

CLIMAS COLLOQUIUM SERIES

EVALUATING ENVIRONMENTAL WATER ACQUISITIONS & REGIONAL CLIMATE SERVICES

CROSS CUTTING THEMES:

Use-inspired science & evaluation

Communities of practice – across academic disciplines
-- across public agencies, researchers, resource users ...



RISA
Regional Integrated Sciences
and Assessments

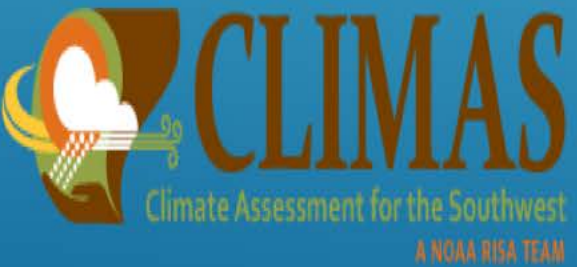
EVALUATING ENVIRONMENTAL WATER ACQUISITIONS

Professor Bonnie Colby

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With appreciation to funders and collaborators:



Boulder Lake, Colorado
Photo Credit: Rowan Isaaks



A FAVORITE TOPIC


- ▶ Globally pressing issue
- ▶ Creative adaptive teamwork (like CLIMAS)
- ▶ Increasingly sophisticated over 30 years
- ▶ Plenty of challenges still to address

BLUE RIDGE RESERVOIR, ARIZONA
PHOTO CREDIT: CC BY-SA 2.0: U.S. FOREST
SERVICE, COCONINO NATIONAL FOREST.




ENVIRONMENTAL WATER ACQUISITIONS (EWA) ESSENTIAL FOR REGIONAL CLIMATE ADAPTATION:

Preserve And Restore Ecosystem Services Provided By Water In Rivers, Lakes And Wetlands

- ▶ improved flood protection, water quality
 - ▶ community and cultural values
 - ▶ property values along lakes and rivers (hedonic valuation)
 - ▶ recreation and renewal
 - ▶ species recovery
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OBJECTIVES IN TALK

- ▶ Provide quick overview: water for environment western US
 - ▶ Changing role of public and private sectors, NGOs, foundations
 - ▶ Evaluation approaches and metrics
 - ▶ Moving forward – what's left to do?
- 

ANOTHER OBJECTIVE ...

Infect some of you with enthusiasm for this work

Cottonwood Creek, Wyoming
Photo credit: Jim Paussa,
Aspen Journalism



WATER FOR ENVIRONMENT: EARLY APPROACHES

- ▶ Early goal: legalize instream flow (ISF) water rights
- ▶ Endangered Species Act & Clean Water Act – litigation threat
- ▶ Buy senior ag water right & accompanying farmland
- ▶ Formal transfer of water right to ISF, facing many objectors
- ▶ Establish uniform year-round ISF requirement
- ▶ Buy and dry – permanently cease irrigation
- ▶ BUT: inflexible & costly – lock up water, lost ag production, acrimony

FAST FORWARD TO 2018

- ▶ Thousands of ISF water rights – concentrated in Pacific Northwest
- ▶ Many flexible agreements with ag that do NOT alter water rights
- ▶ Cease irrigating hay & alfalfa when least profitable, streams need H2O
- ▶ Switch to low water use crops, “deficit” irrigation
- ▶ Policy effort to reduce “buy and dry”

Pinedale, Wyoming ranching
Photo credit: Jim Paussa,
Aspen Journalism

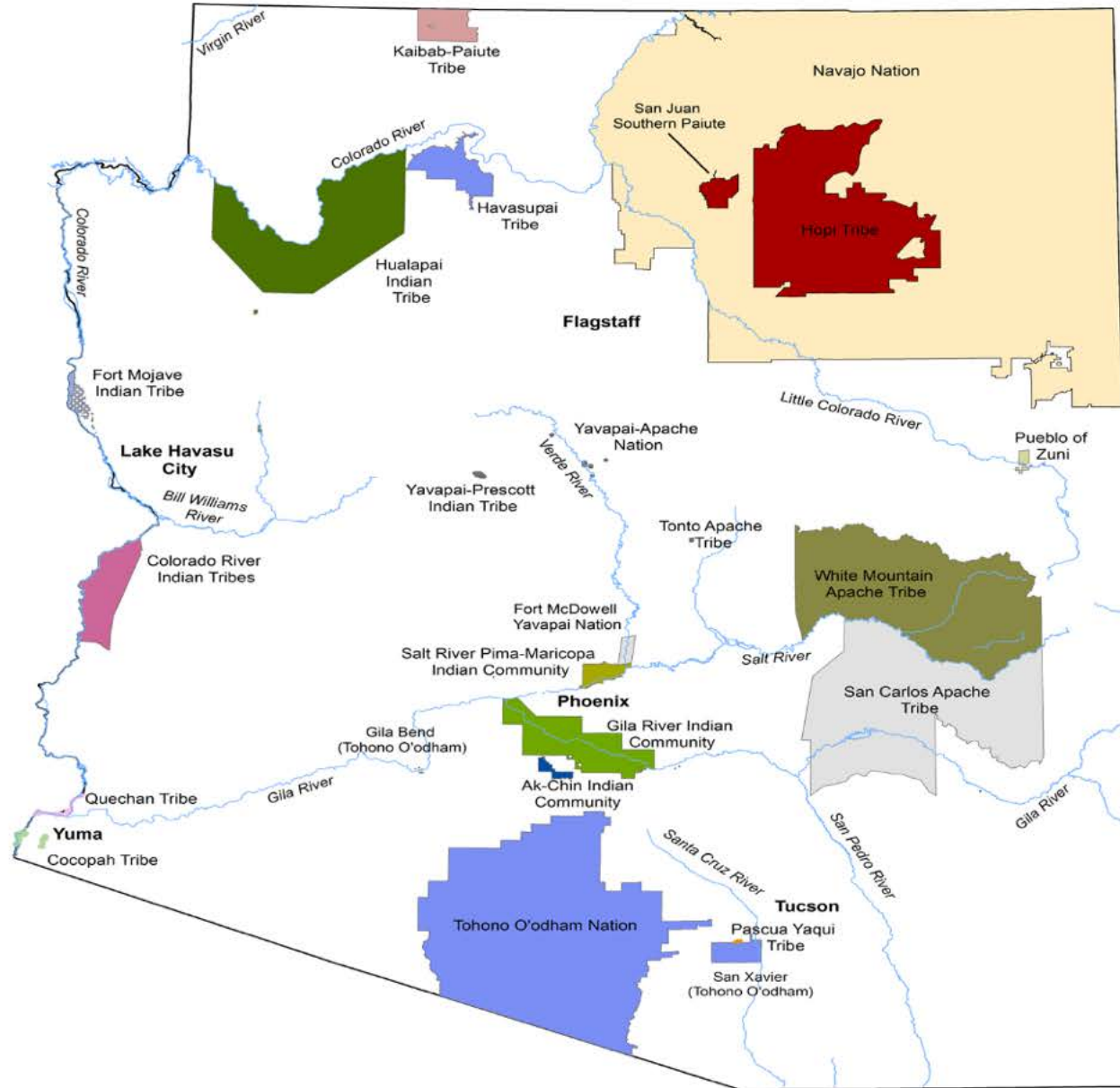


CHANGING ROLES OF PUBLIC AND PRIVATE SECTORS, NGOS, FOUNDATIONS

- ▶ early: public agencies, NGOs –expend \$\$ to acquire water & to litigate
- ▶ 1990s to present: major foundations and local water trusts create and fund environmental water acquisitions, and ongoing public sector support, beverage companies
- ▶ NOW
 - ▶ diverse corporations invest to protect water in their supply chain
 - ▶ investment funds getting into water rights portfolios

ROLE OF TRIBAL NATIONS

Tribal Homelands In Arizona




Arizona

16 tribal nations with water quantifications (court rulings & negotiated settlements)


Most settlements provide water for environmental needs on tribal lands

Map Source:
Inter Tribal Council of
Arizona


ROLES FOR ECONOMISTS

- ▶ Continue valuation work – contributions of water for environment
 - ▶ Sophisticated contracts to alter seasonal pattern of water use
 - ▶ Payment mechanisms that send clear incentive signals
 - ▶ Evaluate – efficient use of \$\$ & water?
- 


EMPHASIS ON EVALUATION

- ▶ Experience with formal program evaluation?
 - ▶ Funders want to know if money well spent
 - ▶ Learn from experience, refine EWAs
 - ▶ Growing community of practitioners evaluating environmental programs and EWAs
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EWA EVALUATION CHALLENGES

- ▶ systematically tracking transaction activity
 - ▶ paying farmers to reduce water consumption: are we getting “new” water?
 - ▶ data – absent & inscrutable
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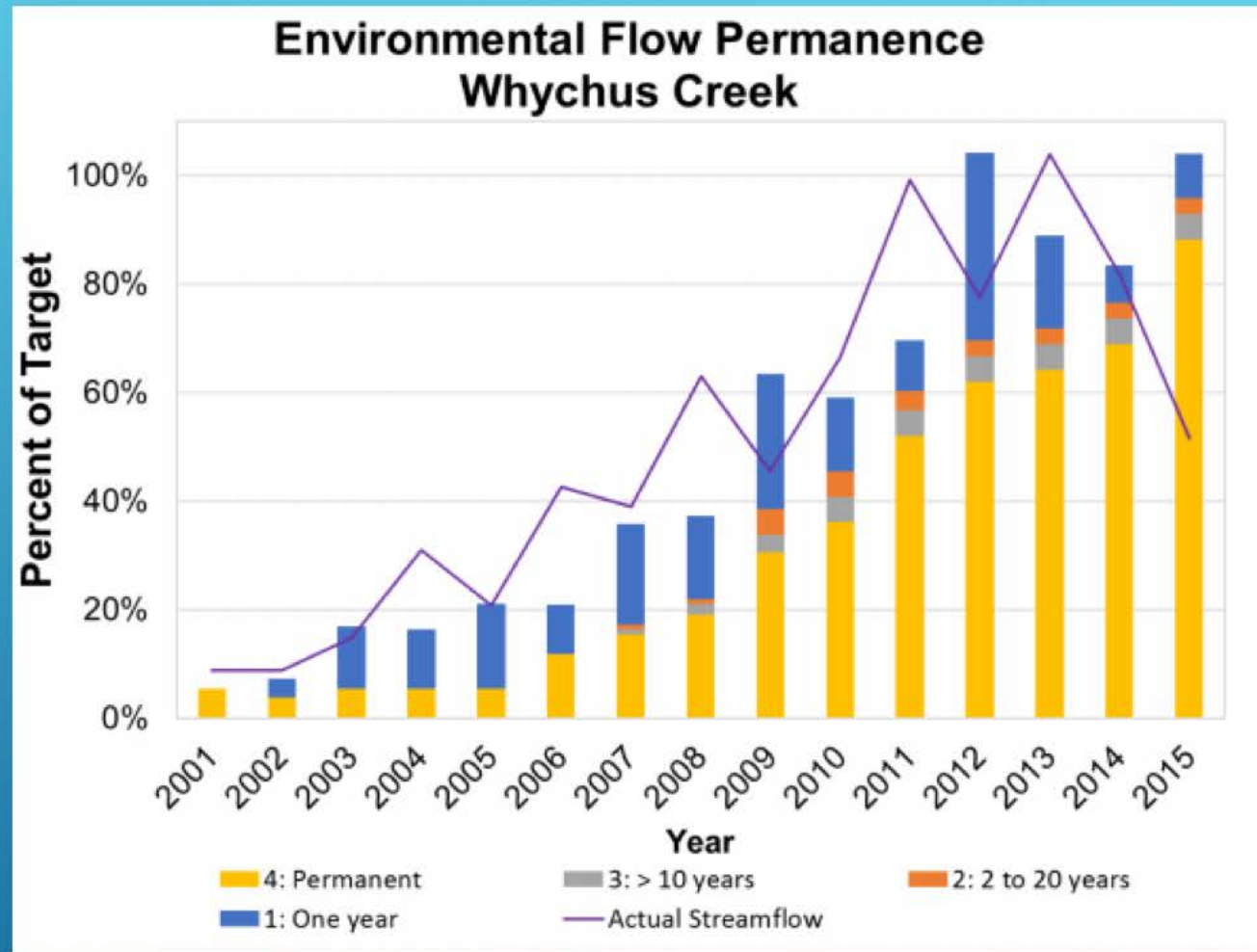
WHAT MAKES A GOOD METRIC?

- ▶ use-inspired: findings make a difference for EWAs (ex: water pricing)
 - ▶ measurable based on accessible data
 - ▶ measurable at reasonable cost and timely
 - ▶ replicable across years, programs and regions
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TYPES OF EWA EVALUATION METRICS

- ▶ Environmental “in-the stream” metrics
 - ▶ Policy metrics
 - ▶ Economic metrics
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EXAMPLE: ENVIRONMENTAL FLOWS METRICS - OREGON



Source: Kendy et al, 2017, Environmental flow duration as a percent of the 33 cfs flow target for Whychus Oregon case study (2001-2015). Actual streamflow as a percent of the 33 cfs flow target at the OWRD gage at Sisters, accumulated for August 1st through September 30th each year

ENVIRONMENTAL FLOW POLICY METRICS

Source: Szeptycki, 2015



COLORADO RIVER BASIN ENVIRONMENTAL WATER TRANSFERS SCORECARD

MARCH 2017 | LEON SZEPTYCKI AND DAVID PILZ



Stanford | Water in the West



EXAMPLE ENVIRONMENTAL FLOW POLICY METRICS

Legal authorization ISF water rights

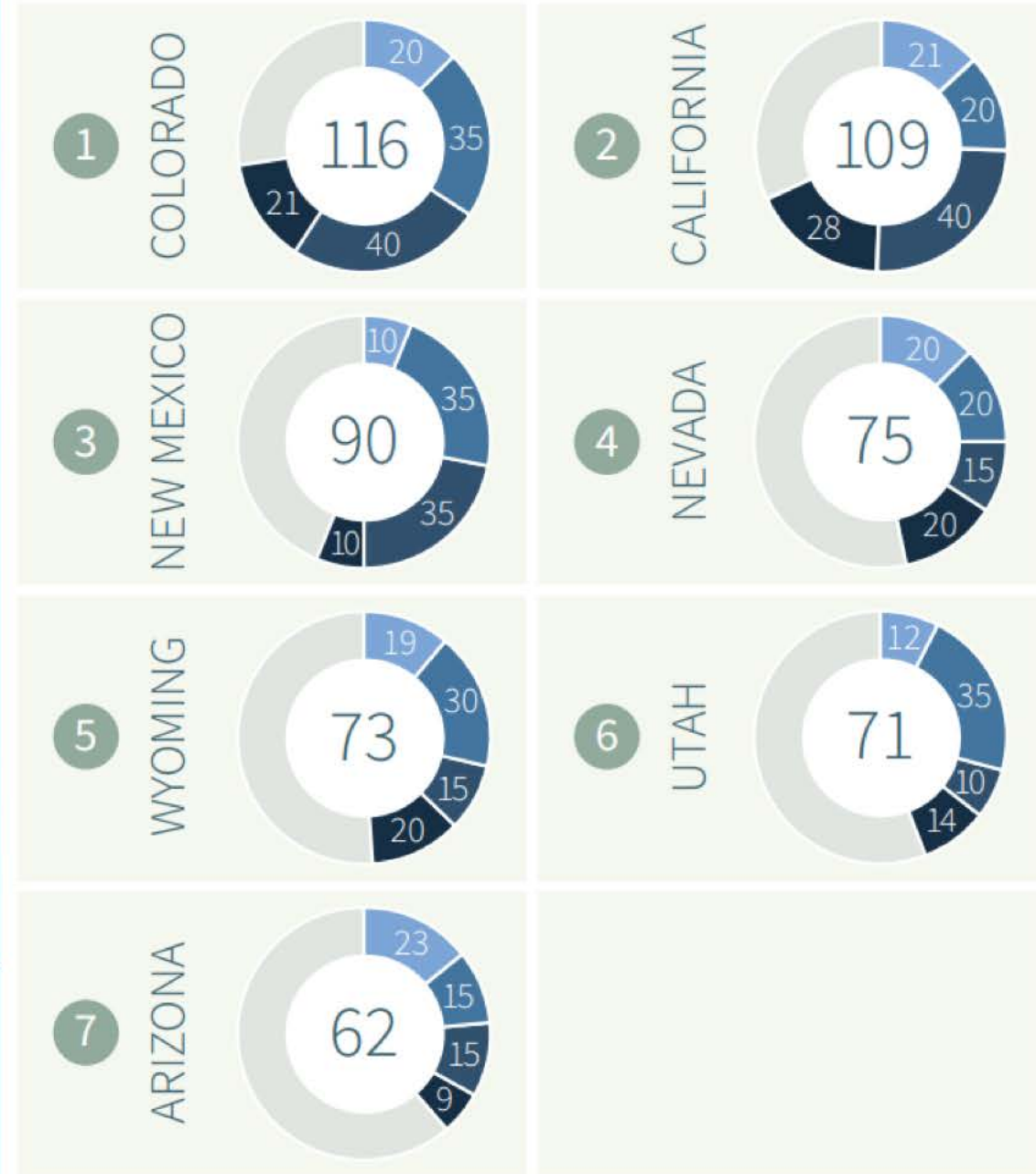
Enforcement of ISF rights

Procedural barriers to ISF rights

Source: Szeptycki, 2015

Figure 2. Overall Scoring

■ Clear Legal Authorization ■ Protection of Environmental Water Rights
■ Scope of Environmental Water Rights ■ Process for Approving Environmental Water Transfers



EWA METRICS: SCORECARD APPROACH

Water Transactions Activity SCORECARD

(excerpts, draft not yet released, location information removed)

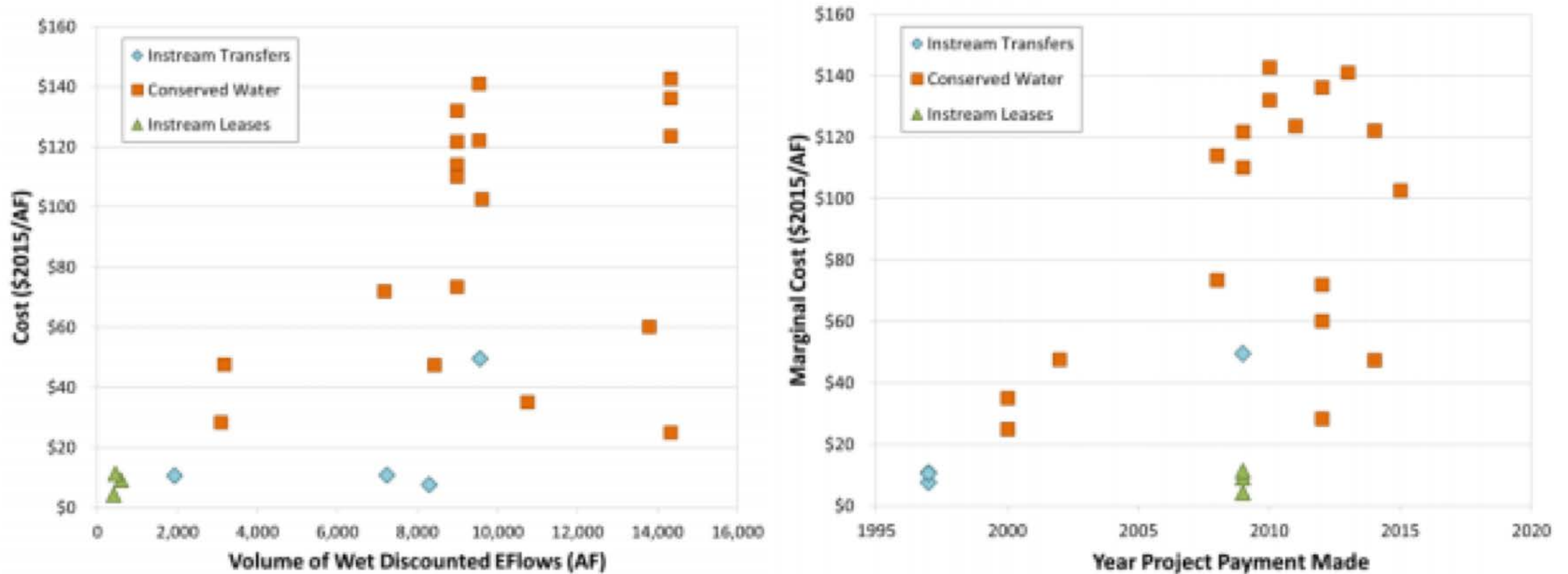
Evaluates specific elements of water transaction activity in 2016. 2013-15 three-year average is baseline. Statewide annual indicators.

Transaction Category & Indicators (units)	Indicator 3-Year Avg		% Change	Score
	2013-15	2014-16	3-Year Avg	2016
I. Water rights change out of ag				
Decrees (unique case #s)	16.25	17	8	A
Volume (estimated afy)	18.4K	27.4K	48	A
II. Temporarily move water from ag				
Projects active (number)	3	2.75	-8	D
Volume (estimated afy)	IDA	IDA		
III. ISF Water Right Acquisitions				
Stream segments initiated (number)	6	0.66	-99	D
IV. Innovative transactions <i>(NOT buy and dry)</i>				
(number)	11.33	10	-12	D

ECONOMIC METRICS

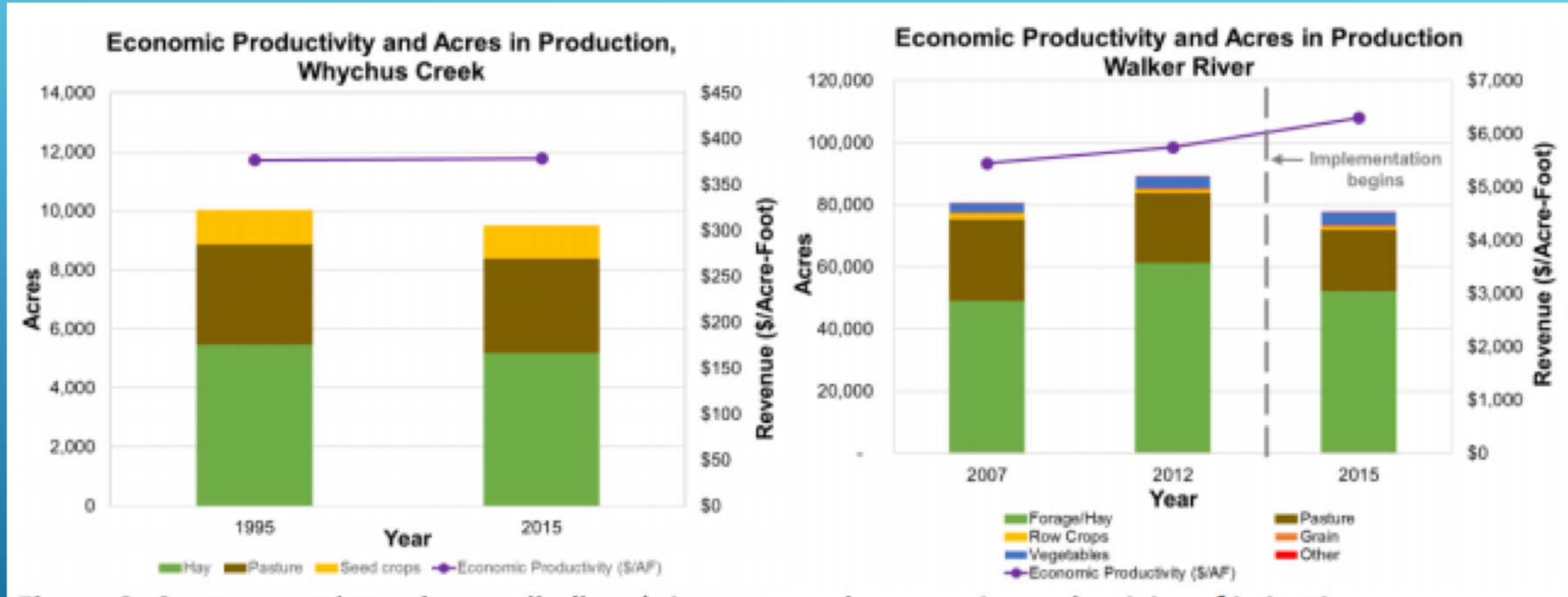
- ▶ Water, money and jobs move across water-using sectors due to transactions
 - ▶ Overview rather than technical economic analyses (love talking about nerdy calculations – email me)
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ECONOMIC METRICS (TWO CASE EXAMPLES IN OR, NV)




Source: Kendy et al, 2018 : Cost-effectiveness of environmental flow transactions by volume (AF) RIGHT: Cost-effectiveness of environmental flow transactions by year (marginal cost).

ECONOMIC METRICS



Source: Kendy et al, 2018 Crop types planted annually (bars), in acres, and economic productivity of irrigation water (line), expressed as annual gross revenue in dollars per acre-foot of water used

EWA METRICS UNDER DEVELOPMENT

- ▶ better water economic productivity indicators
 - ▶ effects on regional drought resilience
 - ▶ effects of EWAs on regional economy, jobs and businesses
 - ▶ diversity of participation in EWAs and sharing of benefits
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PUZZLE MOVING FORWARD

- ▶ Meaningful metrics often not measurable
- ▶ Measurable metrics often unsatisfying



Fall 2018 Graduate Course Offerings in Water and the Environment

AREC 575 Tues/Thurs 12:30–1:45
Resource Economics: Incentive-based Policies and Environmental Markets

A one semester interactive learning community

Description

Economic incentives, tradable permits and markets for ecosystem services are pivotal in contemporary water and environmental policy. This interactive seminar-style course covers economic theory and methods for evaluating water and environmental laws and policies; including ecosystem service provision, tradable use permits, benefit cost analysis, externalities, public goods and valuation methodologies. Case studies include federal, state, tribal and international water and environmental policies.

Pre-requisite: One full semester of natural resource economics or microeconomics

AREC 579 Mon/Wed 4–5:15
Economics of Water Management and Policy

Description

Economic optimization for water management and policy design. Topics include optimal use of water, water as an input in producing recreation, habitat and other ecosystem services; water demand and supply; water pricing and conservation incentives; policies governing water rights and allocation for environmental needs; managing water shortage risks; and economic models of water conflict and bargaining over water. Interactive seminar style course. Calculus proficiency and regular attendance essential.

Meets jointly with AREC 479. Optional graduate student session offered some dates after main class (This shows up in schedule as a discussion section).

Pre-requisite: One semester of college calculus



Which class is right for you? *Proficient in college calculus and have less background in economics, take AREC 579.*

Not proficient in calculus, but have taken microeconomics or resource economics, take AREC 575.

Have questions? *Please contact Professor Bonnie Colby at bcolby@email.arizona.edu*

DISCUSSION – ENV WATER ACQ

(DAN – SET TIMER)

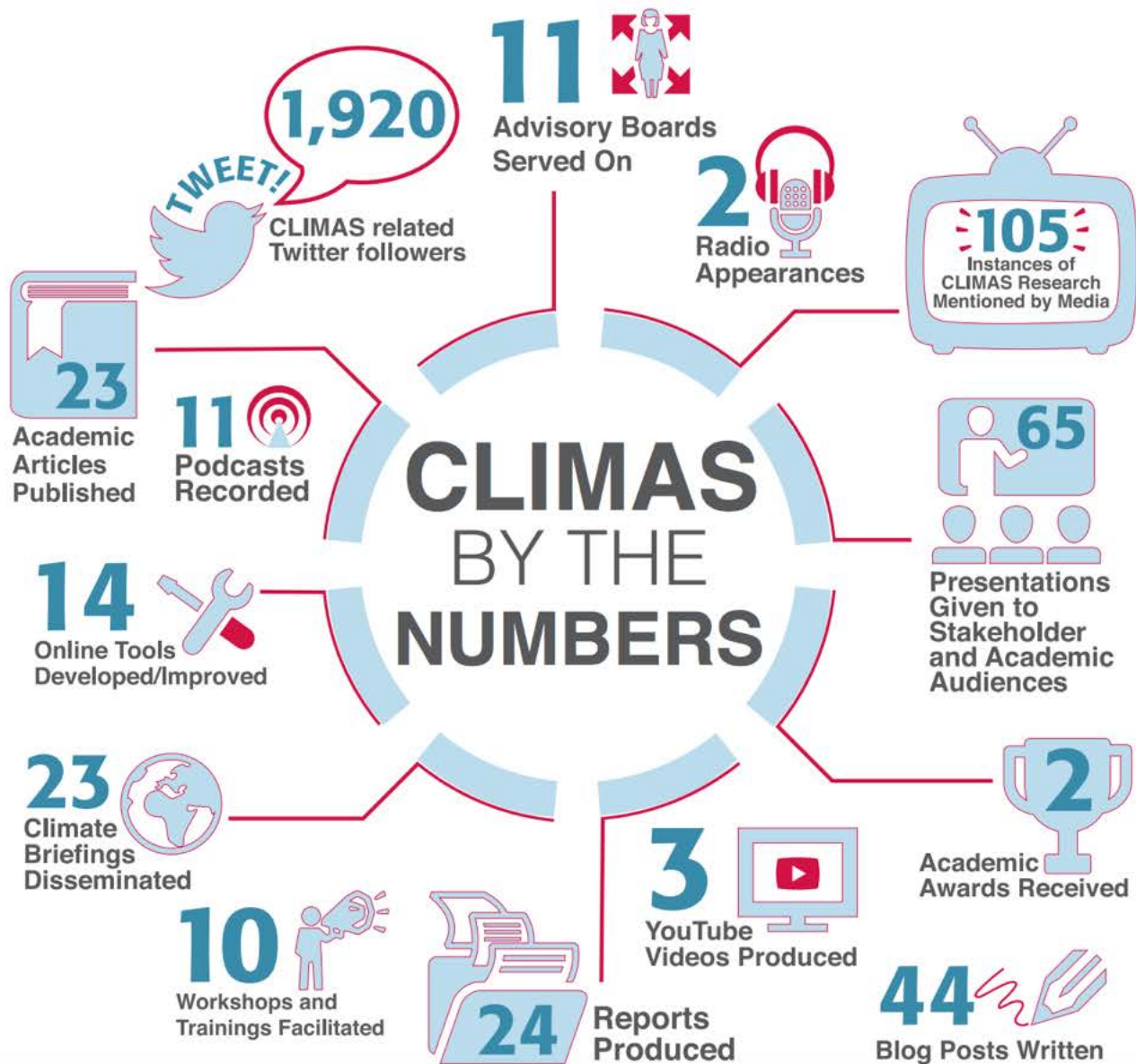


SWITCHING GEARS





CLIMAS



REFERENCES

Colby, B. and R. Isaaks Water Trading: Adaptation, Innovations and Modeling, *Journal of Contemporary Water Research and Education*, forthcoming, November, 2018.

Kendy, E., B. Aylward, L. Ziemer, B. Richter, B Colby, T. Grantham, L Sanchez, W Dicharry, E. Powell, S. Martin, P. Culp, L. Szeptycki, and C. Kappel. Water Transactions for Streamflow Restoration, Water Supply Reliability, and Rural Economic Vitality in the Western United States" *Journal of the American Water Resources Association*, 2018.

Szeptycki, L. F., Forgie, J., Hook, E., Lorick, K., & Womble, P., 2015. "Environmental Water Rights Transfers: A Review of State Laws". Water in the West, Stanford University.