Cowiche Creek PHABSIM (Physical HABitat SIMulation) Study

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WUA (weighted usable area)

- The wetted area of a stream weighted by its suitability for use by aquatic organisms or recreational activity
- How much area fish have to “live” at varied flows
- 5 gallon fish tank compared to a 50 gallon tank
- WUA curves can be used for different fish species, different life stages…even boat passage

Locations and Protocol

1. Select study sites (lower & upper)

- Lower site = below or within canyon
- Upper site = above canyon
- At least two transects for each mesohabitat (pool, riffle, run, tail-out, and hydraulic control points) per site

2. Conduct field samples at low, medium, and high flows

- First at high flow, then 50% of that flow (medium), then 50% of the medium flow (low) **Cowiche = 22, 6, and 2 cfs**
- Surface elevations, flow, substrate, wetted widths, depths and cover are measured

3. Collected data plugged into the RHABSIM program model

- For each flow, all the weighting factors (multiplied by the areas of the stream to which they apply) are summed to yield WUA

Creates WUA curves for different species at various life stages

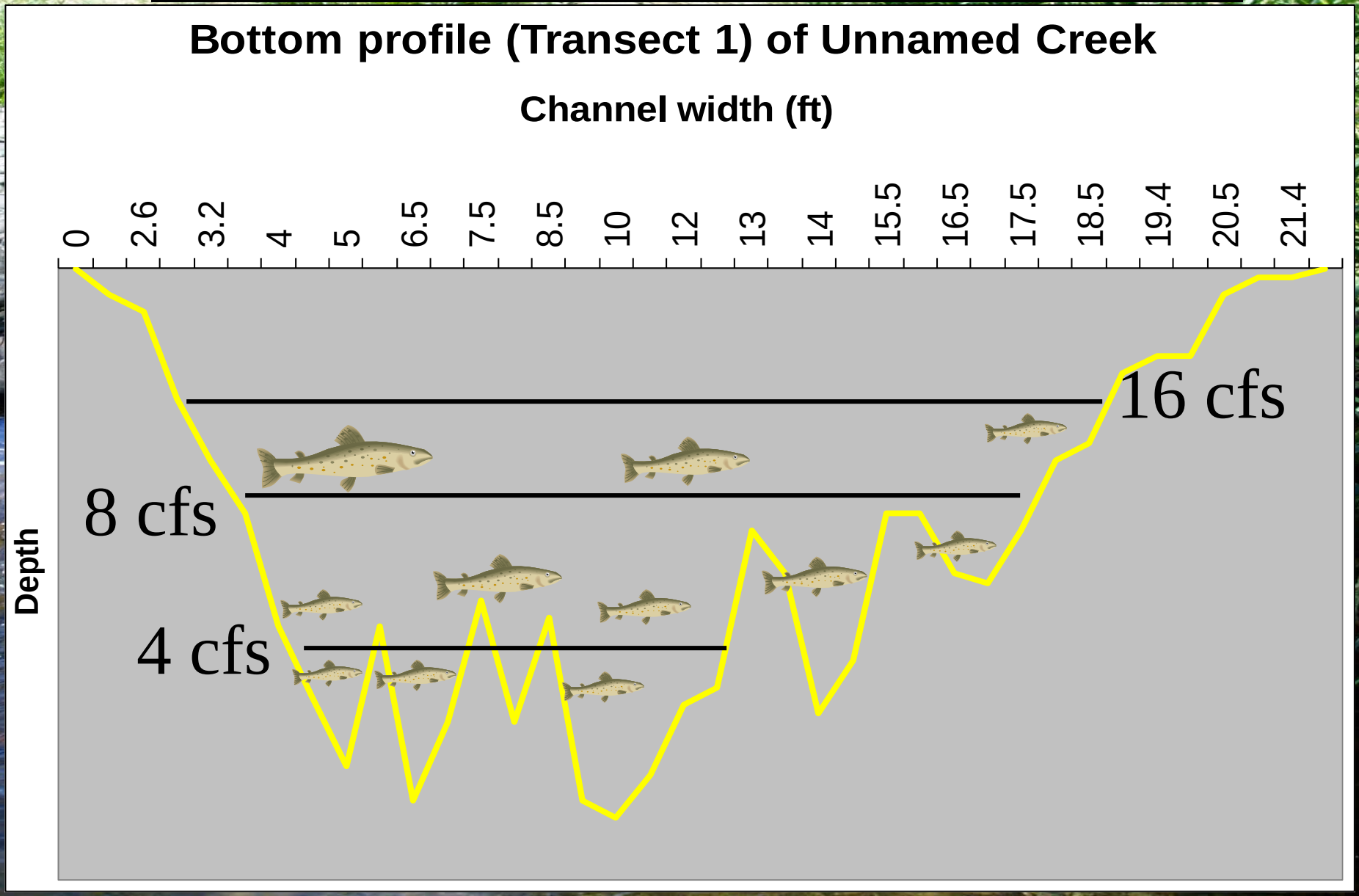
Spawning (uses substrate)

- Chinook
- Coho
- Steelhead
- Rainbow & cutthroat trout

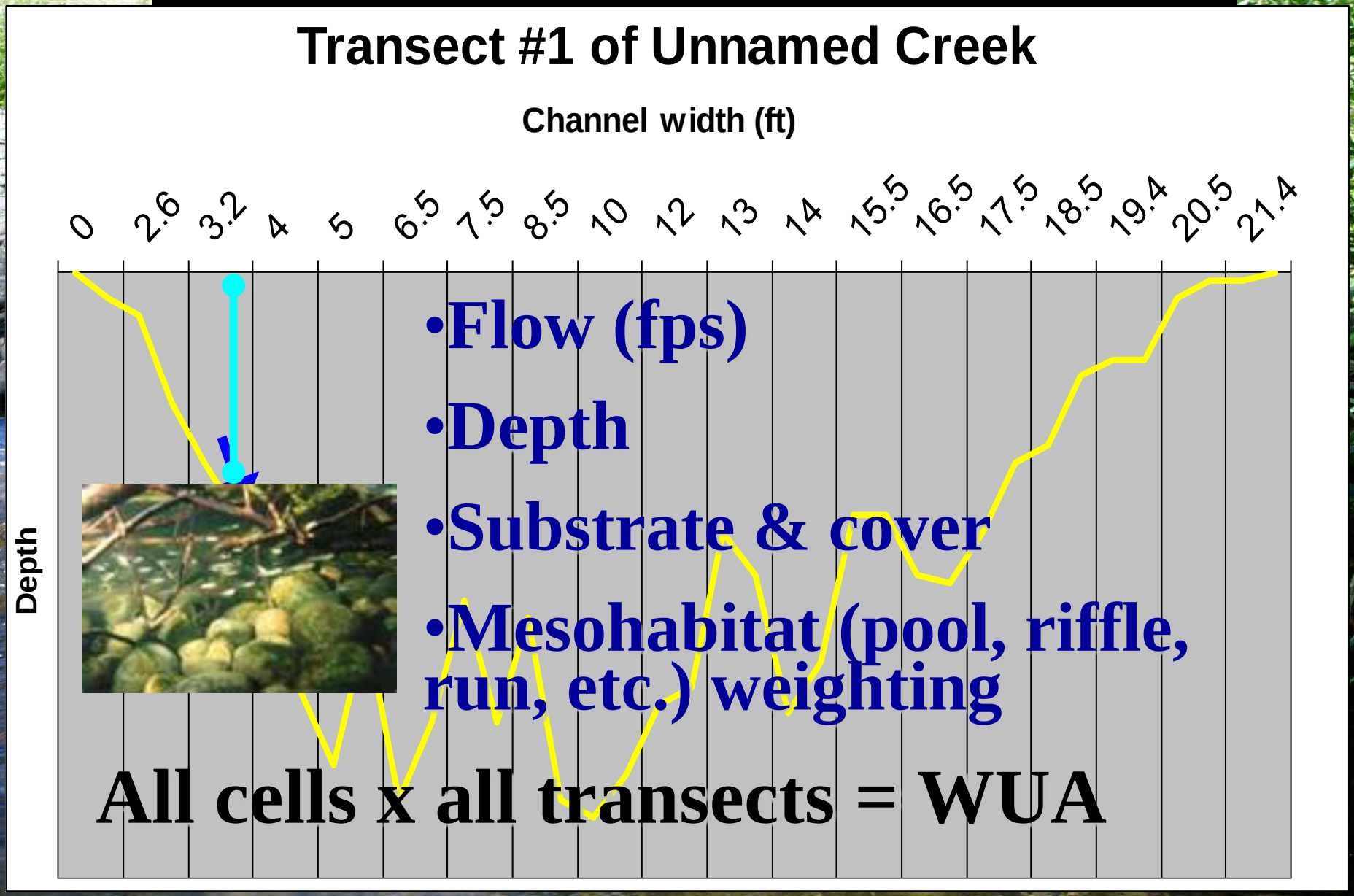
Rearing (uses cover and substrate)

- Chinook
- Coho
- Steelhead
- Rainbow & cutthroat trout
- Rainbow winter rearing
- Bull trout

How does PHABSIM work?



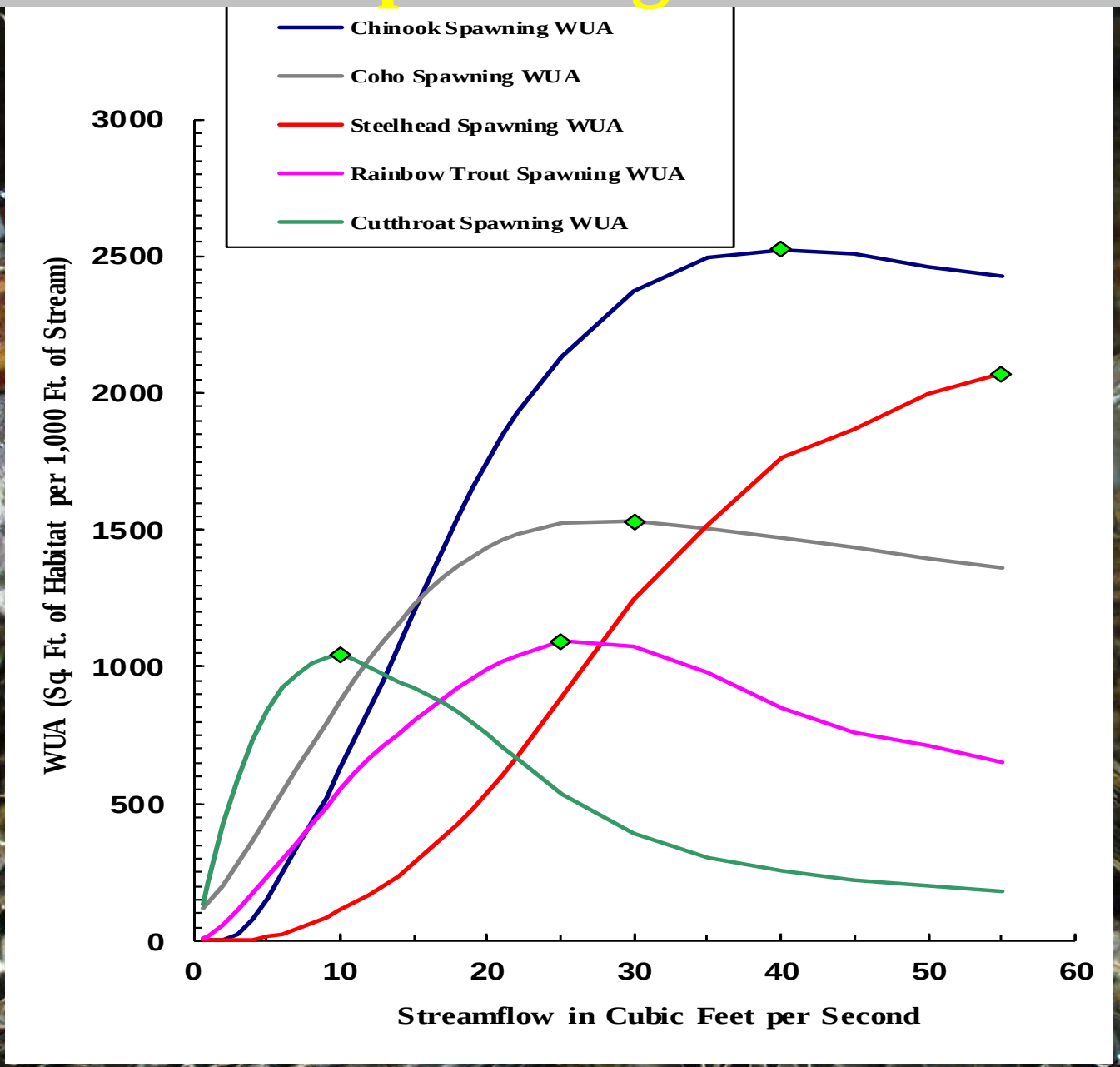
How does PHABSIM work, cont.?



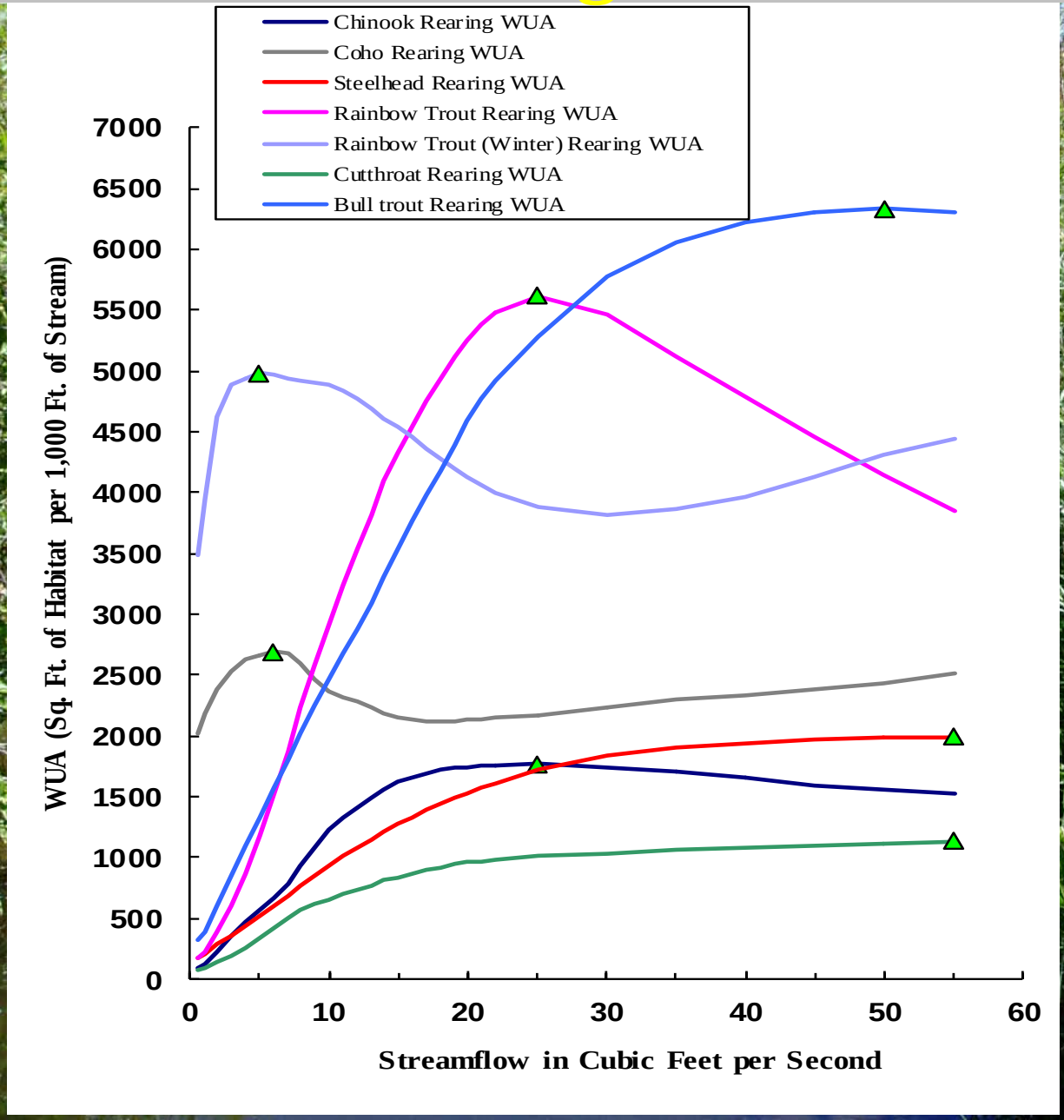
Why do the PHABSIM work?

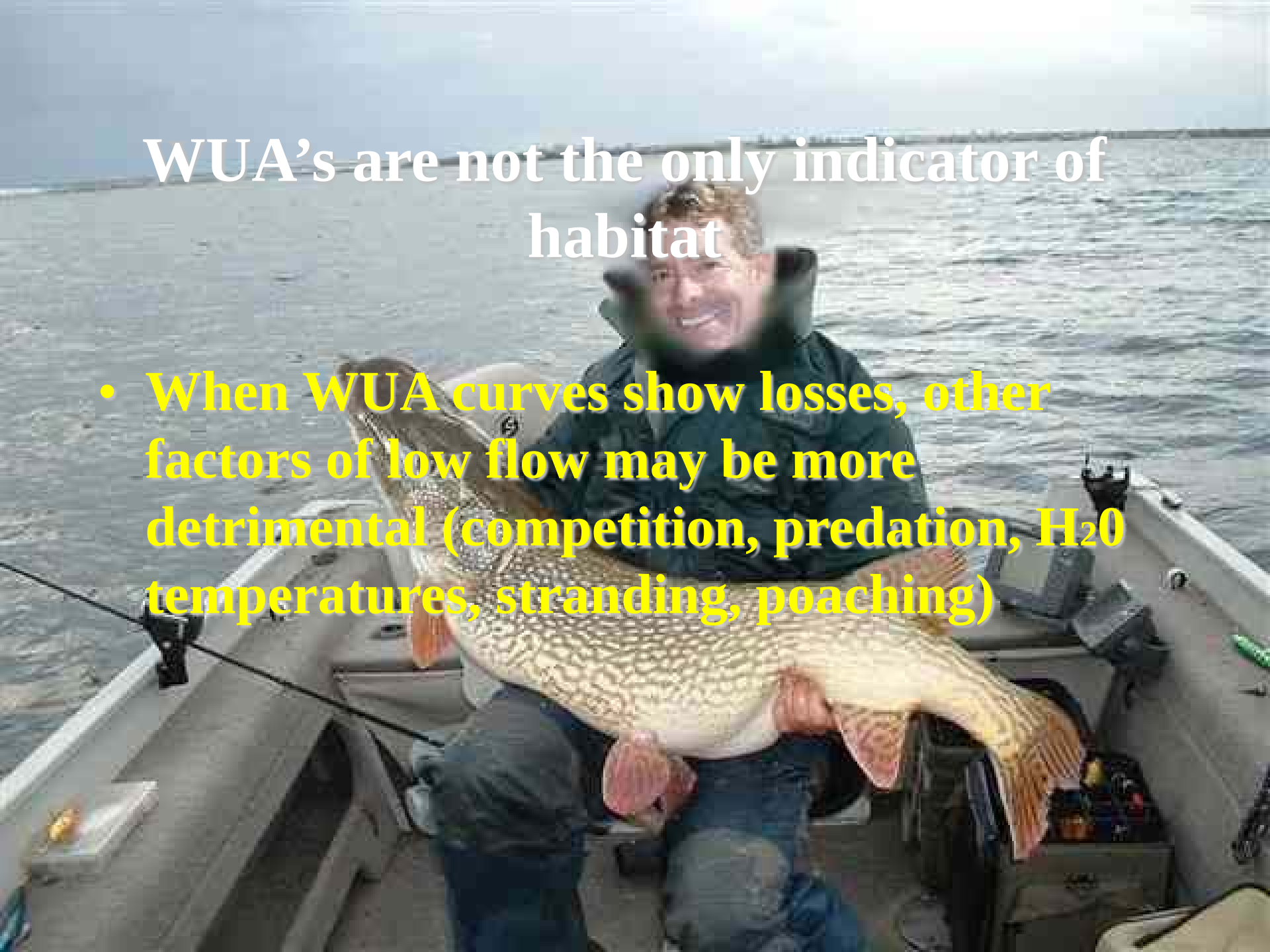
- Used to complement instream flow recommendations.
- Can help estimate instream flow needs (via increased habitat) for water augmentation projects within the watershed.
- Allows water manager's to explain indifferences in water right allocations.
- Could determine fish habitat loss with exempt well use (with known connectivity).
- Used for Water Team monitoring efforts to determine benefits from water augmentation projects.

Predicted Spawning WUA curves



Predicted Rearing WUA curves





WUA's are not the only indicator of habitat

- When WUA curves show losses, other factors of low flow may be more detrimental (competition, predation, H_20 temperatures, stranding, poaching)

Predicted WUA increases for Cowiche Creek

Steelhead Rearing						
Flow periods	*December low	*June low	*August low	December mean	June mean	August Mean
Flow (cfs)	6	10	1	15	34	2
WUA	% increase	% increase	% increase	% increase	% increase	% increase
+1 cfs	14%	8%	38%	5%	<1%	27%
+2 cfs	28%	16%	75%	9%	1%	55%
+3 cfs	41%	23%	113%	13%	2%	84%
+8 cfs	100%	54%	317%	27%	4%	230%
*Lowest recorded since 1991						

Cowiche Creek WUA monitoring totals with 1 cfs acquired water

+1 cfs	
Lower Site (RM 3.0)	
spp.	gain/loss
*spawning O. mykiss	0.0%
*spawning coho	6.6%
**juvenile O. mykiss	3.0%
**juvenile chinook	2.5%
**juvenile coho	2.5%

*Optimal spawning windows

**Summer irrigation season rearing estimates (April 1-October 31).

Thank you for this opportunity!

- Washington Dept. of Ecology
- CBWTP
- Bonneville Power Administration
- Washington River's Conservancy
- Washington Water Trust