Freshwater Mussels and Riparian Restoration

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Image credit: Xerces Society.

What is a freshwater mussel?

Asian clam

- nonnative
- does not use a host fish
- widespread in Columbia basin

zebra/quagga mussel

- nonnative, not present in WA
- does not use a host fish
- small, use of byssus

freshwater mussel

- uses a host fish to complete life cycle
- benthic, burrowing, and forming beds
- long-lived and multiple species found in Washington watersheds
- native and imperiled

Image credit: Xerces Society; USFWS.

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Why are mussels imperiled?

Historic Impacts

- Overharvest (e.g., button industry)
- Habitat destruction

Button shell (Yellow sandshell; *Lampsilis teres*) and button blanks

Chronic Threats

- Habitat alteration
- Water management
- Invasive species

Recent and Emerging Issues

- Enigmatic die-offs
- Lack of reproduction
- Climate change

Image credit: Illinois State Museum/Karen Little and Robert Warren; Xerces Society/Emilie Blevins.

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Mussel Life History

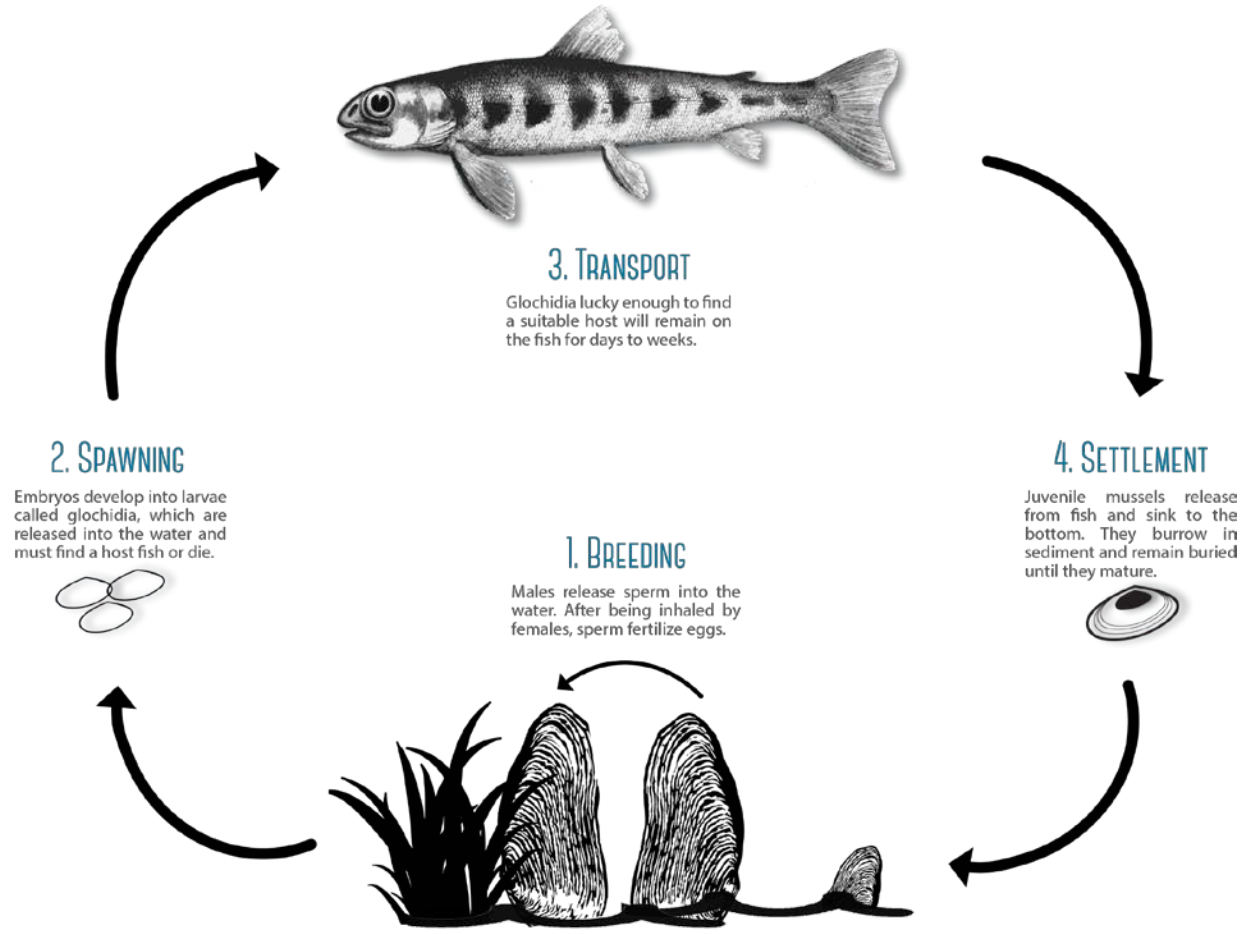

Image credit: Xerces Society.

- Larval, juvenile, and adult life stages
- Host fish relationship
- Dispersal
- Males, females, and hermaphrodites
- Brooding in gills
- Long-lived and productive

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Western Pearlshell

Image credit: USFWS/Roger Tabor.

Margaritifera falcata

- Lifespan up to 100+ years
- Salmonid host specialist
- Widest western North American distribution
- Beds can exceed 10,000s
- ID by “teeth” and papillae arrangement

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Floaters

Image credit: USFWS/Roger Tabor.

***Anodonta* spp.**

and

Sinanodonta beringiana

- Lifespan 10 – 20 years
- Host fish generalist
- Wide distribution
- Similar appearance but genetically distinct
- ID by lack of “teeth” and papillae arrangement

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Western Ridged Mussel

Image credit: USFWS/Roger Tabor.

Gonidea angulata

- Lifespan 30 to 60+ years
- Greater variety of host fish
- More limited in western North American distribution
- More cryptic and sessile
- Greatest declines
- ID by shell shape and papillae arrangement

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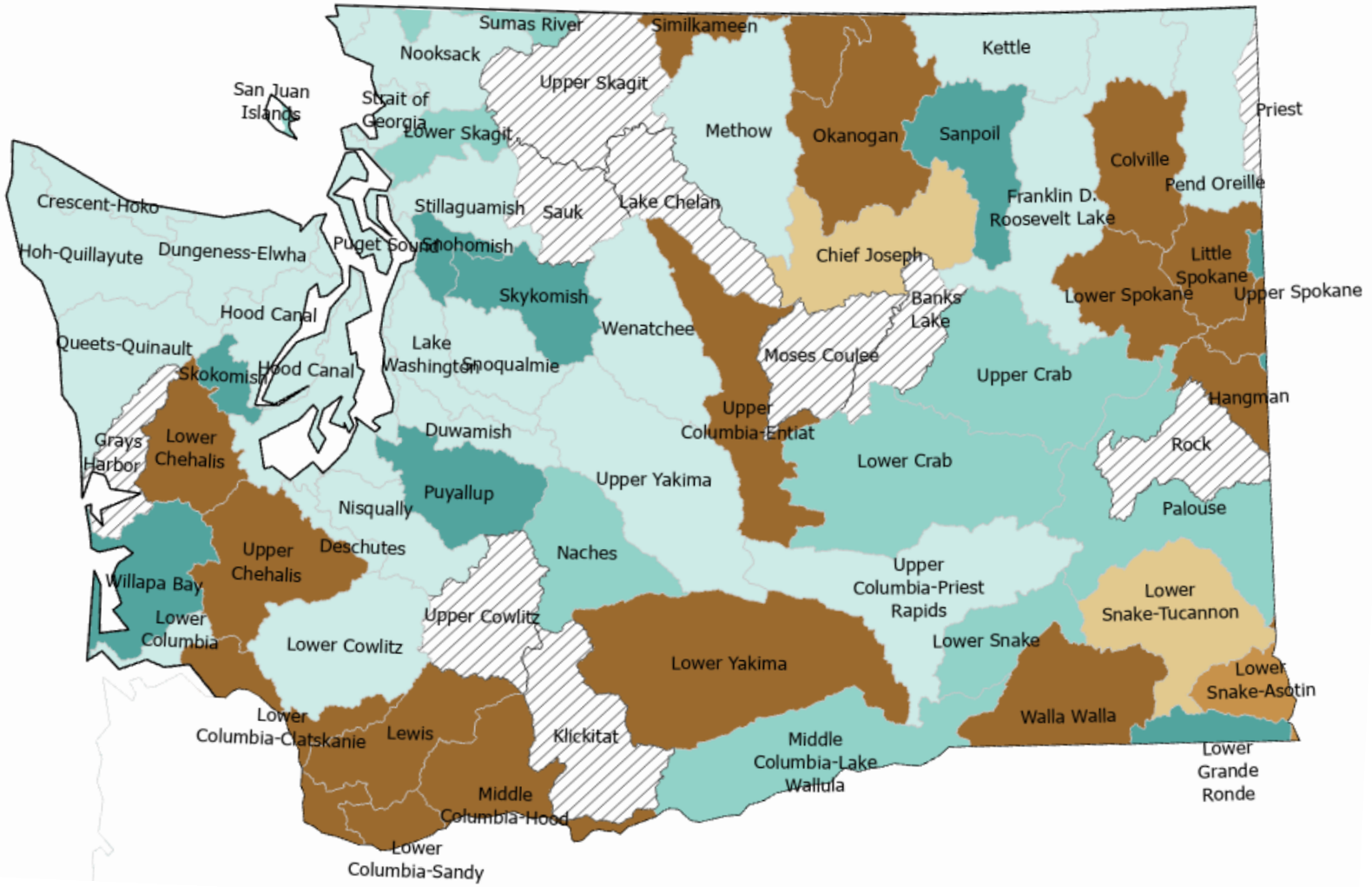
FW Mussels in WA



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Importance of Freshwater Mussels

Filter water and capture nutrients, remove pollutants	Create habitat, increase benthic complexity	Serve as food for mammals, birds, and other species	Increases growth and production of other aquatic species
			

Image credit: Xerces Society.

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Mussel Habitat

Lakes and Ponds	Streams and Creeks	Large and Small Rivers	Perennial Waterbodies
			

Image credit: Al Smith; Xerces Society/Emilie Blevins, Candace Fallon.

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Mussel Needs

Stable Features	Diverse Structure	Burrowing Material	Host Fish
			

Image credit: Methow Salmon Recovery Foundation/John Crandall; Xerces Society/Emilie Blevins; USFWS/Roger Tabor.

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Watershed Context

Image credit: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community; Data credit: CDFW/Justin Garwood.

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Removal of Stability

Image credit: Xerces Society.

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Riparian Habitat Degradation

Image credit: Xerces Society.

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Substrate Habitat Degradation

Image credit: Xerces Society.

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Freshwater Mussel BMPs

Freshwater mussels are sensitive to restoration practices, but BMPs can help protect them.



For Restoration planners, site managers, fish biologists, and contractors:

- *Conserving the Gems of Our Waters: https://xerces.org/conserving-the-gems-of-our-waters/*
- *Mussel-Friendly Restoration: https://xerces.org/mussel-friendly-restoration/*
- *Western Freshwater Mussel Database (*https://www.xerces.org/endangered-species/freshwater-mussels/database; *Emilie.Blevins@xerces.org)*

Image credit: USFWS/Roger Tabor.

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Technique: Conduct Surveys in Advance

- Wading or snorkeling
- Working with fish or wildlife biologists
- Consulting the Western Freshwater Mussel Database

Image credit: Xerces Society.

Technique: Overlay Your Project with Mussel Observations

- Compare your work with mussel bed locations
- Identify areas of potential impact (invasive plant removal, dewatering, bed or bank alteration, etc.)
- Identify areas of potential enhancement

Image credit: Xerces Society.

Technique: Protect Mussel Beds

- Time work to avoid sensitive life stages
- Leave as much existing habitat as possible and protect mussels on-site
- Plan for a potential salvage and relocation effort
- If feasible, establish an exclusion area (+ buffer distance of at least 5 m) around mussels

Image credit: Xerces Society.

Technique: Promote Pockets of Stability

Image credit: River Design Group; Xerces Society.

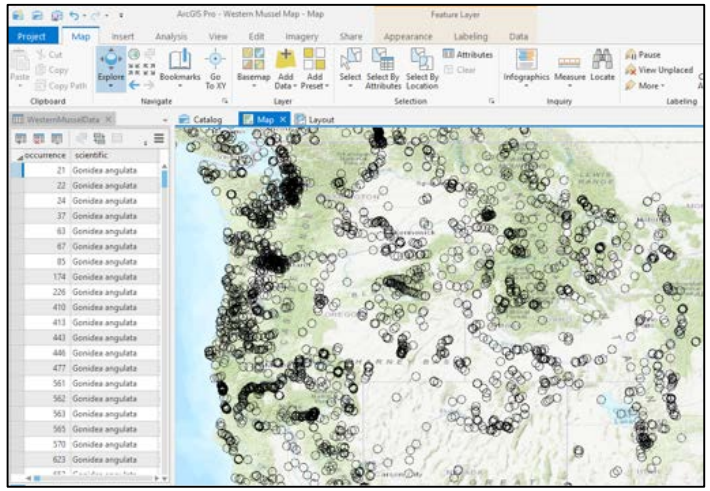
Technique: Protect Banks

Image credit: River Design Group; Xerces Society.

The Payoff

Image credit: Xerces Society.

Xerces Resources



- Surveys and research to support conservation
- Information sharing to increase support
- Partnership with the Confederated Tribes of the Umatilla Indian Reservation Mussel Project

Image credit: Xerces Society.

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Become a freshwater mussel conservation partner:

Join the PNW Mussel Workgroup!

Emilie.Blevins@xerces.org; www.xerces.org

PNW Workgroup: www.pnwmussels.org

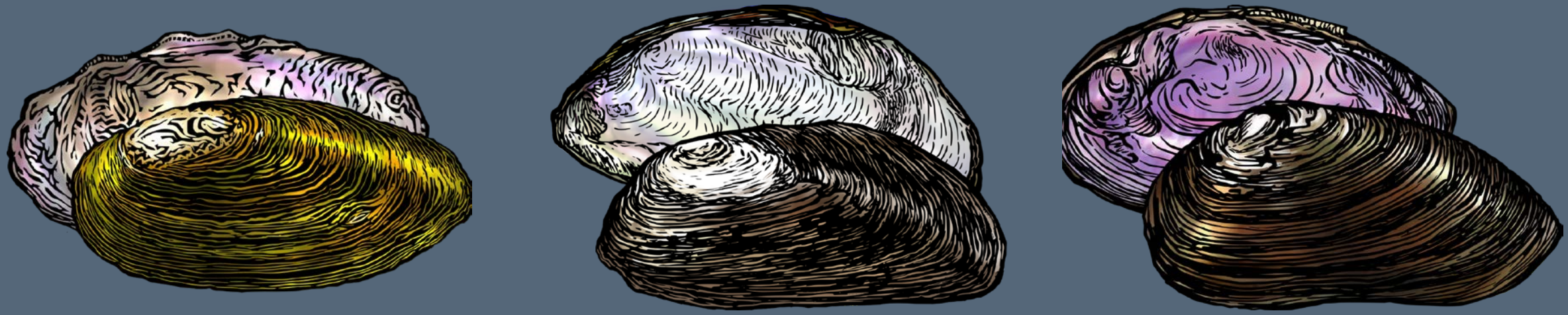

Image credit: Patrick Norton Illustrations.

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