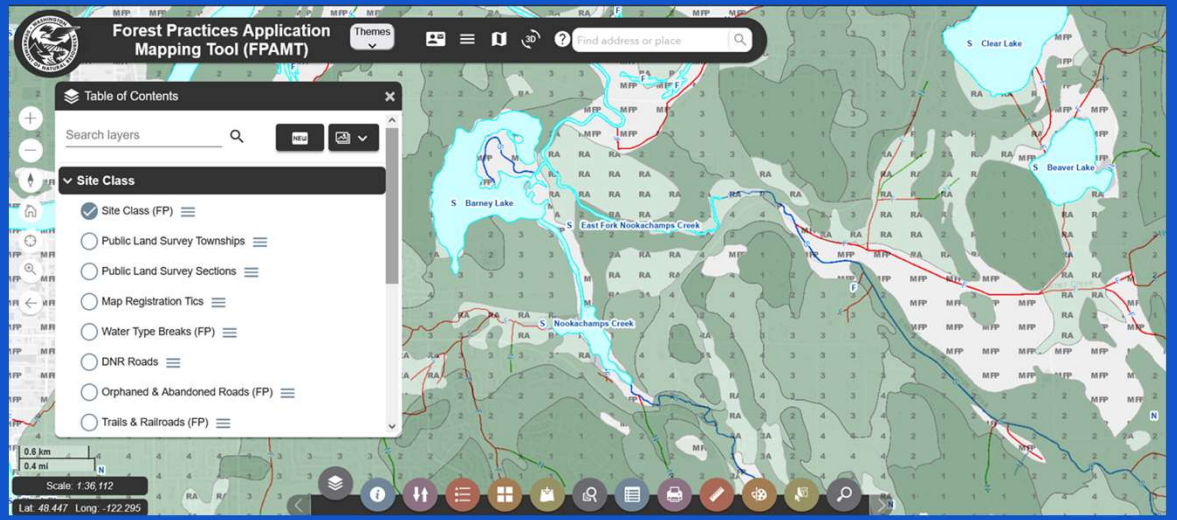
Site Class: A grouping of site indices that are used to determine the 50-year or 100-year site class. In order to determine site class, the landowner will obtain the site class index from the state soil survey, place it in the correct index range shown in the two tables provided in this definition, and select the corresponding site class. The site class will then drive the RMZ width. (See WAC 222-30-021 and 222-30-022.)



Site Class Determined Online:

Forest Practice Application Mapping Tool



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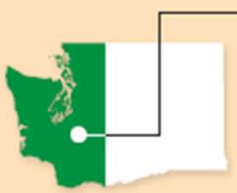
Riparian Management Zones



WESTERN WASHINGTON

S | F

TYPE 'S' OR 'F'
WESTERN WASHINGTON
RMZ REQUIREMENTS

TYPES 'S' AND 'F' ARE FISH HABITAT STREAMS

Site Class	Total RMZ Width	Core Zone Width[1]	Inner Zone Width [2]		Outer Zone Width [3]	
			Stream ≤ 10'	Stream > 10'	Stream ≤ 10'	Stream > 10'
I	200'	50'	83'	100'	67'	50'
II	170'	50'	63'	78'	57'	42'
III	140'	50'	43	55'	47'	35'
IV	110'	50'	23	33'	37'	27'
V	90'	50'	10'	18'	30'	22'

No Harvest

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Image Source: https://www.dnr.wa.gov/forest-practices-illustrated

Determining Adequate Shade on Streams

* Using correct methods is critical to assessing the effectiveness of BMP!

Figure Source:
SB Jennings, ND Brown, D Sheil, Assessing forest canopies and understorey illumination: canopy closure, canopy cover and other measures, Forestry: An International Journal of Forest Research, Volume 72, Issue 1, 1999, Pages 59–74

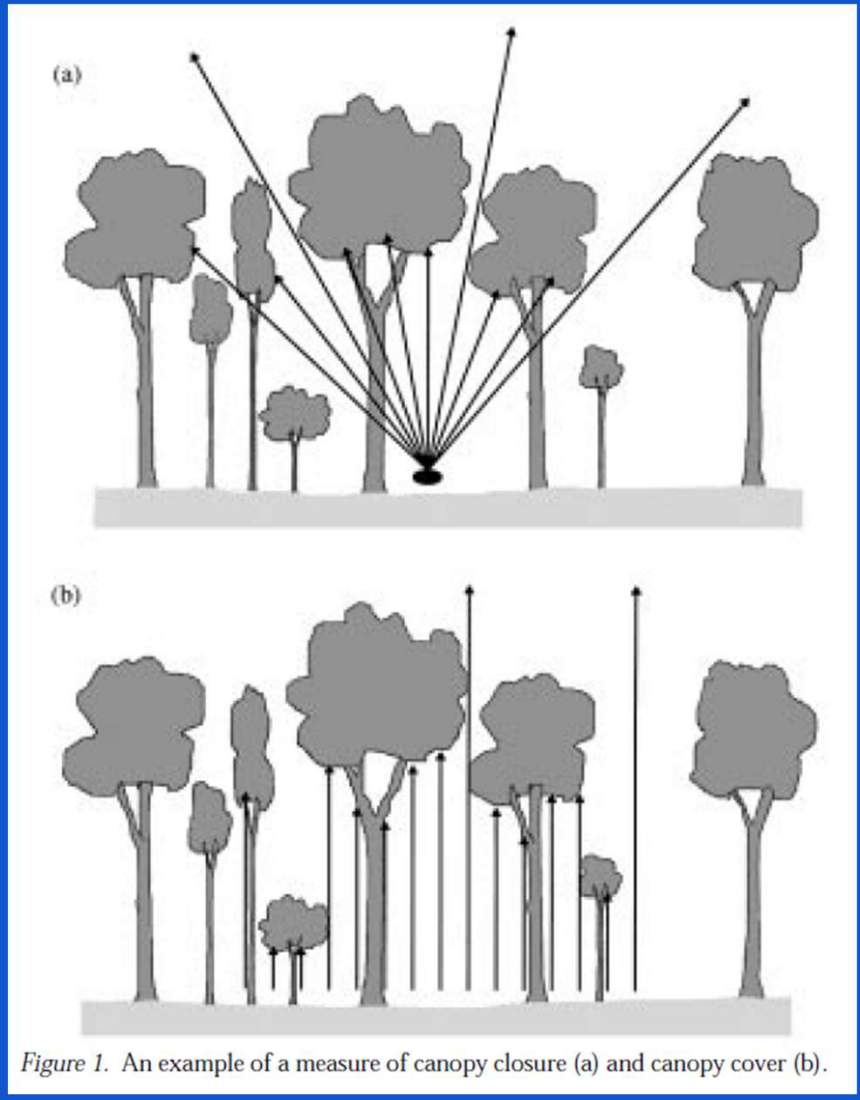

Figure 1. An example of a measure of canopy closure (a) and canopy cover (b).

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Forest Road BMPs

1. Road Locations (topography)
2. Width (cut and fill)
3. Crossings (fish and flow requirements)
4. Surface shape and materials

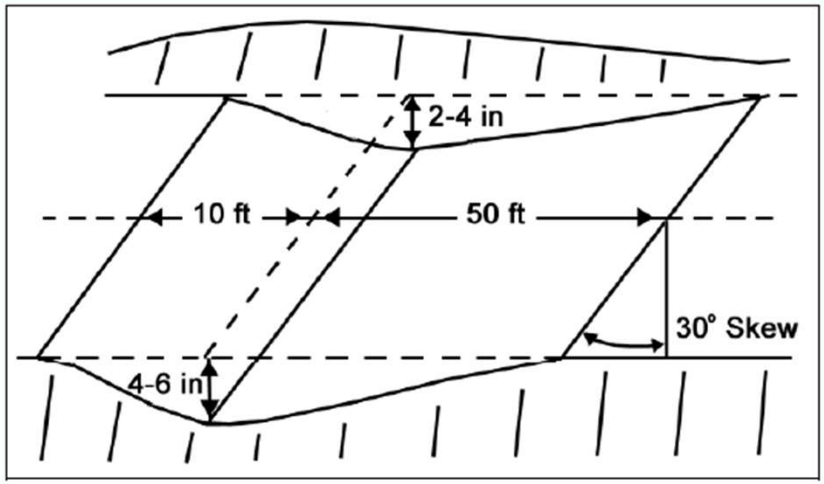

Figure 3.2 Diagram of a rolling dip

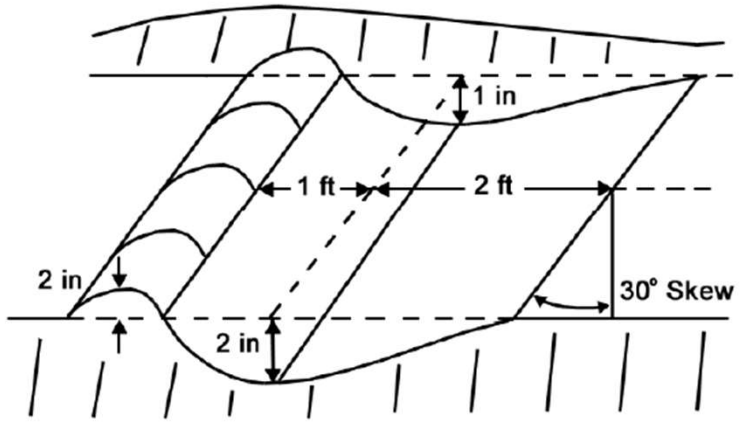

Figure 3.3 Diagram of a water bar

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Road Location

Modified from: Adams and Storm, 2011

Unacceptable option: Roads should not be built or reconstructed next to stream channels where multiple crossings are required. Many older roads may have been built in these locations and they are expensive to maintain and can greatly impact the stream. Whenever possible, these roads should be decommissioned and moved to more favorable locations.

Least preferred option: Roads built on steep or inner gorge slopes near streams should be avoided if possible. If not, they may require special construction techniques, such as full bench endhauling. Roads will require high maintenance and slopes in these areas may be unstable and prone to road failures that impact streams.

Preferred option: Roads should be aligned to take advantage of benches, low gradient slopes, upper hillslope areas and ridges. Generally, roads in these locations will be farthest from streams, have the fewest stream crossings, cost less to construct, be easier to drain, and require less maintenance.

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Road Terminology

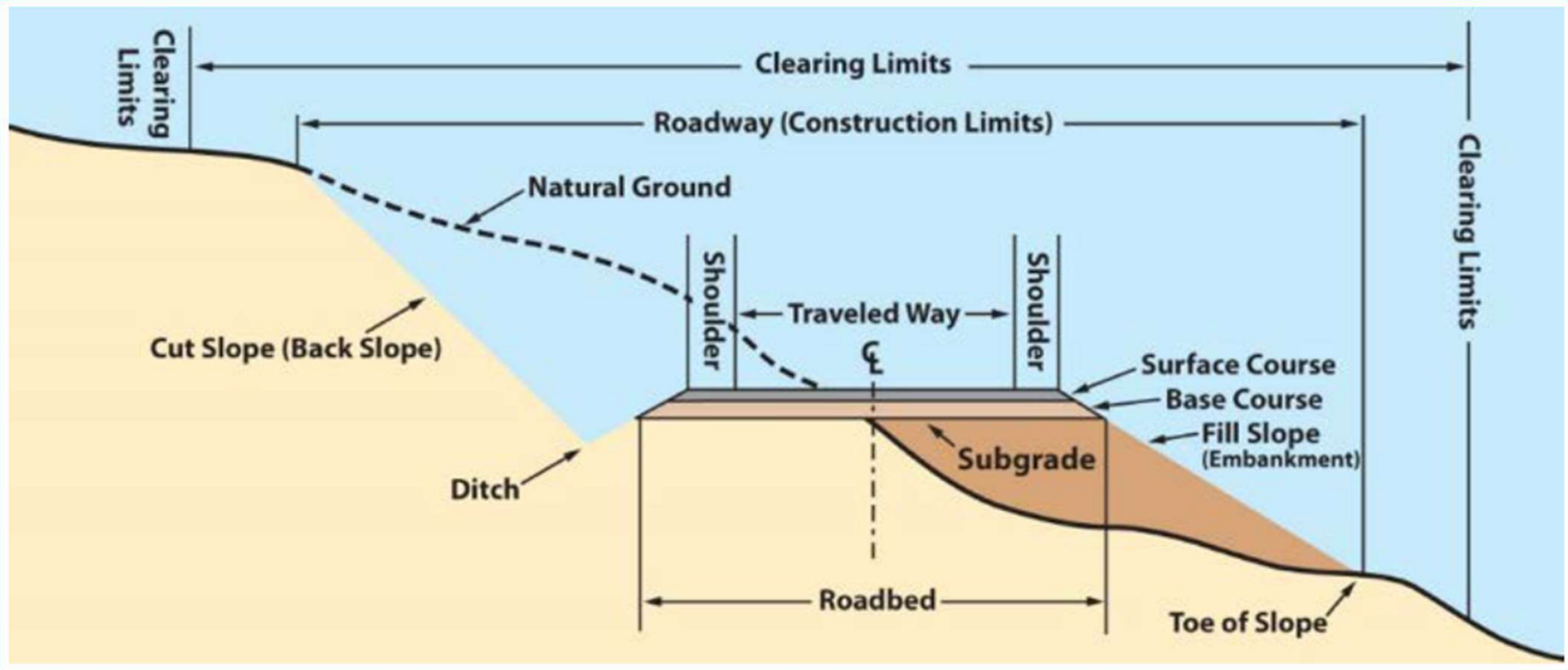

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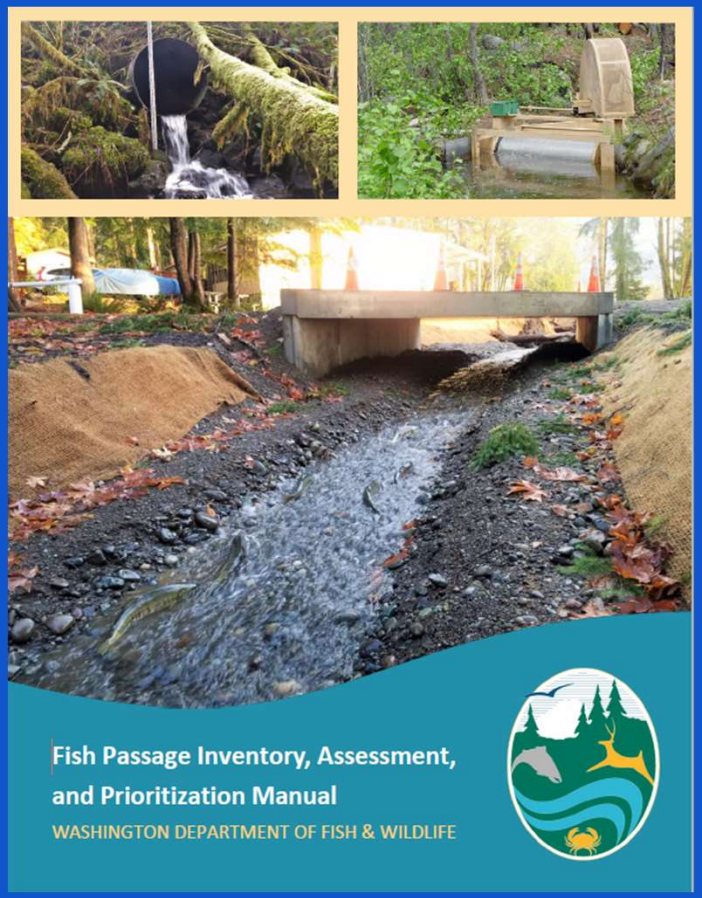
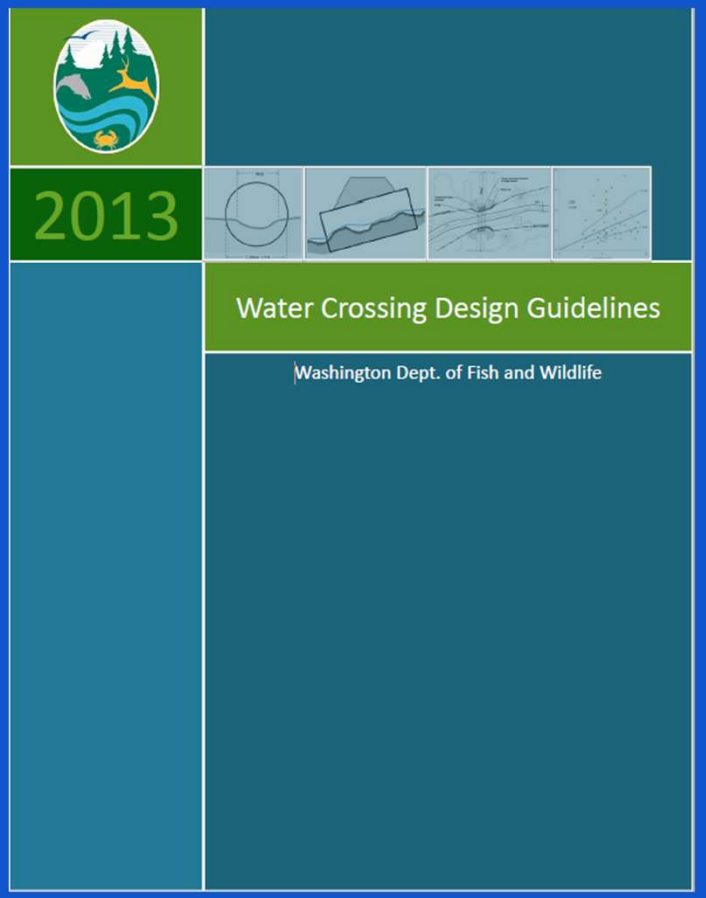
Image Source: Steinfeld et al., 2007

Crossings go through rigorous review for fish passage

When required (State Waters) WDFW has a Hydraulic Project Approval process…





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Wetland Management Zone

all wetland types within 200 feet of your harvest, including those on your neighbor's property (with the neighbor's permission).

Wetlands: Areas that are saturated or covered with water long enough and often enough that their soils and plants differ from those in nearby uplands.

Type A Wetlands: At least 1/2 acre of open water for one week during the growing season, with surrounding crown closure less than 30 percent (see Board Manual in Forest Practices Rule book for specics).

Type B Wetlands: All other non-forested wetlands greater than 1/4 acre.

Forested Wetlands: Wetlands with tree canopy closure of at least 30 percent.

TREES PER 1,000 LINEAR FEET OF WETLAND BOUNDARY
WESTERN WASHINGTON

	100' Width WMZ: 172 Total Trees	50' Width WMZ: 86 Total Trees	25' Width WMZ: 43 Total Trees
6" DBH	115	57	29
12" DBH	46	23	11
20" DBH	11	6	3

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Image Source: https://www.dnr.wa.gov/forest-practices-illustrated

Many sources of Effectiveness Results….

Adaptive Management means were never really done refining BMPs

Edwards, Pamela J.; Wood, Frederica; Quinlivan, Robin L. 2016. Effectiveness of best management practices that have application to forest roads: a literature synthesis. Gen. Tech. Rep. NRS-163. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 171 p.

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Stumped? Got Questions?

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