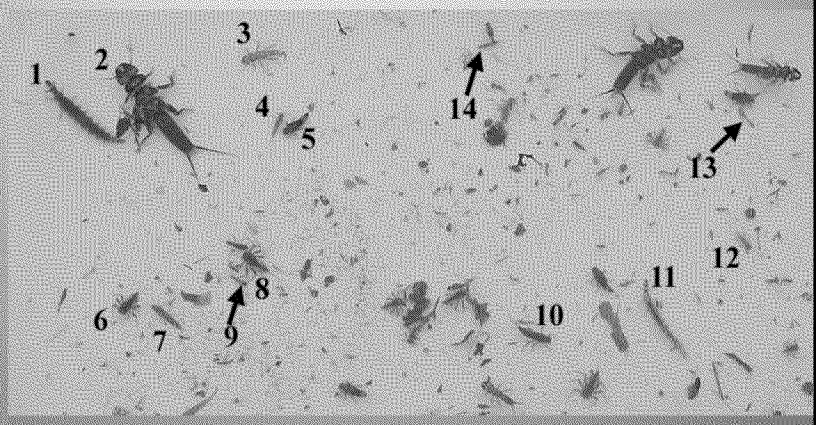
DEQ's Biological Condition Tool

PREDATOR



Shannon Hubler
Laboratory and Environmental Assessment Division

What is PREDATOR?

- A bioassessment index
  - Determine biological condition of wadeable streams
- RIVPACS model
  - Widespread international use
    - U.K
    - Australia
  - Widespread use in U.S.
    - Many states in Western U.S.
    - USEPA's national scale assessments
  - ODF Indicators of Sustainable Forestry
- Developed under guidance from national experts

The Reference Condition Approach

- Are human activities adversely impacting aquatic communities?
  - Estimate community characteristics in the absence of human activities
- What does "Reference" mean?
  - "Least disturbed"
  - Varies by ecoregion
    - Willamette Valley vs. Cascades
- Attempt to represent natural gradients
- Used to establish benchmarks

How DEQ determines Reference Condition

GIS

- Ag and urban land use (MRLC)
- Road density (TIGER)
- Forest Fragmentation (Oregon Biodiversity Project)

Reach

- Human activities observed in the study reach by field crews

See: Drake 2004 http://www.deq.state.or.us/lab/techrpts/docs/WSA04002.pdf

PREDATOR

- Predicts the bugs that would be found if a site was in reference condition
  - Limited to common reference taxa
- Taxa Loss model
  - Taxa = unique types of bugs
    - Various levels of taxonomy
  - O/E = Observed / Expected
  - 0.75 = 25% of expected reference taxa lost
  - 1.1 = 10% more reference taxa than expected

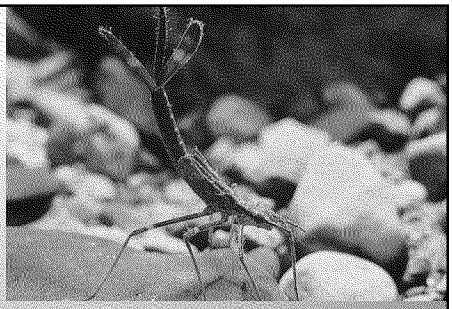
PREDATOR Models

WC+CP
Klamath Mts.
Cascades
E. Cascades
Blue Mts.
Columbia Plateau

MWCF
Coast Range
Willamette Valley

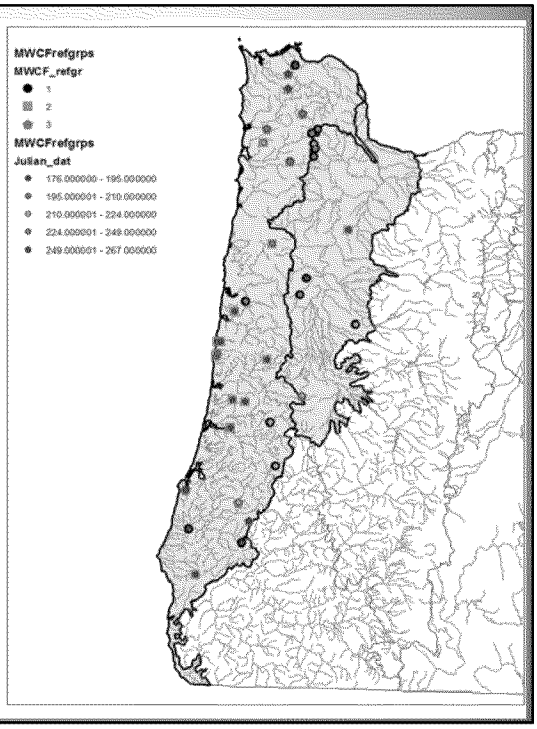
NBR
Northern Basin & Range
Snake River Plains

Using PREDATOR



* **Bug data**
* **Environmental data**
  * all GIS based
  * describe natural gradients
  * not affected by human activities
  * MWCF
    * Julian date
    * Longitude

Reference sites used to build the MWCF model

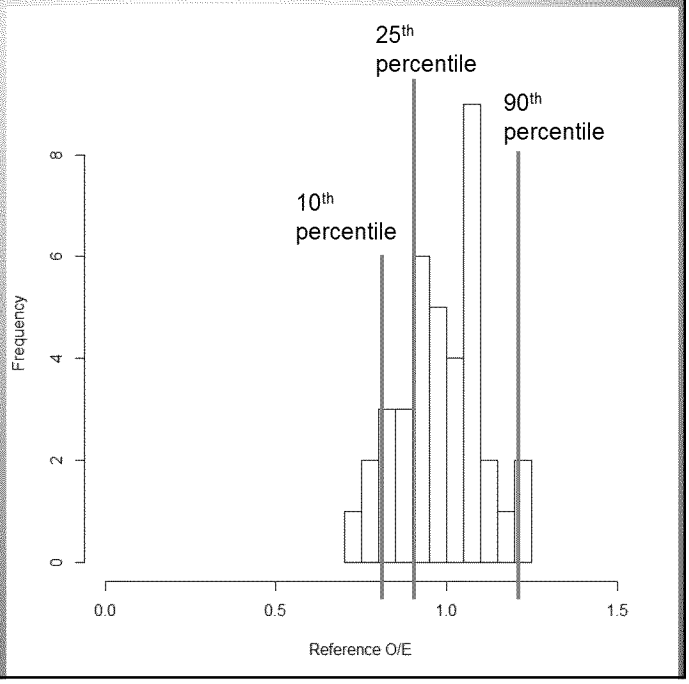


PREDATOR: A very simplified example

Taxa	Common to Reference Sites (Expected)	Collected at Test site (Observed)
Caudatella	X	
Ironodes	X	
Rhyacophilla betteni Gr.	X	X
Drunella doddsi	X	X
Simulium	X	X
Hesperoperla pacifica	X	X
Chironomini	X	X
Antocha		X
Zaitzevia		X
	E = 7	O = 5

O/E = 5/7 = 0.71

Establishing Benchmarks

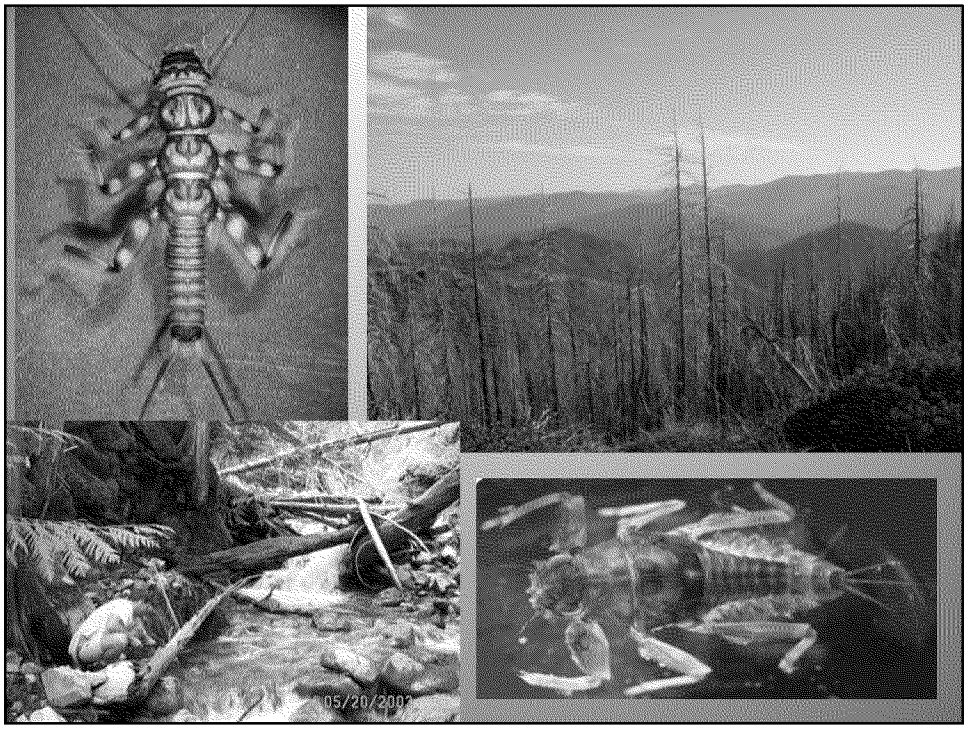


Interpreting PREDATOR O/E

	Most disturbed	Moderately disturbed	Least disturbed	Enriched
Benchmark	<10th percentile	10th-25th	25th to 95th	>95th percentile
MWFC	>14% loss	9-14% loss	0-8% loss 0-24% gain	>24% gain
303(d) Category	3c: Impaired (Pollutant unknown)	3b: Insufficient data/Potential concern	2: Attaining	3b: Insufficient data/Potential concern

Performance and reviews

- The MWCF model performs well compared to other models nationally
  - SD of O/E at reference sites = 0.12
  - < 0.15 is considered excellent
- Our models have been reviewed by several bioassessment experts
  - Chuck Hawkins (Utah State)
  - John Van Sickle (USEPA)
  - Bob Hughes (Oregon State; IMST)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