

*Integrating State and National Aquatic
Resource Surveys (NARS) Sample Frames*

Anthony (Tony) R. Olsen

USEPA NHEERL

Western Ecology Division

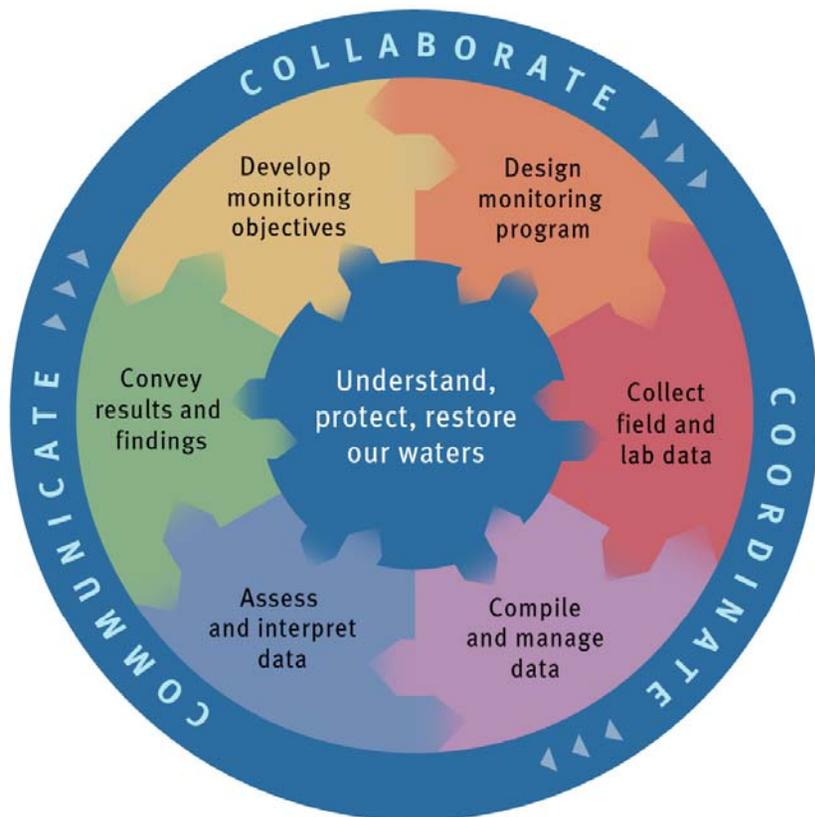
Corvallis, Oregon

(541) 754-4790

Olsen.Tony@epa.gov

Web Page: <http://www.epa.gov/NHEERL/ARM>

National Water Quality Monitoring Council: Monitoring Framework



- View as information system
- Monitoring pieces must be designed and implemented to fit together
- Comprehensive monitoring strategy can become central organizing approach to managing all waters in a state
- National monitoring requires consistent framework
- Reference: Water Resources IMPACT, September 2003 issue



RESEARCH & DEVELOPMENT

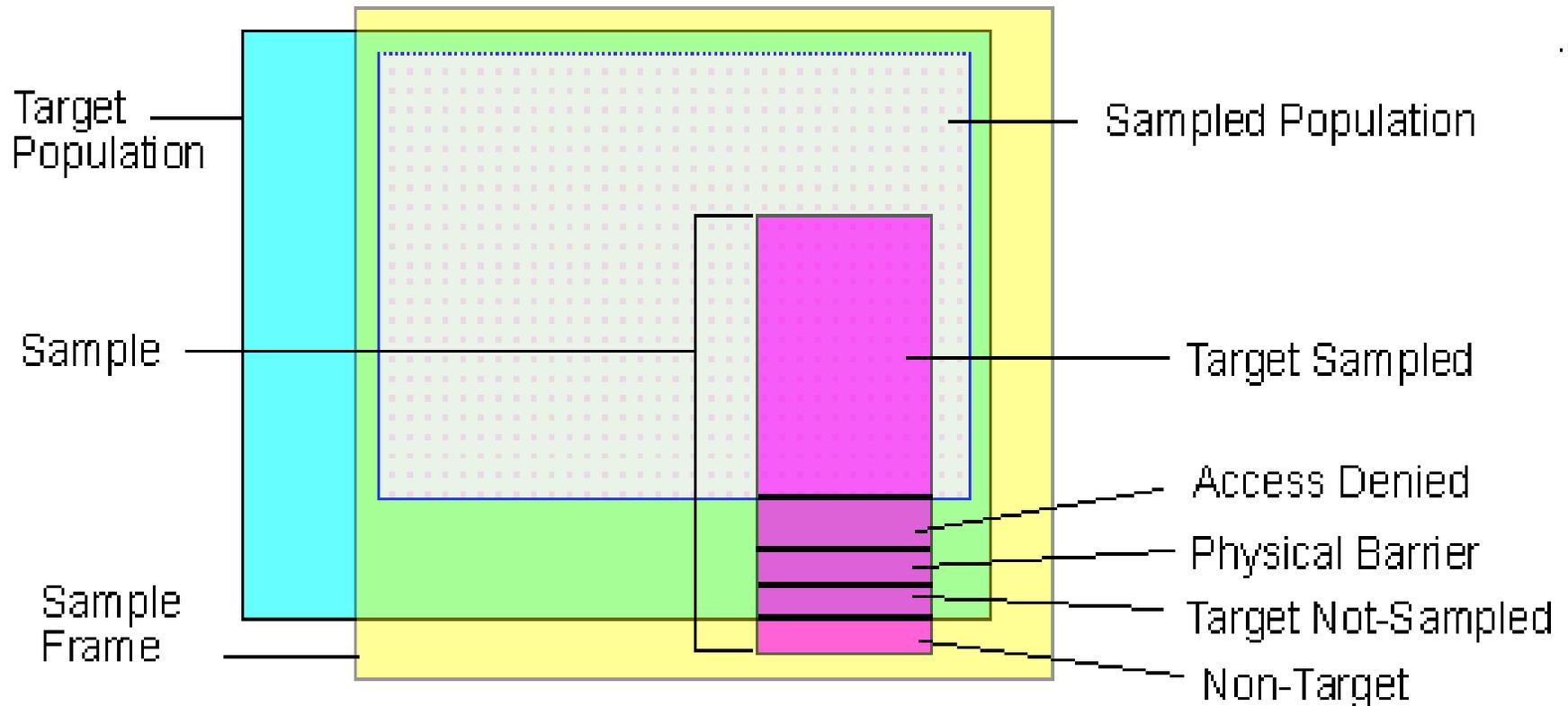
Building a scientific foundation for sound environmental decisions

Target Population, Sample Frame & Sampled Population

- **Target population:** an explicit written definition of the aquatic resource to be monitored
- **Sample frame:** a GIS representation of the aquatic resource target population used in the selection of the sample.
- **Sampled population:** the portion of the target population that might have been selected to be sampled and that could have been sampled in the field.



We Live in an Imperfect World...



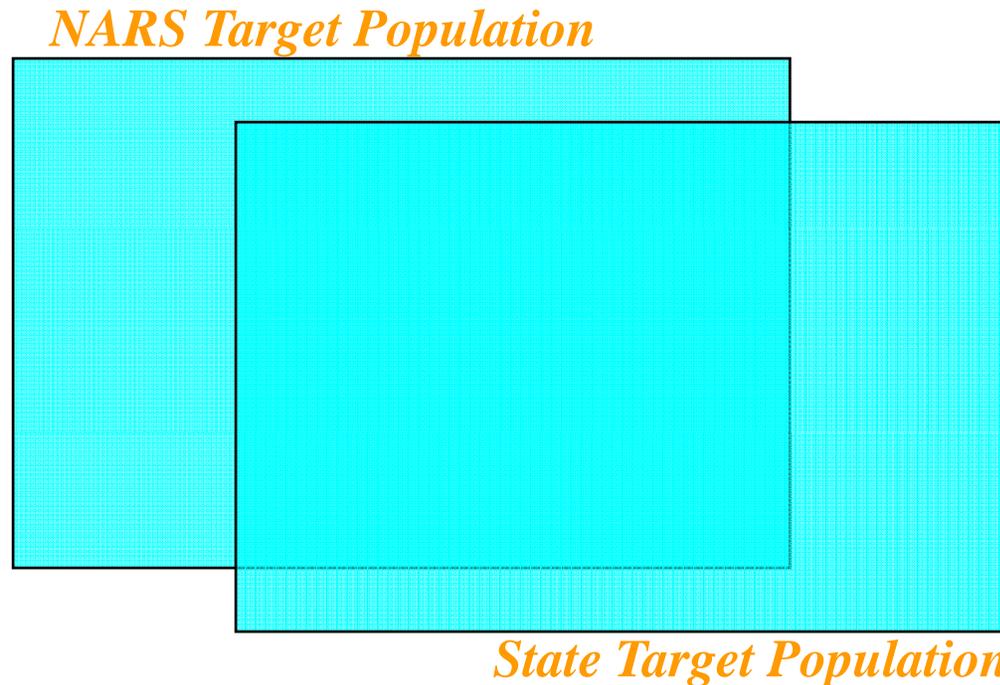
Ideally, cyan, yellow, gray squares would overlap completely



RESEARCH & DEVELOPMENT

Building a scientific foundation for sound environmental decisions

Target Populations: NARS & States

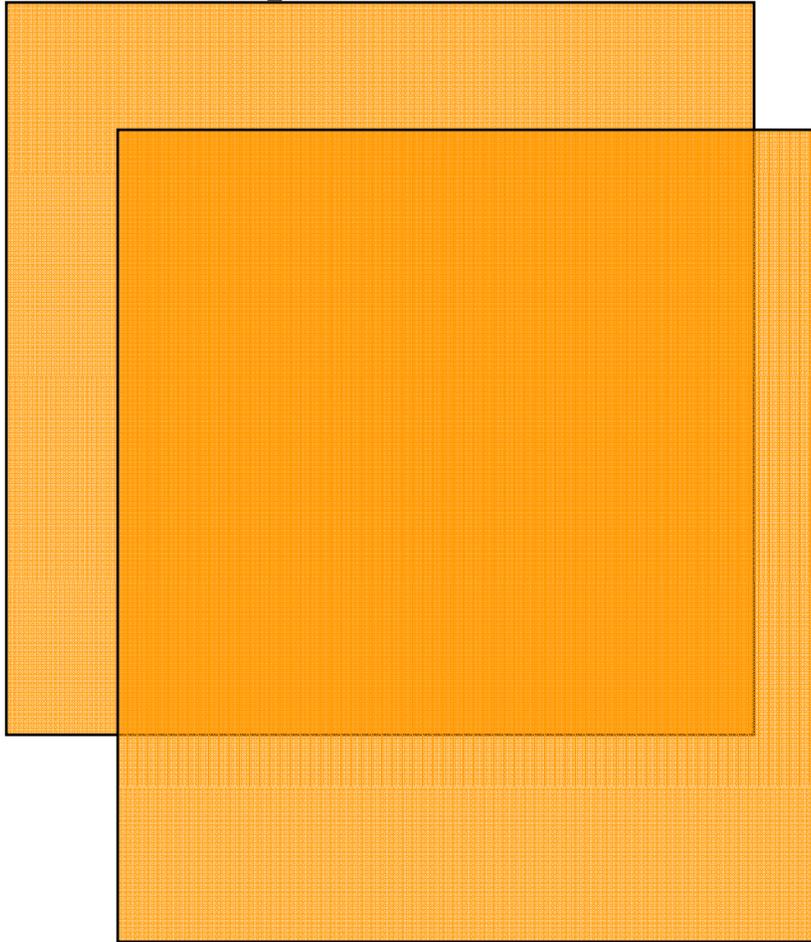


- Target populations for NARS and State may differ due to different monitoring objectives
- Differences must be understood to integrate monitoring programs
- Consequently sample frames may differ



Sample Frames: NARS & States

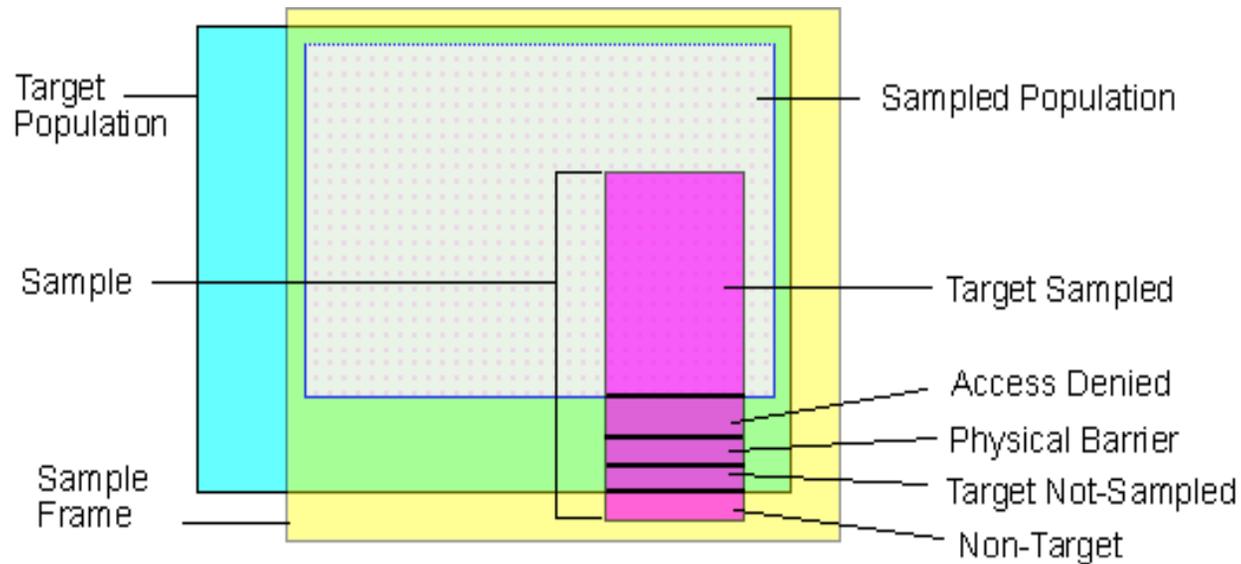
NARS Sample Frame



State Sample Frame

- Sample frames for NARS and State may differ due to
 - Different target populations
 - Different source material
 - State knowledge leading to improvements
- NARS sample frame can be improved
 - by incorporating state improvements
 - while ensuring NARS sample frame covers NARS target sample frame





Why Improve NARS and State Sample Frames?

- Sample frame over coverage of target population
 - States & NARS spend too much effort on screening non-target sites
 - Less assurance that survey design provides desired sample sizes
- Sample frame under coverage of target population
 - Portion of target population is excluded which leads to sampled population being smaller than target population



Sample Frame: Rivers and Streams

- Linear network GIS layer that ideally includes only the rivers and streams in the target population
- National Rivers and Streams Assessment sample frame
 - Derived from NHD-Plus
 - Includes linear features that are not rivers and streams in target population
 - Excludes rivers and streams that are in target population
 - NRSA sample frame
 - Extracts subset of NHD-Plus
 - Adds attributes required for design
- State sample frames
 - Derivation may differ by state



Sample Frame: Lakes

- Polygon and point GIS layers that ideally include only the lakes and reservoirs in the target population
- National Lake Assessment sample frame
 - Derived from NHD-Plus
 - Includes lake features that are not lakes and reservoirs in target population
 - Excludes lakes and reservoirs that are in target population
 - NRSA sample frame
 - Extracts subset of NHD-Plus
 - Adds attributes required for design
- State sample frames
 - Derivation differs by state



NARS Sample Frame: Coastal Waters

- Polygon GIS layer that ideally includes only the coastal waters in the target population
- National Coastal Condition Assessment sample frame
 - Complex History for Derivation
 - Based on NHD Coastline and coastal double line rivers
 - Rule for creating polygons based on size and shape of estuaries and embayments
 - Additional attributes added for design
 - Several portions updated using GIS layers from states and large estuary organizations
- State sample frames
 - Derivation differs by state



Sample Frame: Wetlands

- Polygon GIS layer that ideally includes only the wetlands in the target population
- National Wetland Condition Assessment sample frame
 - Stage 1: FWS 2 mi x 2 mi plot grid across the United States
 - Stage 2: Wetland polygons from FWS National Status & Trend plots



Workshop Agenda

- NHD and NHD-Plus use in NARS (Tommy Dewald)
- Kansas Surface Water Registry for streams and rivers (Liz Smith)
- South Dakota lakes (Sean Kruger)
- Sample frame discussions
 - National Lake Assessment 2012
 - National Rivers & Streams Assessment 2013-14
- Discussion objectives
 - Harmonize state and NARS sample frames
 - Transition to state survey designs as basis for NARS survey designs



