

Comparative Analysis of Federal Program Polluted Water Protocols

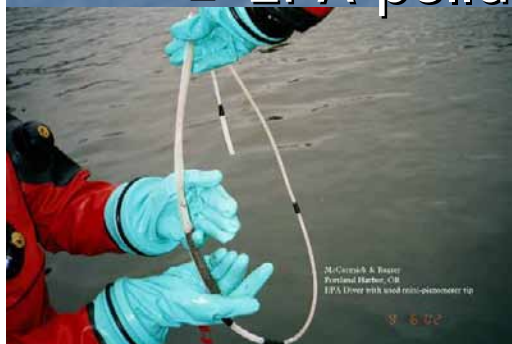
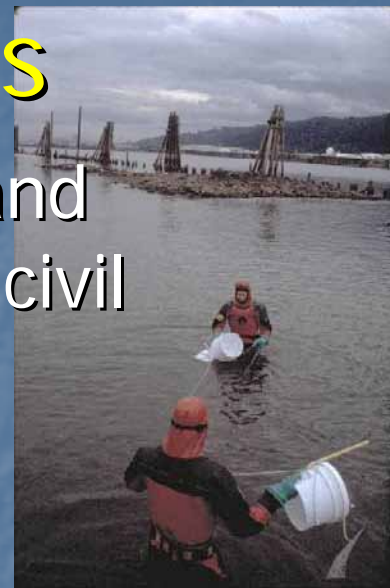
Sean Sheldrake, EPA
Region 10

AAUS, Honolulu March 2010



Region 10 and ERT Units Conduct Polluted Water Dive Operations

- Support of Superfund, Clean Water Act, and Regional initiatives, through criminal and civil investigations, surveys, and sampling.
- R10 since 1968, ERT since 1978
- 3 part module
 - Comparison of federal programs
 - Decon study on the Viking drysuit
 - EPA polluted water protocols



Comparison of EPA, USN, Army, USCG, and NOAA

- Dive sites and dive planning
- Training in polluted water diving
- PPE and decon
- Medical monitoring and immunizations

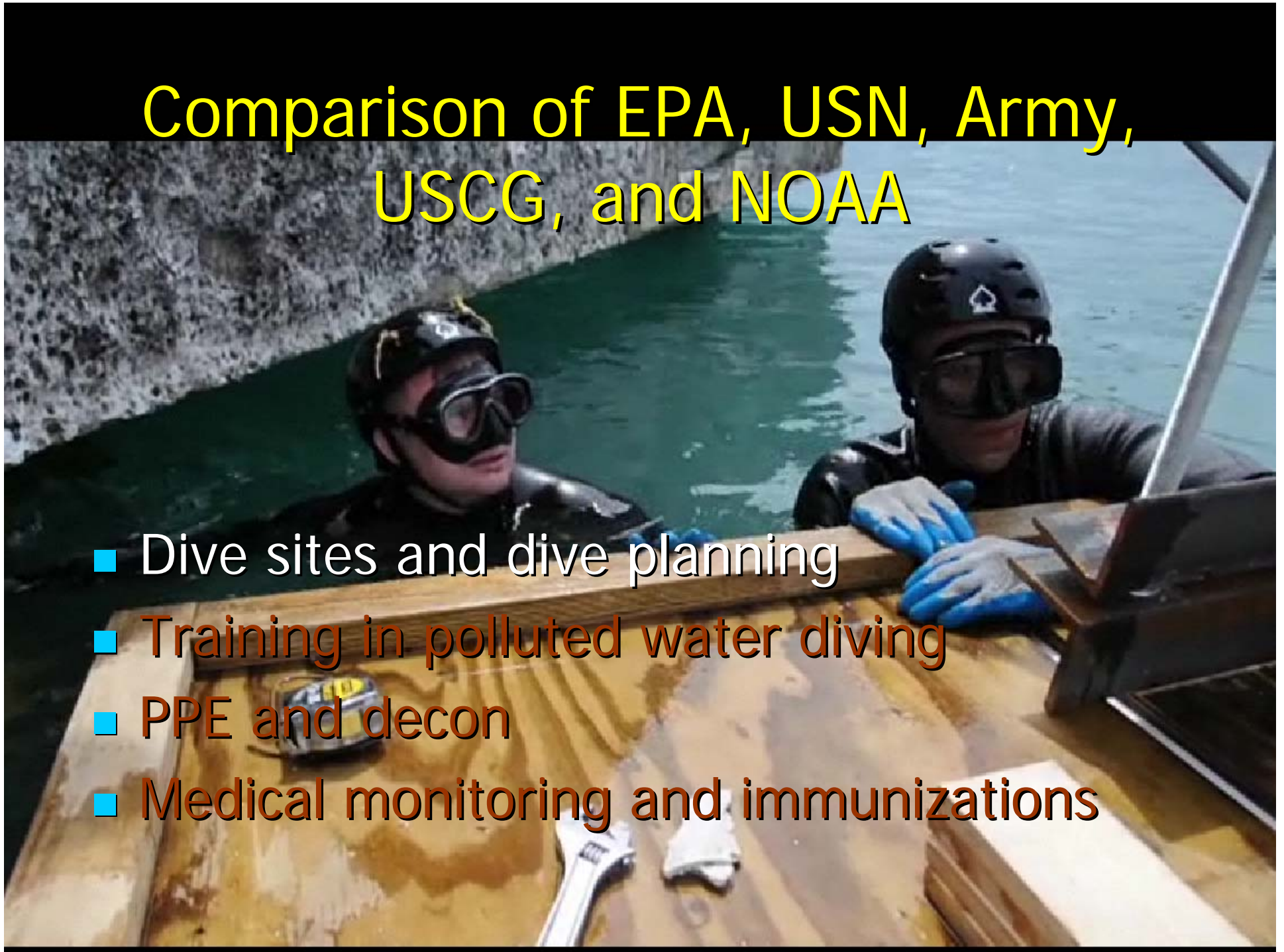


Williamson Cove
Portland Harbor, OR
EPA Diver sampling sediment

McCormick & Baxter
Portland Harbor, OR
EPA Divers & Sediment Cores

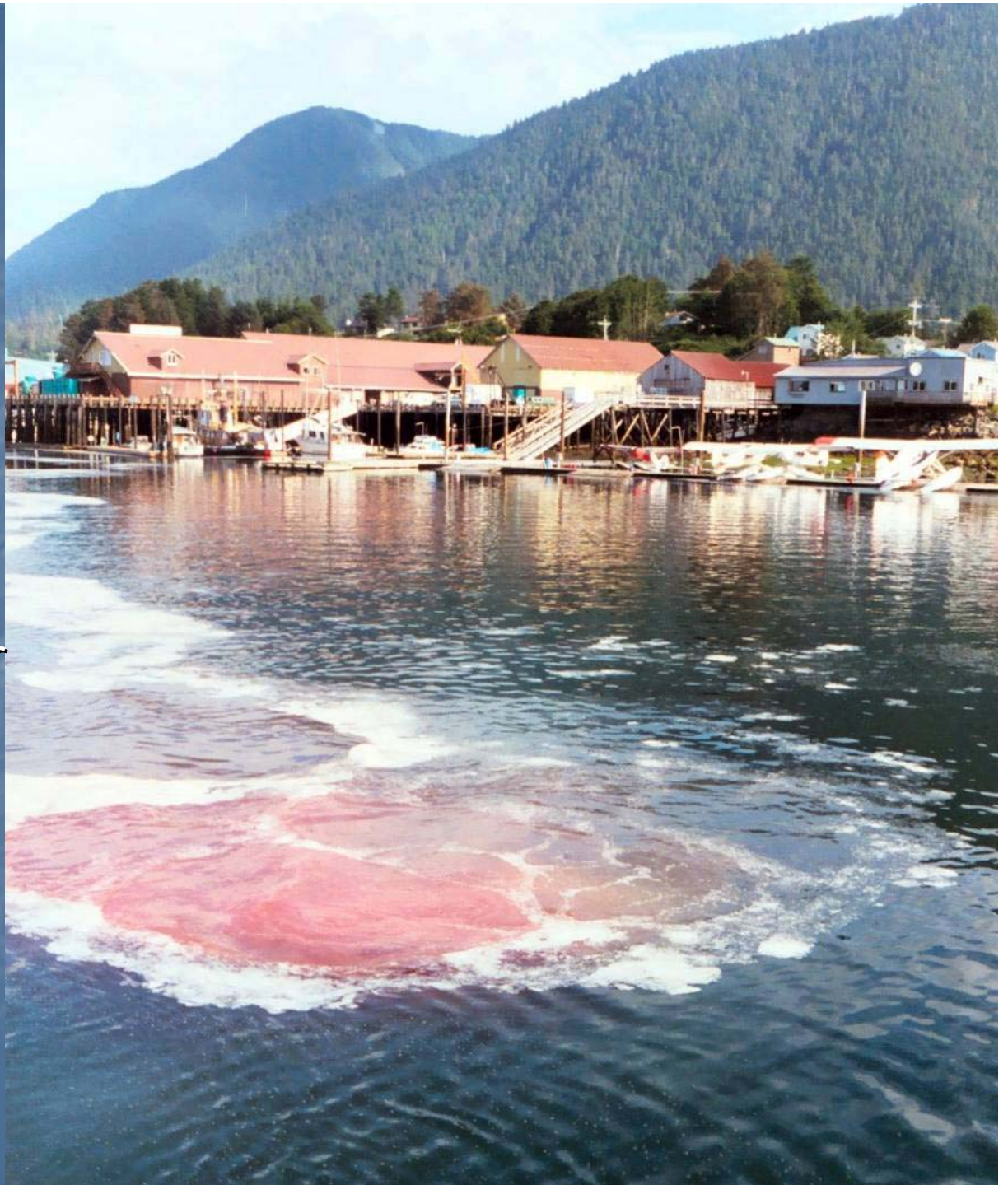
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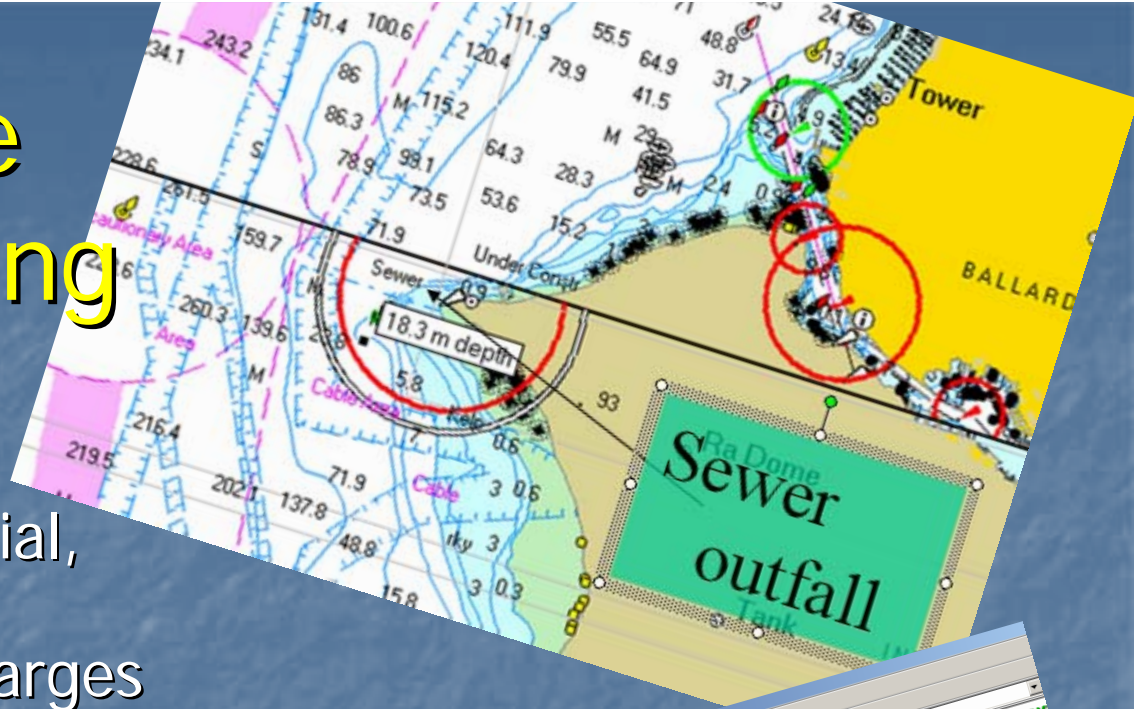


Dive Sites

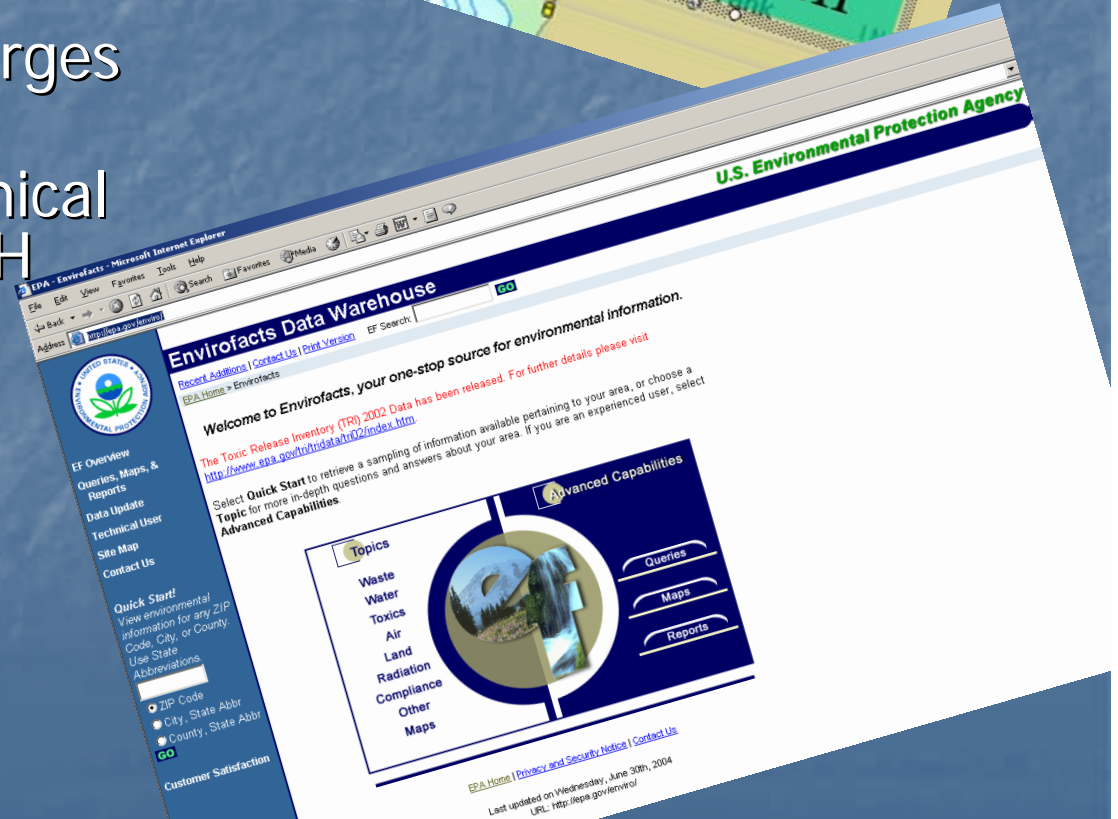
- Army, USN, NOAA, USCG, and EPA all conduct dive operations in enclosed bodies of water
- USN conducts over 40,000 dives/year in harbors
- Near cities, frequent CSOs are present at these dive sites



Dive Planning



- Outfall locations (industrial, stormwater, sewer)
- Types of industrial discharges (envirofacts)
- Effects of exposure, chemical properties (CAMEO/NIOSH data)
- Typical bacterial counts (BEACH program)
- NOAA's mussel watch
- Superfund data for many harbor sites

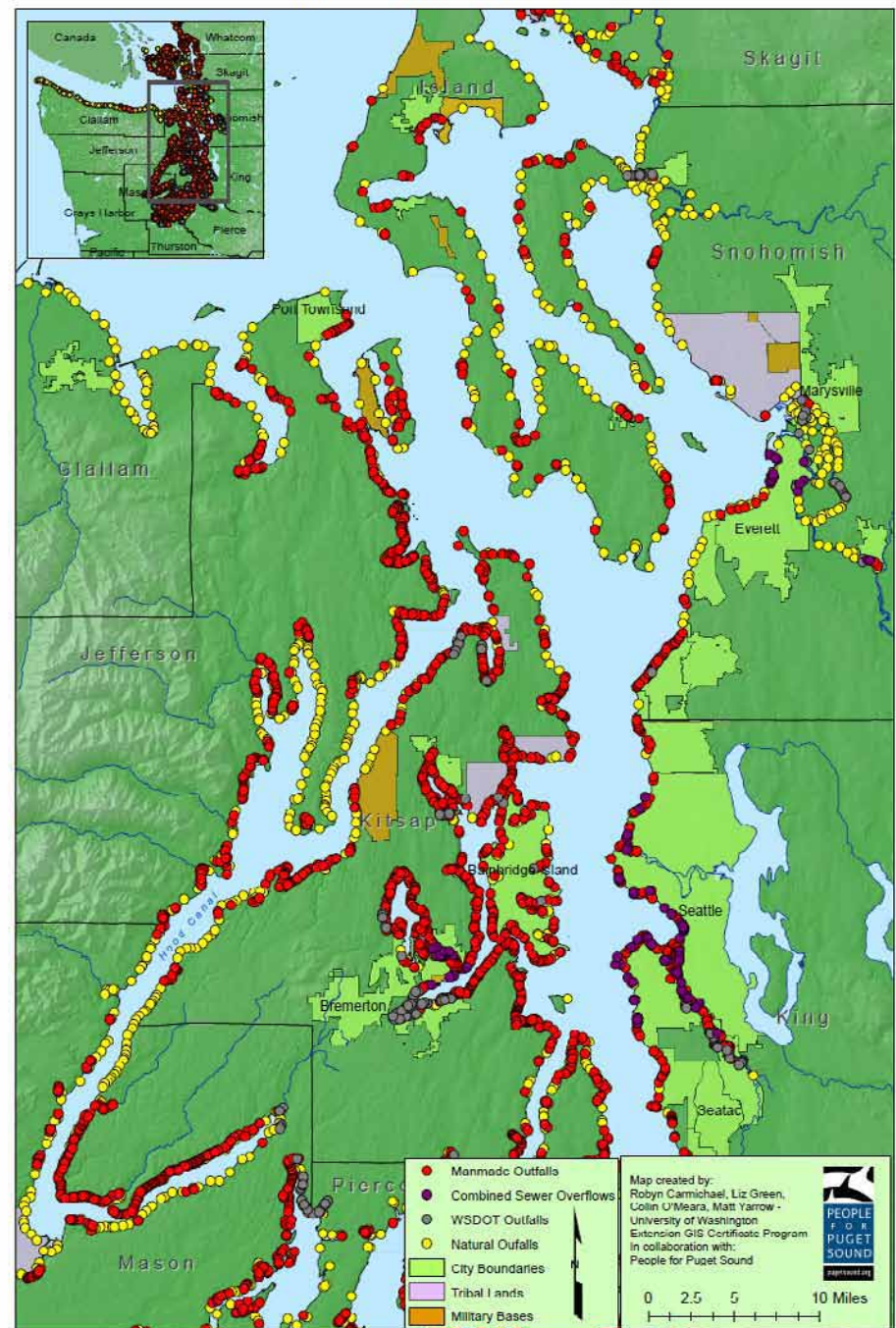


Stormwater is Contaminated

- Pet waste
- Oil
- Metals
- PAHs
- Over 100,000 metric tons of toxic chemicals per year in Puget Sound (Seattle Times, 2009)



Public Stormwater Outfalls to Puget Sound:
Central Sound & Hood Canal



Contaminant Levels

The background of the slide is an underwater photograph. It shows a diver's equipment, including a yellow buoyancy compensator (BCD) and a scuba tank, partially visible. In the foreground, there is a white, crumpled bag or piece of equipment resting on the dark, sandy seabed. The lighting is dim, typical of an underwater environment.

- Sediment levels change slowly-testing can be useful
- Water column levels of contamination can change in minutes-testing is moot as conditions change rapidly
- How much bottom interaction is dictated by the dive operation?



Dive Planning Comparison

- Many entities believe that polluted water only exists if lab tests have confirmed contamination
- “Polluted water” is a term for most referring to extreme conditions, rather than everyday ones
- Dynamic nature of polluted water not well understood, e.g. “how can I test for that?”
- Most not aware of a variety of online dive planning tools available
- Only USN and EPA have a manual for polluted water diving, which includes dive planning information
- Heat stress is an overriding dive planning concern for most non-EPA entities



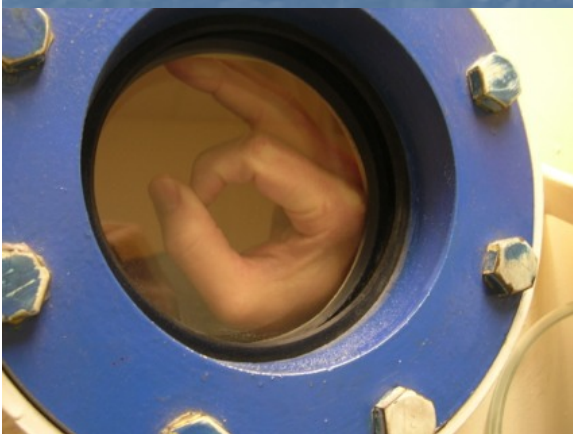
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Dive Training

- Recognition of polluted water diving
- Means to mitigate or avoid exposure for divers and tenders
- How to manage heat stress endemic to PPE



Dive Training Comparison

- Most federal entities do not offer comprehensive dive training for polluted water diving
- USN divers undergo chemical and biological warfare training, which does help in some ways (e.g. decon)
- Most federal entities need improvement on how to plan a dive, use PPE, and manage heat stress.



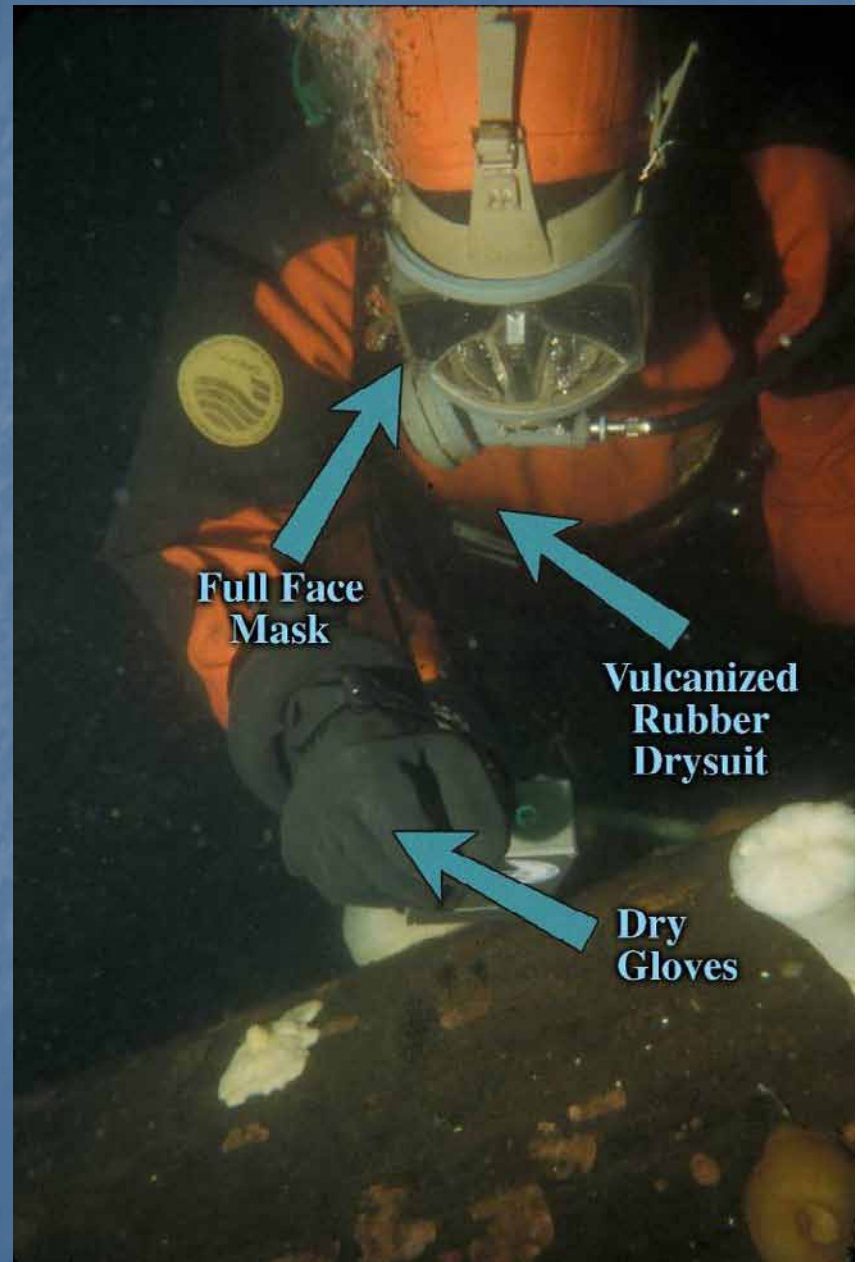
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Personal Protective Equipment (PPE)

- Means to separate the diver and tender from the dive environment is key (e.g. USN cat 1&2)
- FFM mated to drysuit offers some protection from dermal, ingestion, inhalation
- Use of slick rubber materials allows for decon
- Use of a neck dam essentially allows ingestion and inhalation of contaminated water
- Unknown circumstances should dictate use of at least a FFM, dryhood, drysuit, and drygloves





Decon

- Potable water rinse is very effective with decon compatible equipment for microbes
- Neoprene materials cannot be cleaned and need to be managed accordingly
- Protecting the tenders should receive equal priority
- The boat needs to be divided in to a hot zone, contaminant reduction zone, and clean zone

McCormick & Baxter
Portland Harbor, OR
Decontamination Rinse

PPE and Decon Comparison

- NOAA currently does not possess decon compatible PPE
- Army(?) and EPA practice potable water decon at suspect sites
- USN has a dramatic “jump” in PPE from cat. 2 to cat. 4 vs. EPA FFM approach with dryhood
- USN, Army, USCG cite heat stress as an overriding concern in not upgrading PPE, even in unknown waters

A far cry from Belize's Blue Hole, some divers dubbed the harbor the “Brown Hole” for the garbage, sewage — and worse — that has washed into the water from a city still lacking sanitary services. Haitian tug boats moored nearby routinely dump raw sewage into the harbor, Bower said.

After a recent rain left putrid trash-filled slicks floating around the pier, diving was shut down for the day. Navy tests revealed E. coli bacteria but no heavy metals, Sann said. The divers had been prescribed the antibiotics doxycycline and Cipro, and they wash their nicks and cuts with the antiseptic betadine.

“It's pretty disgusting,” O'Hara said. “There are plenty of times when I'd come up with from underwater with something on my head. I just say that it's paper or plastic, I don't even try to think about what it truly is.”

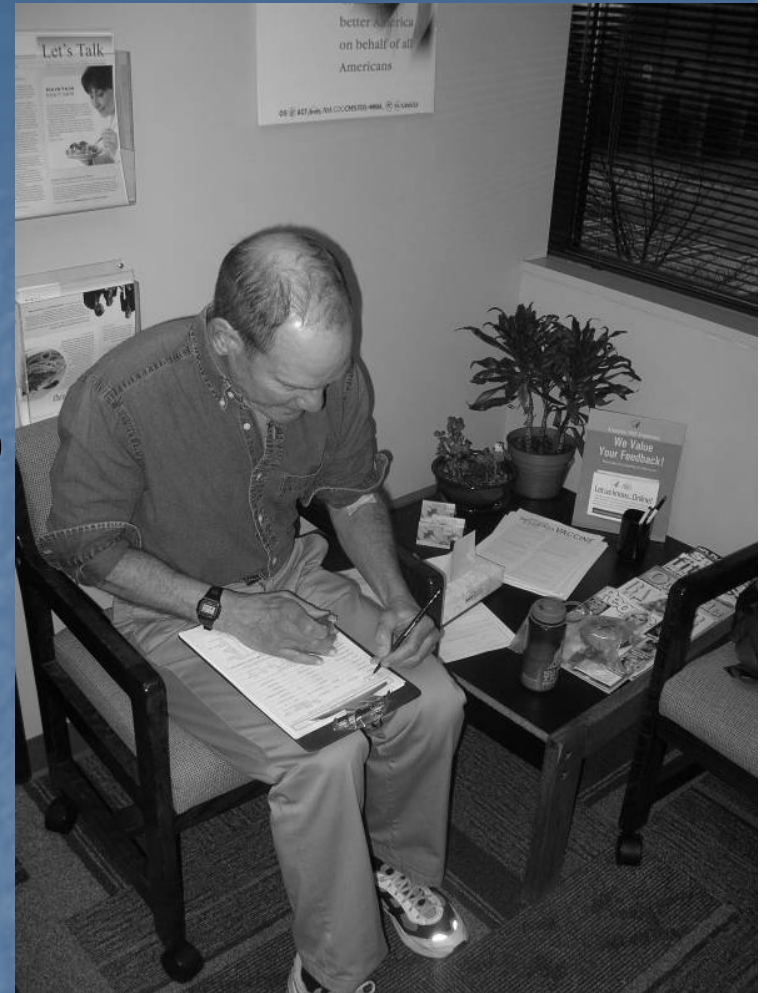
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Exposure History & Immunizations

- Exposure history is needed to determine the nature of chemical or biological exposure that has occurred
- Immunizations should be given for divers that may encounter diluted sewage, which is present in harbor environments, regardless of days of diving exposure



Exposure Monitoring

- OSHA dictates that 30 days or more of polluted water diving per year requires medical monitoring for chemical/biological exposure
- Exposure history adjusts blood test analyses



Medical Monitoring and Immunization Comparison

- Most federal programs conduct physical fitness only medical monitoring (only EPA monitoring for other exposure)
- Most federal programs conduct some level of polluted water diving, but do not conduct exposure monitoring for chemical or biological vectors
- Army and EPA provide immunizations for likely polluted water exposures





Summary

Federal Dive Program	Planning	Training	PPE/ Decon	Medical Monitoring & Immunization
EPA	✓	✓	✓	✓
USCG			✓	
NOAA		✓		
Army	✓		✓*	✓*
Navy	✓	✓	✓	

Recommendations

1. Develop an explicit set of dive planning tools to use as a checklist
2. Provide training
3. Adapt and adopt USN/EPA polluted water PPE standards, or similar
4. Update standard decontamination protocols
5. Develop an exposure monitoring program for mission oriented dives in polluted water (e.g. USN, USCG), and contingency protocols for those inadvertently conducting polluted water dives (e.g. NOAA)
6. Develop reporting processes to evaluate procedures used

Questions/ Comments?

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EPA Region 10 Dive Unit

Google, "EPA DIVE TEAM"

