San Diego Shipyard Sediment Cleanup Site TCAO #R9-2011-0001

Testimony of
Thomas Ginn, Ph.D.

November 14, 2011

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Introduction: Thomas C. Ginn, Ph.D.

- **Ph.D. in biology from New York University 1977**
- **Over 40 years experience in Environmental Toxicology and Ecology**
- **Conducted numerous sediment quality investigations for over 25 years**
- **Publications on sediment toxicity testing, benthic studies and annual literature review of marine pollution studies**
- **Over 20 years experience in San Diego area**
  - Boatyard and Shipyards in San Diego Bay
  - Expert for EPA in U.S. v. City of San Diego sewage case
- **Over 10 years experience with current shipyard site**

A Decade of Experience at the Shipyard Site

- Developed initial and final sampling design with staff oversight
- Supervised field/laboratory investigations and data analyses (2001/2002)
- Supervised Production of Detailed Sediment Investigation Report (2003)
- Analyzed findings in TCAO/DTR for NASSCO

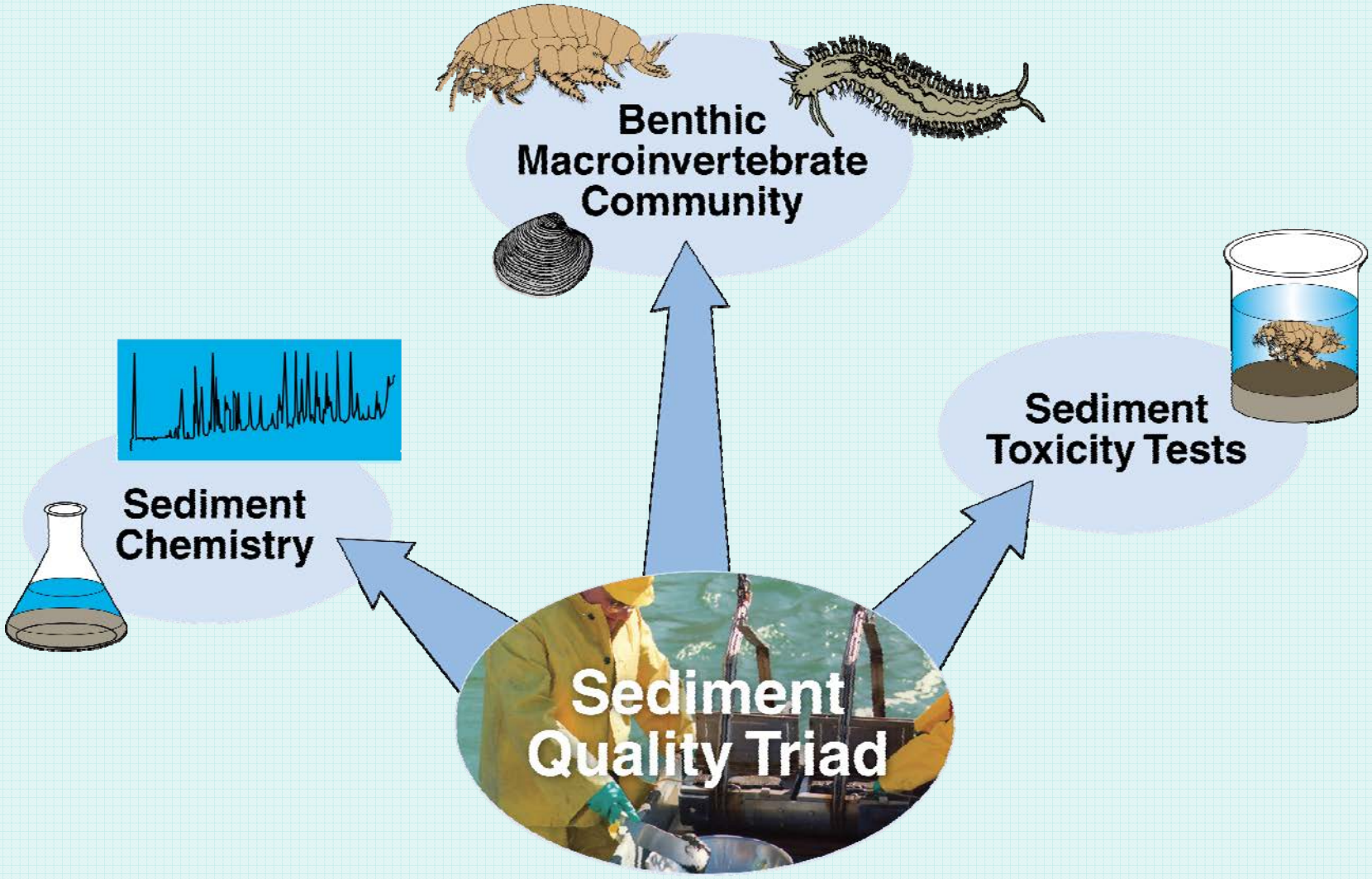
The DTR Beneficial Use Assessment is Unrealistically Conservative

- **Many of the Staff's analyses of data are appropriate, but assumptions and risk characterizations are unrealistically conservative**
  - Aquatic life beneficial uses
  - Aquatic dependent wildlife uses
- **Many of my opinions are based directly on Staff's analyses as presented in the DTR**

The Aquatic Life Studies at The Shipyards are Comprehensive and Sufficient for Remedial Decisions

- **Approximately $4 million study**
- **Multiple line of evidence approach using data on chemistry, laboratory toxicity, benthic communities and fishes**
  - 66 sediment chemistry stations
  - 30 stations also sampled for sediment toxicity and benthic macroinvertebrate communities
  - 253 fish sampled for histopathology and overall health
- **Most comprehensive sediment study conducted to date in San Diego Bay**

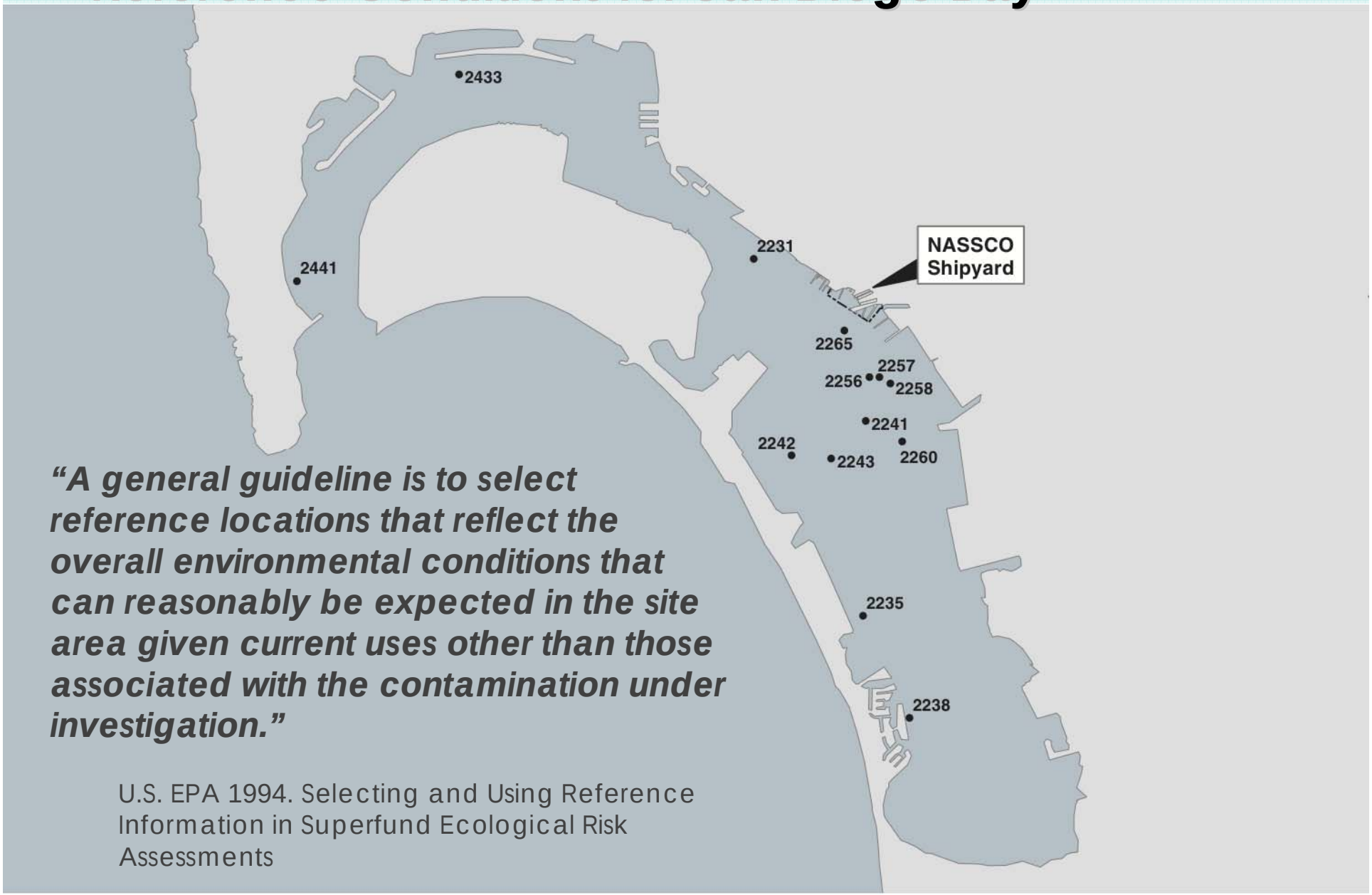
Sediment Quality Triad



Each Triad Sampling Station Represents Seven Independent Measurements

- **Benthic Response Index:** Developed by regional experts to assess benthic community health
- **Benthic Abundance:** Total count of organisms
- **Number of Benthic Taxa:** Total unique kinds of organisms
- **Diversity:** Taxa richness and the balance of taxa among individuals
- **Amphipod Survival:** 10-day test of organisms in sediments
- **Sea Urchin Fertilization:** Successful fertilization of eggs
- **Mussel Larvae Development:** Exposure above sediment-water interface

The Seven Triad Measurements are Compared to Reference Conditions for San Diego Bay



"A general guideline is to select reference locations that reflect the overall environmental conditions that can reasonably be expected in the site area given current uses other than those associated with the contamination under investigation."

U.S. EPA 1994. Selecting and Using Reference Information in Superfund Ecological Risk Assessments

Triad Stations at the NASSCO Shipyard

- 14 Stations with Triad data (excluding station NA22 at the mouth of Chollas Creek)
- Seven direct lines of evidence to measure toxicity or benthic effects for each Triad station
- Therefore, 98 direct measurements at NASSCO stations (14 × 7)
- 93 of 98 measurements were not different from reference conditions (as reported in the DTR)

Aquatic Life Beneficial Uses at The NASSCO Shipyard are Not Impaired

Summary of opinions:

- **TCAO/DTR conclusions concerning impairment of aquatic life beneficial uses are not supported by the Staff's analyses**
- **NASSCO sediments exhibit little or no toxicity**
- **Benthic communities at NASSCO are healthy, abundant, and not different from reference communities (except directly off mouth of Chollas Creek)**
- **No adverse effects on fish health**

Benthic Macroinvertebrates

Benthic macroinvertebrates are the most valuable single indicator of potential effects in sediments

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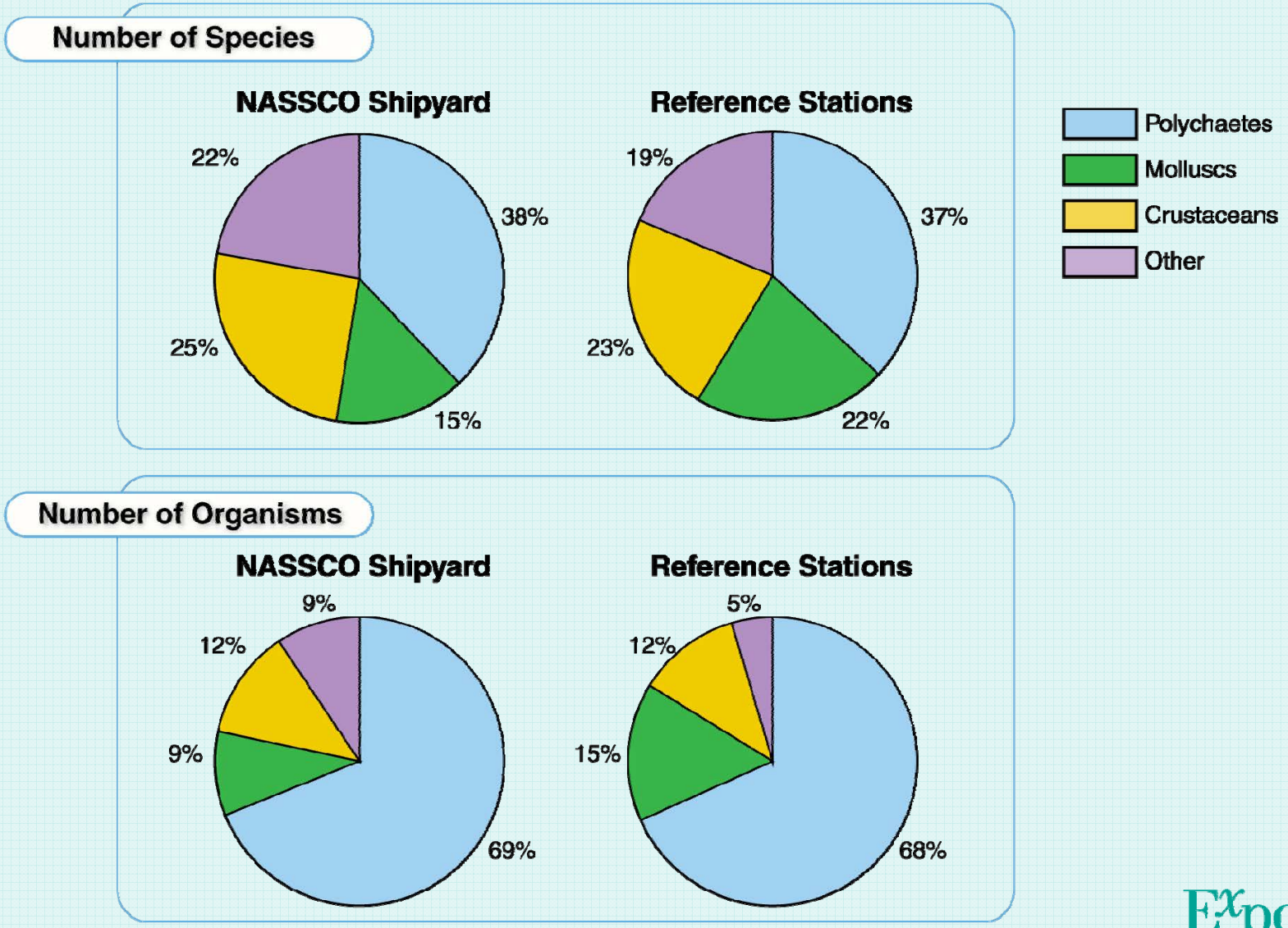
Benthic Communities are Healthy and Abundant at NASSCO Shipyard



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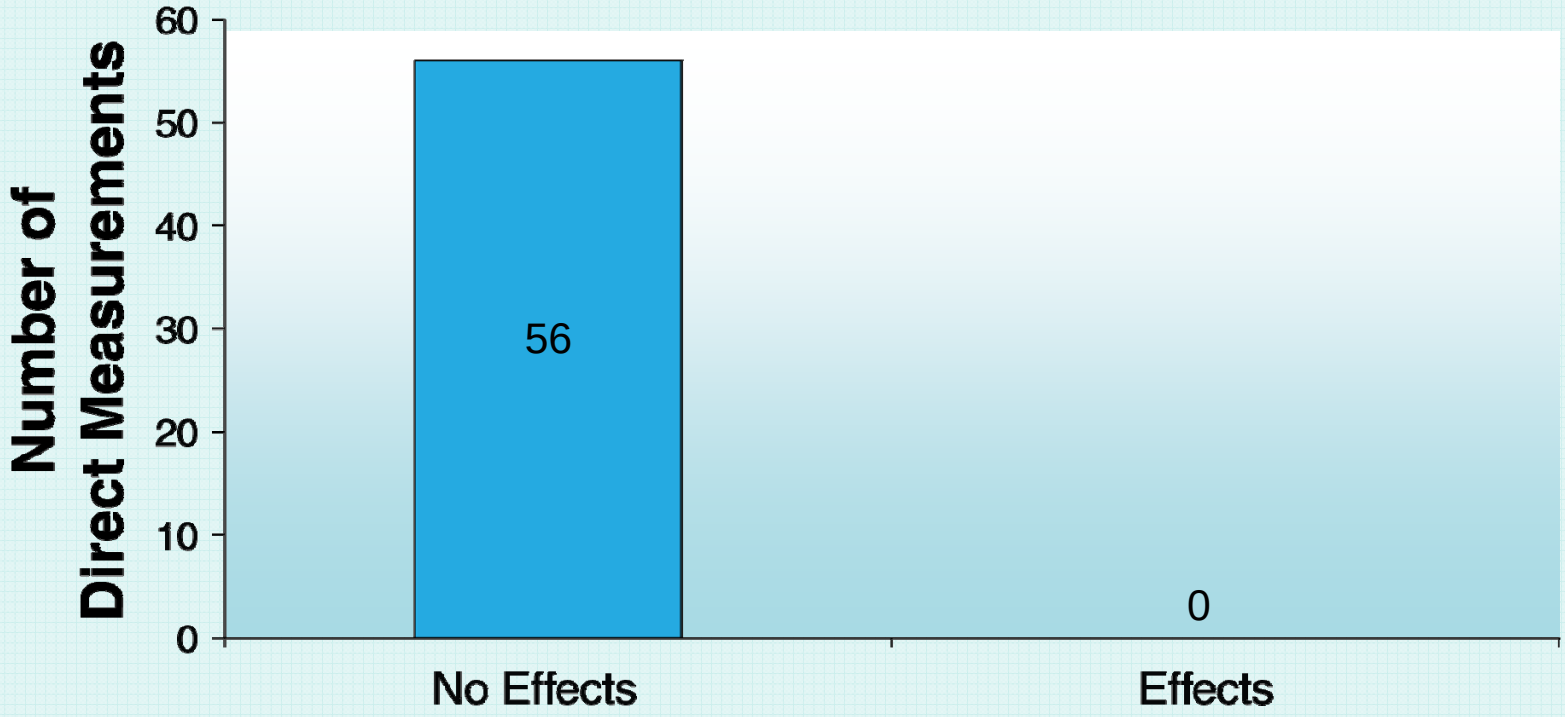
There are No Differences from Reference Conditions for Benthic Community Measurements at NASSCO (14 × 4 = 56)



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Sediment Profile Imaging (SPI) Camera

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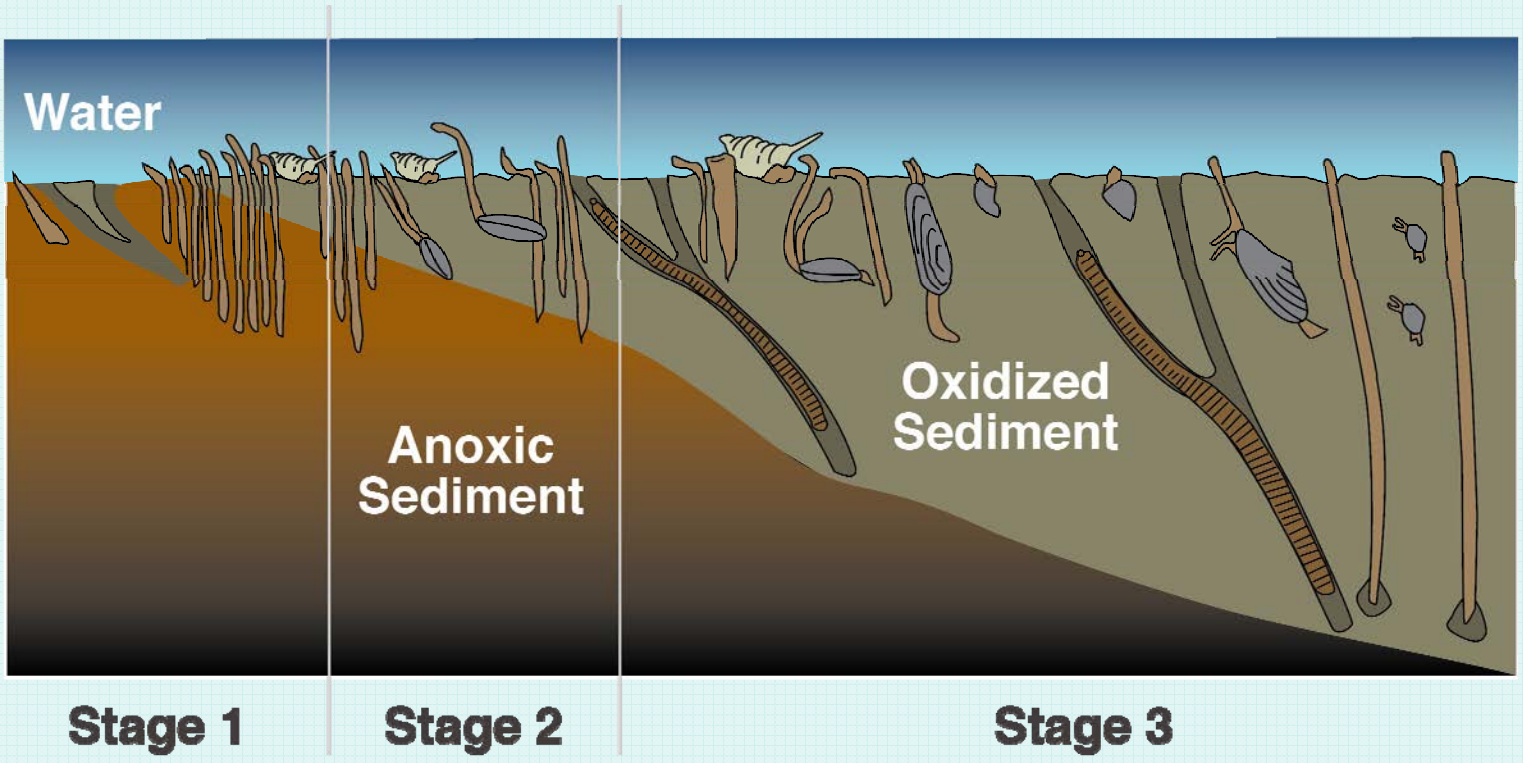
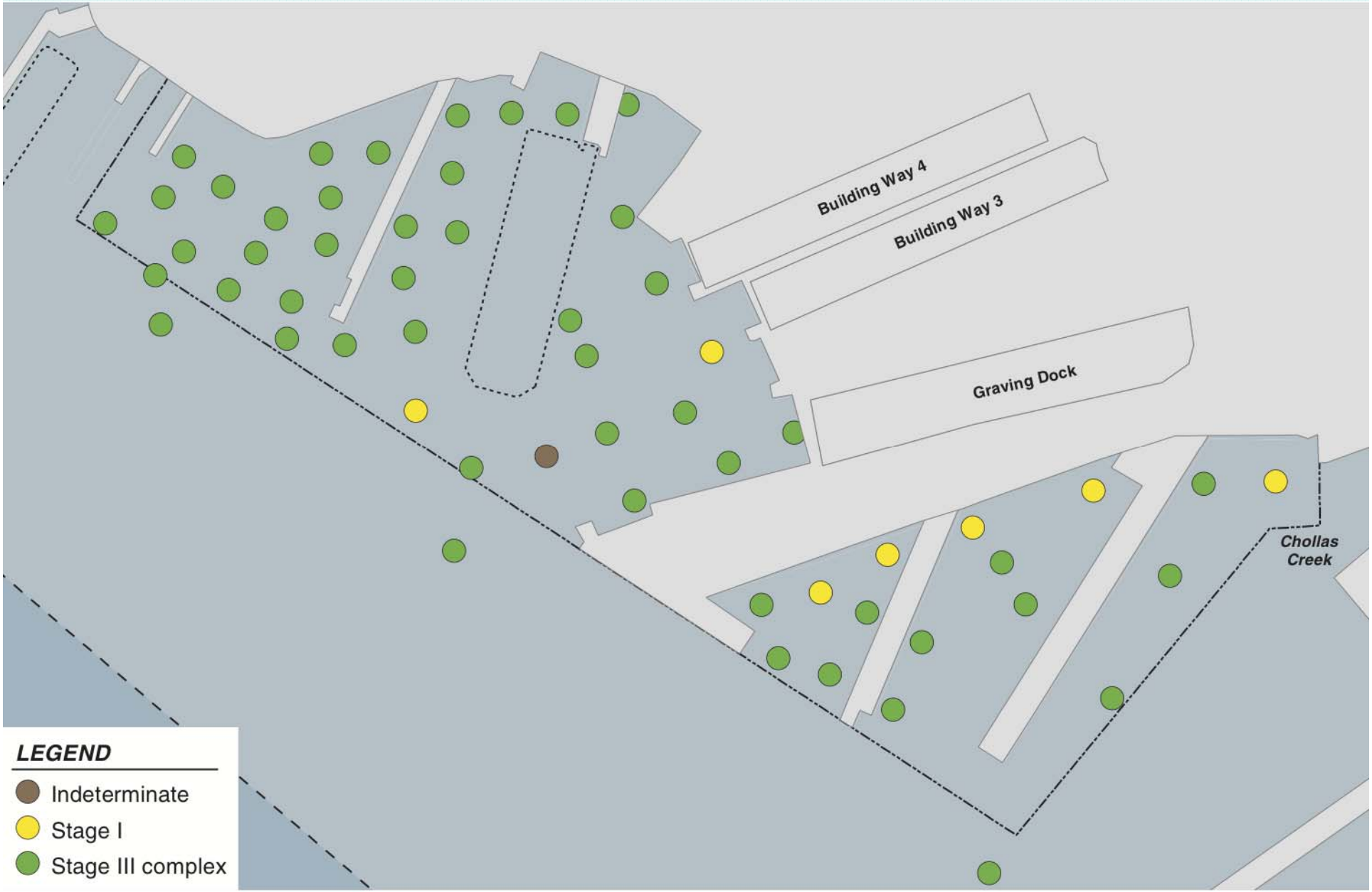
Typical Stages of Benthic Community Development



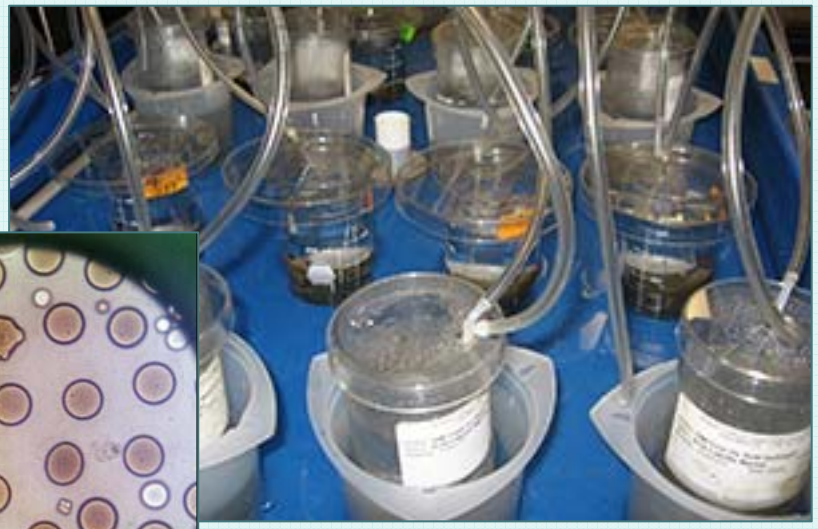
Tolerant early colonizers → Stable, mature community

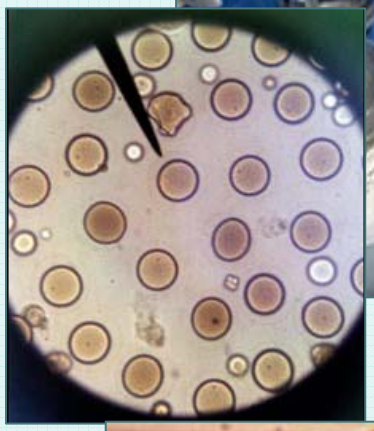
Sediment Profile Imaging at NASSCO Shipyard



Three Sediment Toxicity Tests Were Conducted at the Shipyards

- Amphipod 10-day survival
- Echinoderm fertilization
- Mussel larvae development





Source: www.sccwrp.org

Sediments at NASSCO Exhibit Little or No Toxicity

Comparison of NASSCO toxicity data to the reference pool 95 percent lower prediction limit (LPL)

Station	Amphipod Survival	Urchin Fertilization	Bivalve Development
NA01	80	86	49
NA03	84	84	94
NA04	80	88	84
NA05	89	95	94
NA06	78	103	74
NA07	74	102	88
NA09	88	99	**1**
NA11	**70**	101	80
NA12	82	89	**15**
NA15	97	88	93
NA16	90	84	**3**
NA17	95	88	80
NA19	89	72	**2**
NA20	90	78	80

Note:
Toxicity values less than the 95percent lower prediction limit values are bold faced.

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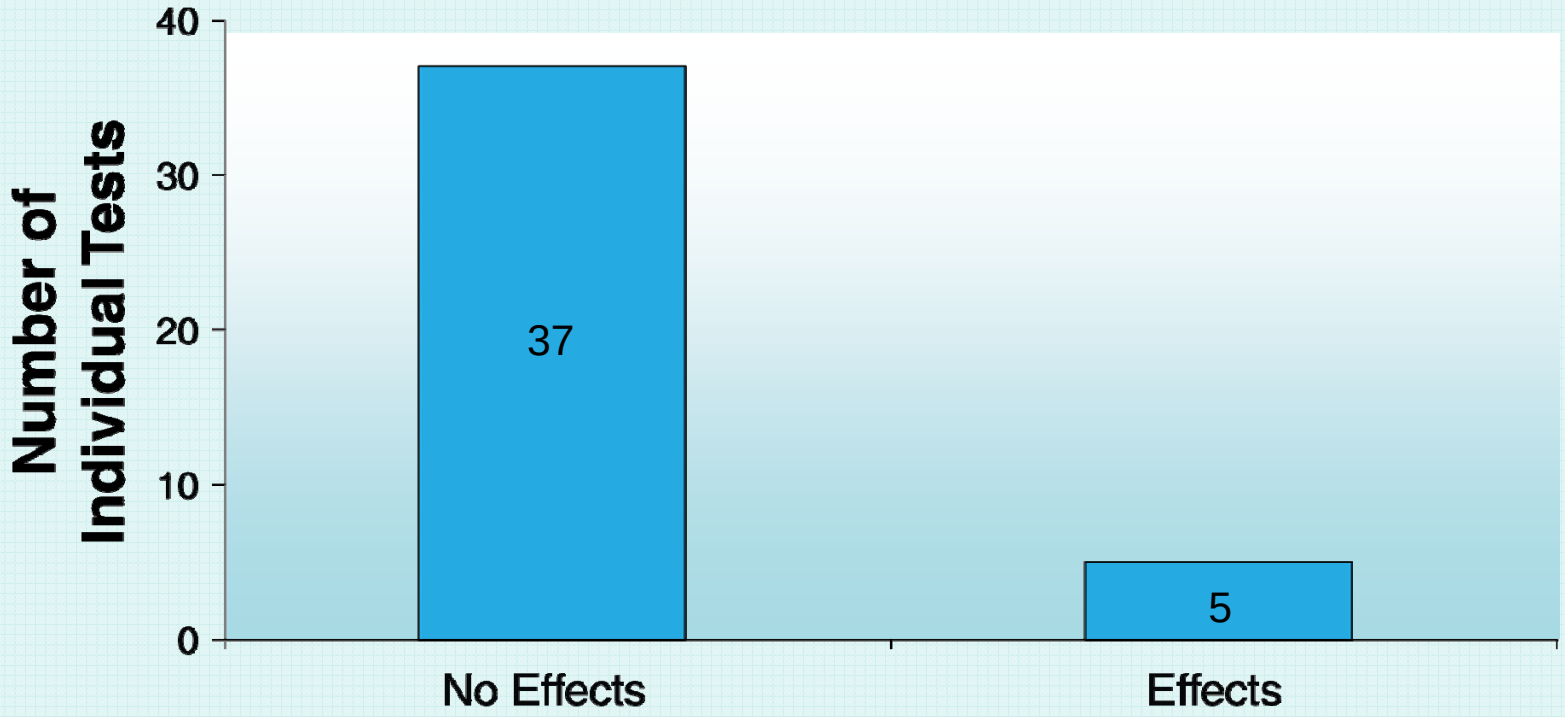
Summary of Sediment Toxicity Tests at NASSCO (14 × 3 = 42)



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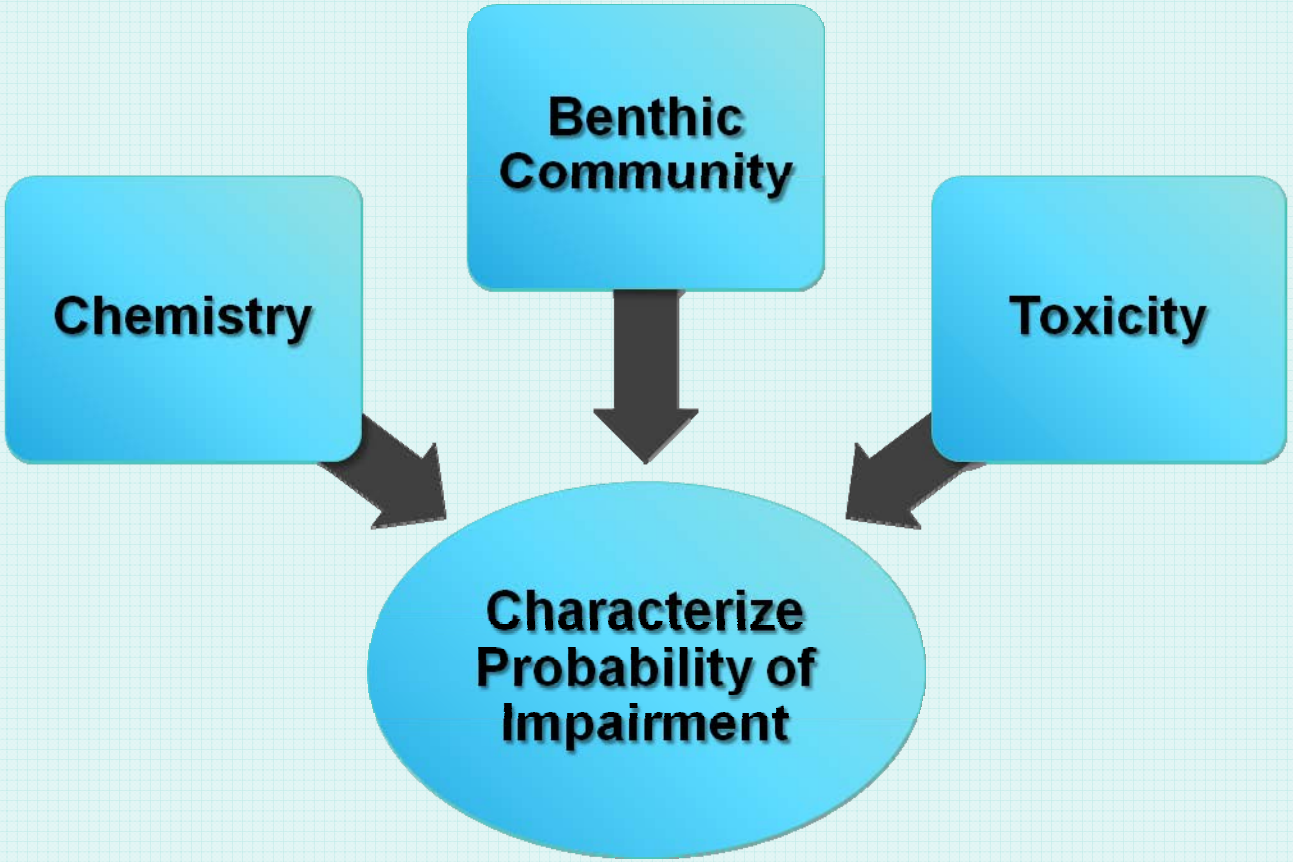
Multiple Lines of Evidence are used in a Decision Framework to Classify Triad Stations



DTR Multiple Line of Evidence Decision Framework is Flawed

- **For chemistry LOE, there is an overreliance on generic, theoretical benchmarks that are not validated for the Site**
- **Weight of evidence analysis framework in DTR is biased toward chemistry LOE**
  - Example from DTR Table 18-14:
    - High chemistry
    - Low (no) toxicity
    - Low (no) benthic community impacts
    - Relative likelihood of benthic community impairment = “Possible”

DTR Framework is Inconsistent with the Scientific Literature and the State's SQO Policy

- ***"This methodology is based on accepted principles of WOE [Weight of Evidence] analysis documented in the scientific literature and consistent with frameworks used at other sediment cleanup sites as well as in the State Board's SQO Policy".***

  Cleanup Team's Hearing Brief, Oct. 19, 2011, p. 8.

- **When contamination is elevated, but no significant toxicity and no benthic alteration:**
  "Contaminant(s) are not bioavailable. No action(s) necessary".

  Chapman, P.M. 1996. Presentation and interpretation of Sediment Quality Triad data. Ecotoxicology. 5:327–339.

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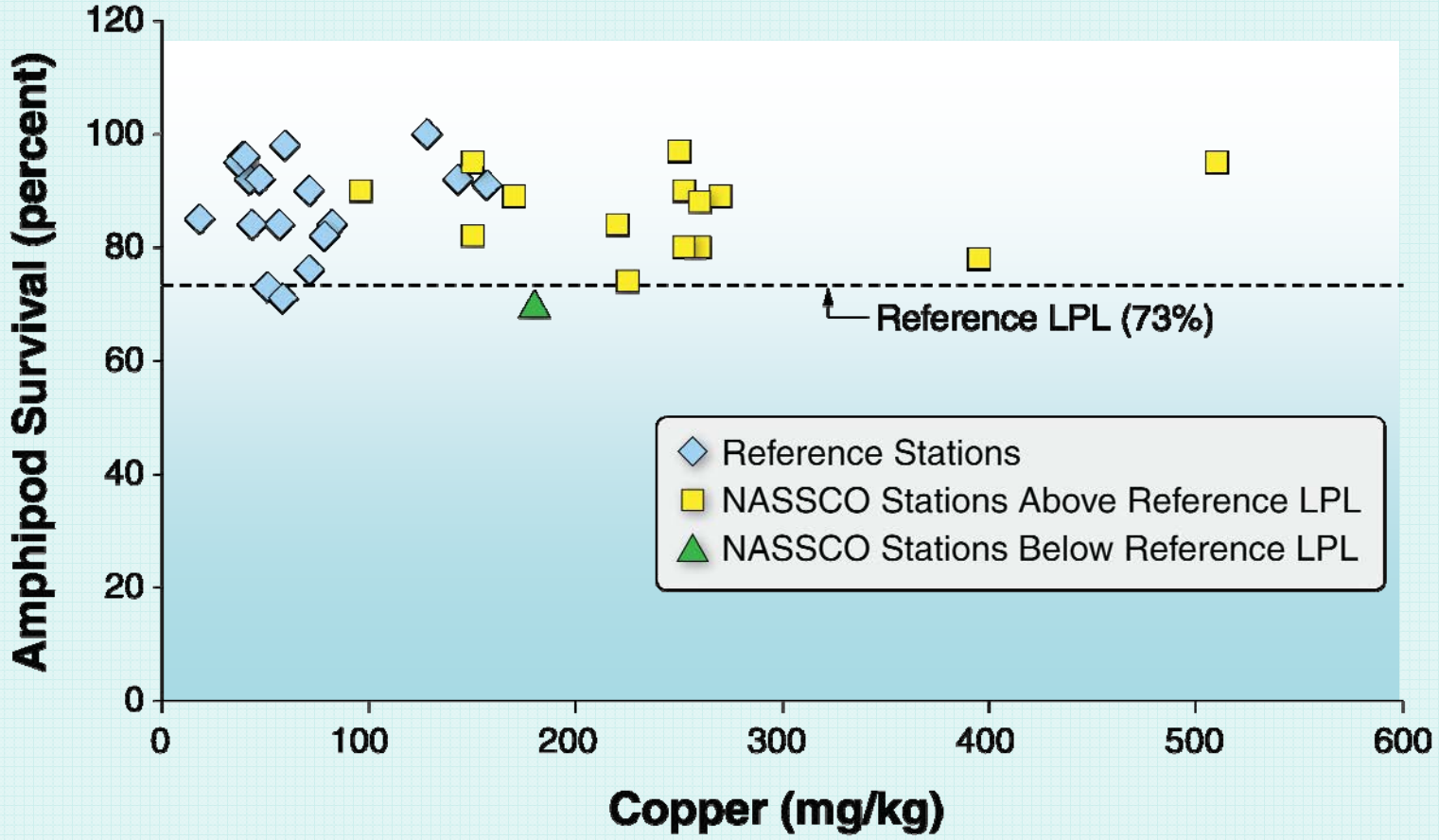
Copper in NASSCO Sediments Does Not Result in Toxicity to Amphipods, Indicating Limited Bioavailability



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DTR Framework is Inconsistent with the Scientific Literature and the State's SQO Policy

Excerpt from: Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1 Sediment Quality, August 25, 2009.

Line of Evidence Category Combination	Chemistry LOE: Sediment Chemistry Exposure)	Benthic LOE: Benthic Community Condition	Toxicity LOE: Sediment Toxicity	Station Assessment (Site Condition)
49	High	Reference	Nontoxic	Likely unimpacted
50	High	Reference	Low	Likely unimpacted
51	High	Reference	Moderate	Inconclusive

Assessment of Triad Data in the DTR

Results of the sediment quality triad approach using the reference condition (adapted from Table 18-1 of the DTR)

Station	Sediment Chemistry	Toxicity	Benthic Community	Weight-of-Evidence Category
NA01	Moderate	Low	Low	Unlikely
NA03	Moderate	Low	Low	Unlikely
NA04	Moderate	Low	Low	Unlikely
NA05	Moderate	Low	Low	Unlikely
NA06	Moderate	Low	Low	Unlikely
NA07	Moderate	Low	Low	Unlikely
NA09	Moderate	Moderate	Low	Possible
NA11	Moderate	Moderate	Low	Possible
NA12	Moderate	Moderate	Low	Possible
NA15	Moderate	Low	Low	Unlikely
NA16	Moderate	Moderate	Low	Possible
NA17	High	Low	Low	Possible
NA19	High	Moderate	Low	Likely
NA20	Low	Low	Moderate	Unlikely

Corrected Assessment of Triad Data

Results of the sediment quality triad approach using the reference condition (adapted from Table 18-1 of the DTR)

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NA07	Moderate	No	Low	Unlikely
NA09	Moderate	Low	Low	Possible
NA11	Moderate	Low	Low	Possible
NA12	Moderate	Low	Low	Possible
NA15	Moderate	No	Low	Unlikely
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NA07	Moderate	No	No	Unlikely
NA09	Moderate	Low	No	Possible
NA11	Moderate	Low	No	Possible
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NA07	Moderate	No	No	Unlikely
NA09	Moderate	Low	No	Possible
NA11	Moderate	Low	No	Possible
NA12	Moderate	Low	No	Possible
NA15	Moderate	No	No	Unlikely
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NA06	Moderate	No	No	Likely Unimpacted
NA07	Moderate	No	No	Likely Unimpacted
NA09	Moderate	Low	No	Likely Unimpacted
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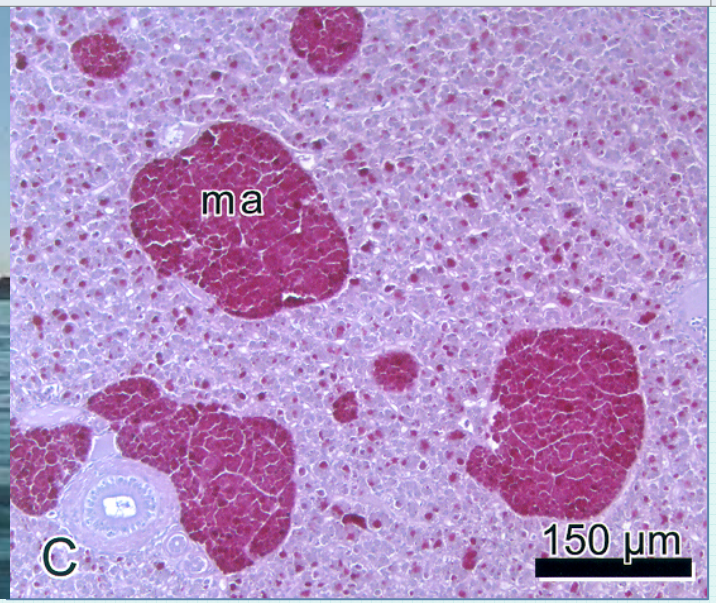
NA12	Moderate	Low	No	Likely Unimpacted
NA15	Moderate	No	No	Likely Unimpacted
NA16	Moderate	Low	No	Likely Unimpacted
NA17	High	No	No	Likely Unimpacted
NA19	High	Low	No	Likely Unimpacted
NA20	Low	No	No	Unimpacted

A Large, Comprehensive Study of Fish Health was Conducted at the Shipyard Site

Number of spotted sandbass collected	253
Total lesions evaluated	70
Number of serious liver lesions observed	0



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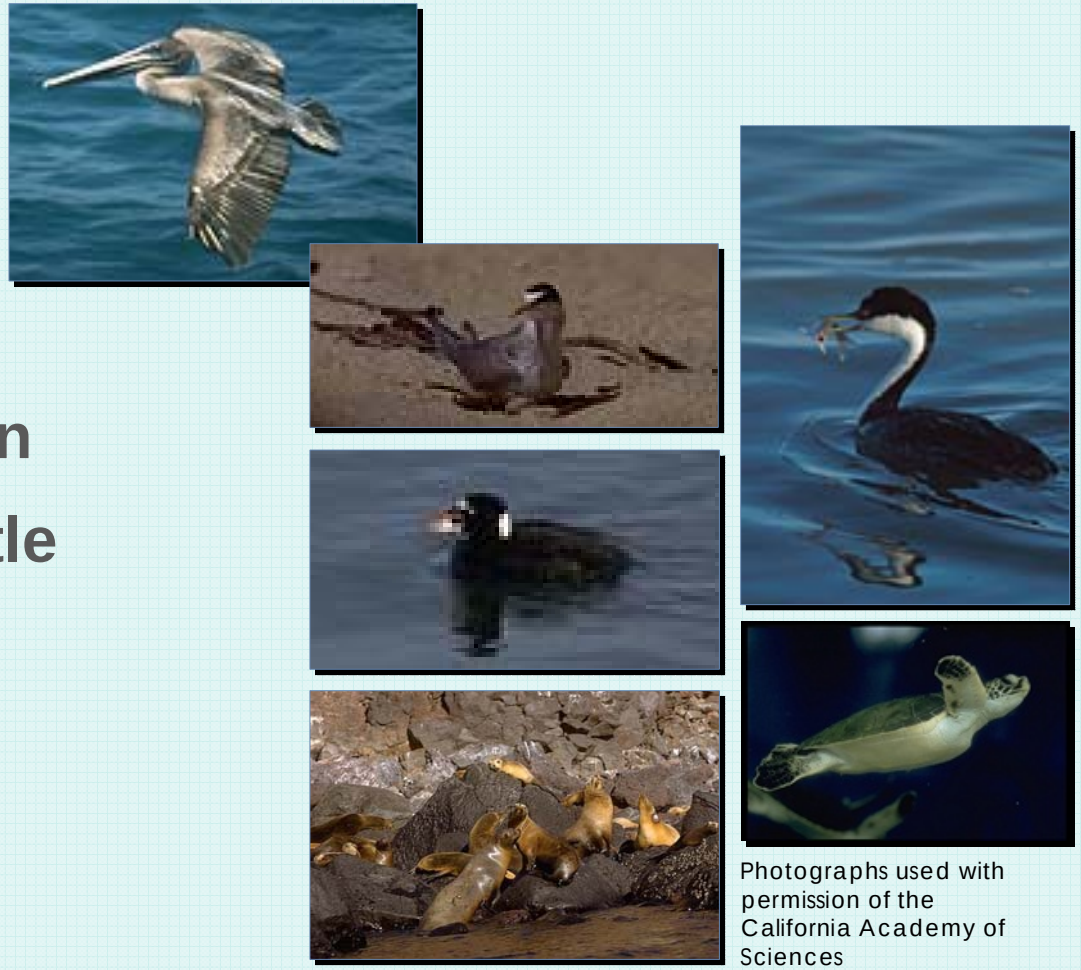
Health of Fish at The Shipyards is Not Impaired

- Growth and condition of fish near the shipyards was not significantly different from reference area fish
- There was no increased prevalence of liver cancer or other serious lesions in shipyard samples
- A few lesions were more prevalent at the reference area; a few lesions were more prevalent at the shipyard sites
- Most of the lesions were categorized as mild and have uncertain causes and effects on fish health
- Fish exposure to PAH is not significantly greater at the shipyard sites than at the reference area

Aquatic-Dependent Wildlife Beneficial Uses

- Brown pelican
- Least tern
- Western grebe
- Surf scoter
- California sea lion
- Pacific green turtle



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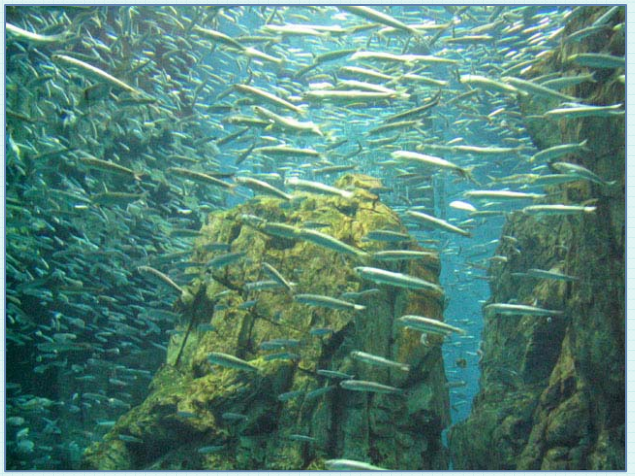
Risks to Wildlife were Estimated using Measured Concentrations of Chemicals in Food Items

- Small fish: Anchovies and topsmelt
- Medium fish: Spotted sand bass
- Benthic mussels
- Eelgrass



Aquatic Dependent Wildlife Beneficial Uses at NASSCO are Not Impaired

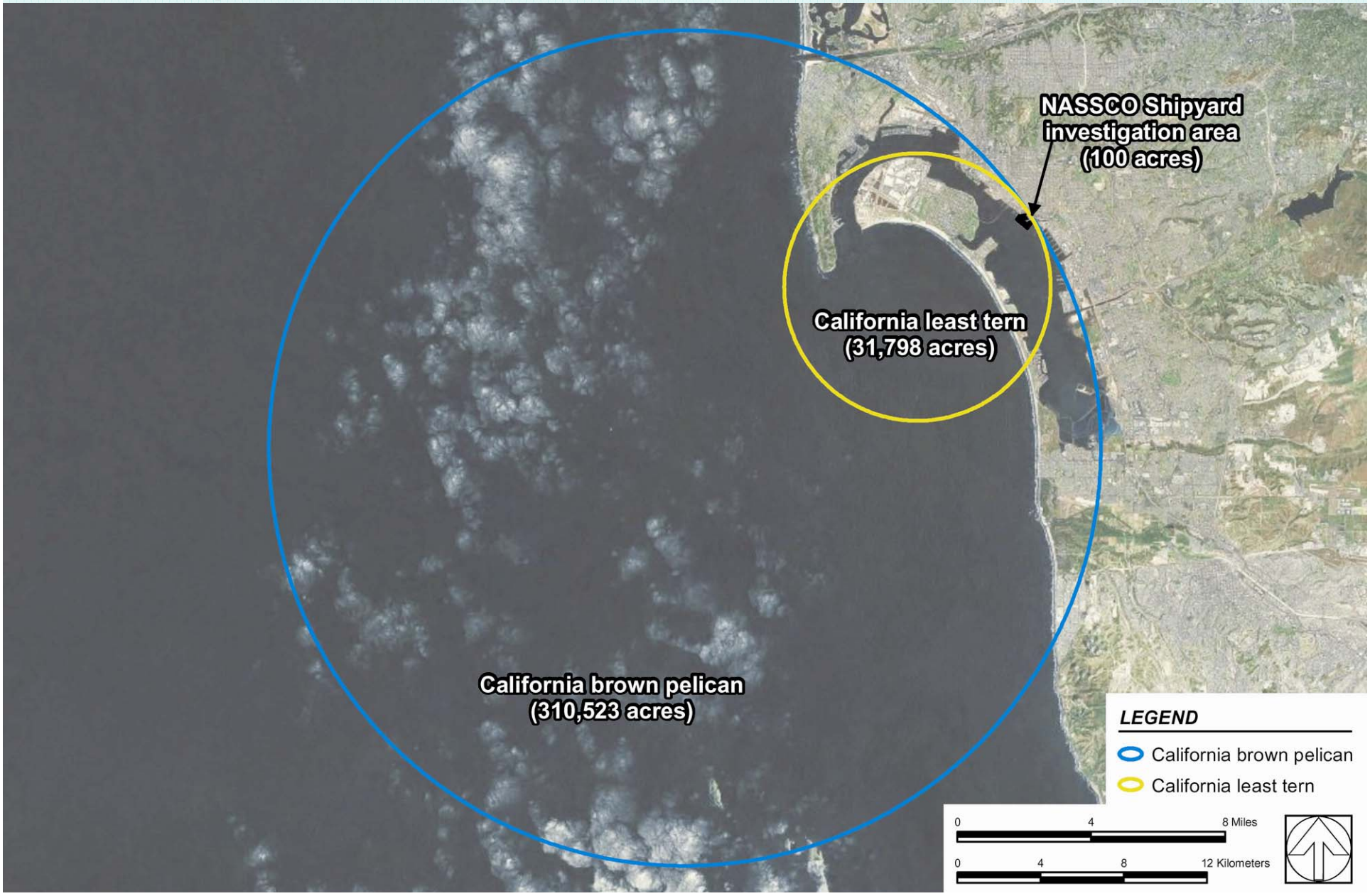
Summary of opinions:

- **Chemicals in wildlife prey are not highly elevated at NASSCO**
- **DTR unrealistically assumes that wildlife would get 100 percent of their food from Shipyards**
- **The DTR assessment shows no exceedances of adverse effect levels for any wildlife species**
- **In summary, pre-remedial conditions pose negligible risk to wildlife**

DTR Ignores Actual Area Use for Wildlife Species

- The area use factor (AUF) is the fraction of total forage area or home range of a given receptor that the Site could reasonably represent
- The use of realistic AUFs for risk characterization is consistent with both U.S. EPA and California guidance

DTR Ignores Actual Area Use for Wildlife Species



DTR Ignores Actual Area Use for Wildlife Species and makes a screening-level assumption

Impacts of flawed DTR approach:

- **AUF of 100 percent for a baseline risk assessment (Tier II) is inconsistent with scientific information, federal and state guidance, and common sense**
- **Both Tier I and II analyses in the DTR are equivalent to screening-level assessments**
- **Screening-level assessments should be used only to screen out sites or chemicals — not to require cleanup**

EPA Policy on Area Use Factors in ERA

- ***"For the screening level exposure estimate for terrestrial animals, assume that the home range of one or more animals is entirely within the contaminated area, and thus the animals are exposed 100 percent of the time. This is a conservative assumption and, as an assumption, is only applicable to the screening-level phase of the risk assessment. Species- and site-specific home range information would be needed later, in Step 6, to estimate more accurately the percentage of time an animal would use a contaminated area".***

U.S. EPA 1997, Ecological Risk Assessment Guidance for Superfund

EPA Policy on Area Use Factors in ERA *(continued)*

- ***"While I believe that the American public expects us to err on the side of protection in the face of scientific uncertainty, I do not want our assessments to be unrealistically conservative. We cannot lead the fight for environmental protection into the next century unless we use common sense in all we do"***

U.S. EPA Administrator 1995, Memorandum to EPA regional administrators concerning risk characterization programs

Risk Calculation for Aquatic-Dependent Wildlife

$$HQ = \frac{\text{Exposure}}{\text{TRV}}$$

HQ = hazard quotient

TRV = toxicity reference value

HQ < 1.0 is protective

Actual Risk to Wildlife is Negligible

No-Effect HQs for NASSCO and Reference from the DTR

Receptor	Location	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc	B[a]P	PCBs	TBT
Brown Pelican												
	Inside NASSCO	0.03	0.2	0.3	14	1.3	0.08	0.6	0.3	0.2	3.3	0.009
	Outside NASSCO	0.04	0.3	0.2	11	1.2	0.08	0.6	0.3	0.2	1.5	0.02
	Reference	0.03	0.1	0.2	4.2	0.9	0.06	0.2	0.3	0.2	1.2	0.004
Green Turtle												
	Inside NASSCO	0.003	0.06	0.3	6.3	0.02	0.01	0.01	0.08	0.03	0.003	0.00007
	Reference	0.002	0.02	0.06	1.7	0.005	0.009	0.01	0.04	0.01	0.002	0.00002
Least Tern												
	Inside NASSCO	0.06	0.3	0.5	18	0.3	0.08	0.3	1.0	0.3	2	0.005
	Outside NASSCO	0.07	0.2	0.4	13	0.3	0.07	0.3	1.2	0.3	2.4	0.007
	Reference	0.05	0.6	0.5	9.5	0.2	0.2	0.5	0.8	0.2	1.3	0.005
Sea Lion												
	Inside NASSCO	0.1	0.01	0.07	0.05	0.5	0.2	0.8	0.1	0.007	0.2	0.007
	Outside NASSCO	0.2	0.02	0.05	0.04	0.5	0.2	0.7	0.1	0.006	0.10	0.01
	Reference	0.1	0.01	0.04	0.02	0.3	0.2	0.2	0.1	0.005	0.08	0.003
Surf Scoter												
	Inside NASSCO	0.2	0.5	1.8	38	0.2	0.3	0.8	0.3	0.8	0.4	0.03
	Reference	0.1	0.5	0.7	19	0.1	0.2	0.8	0.3	0.3	0.4	0.01
Western Grebe												
	Inside NASSCO	0.03	0.2	0.4	17	0.2	0.05	0.1	0.5	0.2	0.9	0.003
	Outside NASSCO	0.03	0.2	0.3	12	0.2	0.04	0.1	0.6	0.2	1.0	0.003
	Reference	0.03	0.3	0.2	6.6	0.1	0.09	0.2	0.4	0.1	0.6	0.002

Actual Risk to Wildlife is Negligible

No-Effect HQs for NASSCO and Reference Using Realistic Area Use Factors

Receptor	Location	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc	B[a]P	PCBs	TBT
Brown Pelican												
	Inside NASSCO	0.0001	0.0007	0.001	0.06	0.005	0.0003	0.002	0.001	0.001	0.01	0.00004
	Outside NASSCO	0.0002	0.001	0.001	0.04	0.005	0.0003	0.002	0.001	0.0008	0.006	0.00007
	Reference	0.0001	0.0004	0.0006	0.02	0.003	0.0002	0.0008	0.001	0.001	0.005	0.00002
Green Turtle												
	Inside NASSCO	0.00003	0.0006	0.004	0.07	0.0002	0.0001	0.0001	0.0009	0.0003	0.00004	0.0000008
	Reference	0.00002	0.0003	0.0007	0.02	0.0001	0.0001	0.0001	0.0004	0.0002	0.00002	0.0000002
Least Tern												
	Inside NASSCO	0.0002	0.001	0.001	0.05	0.001	0.0002	0.0008	0.003	0.001	0.006	0.00002
	Outside NASSCO	0.0002	0.0006	0.001	0.04	0.001	0.0002	0.0009	0.004	0.001	0.007	0.00002
	Reference	0.0002	0.002	0.001	0.03	0.001	0.0006	0.002	0.002	0.001	0.004	0.00002
Sea Lion												
	Inside NASSCO	0.0006	0.00005	0.0003	0.0002	0.002	0.0008	0.003	0.0005	0.00003	0.0009	0.00003
	Outside NASSCO	0.0007	0.00009	0.0002	0.0002	0.002	0.0008	0.003	0.0006	0.00002	0.0004	0.00005
	Reference	0.0005	0.00003	0.0001	0.00006	0.001	0.0006	0.0009	0.0005	0.00002	0.0003	0.00001
Surf Scoter												
	Inside NASSCO	0.0006	0.002	0.007	0.2	0.0008	0.001	0.003	0.001	0.003	0.001	0.0001
	Reference	0.0004	0.002	0.003	0.08	0.0005	0.0006	0.003	0.001	0.001	0.002	0.00004
Western Grebe												
	Inside NASSCO	0.0001	0.001	0.001	0.07	0.0007	0.0002	0.0005	0.002	0.0007	0.004	0.00001
	Outside NASSCO	0.0001	0.0007	0.001	0.05	0.0006	0.0002	0.0006	0.002	0.0006	0.004	0.00001
	Reference	0.0001	0.001	0.001	0.03	0.0004	0.0004	0.0009	0.001	0.0004	0.002	0.00001

Actual Risk to Wildlife is Negligible

No-Effect HQs for NASSCO and Reference Using 5X Realistic Area Use Factors

Receptor	Location	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc	B[a]P	PCBs	TBT
Brown Pelican												
	Inside NASSCO	0.0006	0.004	0.006	0.3	0.03	0.002	0.01	0.006	0.005	0.07	0.0002
	Outside NASSCO	0.0008	0.007	0.005	0.2	0.02	0.002	0.01	0.006	0.004	0.03	0.0004
	Reference	0.0005	0.002	0.003	0.08	0.02	0.001	0.004	0.005	0.004	0.02	0.0001
Green Turtle												
	Inside NASSCO	0.0002	0.003	0.02	0.3	0.0009	0.0007	0.0006	0.004	0.002	0.0002	0.000004
	Reference	0.0001	0.001	0.003	0.09	0.0003	0.0005	0.0006	0.002	0.0008	0.0001	0.000001
Least Tern												
	Inside NASSCO	0.0009	0.004	0.007	0.3	0.005	0.001	0.004	0.02	0.004	0.03	0.0001
	Outside NASSCO	0.001	0.003	0.006	0.2	0.005	0.001	0.005	0.02	0.004	0.04	0.0001
	Reference	0.0008	0.009	0.007	0.1	0.003	0.003	0.008	0.01	0.003	0.02	0.0001
Sea Lion												
	Inside NASSCO	0.003	0.0002	0.001	0.001	0.01	0.004	0.02	0.003	0.0001	0.004	0.0001
	Outside NASSCO	0.004	0.0004	0.001	0.0008	0.009	0.004	0.01	0.003	0.0001	0.002	0.0003
	Reference	0.002	0.0001	0.0007	0.0003	0.006	0.003	0.005	0.002	0.0001	0.002	0.0001
Surf Scoter												
	Inside NASSCO	0.003	0.01	0.04	0.8	0.004	0.006	0.02	0.007	0.02	0.007	0.0006
	Reference	0.002	0.009	0.01	0.4	0.003	0.003	0.02	0.005	0.006	0.009	0.0002
Western Grebe												
	Inside NASSCO	0.0006	0.005	0.007	0.3	0.004	0.001	0.002	0.009	0.003	0.02	0.0001
	Outside NASSCO	0.0006	0.003	0.005	0.2	0.003	0.001	0.003	0.01	0.003	0.02	0.0001
	Reference	0.0005	0.006	0.005	0.1	0.002	0.002	0.005	0.007	0.002	0.01	0.00005

The DTR Ignores the Results of the Lowest Adverse Effect Level Comparisons

DTR Tier II ERA assessed exposure at two risk levels:

- **No effect level**

  "The numerically low TRV is meant to represent an intake which the developers of the TRVs believed presents a dose unlikely to produce adverse effects"

  DTSC 1999.

- **Lowest adverse effect level**

  "The numerically high TRV is meant to represent an intake which the developers of the TRVs believed presents a dose which would produce adverse population effects"

  DTSC 1999.

Actual Risk to Wildlife is Negligible

Lowest Adverse Effect Level HQs for NASSCO and Reference (Unmodified from DTR)

Receptor	Location	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc	B[a]P	PCBs	TBT
Brown Pelican												
	Inside NASSCO	0.008	0.04	0.01	0.02	0.3	0.002	0.2	0.03	0.02	0.2	0.0002
	Outside NASSCO	0.01	0.07	0.01	0.02	0.3	0.002	0.1	0.03	0.02	0.1	0.0003
	Reference	0.006	0.02	0.007	0.007	0.2	0.001	0.05	0.03	0.02	0.09	0.00007
Green Turtle												
	Inside NASSCO	0.0008	0.01	0.02	0.01	0.004	0.0003	0.003	0.008	0.003	0.0002	0.0000011
	Reference	0.0005	0.005	0.003	0.003	0.001	0.0002	0.003	0.004	0.001	0.0001	0.0000003
Least Tern												
	Inside NASSCO	0.02	0.05	0.02	0.03	0.07	0.002	0.06	0.1	0.03	0.1	0.00008
	Outside NASSCO	0.02	0.04	0.02	0.02	0.07	0.002	0.07	0.1	0.03	0.2	0.0001
	Reference	0.01	0.1	0.02	0.02	0.05	0.005	0.1	0.08	0.02	0.09	0.00008
Sea Lion												
	Inside NASSCO	0.009	0.0006	0.0003	0.0002	0.05	0.0009	0.03	0.003	0.0003	0.06	0.0001
	Outside NASSCO	0.01	0.001	0.0002	0.0002	0.05	0.0009	0.03	0.003	0.0002	0.03	0.0002
	Reference	0.008	0.0003	0.0002	0.00006	0.03	0.0007	0.01	0.003	0.000	0.02	0.00006
Surf Scoter												
	Inside NASSCO	0.04	0.1	0.08	0.06	0.05	0.008	0.2	0.03	0.08	0.03	0.0005
	Reference	0.02	0.09	0.03	0.03	0.03	0.004	0.2	0.03	0.03	0.03	0.0002
Western Grebe												
	Inside NASSCO	0.01	0.05	0.02	0.03	0.04	0.001	0.03	0.05	0.02	0.06	0.00004
	Outside NASSCO	0.008	0.03	0.01	0.02	0.03	0.001	0.03	0.06	0.02	0.07	0.00005
	Reference	0.006	0.06	0.01	0.01	0.02	0.002	0.06	0.04	0.01	0.04	0.00004

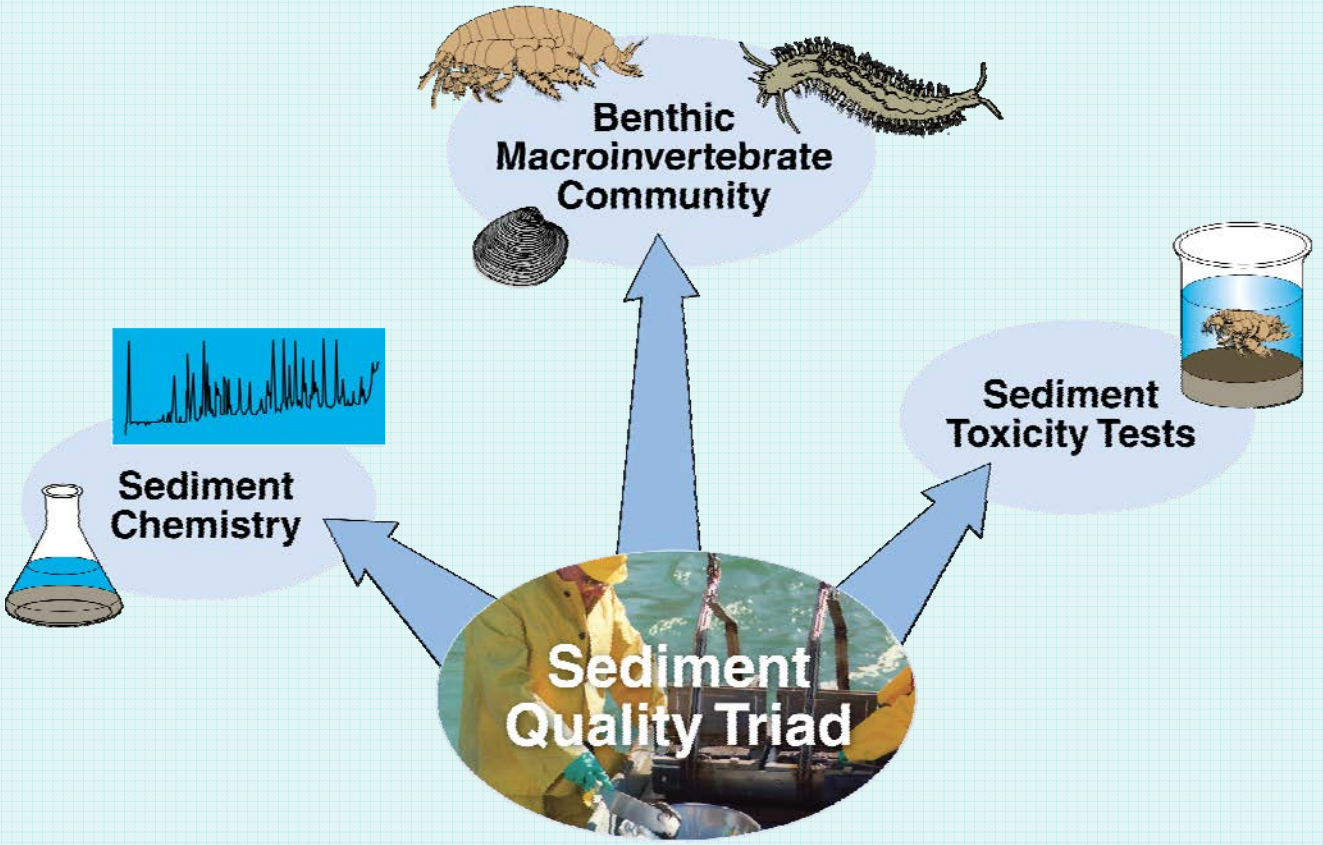
There is No Impairment of Beneficial Uses for Aquatic-Dependent Wildlife

Summary of wildlife risk analysis:

- **Use of a conservative, but realistic AUF results in a conclusion of no significant risk for Wildlife**
- **Even using highly unrealistic assumption of AUF = 100 percent, the DTR assessment shows no exceedance of adverse effect levels**
- **There is no significant risk to wildlife, no beneficial use impairment, and no need for remediation to protect wildlife**

Is the Proposed Dredging at NASSCO Consistent with the Site-Specific Biological Data?

- 5 of 6 stations in NASSCO footprint have Triad data



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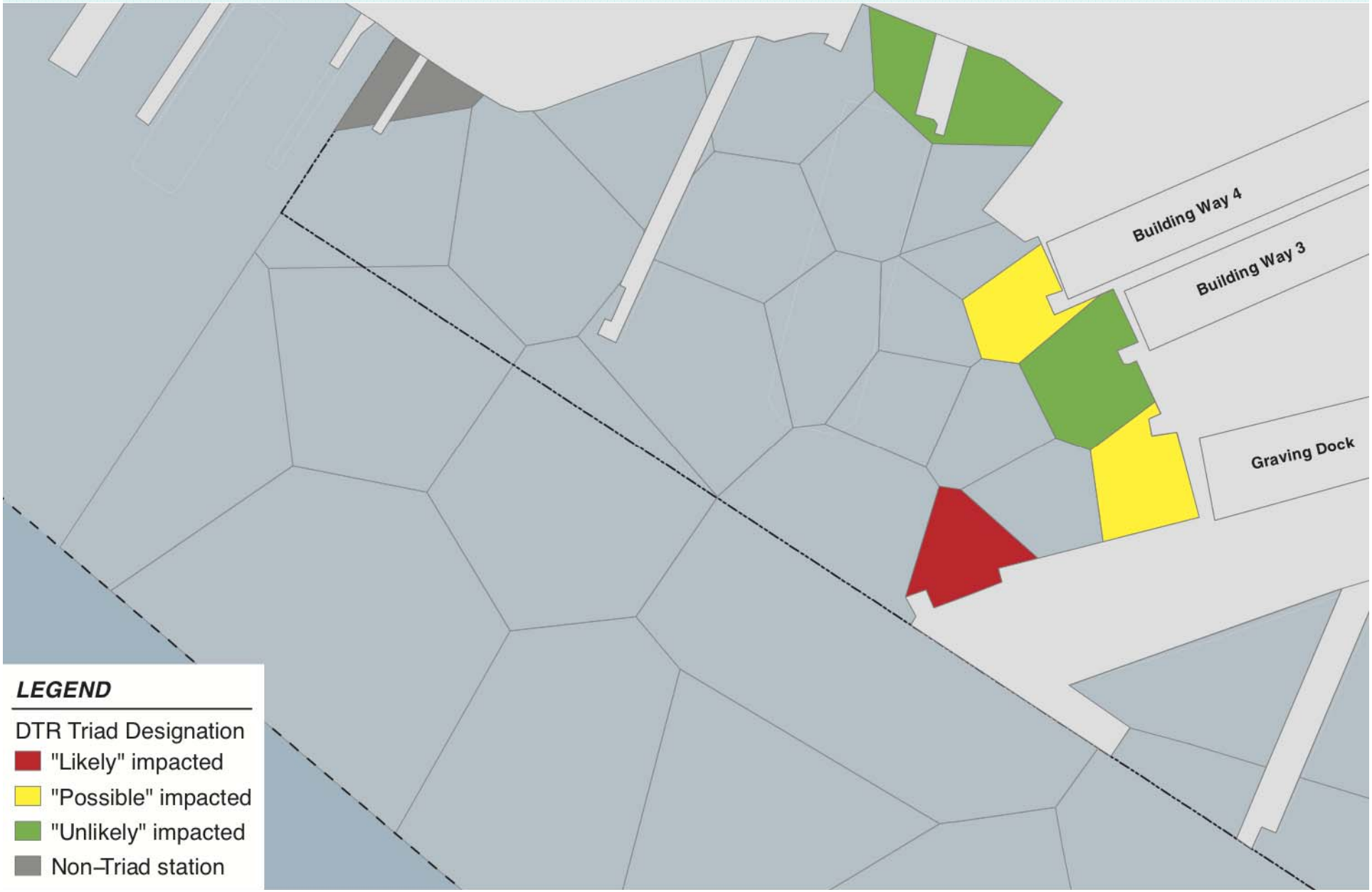
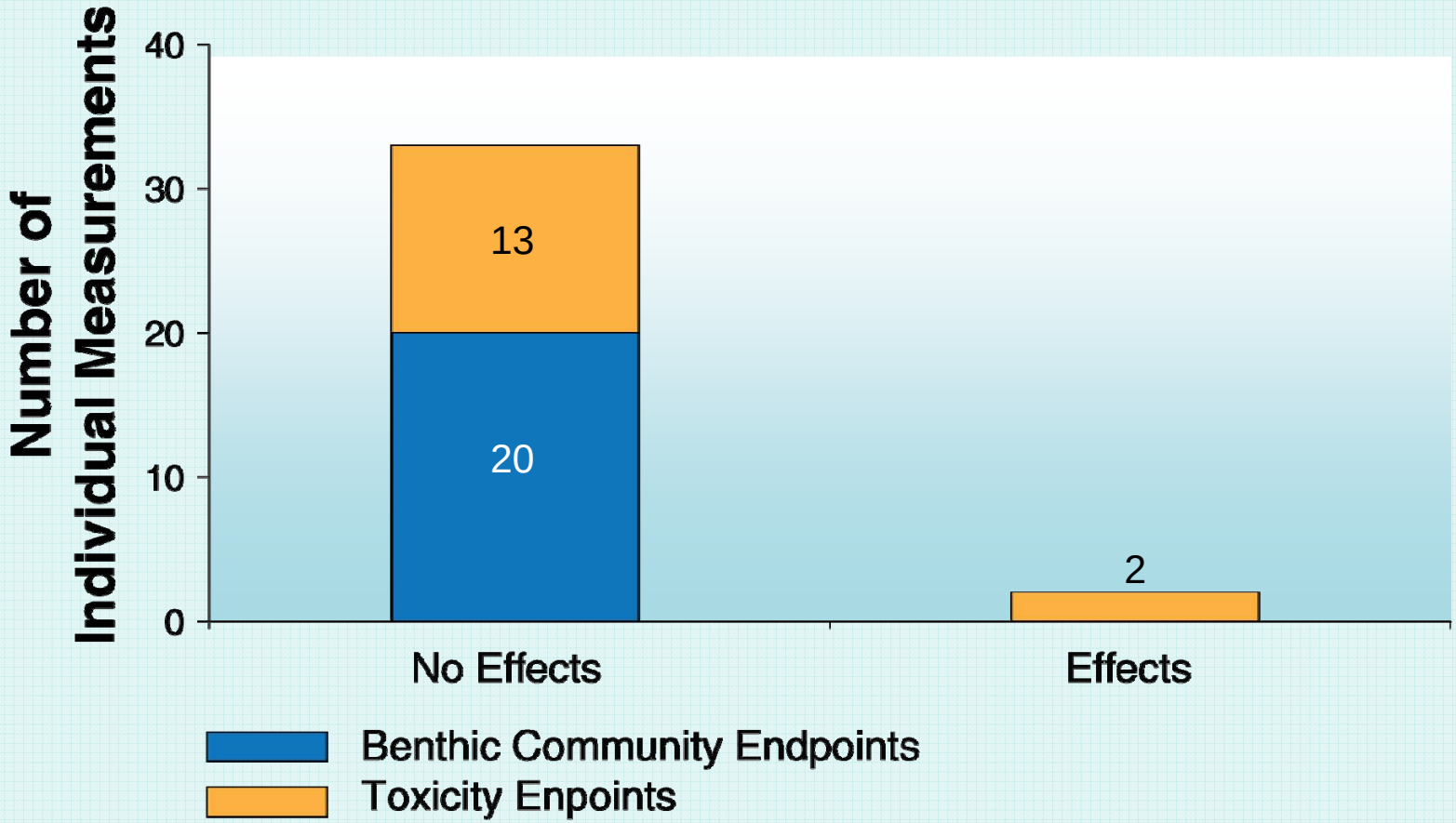
DTR Designations for NASSCO Shipyard Remedial Areas



The Proposed Dredging Area at NASSCO has Healthy Benthic Communities and only Minimal Toxicity (5 × 7 = 35)



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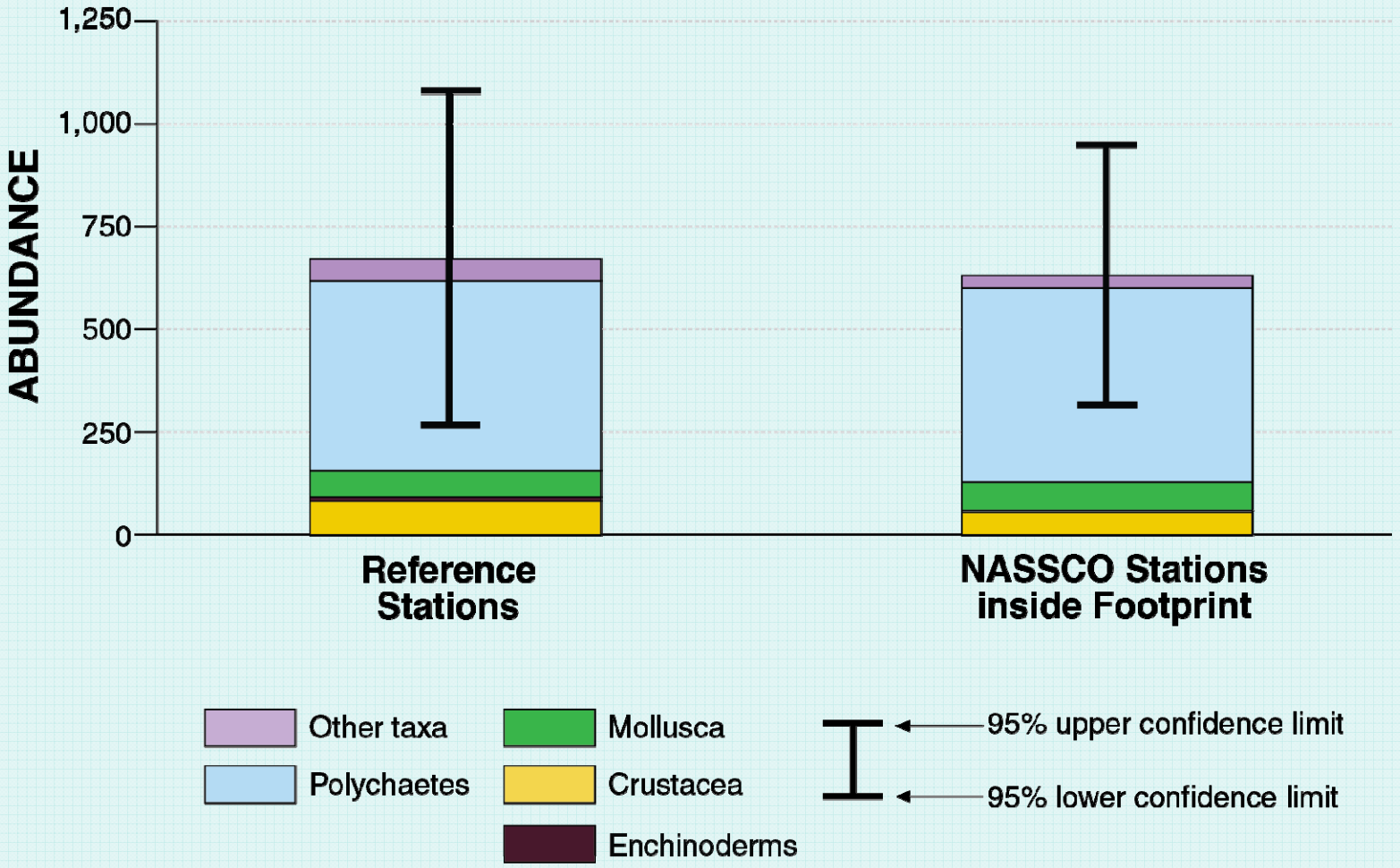
The DTR Cleanup Footprint is Inconsistent with the Cleanup Team's Stated Focus

"The Cleanup Team focused on benthic organisms as a primary measure of aquatic life-related beneficial use impairment because of the critical role benthic organisms play in aquatic ecosystem health".

Cleanup Team's Hearing Brief, Oct. 19, 2011, p. 7.

Benthic Communities are Healthy and Abundant at NASSCO Shipyard



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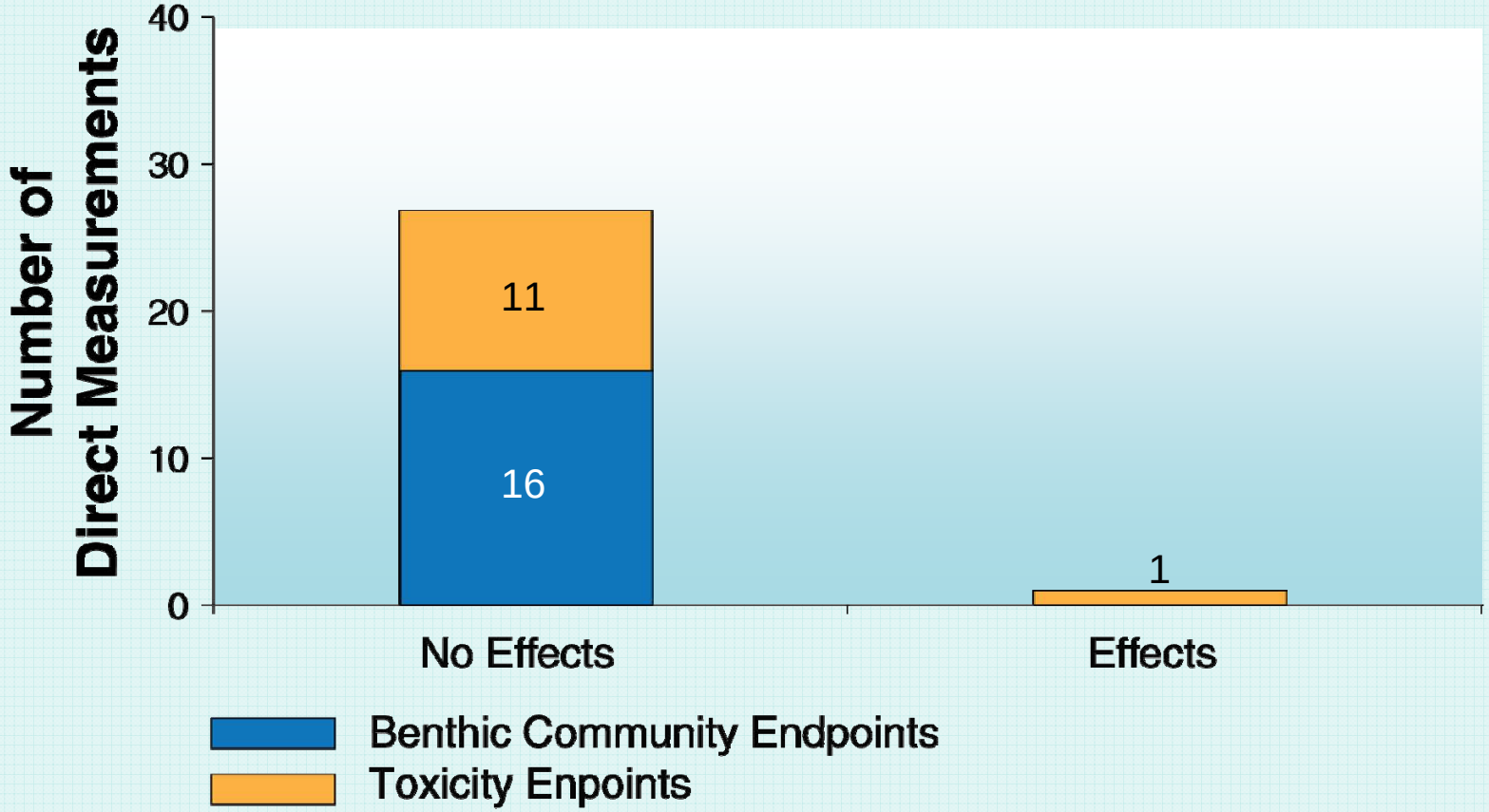
Mr. MacDonald Recommends Five Additional Remedial Polygons at NASSCO Shipyard

- **Remedial action decision at NA22 is appropriately deferred in the DTR**
- **Triad data and DTR analysis demonstrates no adverse effects on benthic communities at the other four stations at NASSCO (NA01, NA04, NA07, NA16)**
  - Low or No toxicity
  - No benthic disturbance

The Additional Dredging Area Proposed by Mr. MacDonald for NASSCO has Healthy Benthic Communities and Minimal Toxicity (4 × 7 = 28)



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Mr. MacDonald Recommends Five Additional Remedial Polygons at NASSCO Shipyard

- Mr. MacDonald's conclusions about high risk to benthic fish were driven by theoretical PCB bioaccumulation model in gobies
- The highly uncertain, theoretical model was unnecessary and ignored the measured PCB accumulation levels in Site fish
- Mr. MacDonald relies on theoretical sediment quality benchmarks that are invalidated by site-specific data
- The tissue residue risk threshold for PCBs used by MacDonald to determine risk was based on an erroneous interpretation of the source study (Orn et al. 1998)

The Additional Dredging Requirement of 120 Percent is Appropriate and Protective

- There is natural variability in sediment concentrations at the shipyards
- This factor applies to sediments deeper than 10 cm below the dredge level
- The use of a 120 percent factor recognizes this variability and accounts for some uncertainty in absolute sediment concentrations
- The SWAC for NASSCO with the 120 percent target values is not significantly different from the SWAC calculated for background concentrations
- Post-remedial risks to wildlife and human health are not different assuming the 120 percent values
- Allows for the placement of sand cover over the dredged area, if necessary

The Post-Remedial Trigger Levels are Scientifically Based and Appropriate

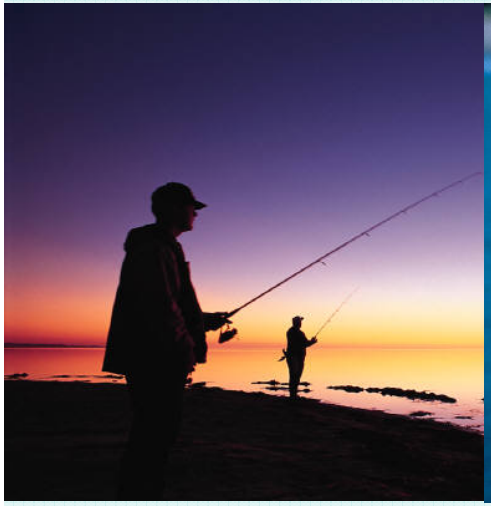
- The natural variability of sediment concentrations and laboratory analytical results affect SWAC calculations
- Conclusions concerning the success of dredging should be based on explicit acknowledgment of such variability expressed as statistical confidence
- Trigger levels are based on 95 percent upper confidence limits on the SWACs
- Therefore, important decisions concerning the success of dredging will be based on the statistical limits of the expected SWAC values
- Direct comparisons to nominal SWACs would have no basis in statistical probability and would be subject to alternative interpretations and potential errors in remedial decisions

Every Polygon Does Not Require Individual Sampling for Post-Dredging Analysis

- **The volume of the sample at each of the 65 stations will be proportional to the area of the polygon the station represents**
- **Therefore, the result of the composite analysis will be mathematically equivalent to the collection of 65 individual samples with chemical analyses**
- **Calculated averages are robust because**
  - Two grabs will be taken from each station
  - Three replicates will be taken from each of these six composite samples and analyzed for the COCs.
- **The site-wide SWAC calculated from the composite sample results is consistent with the SWAC method used for pre-remedial calculations and also includes an estimate of variance**

Key Question

- **Will dredging of the NASSCO Shipyard site improve beneficial uses of San Diego Bay?**



Question: Will Dredging Improve Beneficial Uses for Aquatic Life of San Diego Bay?

- **Answer: No**
  - The aquatic life at the NASSCO shipyard is healthy, abundant, and comparable with reference sites in San Diego Bay
  - Dredging would destroy the present healthy benthic communities

Question: Will Dredging Improve Beneficial Uses for Aquatic Dependent Wildlife of San Diego Bay?

- **Answer: No**
  - There are no significant risks to aquatic dependent wildlife
  - Theoretical risks can only be calculated by creating unrealistic, overly conservative exposure scenarios (i.e., AUF = 100 %)
  - Even with the unrealistic assumptions, there are NO exceedances of adverse effect levels.

Question: Will Dredging Improve Beneficial Uses Associated with Recreational and Subsistence Anglers in San Diego Bay?

- **Answer: No**
  - Anglers have no access to the Shipyard Site
  - There would be no significant risks to anglers, even if they had access to the shipyard in the distant future
  - Theoretical risks can only be calculated by creating unrealistic, overly conservative exposure scenarios

Summary of Opinions

- There are no beneficial use impairments at the NASSCO Shipyard that justify dredging
- The scientific basis for the proposed dredging is based on unrealistically conservative assumptions
- The proposed dredging is not necessary to reduce any impairments of beneficial uses, but it will reduce the SWACs for site chemicals
- Given the absence of impacts to beneficial uses, monitored natural attenuation is the appropriate remedial action for the NASSCO shipyard.