



Origin and Evolution of DMMP

Justine Barton - EPA
David Fox - USACE

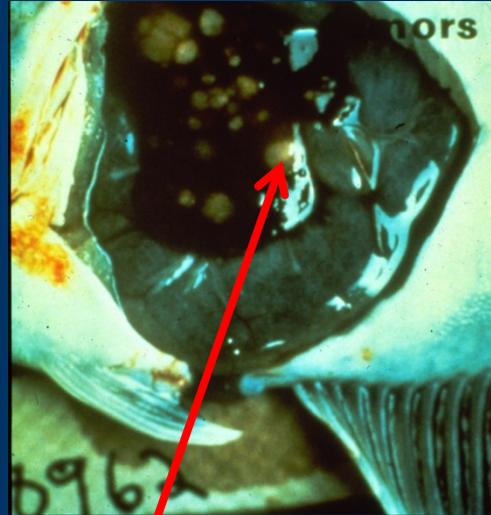


WASHINGTON STATE DEPARTMENT OF
Natural Resources

Mid-1980s State of the Sound



Early waterfront industries contaminated Puget Sound



1980's NOAA studies identified English Sole with liver lesions



1984 Seattle Times highlighted contaminated sediments in Puget Sound

Early Dredged Material Management

- Corps evaluated Federal navigation dredging, while Ecology and EPA reviewed for permits
- Water quality based initially, for sediments - no consistent standard -- site-specific background concentrations used for Elliott Bay (Four-Mile Rock), Port Gardner -- controversial
- Little disposal site monitoring
- Crisis develops:
 - Public awareness and outcry,
 - Four-Mile Rock & Port Gardner sites first closed in 1984

PSDDA

- Puget Sound Dredged Disposal Analysis
- 4.5 years, \$4.5M Corps-led study
- Phase I: Central Puget Sound
- Phase II: North and South Sound

PSDDA Study – Workgroups

PSDDA Workgroups

```
graph LR; A[PSDDA Workgroups] --- B[Disposal Site Selection]; A --- C[Evaluation Procedures]; A --- D[Management Plans];
```

Disposal Site Selection

Evaluation Procedures

Management Plans

Participants



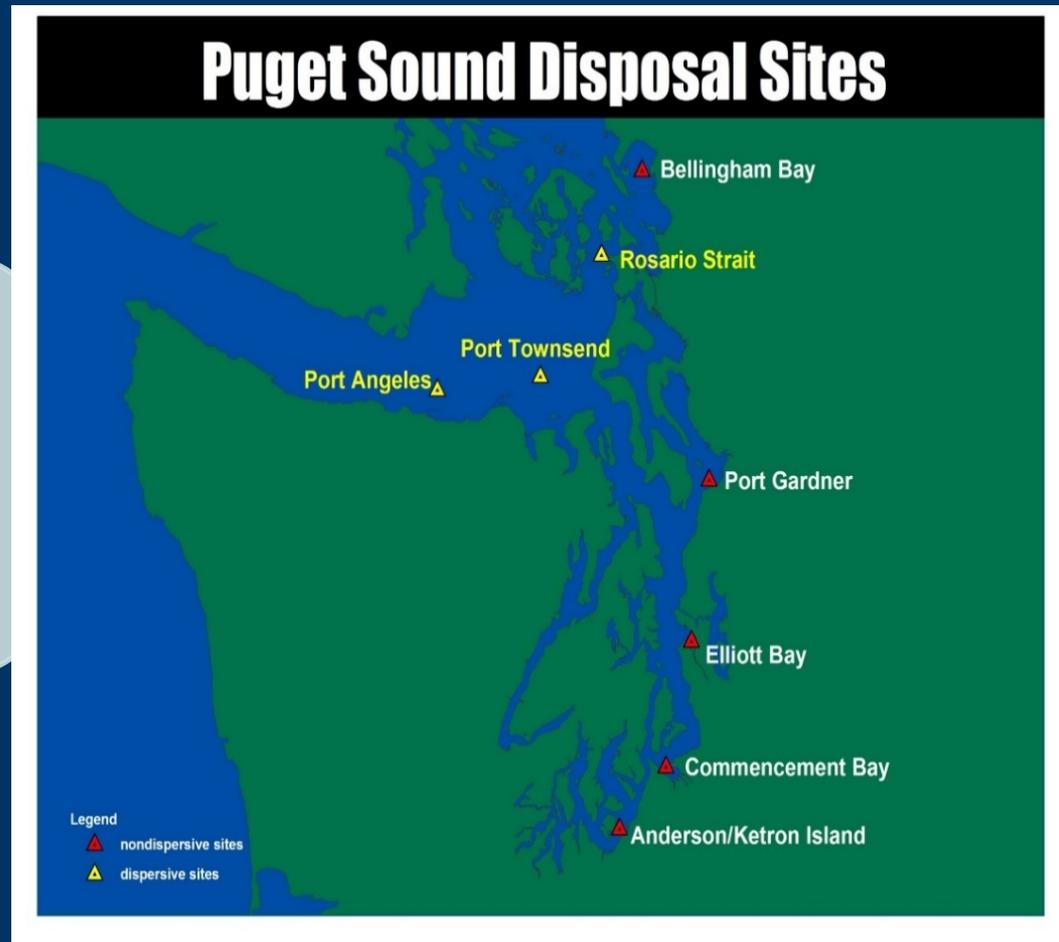
PSDDA Study – Objectives

- ✓ Identify acceptable multi-user unconfined open-water disposal sites for dredged material that passes evaluation guidelines
- ✓ Define consistent and objective dredged material evaluation procedures
- ✓ Develop site management plans, including monitoring, to provide controls on site use and assure program accountability

PSDDA Disposal Sites

**Eight
Sites
Selected**

- 5 Non-dispersive
- 3 Dispersive



Site Condition II Selected

- Minor adverse effects
 - Some chronic sublethal effects on-site
 - Potential increase in mortality of more sensitive, but less abundant, crustacean species
 - No significant effects off-site
 - Some bioaccumulation expected on-site, but not enough to pose a human health problem

Source: PSDDA Evaluation Procedures Technical Appendix – Phase I (Central Puget Sound); Part II, Section 9.6.3.2

Evaluation Procedures

- Screening levels (SLs) and maximum levels (MLs) based on apparent effects thresholds (AETs)
- Bioaccumulation triggers (BTs) established between SLs and MLs or on chemical-specific basis
- SL exceedances trigger bioassays; BT exceedance triggers bioaccumulation testing
- Exceedance of multiple MLs or single ML by 100% resulted in unsuitability (no longer in effect)

Site Monitoring Questions

Does the dredged material stay on site?

1

Are significant acute effects observed to biological resources on site?

2

Are unacceptable effects due to dredged material disposal occurring to biological resources off site?

3

Each question answered by testing two hypotheses

Site Monitoring Components

- Sediment profile imaging (SPI)
- Chemical testing at on-site and perimeter stations
- Bioassays on-site
- Benthic community evaluation
- Tissue analysis
- Benchmark stations
- Volume triggers (originally 45,000 cy)
- Full vs. partial monitoring

Agency Roles and Responsibilities

DNR

Environmental monitoring
Acquire shoreline permits
Collect disposal fees
Disposal record

Baseline monitoring
Dredging inspection
plans for non-Corps projects

Ecology

Section 401 WQC
Update AETs

- Suitability determinations
- Disposal site management
- Program updates

EPA

Testing requirements for
Section 404 permits
Review Section 404(b)(1)
evaluations

Section 404 permits
Physical monitoring
DAIS database

USACE

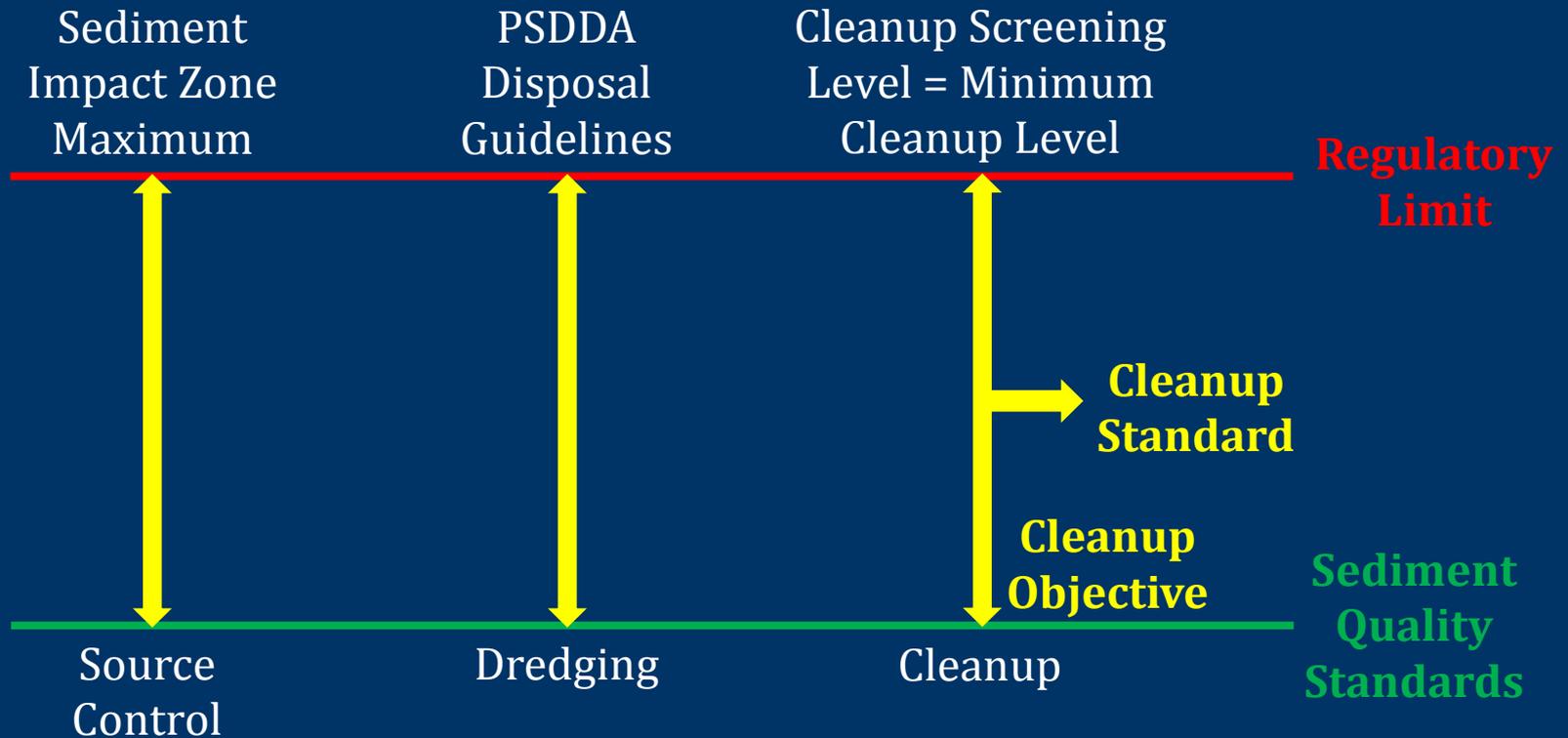
Early PSDDA Implementation

- Many minor program modifications to address technical issues with chemistry analysis and bioassays
- Developed User Manual
- Developed suitability determinations
- Started monthly meetings
- Example sampling and analysis plans

SMS Implementation

- Adopted in March 1991
- Deferred to existing PSDDA guidelines for dredged material evaluation, or as amended
- Antidegradation policy applicable to sediment exposed by dredging
- Ecology considered establishing sediment impact zones for PSDDA sites
- “Regulatory beauty”

Original Vision for “Regulatory Beauty”*



*from ARM presentation by Keith Phillips (Ecology) in May 1991

Cooperative Sediment Management Program

- 1994: Interagency agreement signed
- PSDDA agencies plus Puget Sound Water Quality Authority
- Initial action items:
 - Sediment cleanup strategy (Bellingham Bay pilot)
 - Action plan for multiuser confined disposal site(s)
 - Policies to facilitate beneficial use of dredged material

MUDS

- Multiuser confined disposal sites envisioned
- USACE initiated feasibility study in 1997
- Conclusions (2003):
 - Significant environmental, political, permitting, financing and administrative obstacles
 - Private sector provided readily available solution
 - Transload from dredge barges to rail cars with disposal at two regional landfills east of the Cascades

PSDDA becomes DMMP

- 1995: Grays Harbor and Willapa Bay Evaluation Procedures and Disposal Site Management Manual
- 1998: Columbia River Dredged Material Evaluation Framework
- 1998 SMARM: Acronym 'DMMP' used for the first time

Open-Water Disposal Sites: Grays Harbor, Willapa Bay and Lower Columbia River

Grays Harbor/ Willapa Bay

- All dispersive sites
- Four estuarine and one ocean site
- Flowlane disposal in Willapa

Lower Columbia River

- All dispersive sites
- Flowlane disposal

Grays Harbor and Willapa Bay Disposal Sites



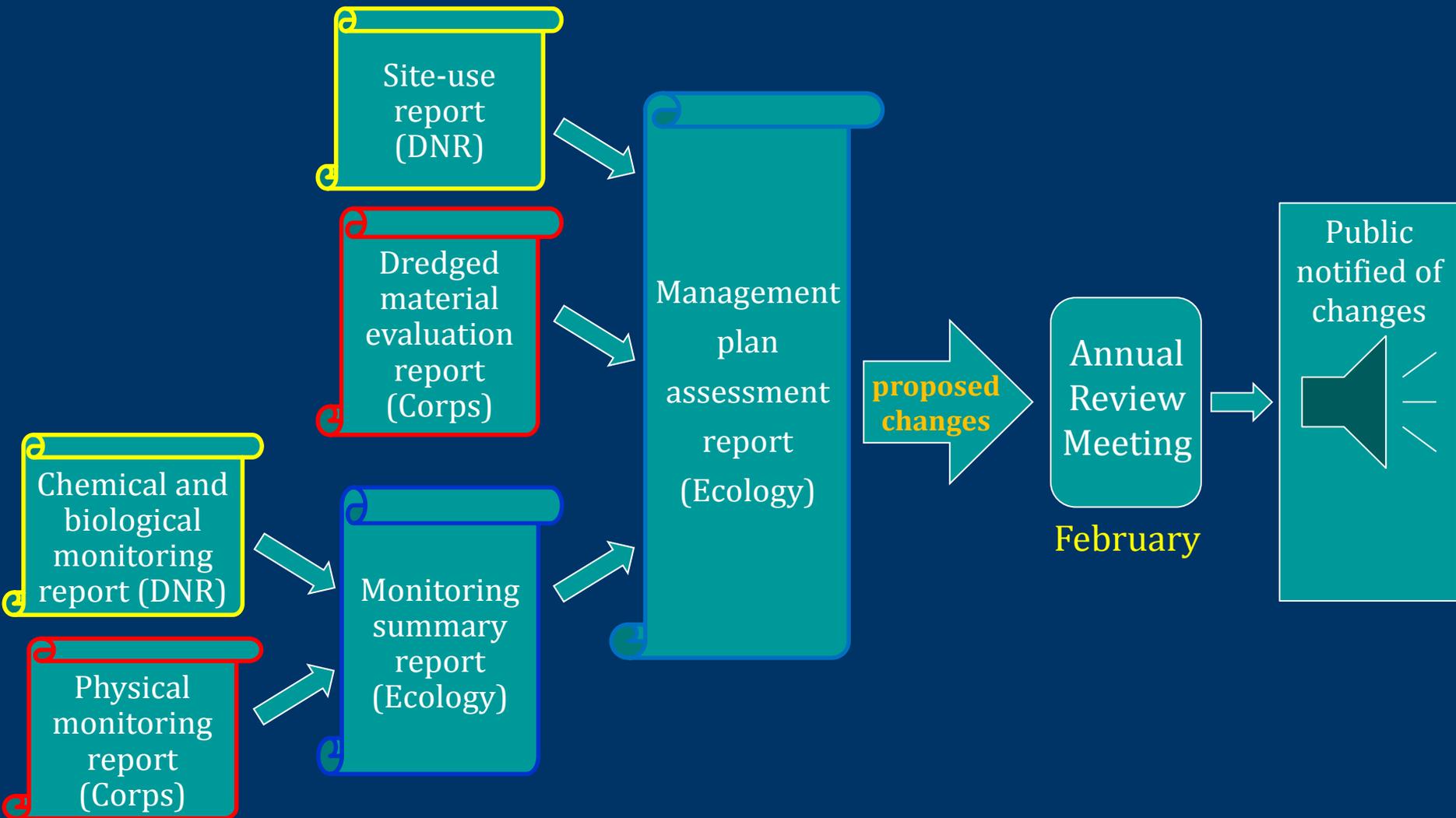
PSDDA Study vs. DMMP

- Series of slides comparing the original PSDDA program to today's DMMP
 - Annual review process
 - Role of agency directors
 - Program updates
 - Bioaccumulation
 - Site Monitoring
 - ESA compliance
 - Suitability – PSDDA predicted vs. actual
 - Disposal volumes

Design vs. As-Built



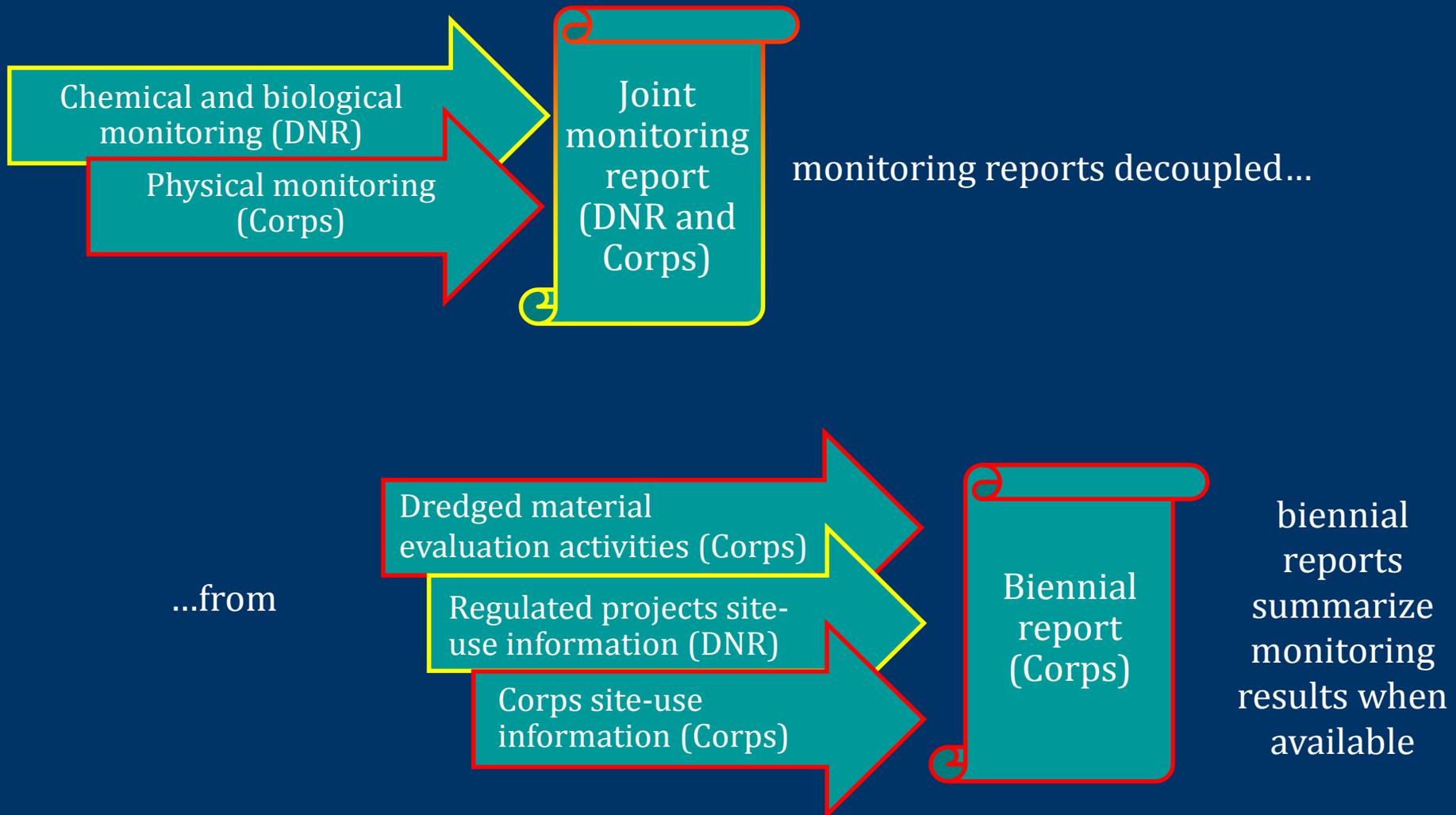
Annual Review as Envisioned in PSDDA Study



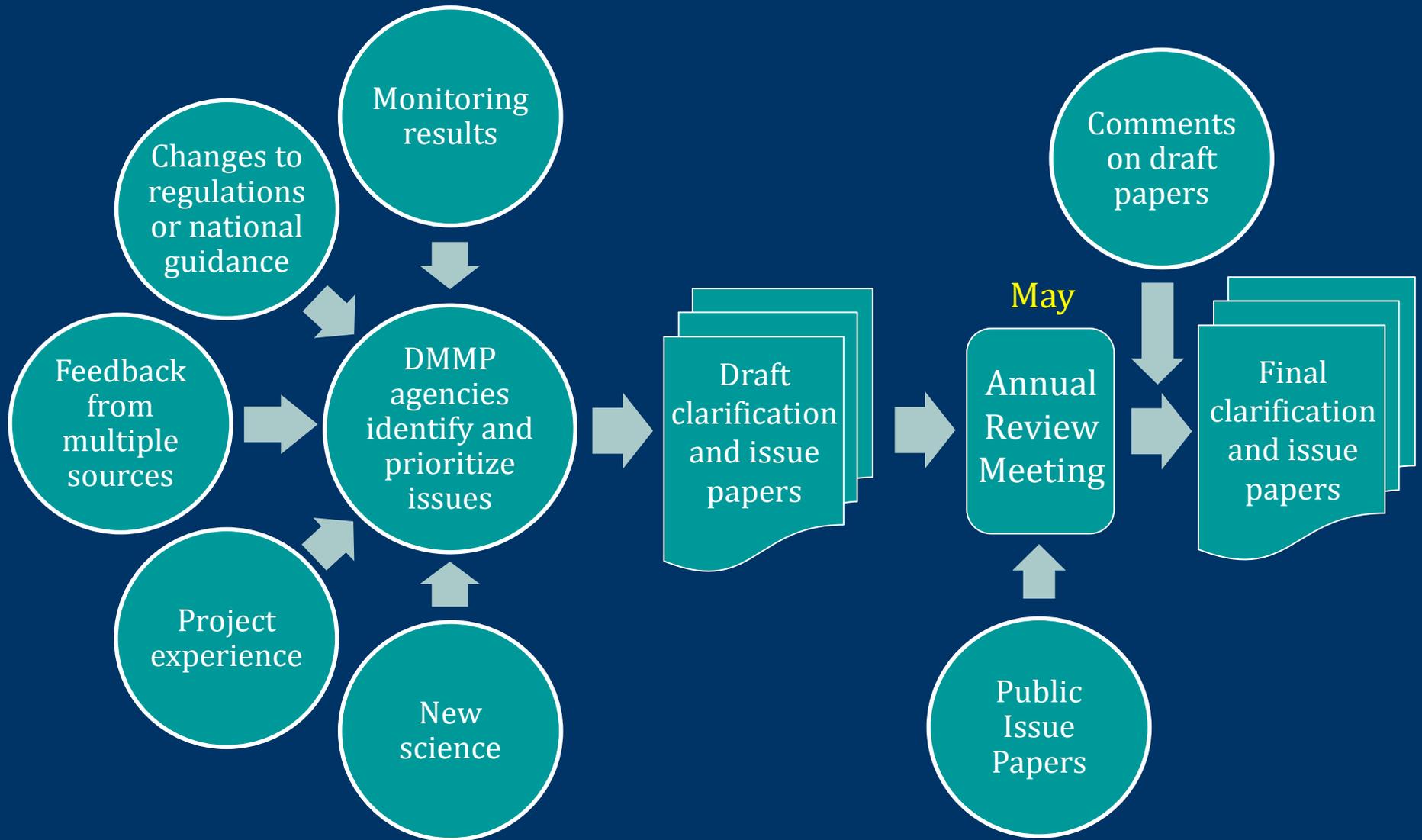
Early Annual Review Meetings

- February 1989; April 1990; May 1991
- Issues raised by participants added to flip chart
- Issues to be addressed summarized at the end of the meeting
- Post-ARM agency meeting
- Public notified of changes
- Reporting and annual review requirements revised in 1991 to eliminate redundancy and improve efficiency

Revised Reporting Procedures



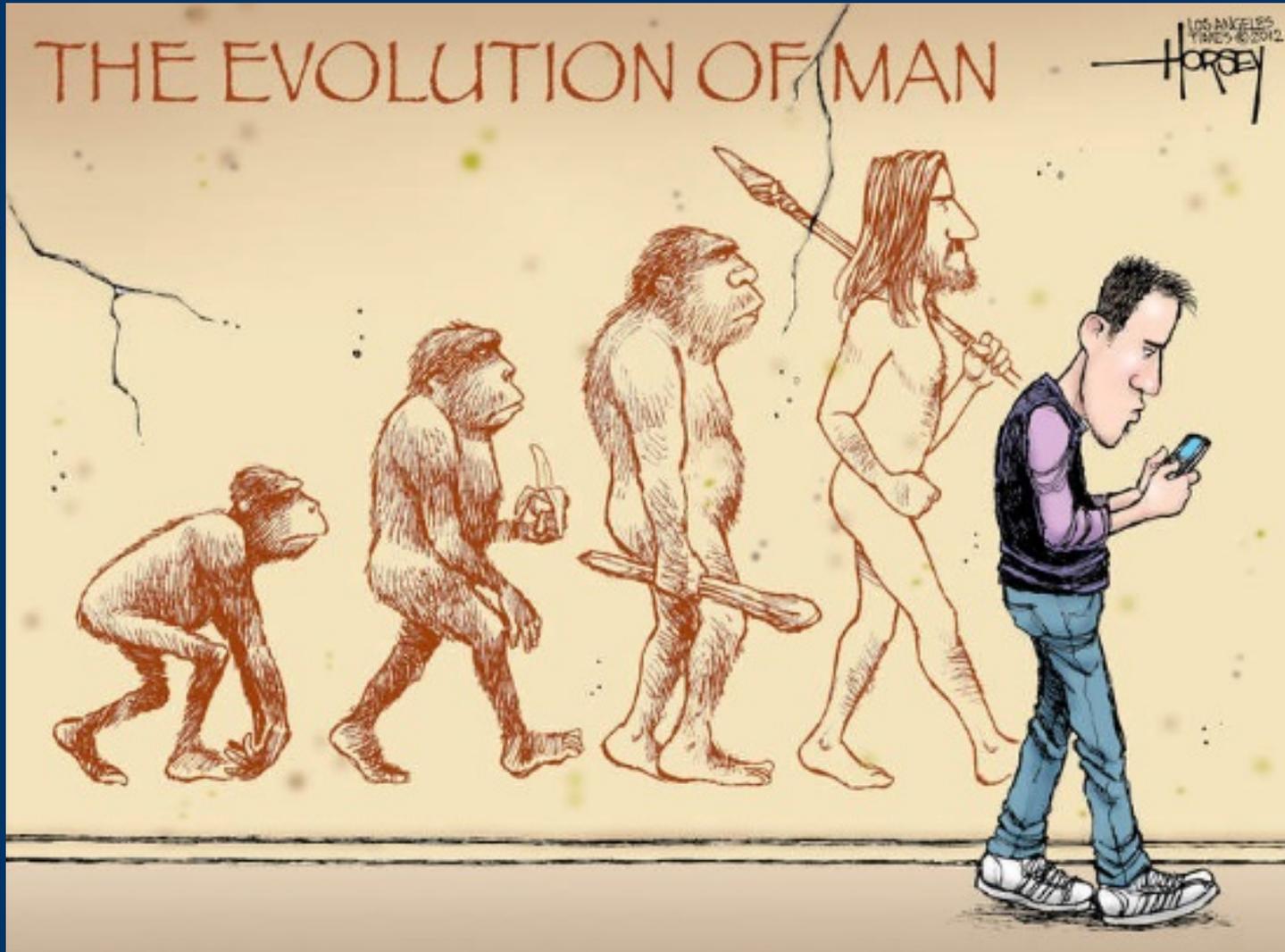
Revised Annual Review Process



Agency Directors

- Originally envisioned to be briefed each year and approve all changes to PSDDA management plan
- Impractical; convene only for most significant issues; for example:
 - *Neanthes* implementation
 - CSMP
 - Revised dioxin guidelines

Program Evolution



Some Significant Program Updates

Regulatory guidelines

- Revised dioxin guidelines
- Freshwater sediment screening levels and bioassays
- Alignment with RSET (SEF)

Chemical and biological testing

- Microtox dropped, *Neanthes* added
- Bioaccumulative COC list updated
- Standard Reference Material for Puget Sound

Disposal site use

- Debris screening

Bioaccumulation - PSDDA

- Potential ecological effects acknowledged...
- ...but a decision was made to focus on human health only, because:
 - Ecological effects were unknown at the time
 - Some COCs are metabolized, complicating any analytical approach
 - Tissue concentrations associated with human health effects could be calculated

Bioaccumulation - 2013 SMS Rule Revision

- 25 years after PSDDA study – science and policy on bioaccumulatives had changed
 - New understanding about exposure and risks of bioaccumulative compounds
 - SMS revisions based on human health exposure and risk as well as risk to higher trophic levels
 - Acceptable concentrations often default to natural and regional background

Bioaccumulation - DMMP

- Bioaccumulation protocols have been periodically updated (e.g. COC list, length of test, co-testing of species)
- But focus of site monitoring has been on benthic species and community impacts and not on trophic transfer of bioaccumulatives

Site Monitoring

- Basic framework remains the same, but some changes have been made:
 - Monitoring trigger volumes increased
 - Tiered monitoring introduced
 - Chemical tracking system implemented
 - Special monitoring events added to address specific issues (e.g. EB debris survey)
 - Dioxin baseline surveys conducted and dioxin added to monitoring plan

Endangered Species Act Compliance

- PSDDA documents did not anticipate the level of effort required for compliance (fewer listed species then)
- Now: rockfish, salmonids, Southern Resident Killer Whales
- Biological Opinion for rockfish

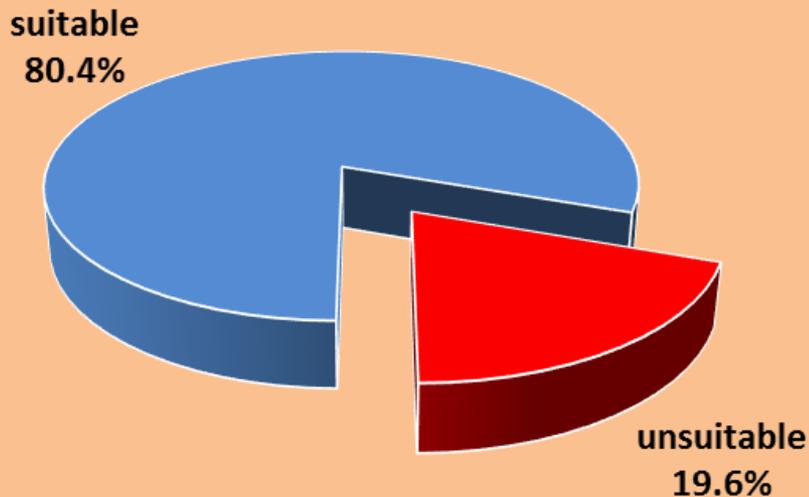


1988/89 PSDDA Forecast vs. Actual

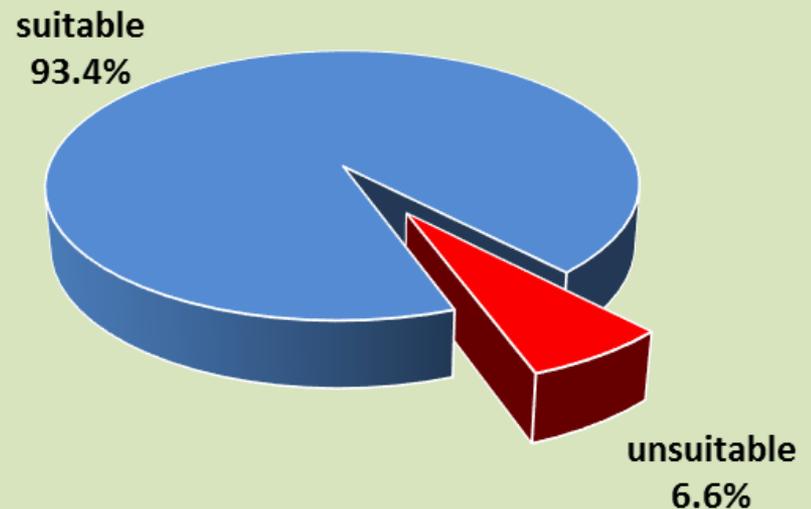


Commencement Bay (ND)

PSDDA Forecast



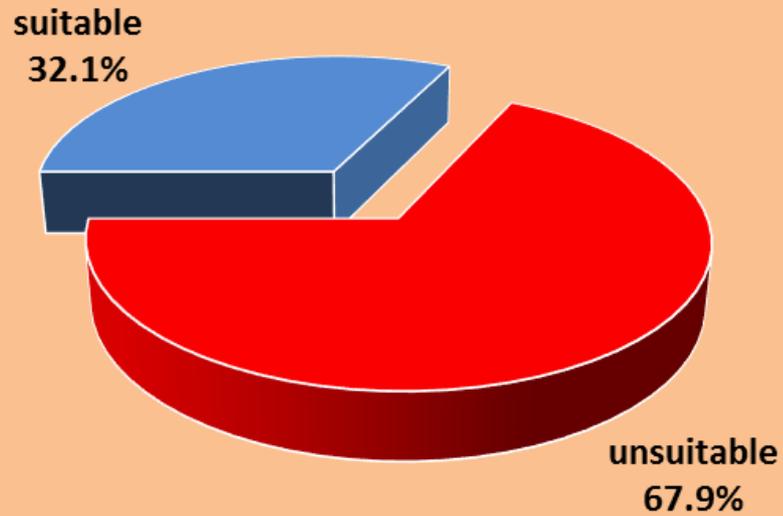
Actual



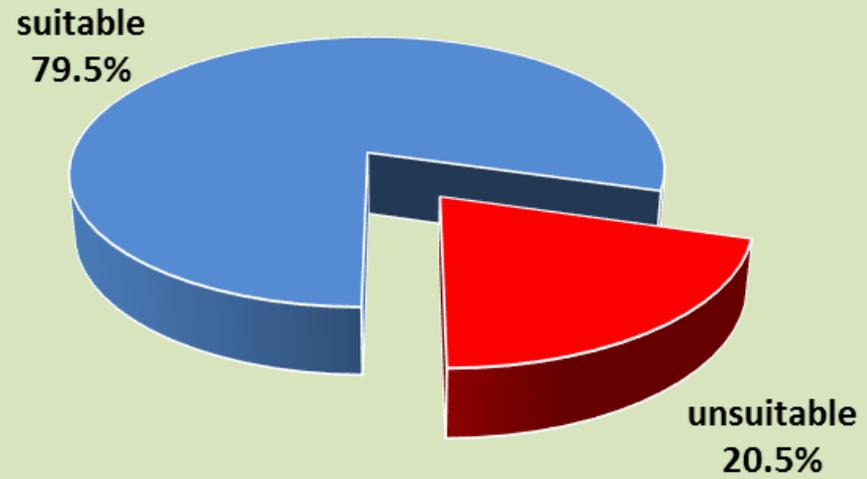
PSDDA forecasts based on Site Condition II and chemical data from specific projects in the planning stage at the time (e.g. Blair/Sitcum navigation improvement project) as well as maintenance dredging projects. Not all planned projects were constructed.

Elliott Bay (ND)

PSDDA Forecast



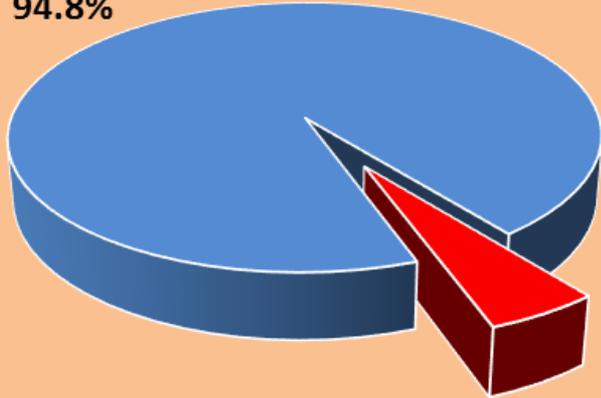
Actual



Port Gardner (ND)

PSDDA Forecast

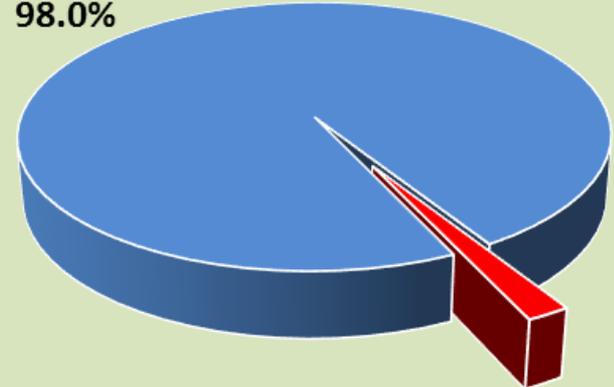
suitable
94.8%



unsuitable
5.2%

Actual

suitable
98.0%

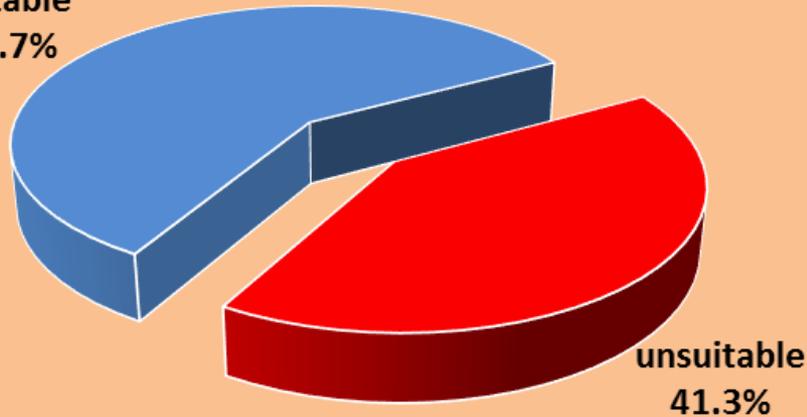


unsuitable
2.0%

Anderson-Ketron (ND)

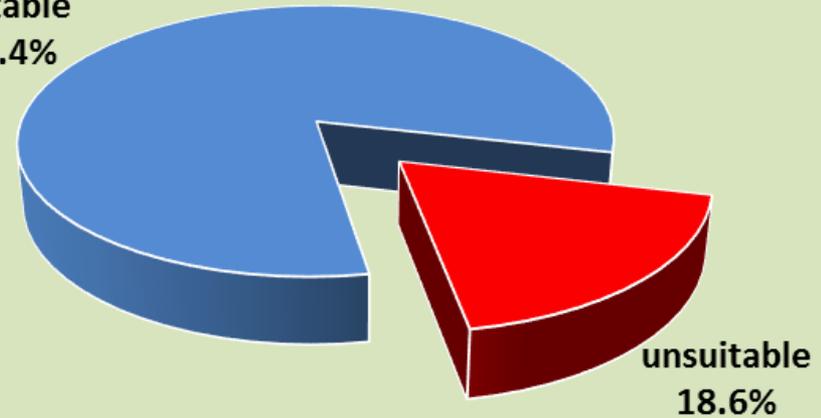
PSDDA Forecast

suitable
58.7%



Actual

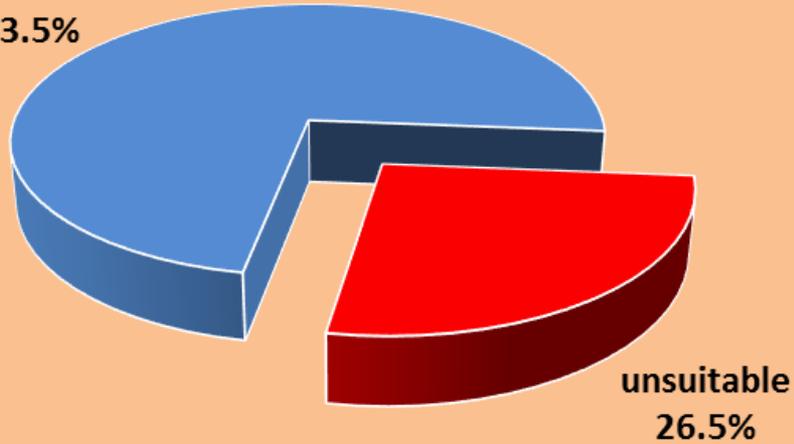
suitable
81.4%



Bellingham Bay (ND)

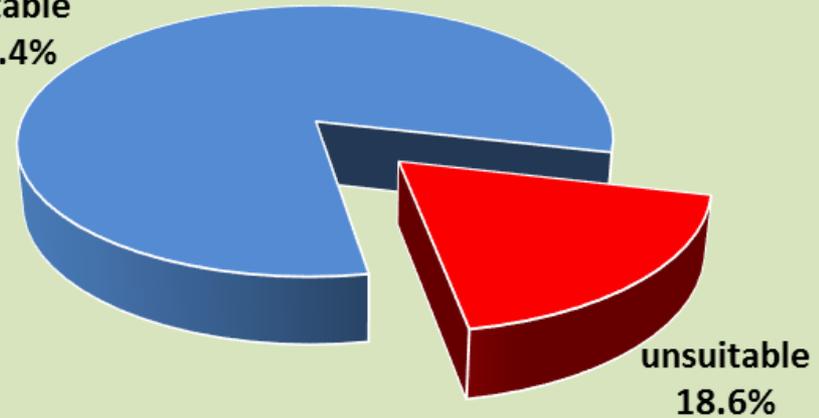
PSDDA Forecast

suitable
73.5%



Actual

suitable
81.4%

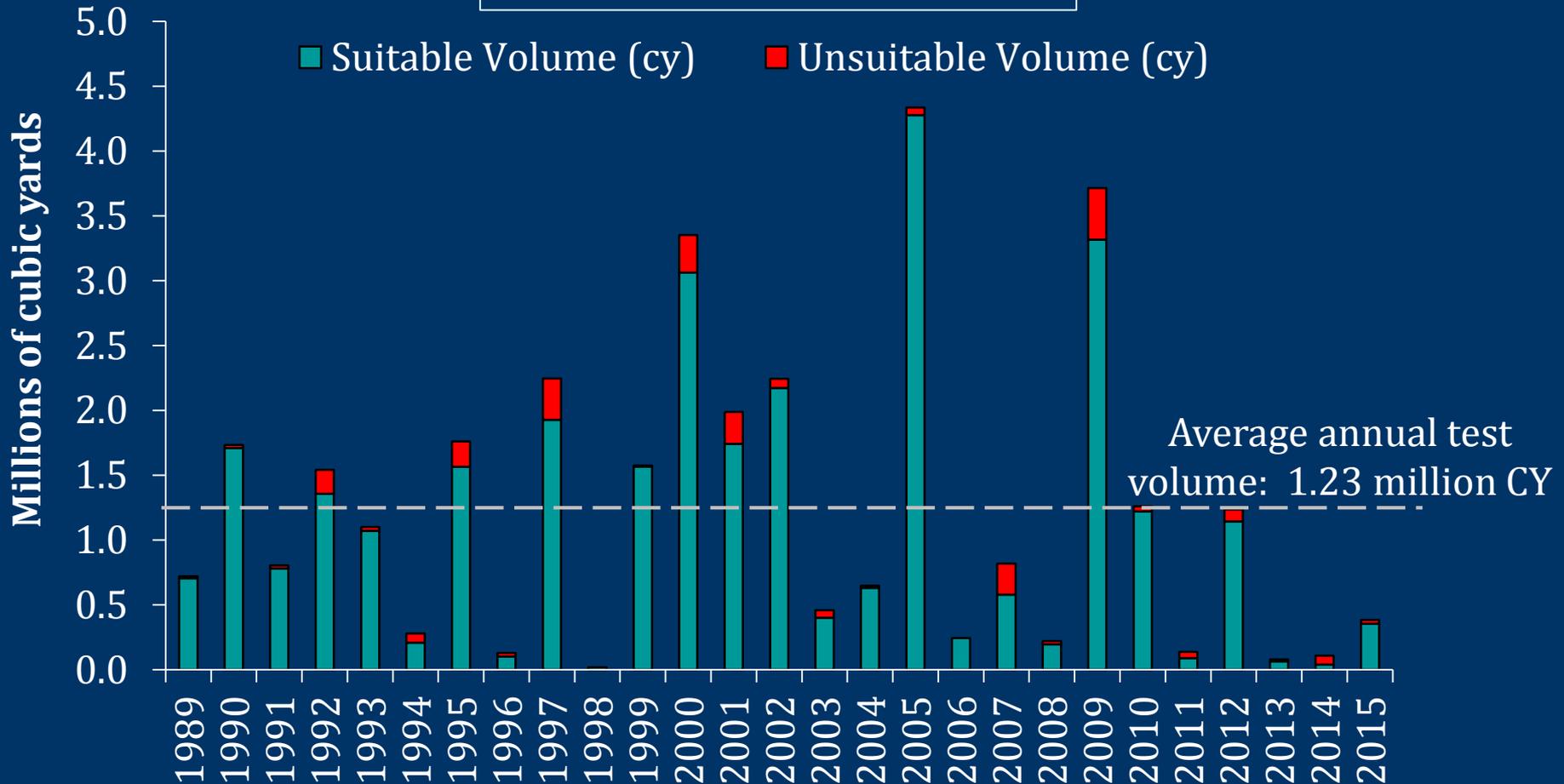


Dispersive Sites

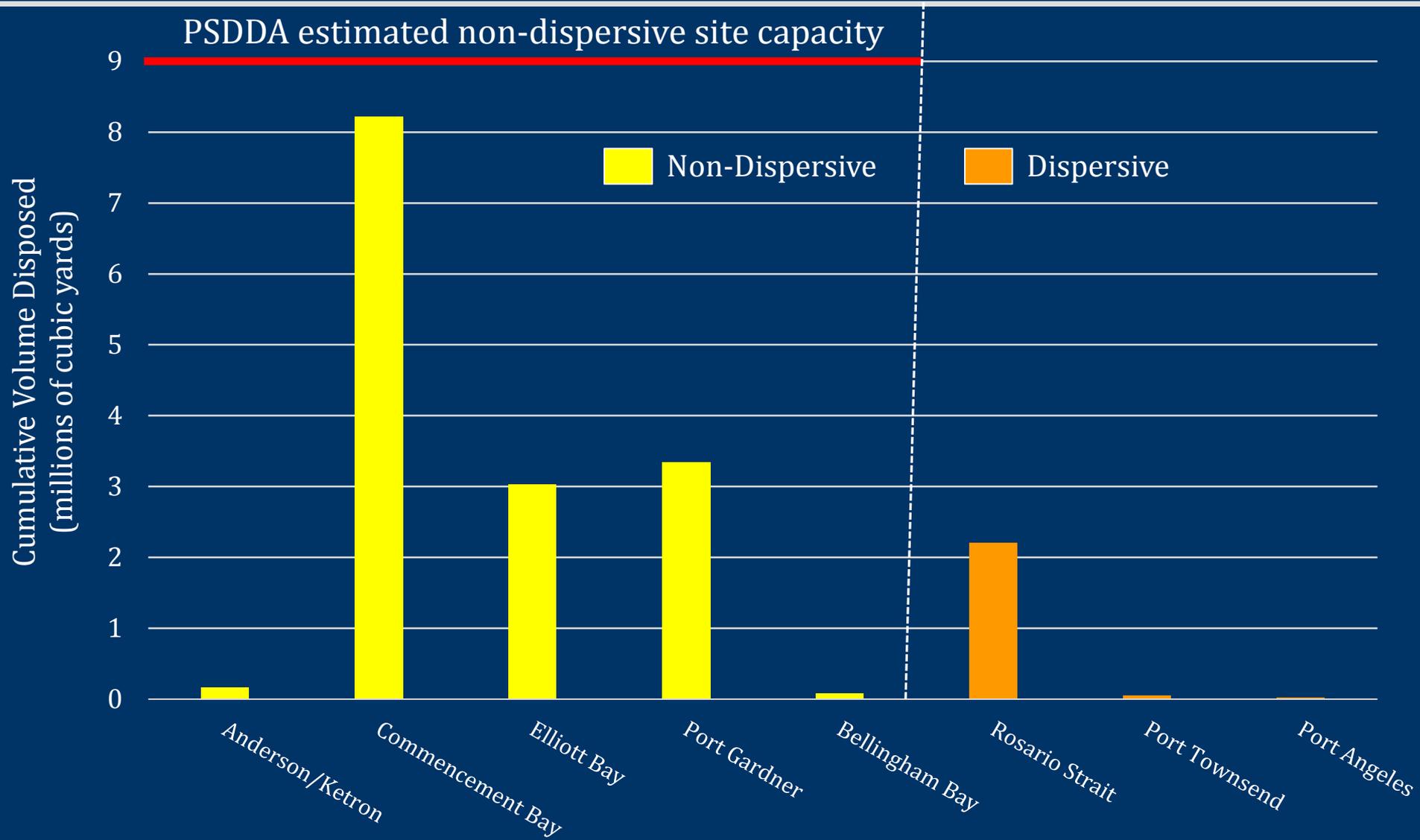
Disposal Site	Suitable for Disposal (%)	
	PSDDA Forecast	Actual
Port Angeles	100	100
Port Townsend	100	98.9
Rosario Strait	100	97.5

Puget Sound Testing History

forecast unsuitable rate: 27.9%
actual unsuitable rate: 11.8%



Puget Sound Disposed Volumes (1989-2015)



2009 Commencement Bay Supplemental Environmental Impact Statement

- Cumulative disposed volume ~ 7.9 mcy in 2007
- Mound height = 121 ft
- Shoreline permit volume limit: 9 mcy
- SEIS evaluated management alternatives
- Selected alternative included two additional disposal coordinate shifts (one shift already implemented in 2007)
- New site capacity = 23 mcy
- Predicted mound height = 155 ft

Flexibility and Communication



Agency Flexibility

- EPTA (PSDDA Phase I):
 - Use best professional judgment as needed
 - project-specific basis
 - Use of BPJ should be the exception, not the rule
 - Seek agency consensus
 - Document use of BPJ
- 2010 Dioxin Guidelines:
 - Case-by-case determinations may be made based on:
 - Sequencing
 - Cumulative effects of bioaccumulatives
 - Frequency of site use

Examples of Flexibility

- Recency extensions
- No-test determinations
- Dioxin reason-to-believe guidelines
- Case-by-case dioxin evaluation
- Benzyl alcohol
- Documenting use of BPJ:
 - Suitability determinations document use of BPJ
 - Biennial reports document use of BPJ

Communication

- SMARM
- Monthly meetings
 - Open to anyone (labs, ports, dredging project applicants, etc.)
 - Project-specific discussions
 - Technical and policy issues
- DMMO website and User Manual updates
- Biennial Reports



Challenges

- Two sites currently without shoreline permits
 - Bellingham Bay
 - Anderson/Ketron
- Opposition to A/K site
 - Local resident concerns
 - Pierce County SMP proposed revisions prohibit dredged material disposal in Nisqually Aquatic Reserve
- Limited monitoring budget

More Challenges

- Effective communication and participation/input
- PAHs – demonstrated effects to fish
- Other bioaccumulatives – e.g. PCBs, PBDEs
- Integration of 2013 SMS revisions with DMMP
- Budget and staffing limitations

Questions?

