



Assessing the Health of the Upper Santa Cruz

2009 Santa Cruz Researcher's Day

March 27, 2009
Tucson, Arizona

Overview

- ❖ Sonoran Institute in Santa Cruz
- ❖ Santa Cruz Assessment
- ❖ Other assessments & “state of” reports
- ❖ Decision making



Photo credit: Sonoran Institute

Upcoming Publications

Health Assessment

- ❖ Annual status of health
- ❖ Geographically detailed
- ❖ Integrates data
- ❖ Educates public & managers
- ❖ Inspires improvements
- ❖ Published summer 2009

State of the Santa Cruz

- ❖ Status and trend over 10 years
 - ❖ Trend of score card indicators
 - ❖ Include additional parameters
- ❖ Integrates ecological data and human activities
- ❖ Published Dec. 2010

Assessments, Score Cards & State of ...



Staged Approach

- ❖ Science Advisory Council
- ❖ Scoping
- ❖ Starting small
- ❖ Internal & external review



Photo credit: Sonoran Institute

Health Assessment Goals

Annual assessment of aquatic & riparian health

- Develop an integrated aquatic & riparian health assessment using indicators and standards
- Generate a technique to compare aquatic & riparian health spatially and temporally
- Effectively communicate the health assessments to the Upper Santa Cruz watershed residents

Assessment Approach

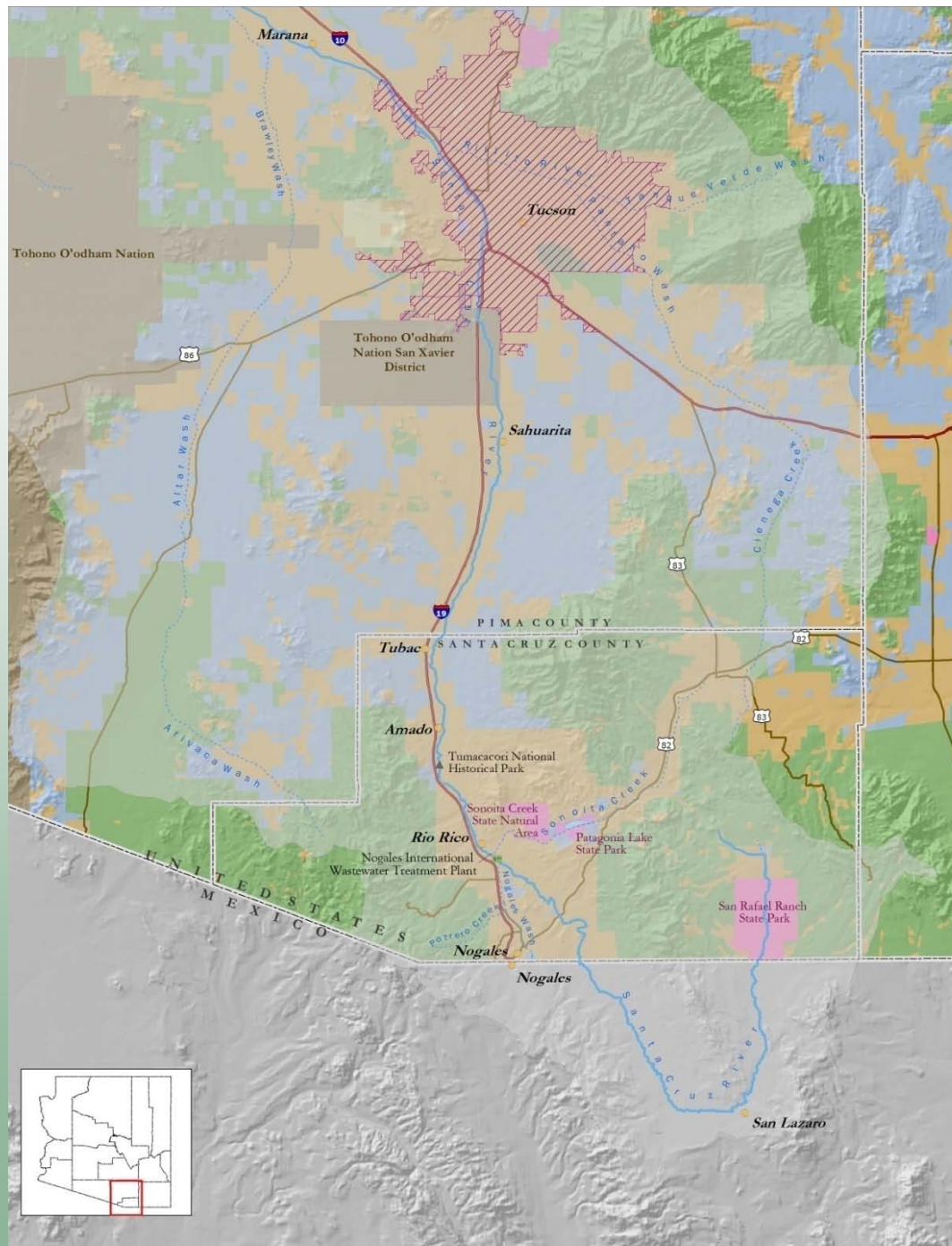
1. Define health
2. Identify spatial and temporal scales of assessment
3. Select indicators that convey meaningful ecological information
4. Define ecological thresholds or regulatory standards for each indicator
5. Calculate % attainment of each indicator

A Healthy Ecosystem

- ❖ Functional
- ❖ Resilient
- ❖ Human communities



Photo credit: Sonoran Institute





Category	Indicators and Standards	Standard Source and Type
 Aquatic	 Ammonia: varies with pH	ADEQ: wildlife in effluent ¹
	 Dissolved oxygen: ≥ 3.0 mg/L	ADEQ: wildlife in effluent ²
	 Total phosphorus: < 1 mg/L	Baseline (1986–1999 mean) ³
	 E. coli: < 235 CFU/100mL	ADEQ: human health ²
	 Fish: 2008 baseline	Baseline information
	 Aquatic invertebrates: 2008 baseline	Baseline information
 Riparian	 Depth to groundwater: < 5.1 m	Scientific standard ⁴
	 Groundwater variability: < 0.5 m	Scientific standard ⁴
	 Birds: 2008 baseline	Baseline information
	 Riparian vegetation: 2006 baseline	Baseline information

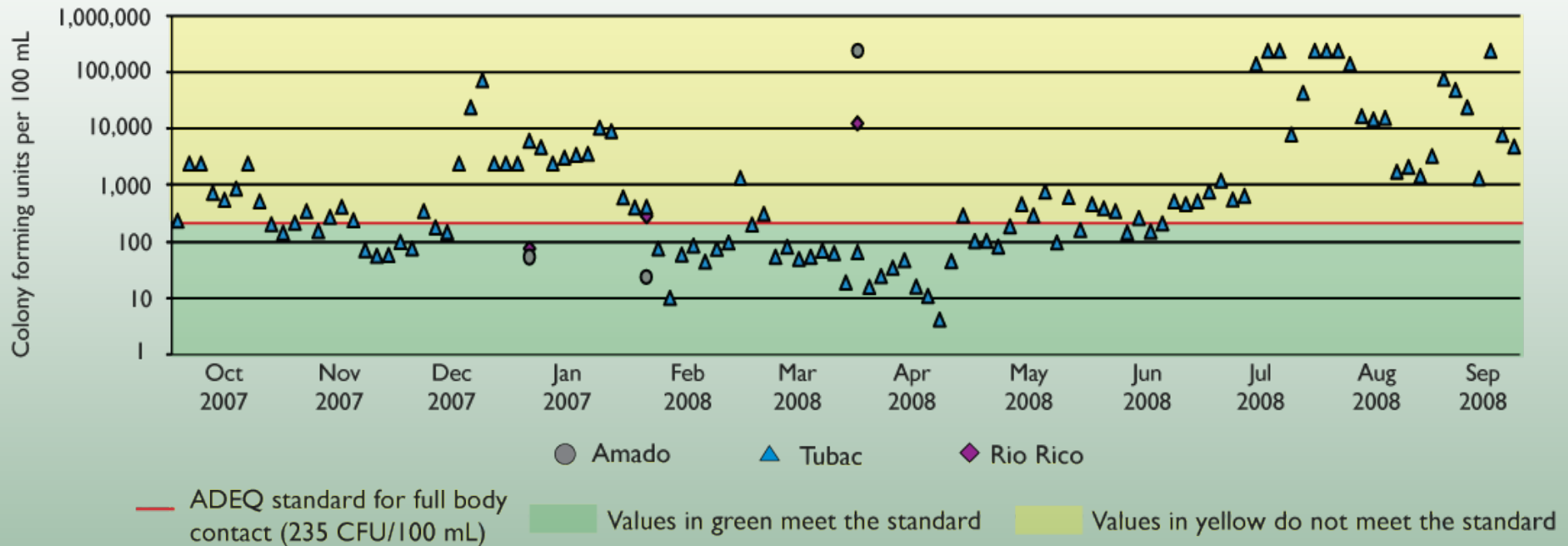
¹ Arizona Department of Environmental Quality. (2009). *Notice of Final Rule Making Title 18. Environmental Quality, Chapter 11. Department of Environmental Quality, Water Quality Standards. (not a final rule)*. Retrieved February 13, 2009 from <http://www.azdeq.gov/function/laws/download/NFRM1.pdf>.

² Arizona Administrative Code. (2003). *Title 18. Environmental Quality, Chapter 11. Department of Environmental Quality, Water Quality Standards*. Arizona Administrative Code Supp. 03-1, pp. 1-85.

³ National Parks Service. (2001). *Baseline Water Quality Data Inventory and Analysis, Tumacacori National Historical Park*. Water Resources Division and Servicewide Inventory and Monitoring Program, Fort Collins, Colorado.

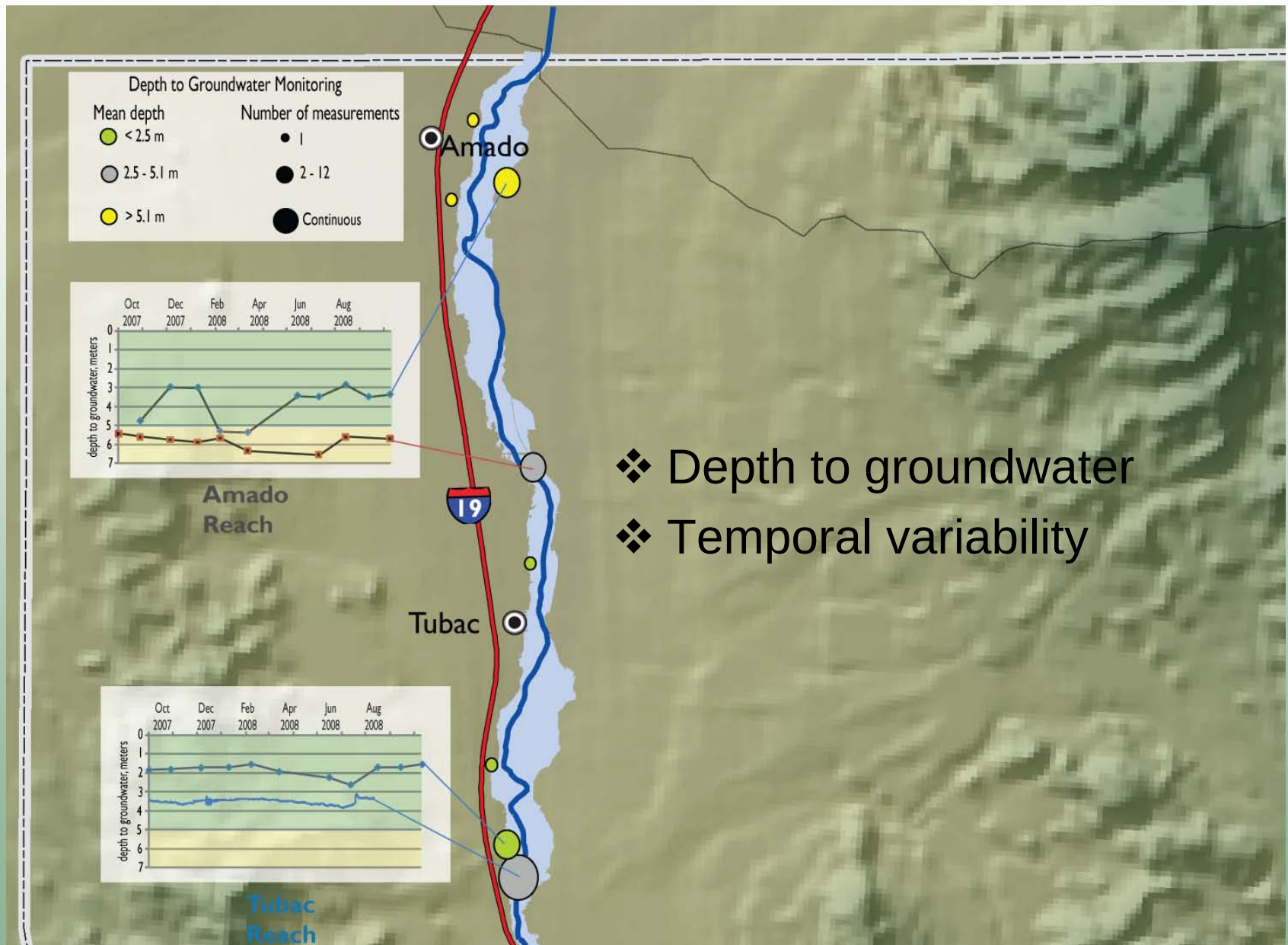
⁴ Lite, S. J., and J. C. Stromberg. 2005. Surface water and ground-water thresholds for maintaining Populus-Salix forests, San Pedro River, Arizona. *Biological Conservation* 125:153-167.

Aquatic Indicator – E. coli



Data source: Tumacácori National Historical Park, Friends of the Santa Cruz River, and NPS Sonoran Desert Network

Riparian Indicator – Groundwater



Health Assessment Summary

Category	Indicators and Standards	% Attainment of Standard		
		Amado	Tubac	Rio Rico
 Aquatic	 Ammonia: varies with pH	0%	25%	33%
	 Dissolved oxygen: ≥ 3.0 mg/L	91%	38%	45%
	 Total phosphorus: < 1 mg/L	no data	0%	0%
	 E. coli: < 235 CFU/100mL	33%	34%	66%
	 Fish: 2008 baseline	0%	0%	0%
	 Aquatic invertebrates: 2008 baseline	no data	no data	no data
 Riparian	 Depth to groundwater: < 5.1 m	25%	100%	86%
	 Groundwater variability: < 0.5 m	0%	0%	0%
	 Birds: 2008 baseline	baseline	baseline	no data
	 Riparian vegetation: 2006 baseline	baseline	baseline	baseline

Potential Management & Policy Decisions



Public access to river



Floodplain protection



Infrastructure upgrades



Restoration

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Thank you



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