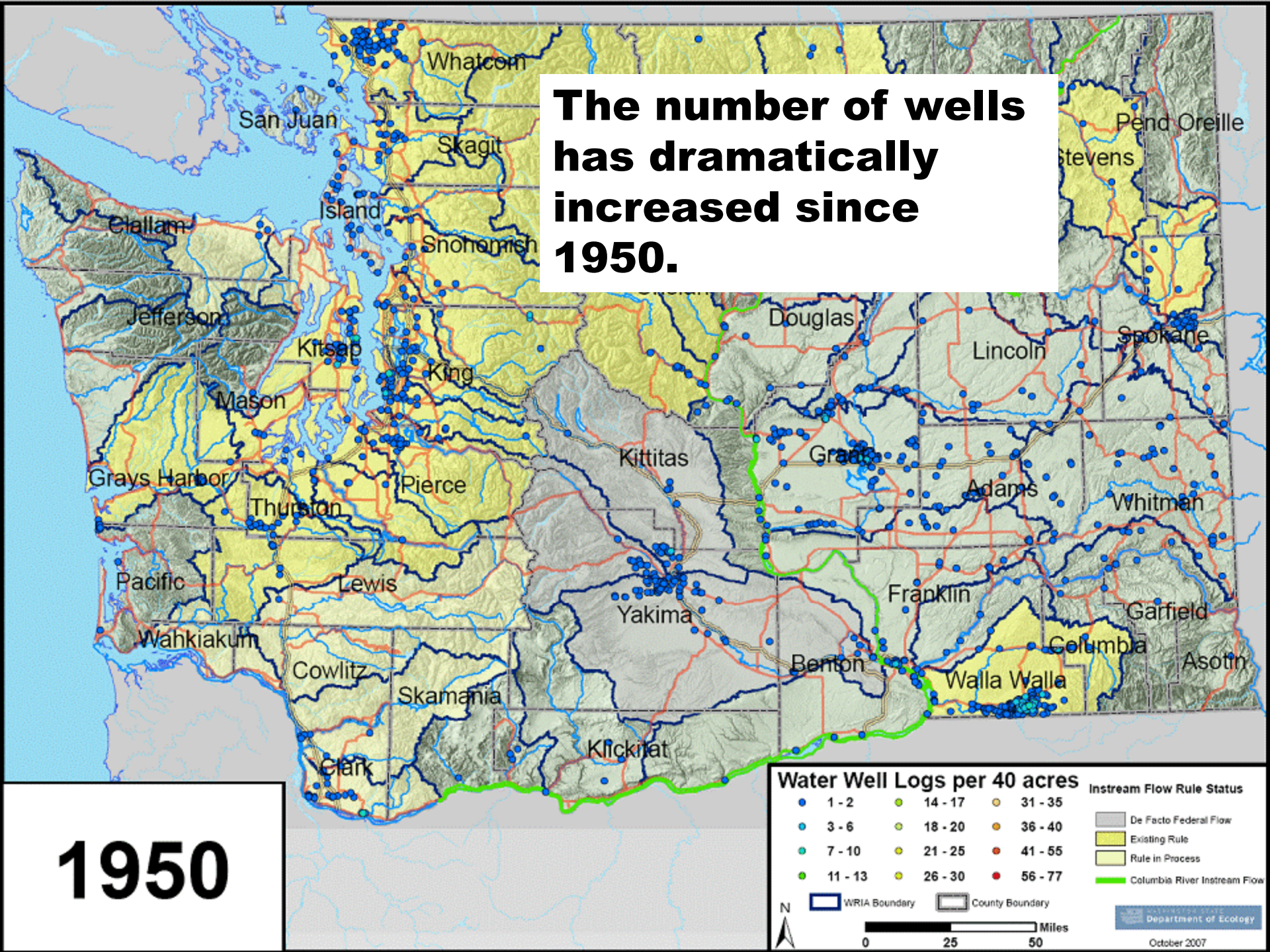
Setting Instream Flows In Washington State.

Why do we need Instream Flows?

We need instream flows to prevent further degradation to existing fish, wildlife, recreational, aesthetic, scenic, navigation, and other environmental values.


The number of wells has dramatically increased since 1950.
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Water Well Logs per 40 acres
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31 - 35
36 - 40
41 - 55
56 - 77
WRIA Boundary
County Boundary
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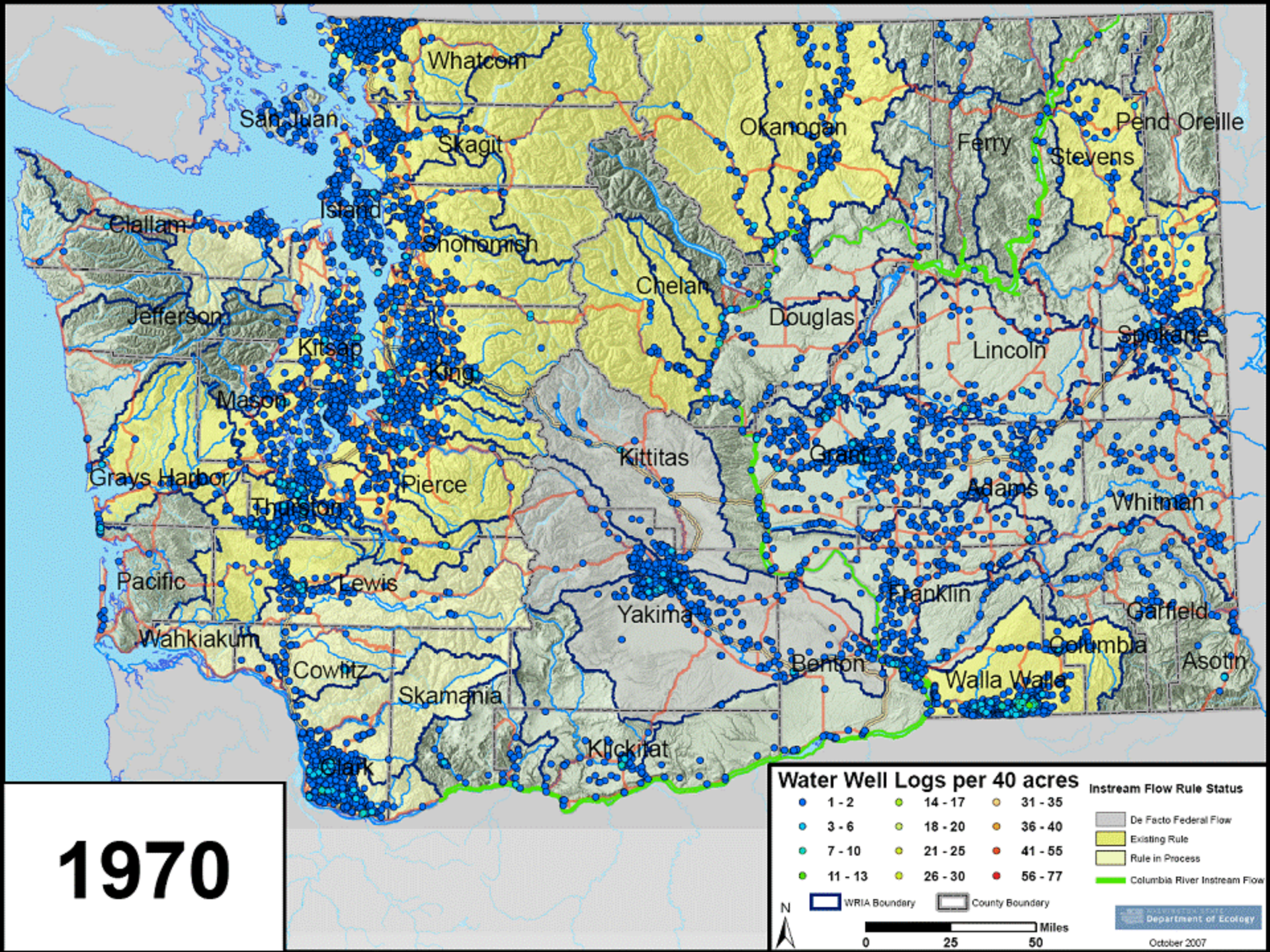
Instream Flow Rule Status
De Facto Federal Flow
Existing Rule
Rule in Process
Columbia River Instream Flow
Department of Ecology
October 2007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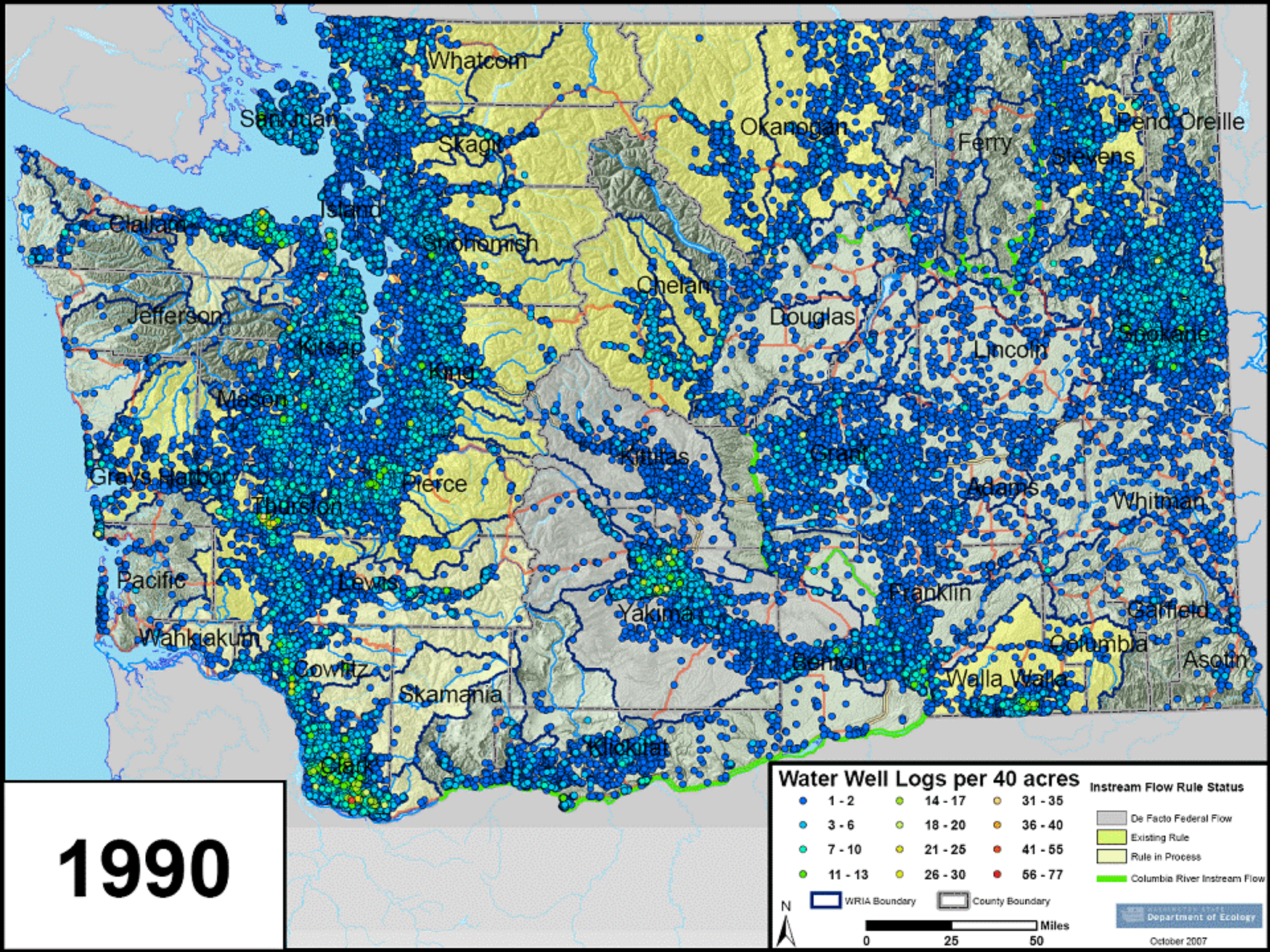
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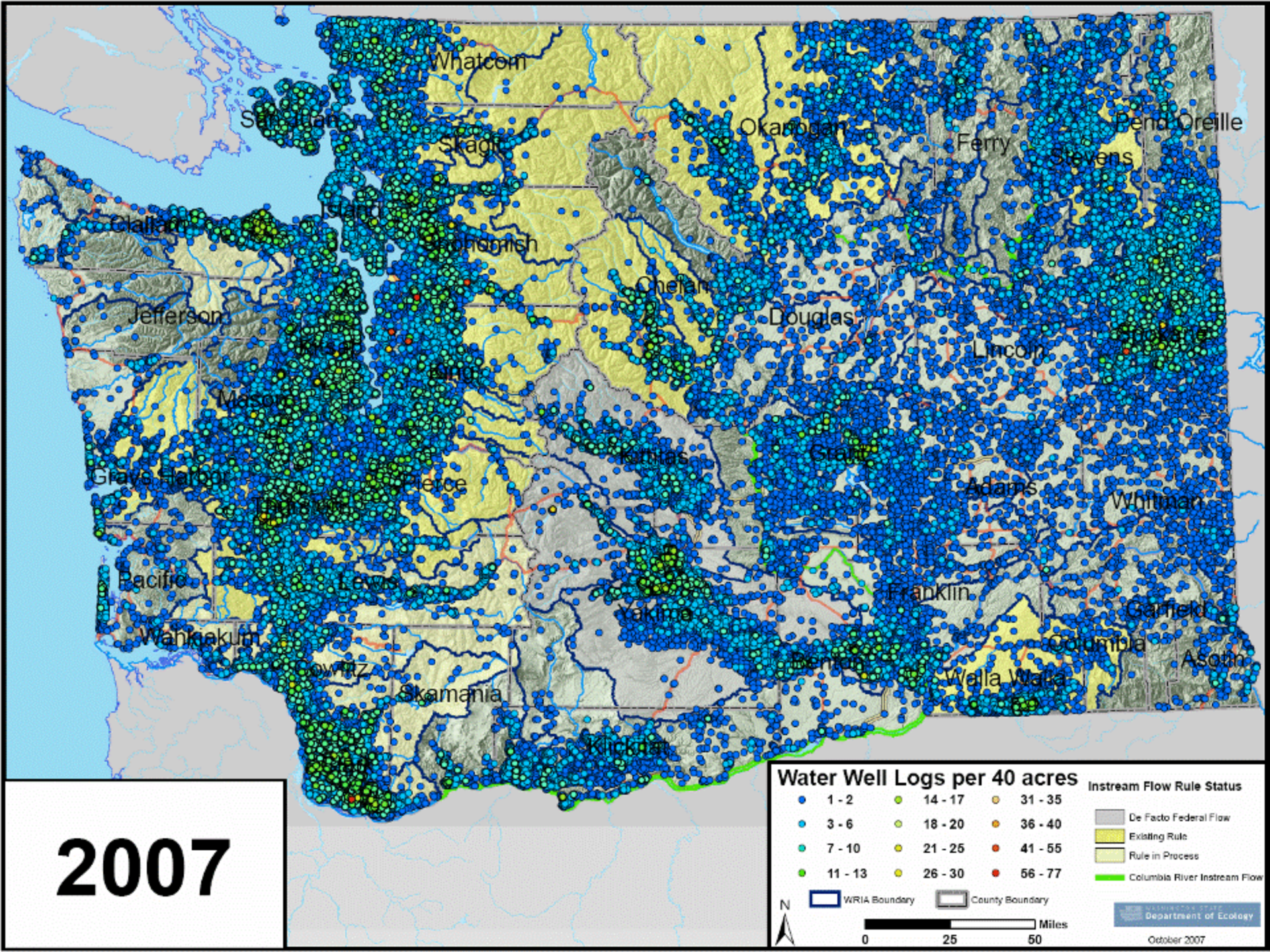
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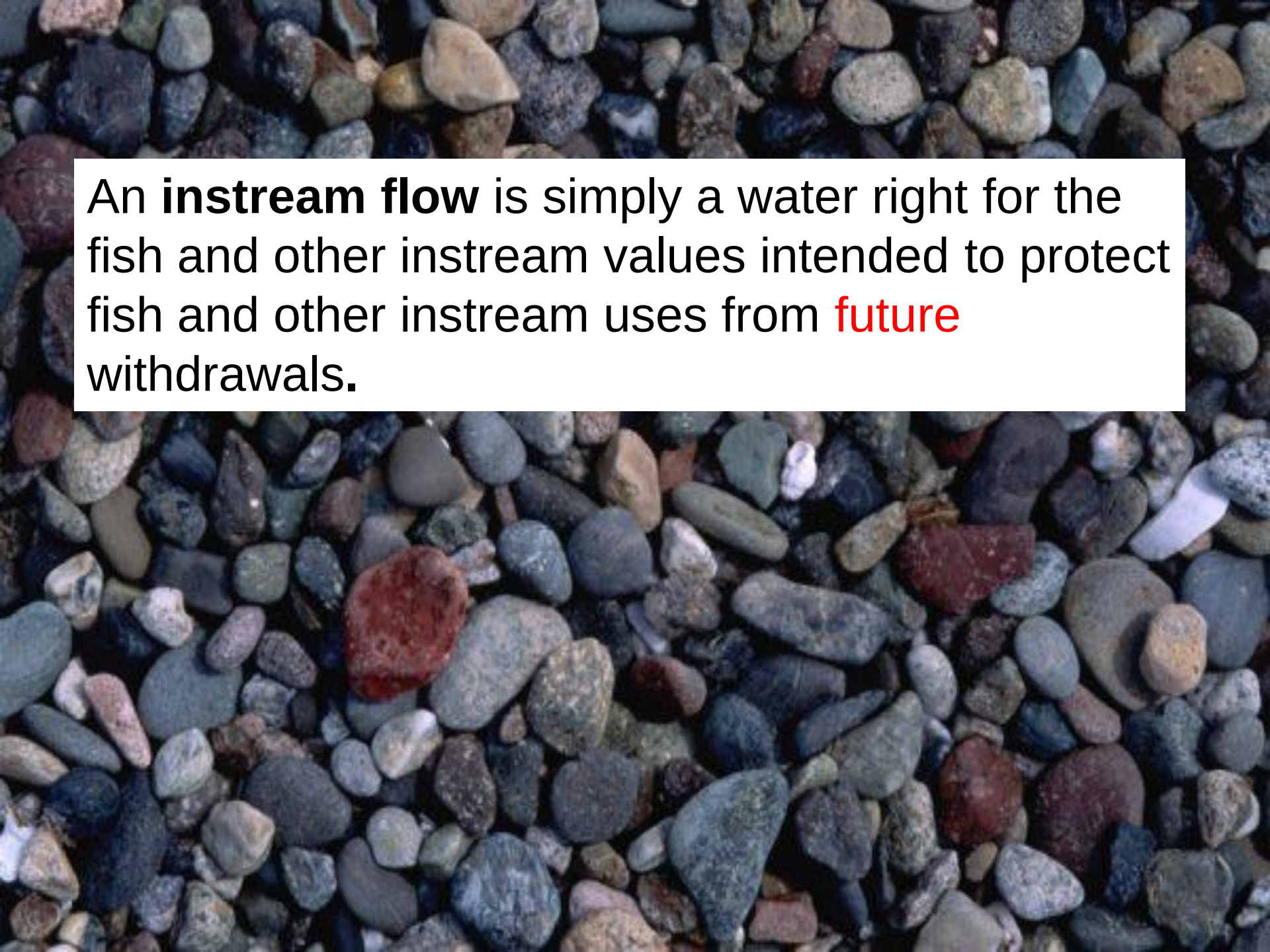
Definitions:

Flow or **Streamflow:** It's the quantity of water flowing down a stream.

Instream Flow: It's a legal term.

Base flow = minimum instream flow = instream flow.

Streamflow above this number is unneeded for protecting fish and other instream resources and may be given away by Dept of Ecology.



An **instream flow** is simply a water right for the fish and other instream values intended to protect fish and other instream uses from future withdrawals**.**

Calculating Instream Flows

- One goal is to protect flows needed for:

- Fish rearing
- Fish spawning
- Fish migration


Salmon need specific depths and velocities for 1) juveniles to rear and 2) adults to spawn.

Two Instream Flow Methods commonly used in Washington :

1) Toe-width:

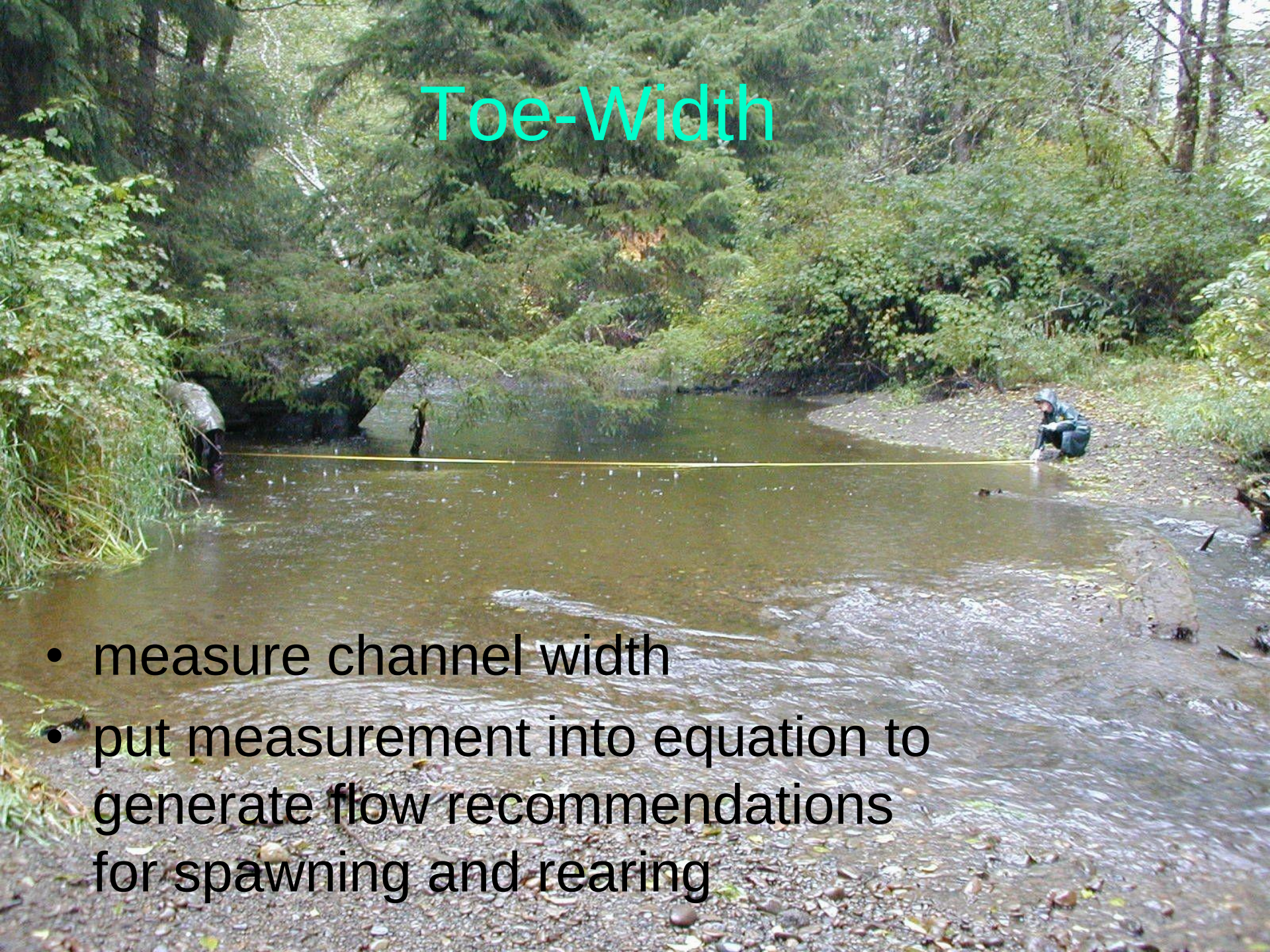
Simple stream width measurement and calculation. Determines a good spawning and rearing flow for salmon and steelhead. Based on correlations to fish habitat versus flow studies throughout Washington.

2) IFIM / PHABSIM:

Requires many more site-specific stream measurements of depth, velocity, substrate and cover.

Calculates the full fish habitat versus streamflow relationship.

Toe-Width



- measure channel width
- put measurement into equation to generate flow recommendations for spawning and rearing

Toe-Width fish habitat results for Snow Creek.

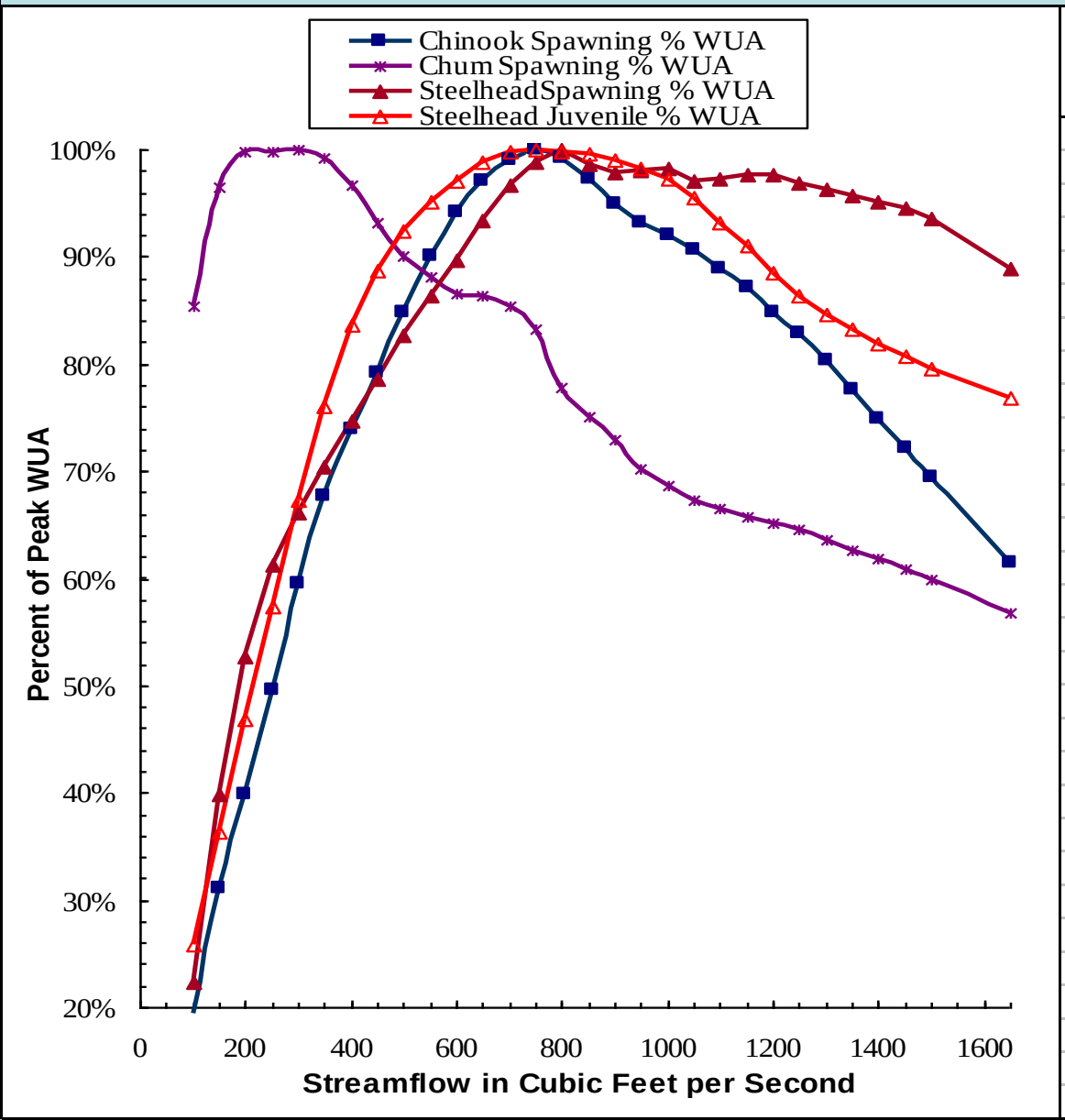
Stream	**Toe-Width** **(feet)**	**Spawning and Rearing flows** **(cfs)**
Snow Creek at River Mile 3.9	15.2	Summer chum spawning 19.4 Coho spawning 19.4 Coho rearing 7.0 Steelhead spawning 36.4 Steelhead rearing 7.8

IFIM / PHABSIM

- Measure stream along several cross-sections at low, medium, and high streamflows

- Create a computer model of the depths, velocities, bottom substrates at different streamflows

IFIM (WUA) results showing how a change in streamflow (cfs) results in a percent loss or gain of fish habitat.



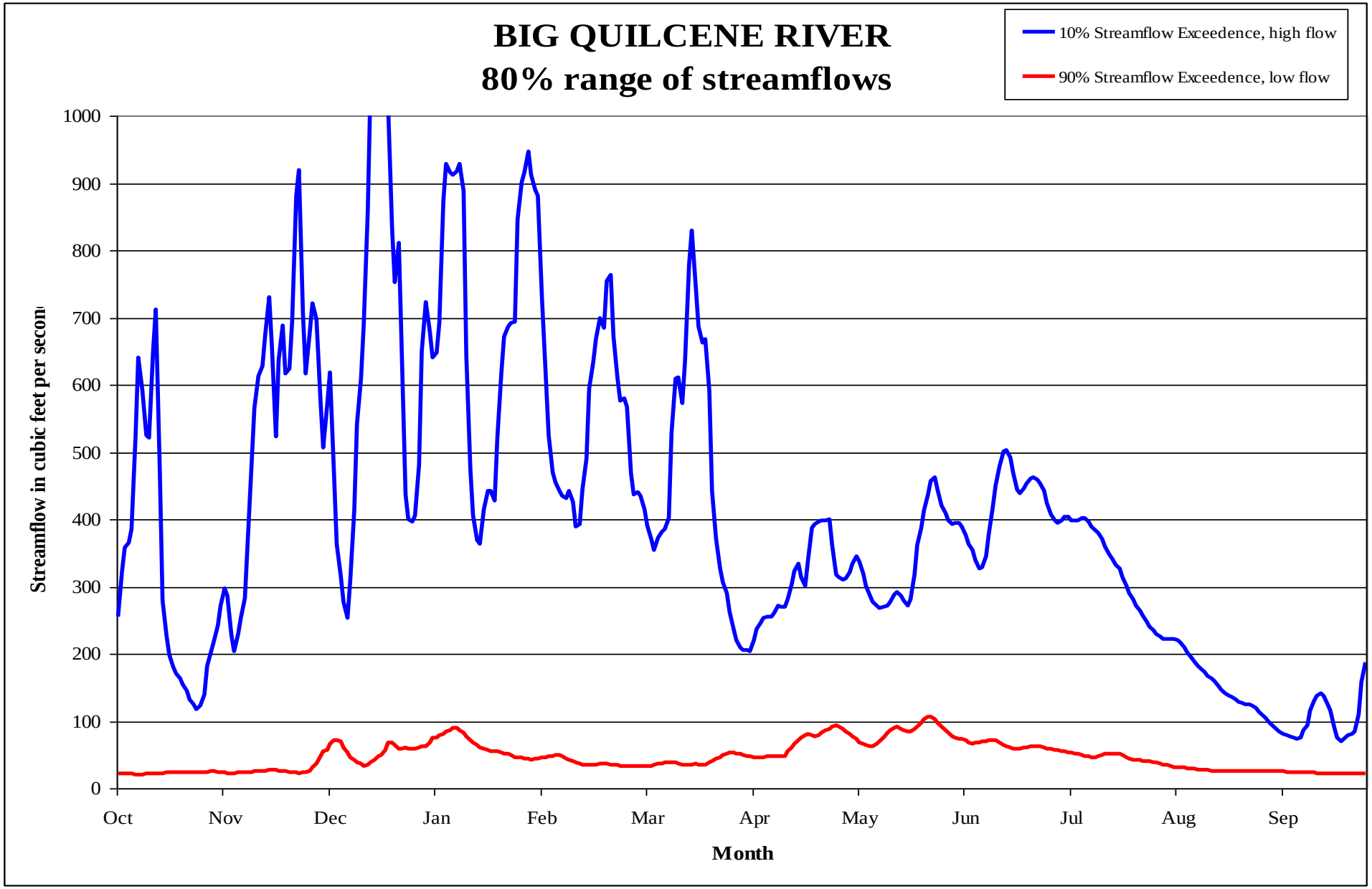
Flow (cfs)	Chinook Spawning % WUA	Chum Spawning % WUA	Steelhead Spawning % WUA	Steelhead Juvenile % WUA
100	19%	85%	22%	26%
150	31%	97%	40%	36%
200	40%	**100%**	53%	47%
250	50%	**100%**	61%	57%
300	60%	**100%**	66%	67%
350	68%	99%	70%	76%
400	74%	97%	75%	84%
450	79%	93%	79%	89%
500	85%	90%	83%	92%
550	90%	88%	86%	95%
600	94%	87%	90%	97%
650	97%	86%	93%	99%
700	99%	85%	97%	**100%**
750	**100%**	83%	99%	**100%**
800	99%	78%	**100%**	**100%**
850	97%	75%	99%	**100%**
900	95%	73%	98%	99%
950	93%	70%	98%	98%
1000	92%	69%	98%	97%
1050	91%	67%	97%	96%
1100	89%	67%	97%	93%
1150	87%	66%	98%	91%
1200	85%	65%	98%	89%
1250	83%	65%	97%	86%
1300	80%	64%	96%	85%
1350	78%	63%	96%	83%
1400	75%	62%	95%	82%
1450	72%	61%	95%	81%
1500	69%	60%	93%	80%
1650	61%	57%	89%	77%

What other information is needed to develop an instream flow?

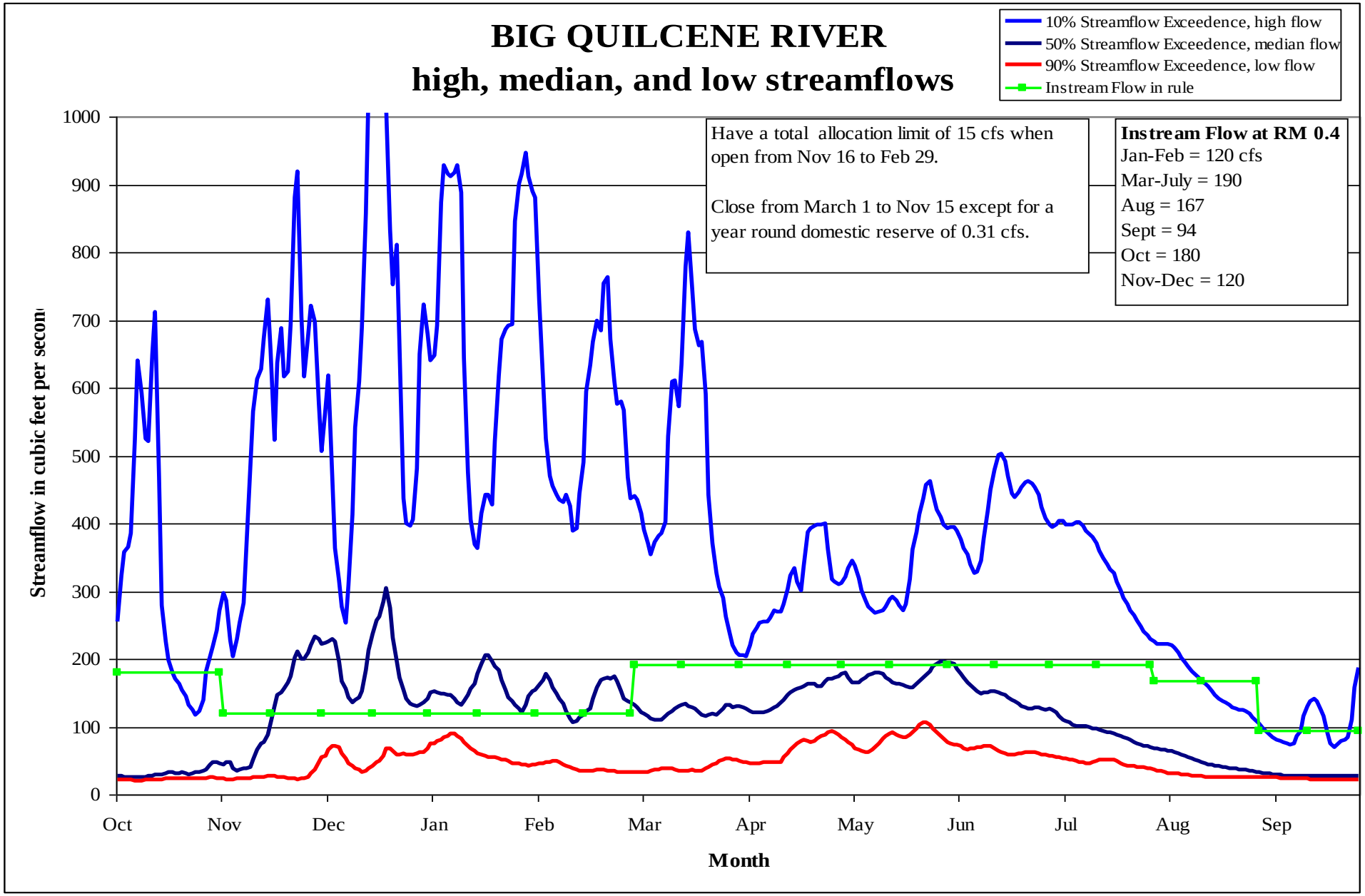
A hydrograph will tell us how much streamflow has existed in the stream.

With so many streamflow numbers we use statistics: exceedance levels.

Then we compare the instream flow to these exceedance levels.



This is the instream flow (in green) based on a fish habitat study (IFIM/PHABSIM) and adopted into rule to be used to condition new water rights.



More information is available at the Washington State Department of Ecology website at:
http://www.ecy.wa.gov/programs/wr/instream-flows/isfhm.html

Brad Caldwell
Water Resources
Washington State Department of Ecology
Telephone 360-407-6639