Status of Nevada's Bioassessment Program

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Historical Perspective

- Chemical Monitoring Only - 1970's
  - WQS based on chemical criteria
  - Species of major concern (trout)
  - Propagation of Aquatic Life
    - Coldwater vs Warmwater
    - Self-supporting vs Stocked Systems
- Focus on Larger River Systems

Bioassessment Introduced in 2000 at NDEP – Wadeable Streams

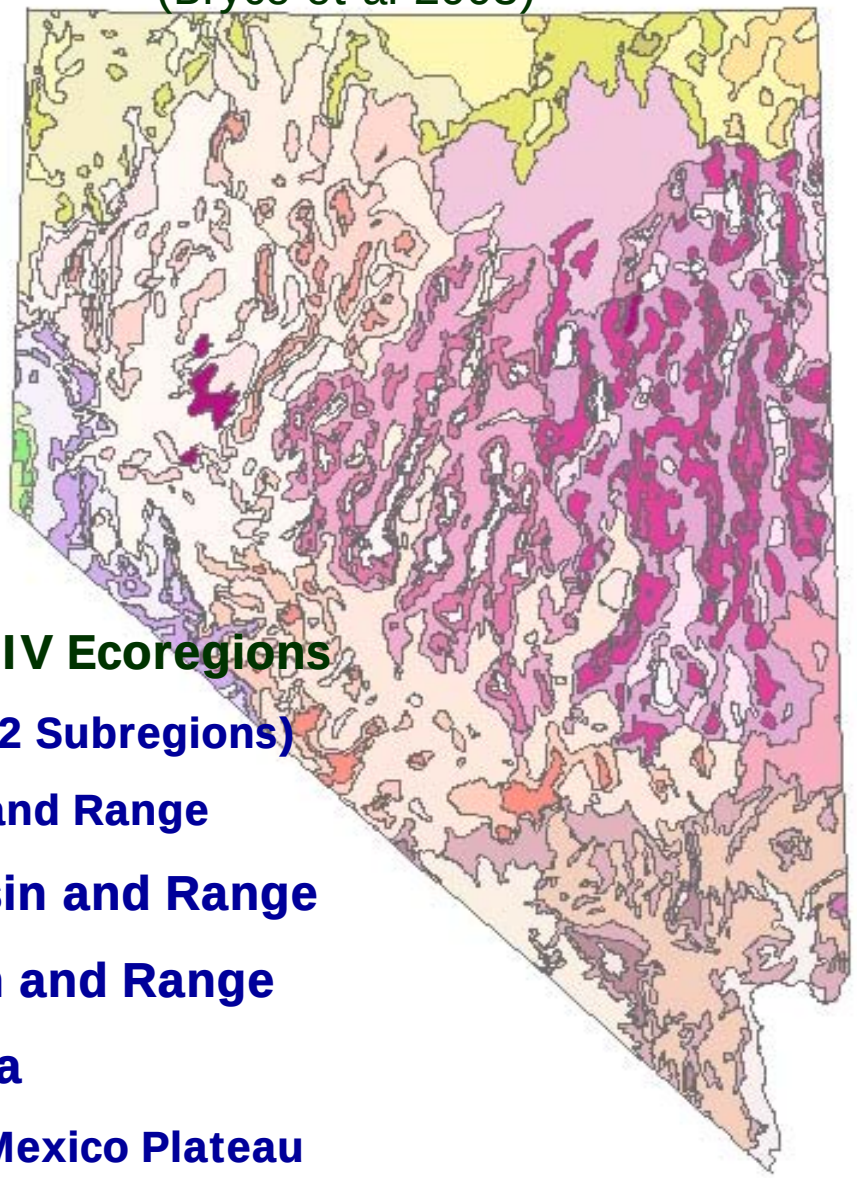
- Macroinvertebrates & limited P-hab)
  - Limited Sites (50) 1st year – NW NV
  - California Sampling Protocols- riffles (composite sample)
  - Chemical Characteristics (DO, pH, etc.)
  - P-Hab: Riffle length, depth, canopy cover, % substrate, etc.
  - Lab ID macro's to 500 organisms (family, genus, & species

2001 to 2004 Wadeable Streams

- Statewide Bioassessment
  - Major Rivers and Tributaries
  - Over 300 sites
  - Objective
    - **Complete Statewide Sampling Goal of 3-5 years worth of data at each site for background information**
  - **Completed for the major water basins in the state**
    - **Other basins have 1-2 samples per site**
    - **Look at biology at different ecoregions (Level IV)**

Nevada Level IV Ecoregions

(Bryce et al 2003)



Nevada Level IV Ecoregions

5 Ecoregions (42 Subregions)

- **Central Basin and Range**
- **Northern Basin and Range**
- **Mojave Basin and Range**
- **Sierra Nevada**
- **Arizona/New Mexico Plateau**

Northern Nevada: High Elevation

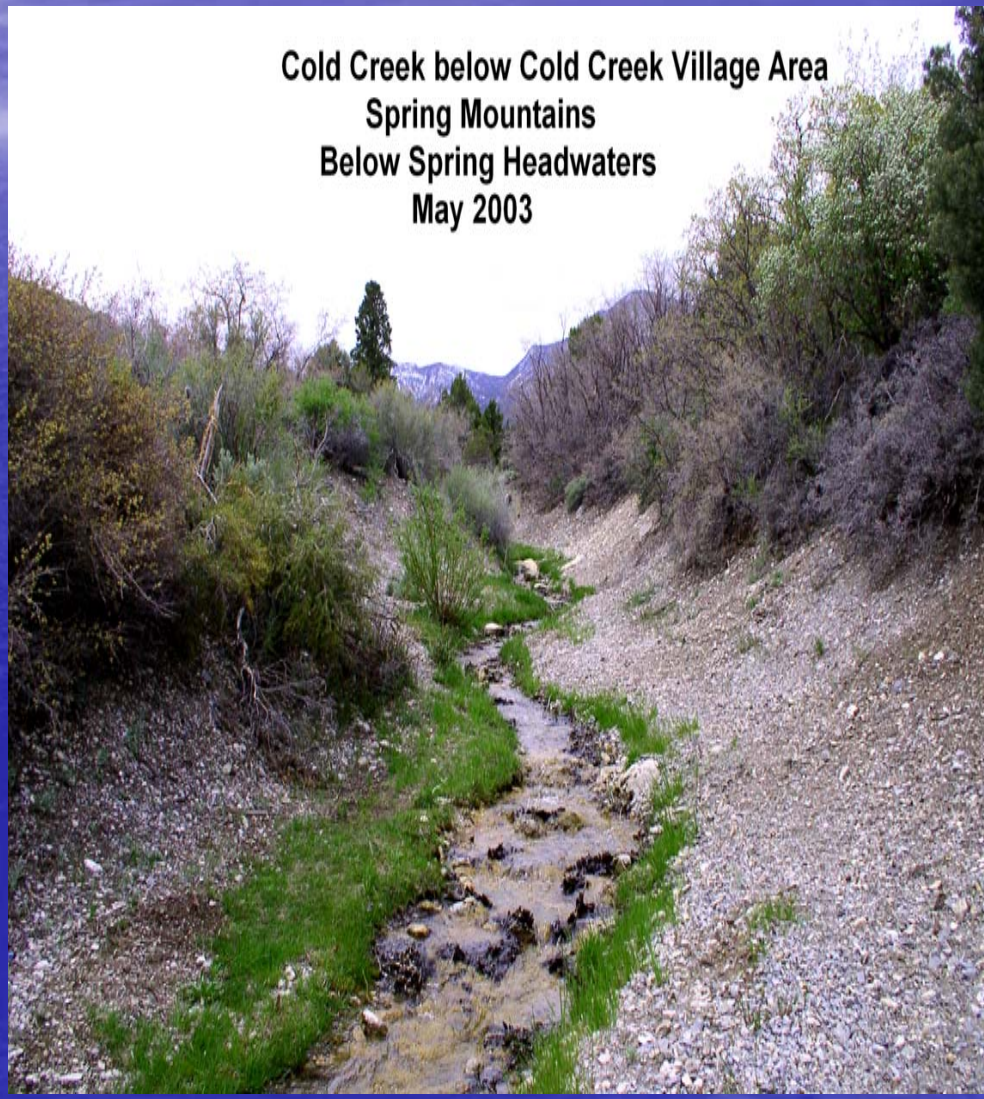
Northern and Central Basin and Range

Elevation Range: 1200m to 3700m

Southern Nevada

Mojave Basin and Range

Elevation Range: 152m to 4000m



2005 – 2007 Wadeable Streams

- 2005
  - Used Calif and WEMAP sampling Protocols (Riffle vs 40x wetted width)
  - Completed approximately 70 sites
- 2006 – 2007
  - Probabilistic WEMAP Sampling Methodology (35+ sites a year)

2006-2007 Probabilistic Sampling Wadeable Streams

- State split into 3 sections
  - Each Section 20 sites sampled
  - Plus Reference Sites (EMAP, NDEP & Lattins)
  - Macro's, periphyton, biomass, chlorophyll, water chemistry (nutrients/metals/BT), sediment metals, fish, fish tissue Hg, flow, pebble counts, canopy, etc.
  - Seasonal Crew of 4 to Monitor

Problems encountered with the Probabilistic EMAP Approach

- Hiring/training of crews for quality data
  - We did both Wadeable Stream and the Lake Survey in 2007 (8 crew members)
- Less Sites monitored because of Intense Field Protocols
- Less Sites monitored because sites are further apart than doing a basin wide approach
- In Southern Nevada the biggest problem was……

300 sites were evaluated to find 20 sites with water

How well did the probabilistic design work in Southern Nevada in 2007?

Needed Improvements for the Probabilistic Design in Nevada

- Cost of lab analysis, vehicles & salaries
- Need better selection of sites that contain perennial waters
  - Not washes
  - Not on Nellis Air Force Base or Area 51
- The other 2/3 of the state had less problems with finding water
  - 40 sites evaluated to find 20 etc.

Positives of the Probabilistic Design

- Protocols are National and Consistent
- Can statistically indicate the condition of the state's waters
- Combine data with EMAP National Monitoring Survey's for the state and on a national basis
- Assist in development of nutrient criteria
- Unbiased approach in the site selection and the targeted biological/p-hab collection sites
- Monitoring various parameters not previously measured: periphyton, invasive species
- Additional Reference Sites

What have we done with all this Bioassessment Data?

- Older methodology and some EMAP methodology:
  - Coordinated with Pyramid Lake Paiute Tribe for Development of Lower Truckee River
    - Macroinvertebrate IBI (Tetra Tech)
    - Periphyton Index (Desert Research Institute)
    - P-Hab Index (Tetra-tech)

What have we accomplished?
(continued)

- And,
  - Eastern Sierra Fish Index (Hughes, Whittier, Lomnicky)
  - Carson River Macroinvertebrate IBI and P-Hab index (Tetra Tech)
  - Walker River Macroinvertebrate IBI (Tetra Tech)

IBI Development

Lower Truckee River vs Lower Truckee, Carson, and Walker Rivers

- Lower Truckee River IBI (Tetra Tech, 2004)
- 4 Data Sets
- Core Metrics
  - Total Taxa
  - % Ephemeroptera
  - %Chironomidae
  - %Dominant Taxon
  - % Filterers
  - %Clinters

- Combined Basins IBI (Tetra Tech, 2007): 222 Samples (46 Validation & 176 comparison)
- 2 Data Sets (Truckee only)
- Core Metrics
  - # Filterer Taxa
  - % Sprawlers
  - # Burrower Taxa
  - # EPT Taxa
  - % 1 Dominant Taxon

Reference Site Selection for IBI

- Chemistry: DO, Conducitivity, pH, Total phosphorus, Water Temp
- P-Hab: Embeddeness Score, Channel Alteration
- Natural Hydrograph (not below a dam)
- Each Basin contains Reference Sites

Multimetric Index for 3 Basins

~35 sites sampled

- 7 % Exceptional
  - >75th Percentile of Reference (71.9 to 100)
- 14% Good
  - >25th Percent of Reference (60.2 to 71.8)
- 62% Fair
  - Upper bisection of 25th (30.1 to 60.1)
- 17% Poor
  - Lower bisection of the 25th (0 to 30.00)

Values/IBI at this time are considered for Assessment Purposes Only

What do we still need to Do?

- Recalibration of Index's with additional data
- Analysis of the probabilistic laboratory results for periphyton, macro's, chem, sediment, fish and Hg in fish tissue from wadeable streams
- Compare these results with reference site conditions to evaluate and establish index's (Tools) and then address tiered aquatic life uses (TALU) & Stressors
- Ecoregional approach Level IV or 3 or elevation etc.

What do we still need to Do?
(Continued)

- Database Management
- Staff to input data and improve QA/QC Development
- Currently we have FT staff of 14 scientist/engineers doing
  - WQS development
  - NPS 319 projects
  - Laboratory Certification
  - Educational Programs
  - TMDL Development
  - 303(d) and 305(b) reporting
  - Routine Chemistry Monitoring
  - Database Management & Web Site Updates
  - Bioassessment Surveys (Probabilistic, routine, lake survey & Hg fish tissue study with NV Division of Wildlife and EPA Region 9 lab

Questions?

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