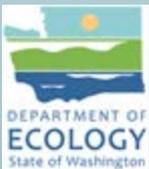


# SMS Freshwater Sediment Standards

Washington State Department of Ecology



# Objectives

- ▶ Policy considerations.
- ▶ Structure of the rule for marine and freshwater criteria.
- ▶ Technical issues.
- ▶ Here's what we want your feedback on
  - ▶ Do you endorse promulgating biological and chemical freshwater sediment standards?
  - ▶ Is adequate flexibility built into implementation to address unique or under-represented sites?
  - ▶ The SQVs are empirically derived to accurately predict toxicity and some metals are much higher and some lower than other SQVs. Are these differences OK?

# Policy Decisions

- ▶ Consistency with SMS framework:
  - ▶ Two tier SQS and CSL.
  - ▶ Adopt biological and chemical criteria.
  - ▶ Retain the biological override provision to use at sites where chemical criteria may not be applicable – such as mining sites.
- ▶ Revise Part V: Sediment Cleanup Standards.
- ▶ Develop criteria that are applicable to the majority of sites in Washington.
- ▶ Balancing false positive and false negatives and incorporating the SMS three hit/station conservativeness.

# History of SQV Development

- ▶ Washington, Oregon and Idaho collaborated through the Regional Sediment Evaluation Team – Eye towards both Dredge & Cleanup Program application:
  - ▶ WA Department of Ecology
  - ▶ OR Department of Environmental Quality
  - ▶ EPA
  - ▶ Federal Resource Agencies: NMFS & USFWS
  - ▶ Army Corps of Engineers
- ▶ Ground Rules Agreed Upon for Development:
  - ▶ Empirical approach, don't prejudge toxicity levels.
  - ▶ Use best data available, meeting stringent QA-2 level review.
  - ▶ Establish goals for **Reliability** (= ability to accurately predict toxicity) up front.
  - ▶ Use **reliability testing** to improve and to compare to other SQVs.
  - ▶ Update reliability measures to better assess performance.
- ▶ Culmination is SQV report and proposed rule revisions.

# SMS Rule Structure

## Part V: Sediment Cleanup Standards

- ▶ Sections 570 – 574: Establishing sediment cleanup standards
- ▶ Section 570: Cleanup standards framework
- ▶ Section 571: Human health cleanup standards
- ▶ Section 572: Marine benthic criteria
- ▶ **Section 573: Freshwater benthic criteria**
- ▶ Section 574: Ecological risk from bioaccumulatives narrative

## Section -572

### Marine Criteria Organization Changes

- ▶ SQS chemical and biological criteria added to Part V – also remain in Part III.
- ▶ Tables added for biological criteria – tests, species, performance standards.
- ▶ Numeric chemical and biological criteria not changed.
- ▶ No substantive changes made to marine criteria.

# Section -573 Freshwater Standards

## Subsection (2) Chemical Criteria

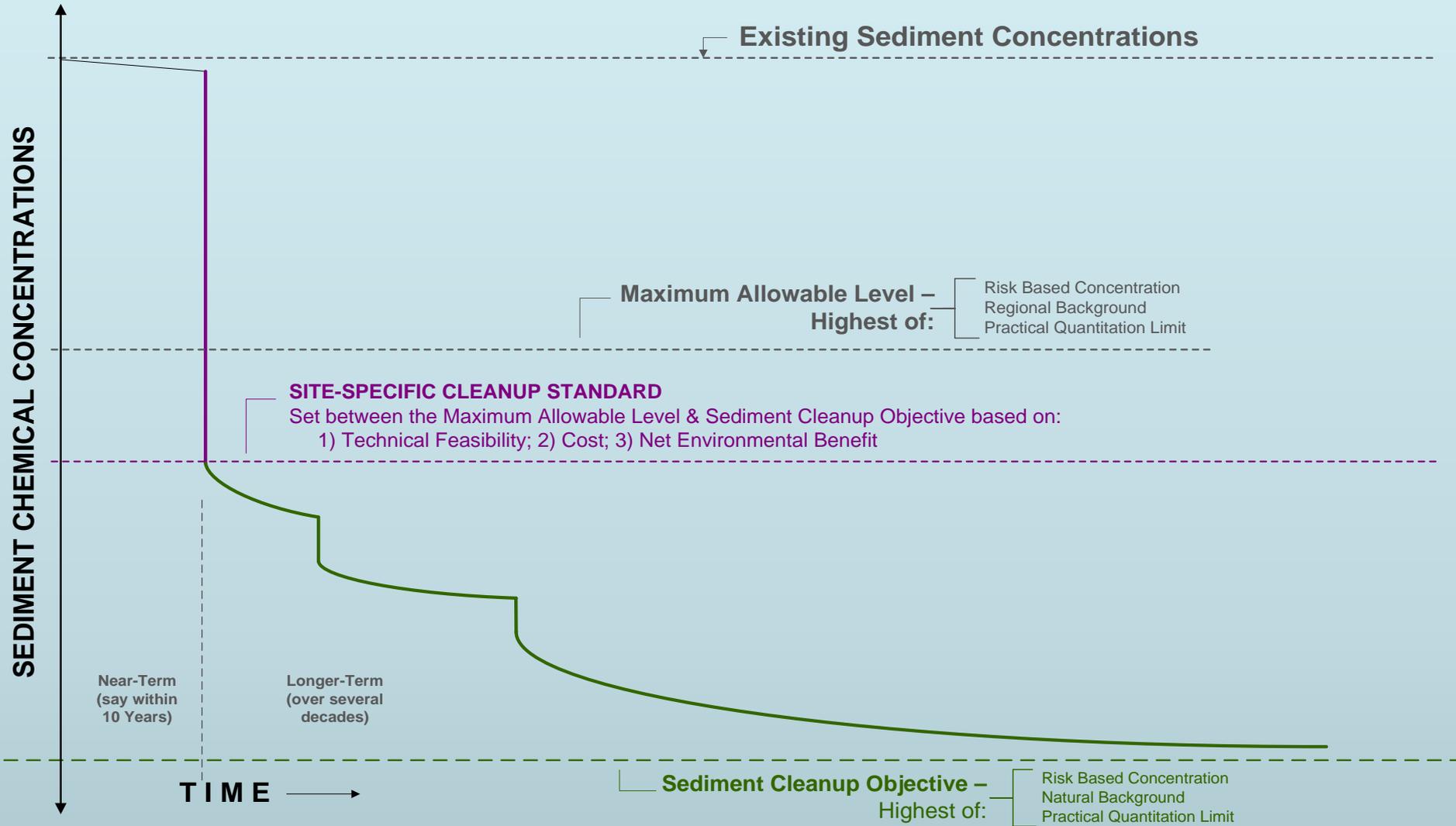
- ▶ Same layout as Marine (572)
- ▶ Subsection (2)(1): Recognition of diversity of freshwater sites and need to use bioassays.
  - ▶ Subsection (1)(i): applicability to metals mining, metals milling, smelting sites.
- ▶ How does that look in implementation?
  - ▶ Cleanup project manager determines need for biological override.
  - ▶ PLP may also choose to perform bioassays.

# SMS Rule Structure

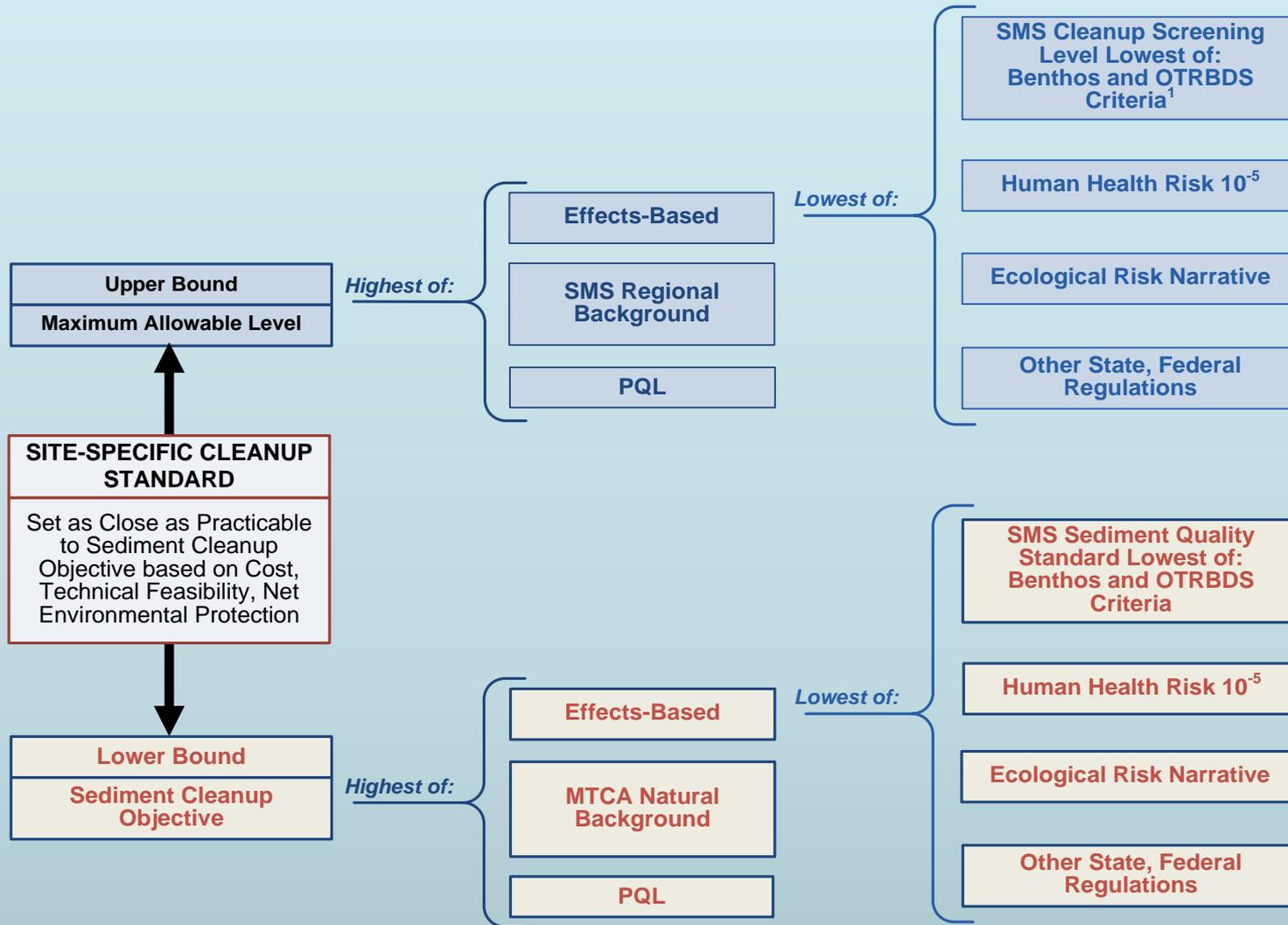
## How criteria are applied

- ▶ Two tier criteria: sediment quality standard and cleanup screening level.
- ▶ Criteria are protective of the benthic community:
  - ▶ Population effects vs. individual species or animals.
  - ▶ Toxicity to benthic community – not bioaccumulatives.
- ▶ Chemical and biological criteria.
- ▶ Biological override of chemical criteria.
- ▶ Flexibility to require bioassays when there is reason to believe chemical stds may not be protective.

# Establishing cleanup standards



# Establishing cleanup standards

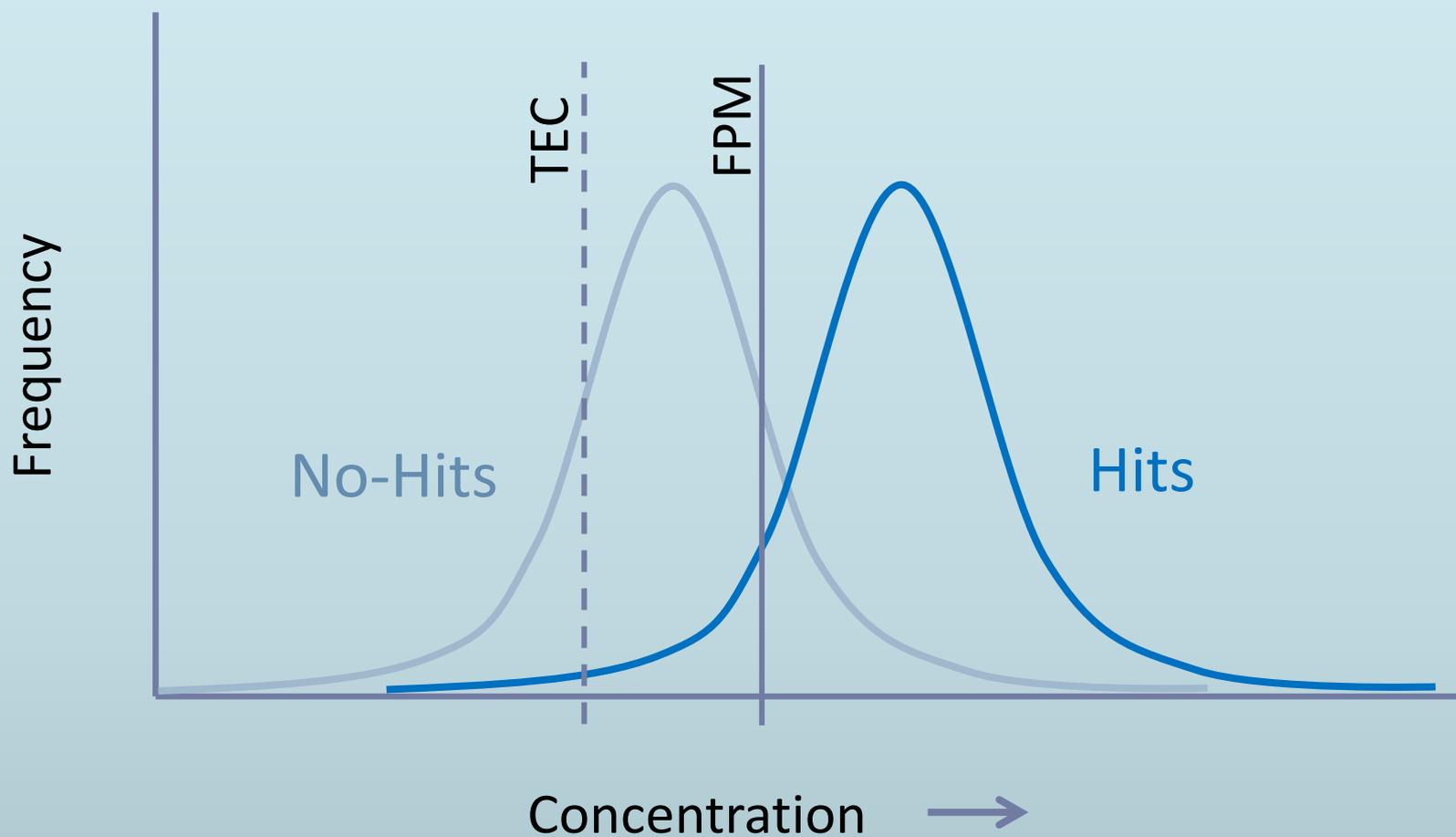


# Issues for discussion – we need your feedback

- ▶ Application to sites under negotiation.
- ▶ Flexibility in applying freshwater standards:
  - ▶ Appropriate for addressing sites with unique characteristics?
- ▶ Limitations of chemical criteria:
  - ▶ Diversity of freshwater sediment – not able to develop criteria applicable to all sites.
  - ▶ Metals – some criteria are higher some lower than other datasets. Is that OK?



# Accuracy Predicting Hits and No-Hits



Comparison of Ecology's FPM SQVs and MacDonald et. al. Consensus-based Values

Chemical	FPM SQVs		MacDonald et al.	
	SL1/SQS	SL2/CSL	C-Based TEC	C-based PEC
Arsenic	14	120	9.79	33
Cadmium	2.1	5.4	0.99	4.98
Chromium	72	82	43.4	111
Copper	400	1200	31.6	149
Lead	360	> 1300	35.8	128
Mercury	0.66	0.8	0.18	1.06
Nickel	26	110	22.7	48.6
Selenium	11	> 20		
Silver	0.58	1.7		
Zinc	3200	> 4200	121	459
Dibutyltin	910	130000		
Monobutyltin	540	> 4800		
Tributyltin	48	320		
Tetrabutyltin	97	> 97		
Ammonia	230	300		
Benzoic acid	2900	3800		
Sulfide	39	61		
4-Methylphenol	260	2000		
bis(2-Ethylhexyl)phthalate	500	22000		
Di-n-butyl phthalate	380	450		
Di-n-octyl phthalate	39	> 1100		
Dibenzofuran	200	680		
Phenol	120	210		
beta-Hexachlorocyclohexane	7.2	11		
Carbazole	1100	1400		
Dieldrin	4.9	9.3	1.9	61.8
Endrin ketone	8.5	**	2.22	207
Pentachlorophenol	1200	> 1200		
Total Aroclors	110	2500	59.8	676
Total DDDs	310	860	4.88	28
Total DDEs	21	900	3.16	31.3
Total DDTs	100	8100	5.28	572
Total PAHs	17000	30000	1610	22800
TPH-Diesel	340	510		
TPH-Residual	3600	8400		
Anthracene			57.2	845
Fluorene			77.4	536
Naphthalene			176	561
Phenanthrene			204	1170
Benz[a]anthracene			108	1050
Benzo[a]pyrene			150	1450
Chrysene			166	1290
Dibenz[a,h]anthracene			33	
Fluoranthene			423	2230
Pyrene			195	1520
Chlordane			3.24	17.6
Heptachlor Epoxide			2.47	16
Lindane			2.37	4.99

Units - Metals mg/Kg dry  
 Organics ug/Kg dry  
 Butyltins ug/Kg ion

## Comparison of Ecology's FPM SQVs and MacDonald et. al. Consensus-based Values

Chemical (ppm dry)	FPM SQVs		MacDonald et al.	
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