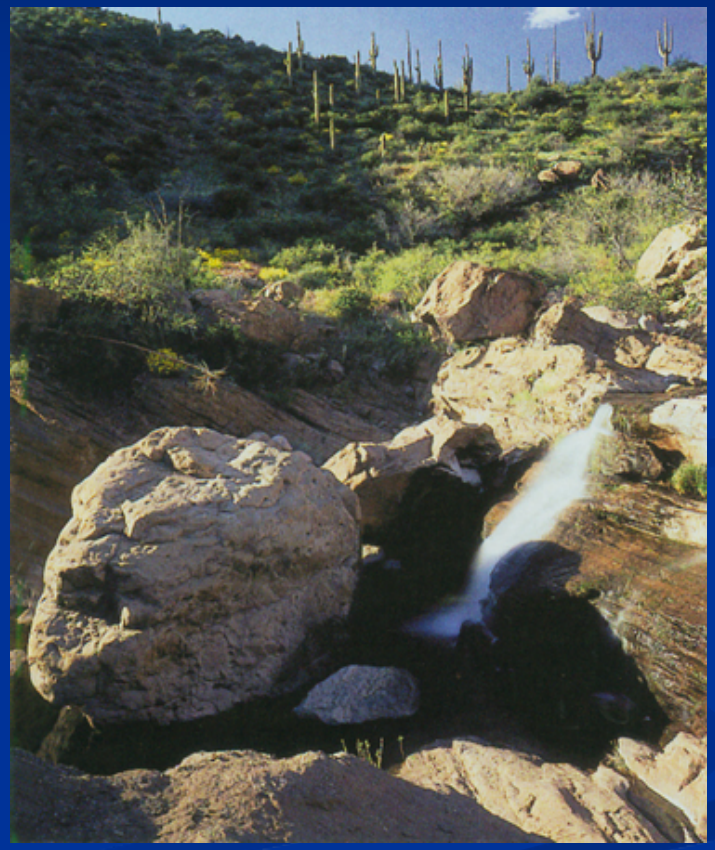
A Source of Information for Water Related Issues Across Arizona

SWES People and Programs

Extension Faculty that Focus Primarily on Water Related Issues

- Kathy Jacobs, Executive Director
  - Arizona Water Institute, Professor & Specialist
- Michael Crimmins PhD
  - Assistant Specialist & Professor, Climate Science
- Paul Brown PhD
  - Extension Specialist &, Research Specialist, AZMET
- James Walworth PhD
  - Extension Specialist & Professor
- Charles Sanchez PhD
  - Resident Director YAC, Professor & Research Scientist
- Kevin Fitzsimmons PhD
  - Extension Specialist & Professor
- Janick Artiola PhD
  - Associate Professor & Extension, Research Scientist
- Channah Rock PhD
  - Assistant Specialist & Professor, Water Quality



ARIZONA COOPERATIVE EXTENSION


Michael Crimmins
Assistant Specialist &
Assistant Professor, Climate
Science

Arizona Drought Impact Reporting System

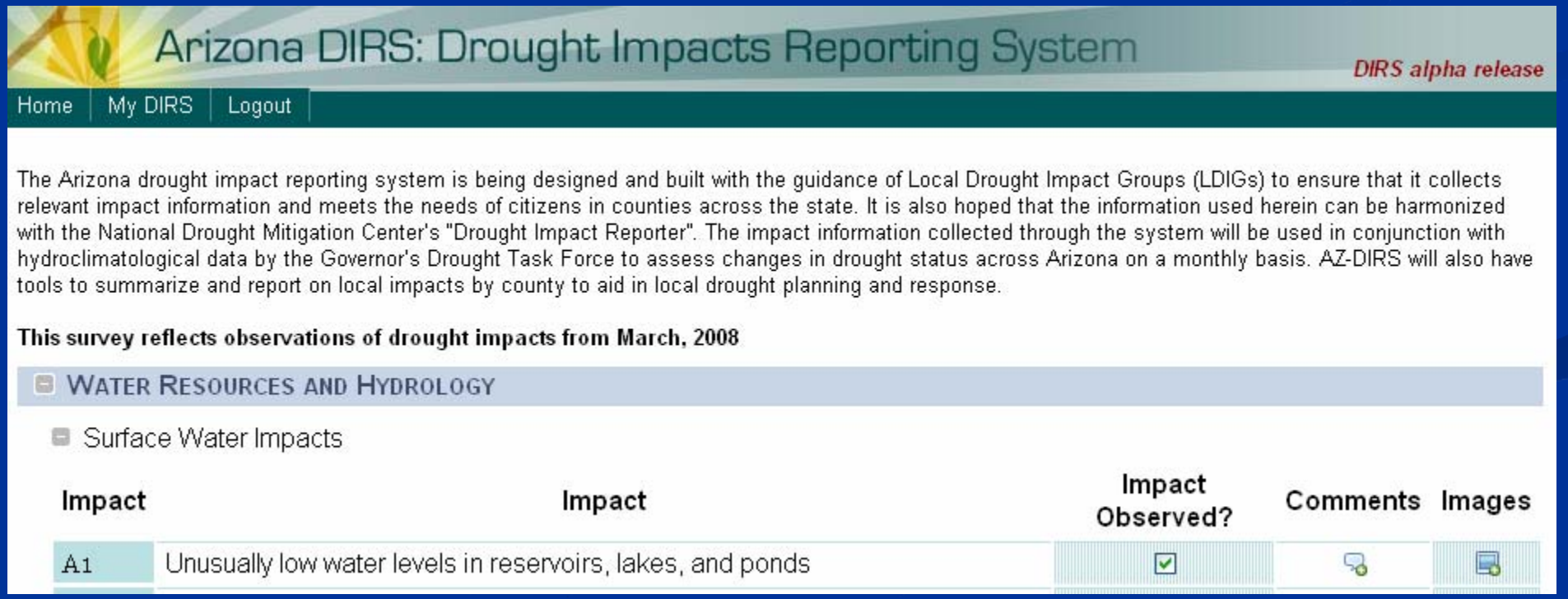
- The Arizona Drought Impact Reporting System is being designed and built with the guidance of Local Drought Impact Groups (LDIGs)

- The main goal of the DIRS is to ensure relevant impact information collection to meets the need of citizens and counties across the state.

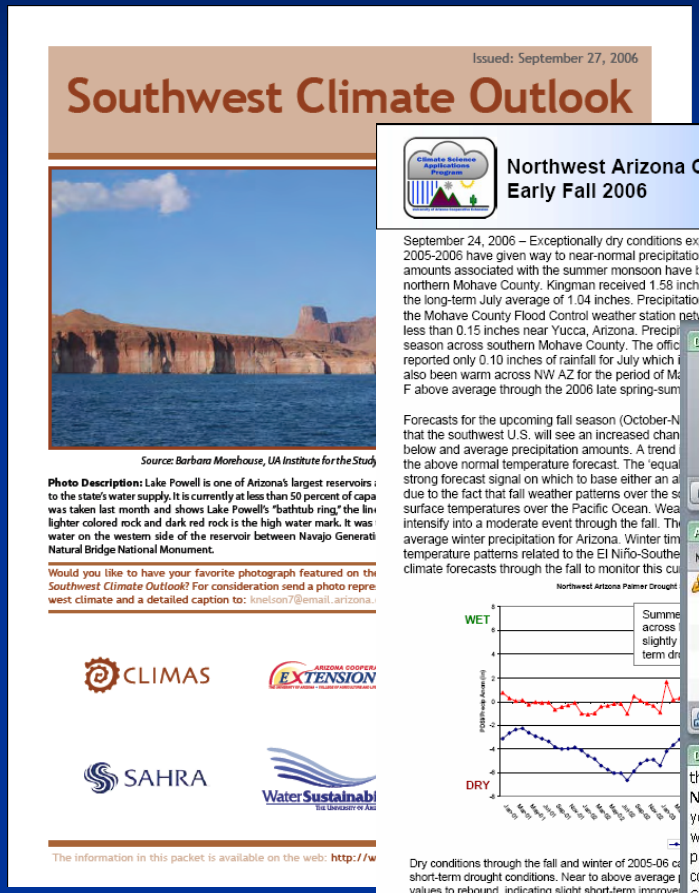
- It is also hoped that the information collected can be used to assess changes in drought status across Arizona and aid in local drought planning and response.

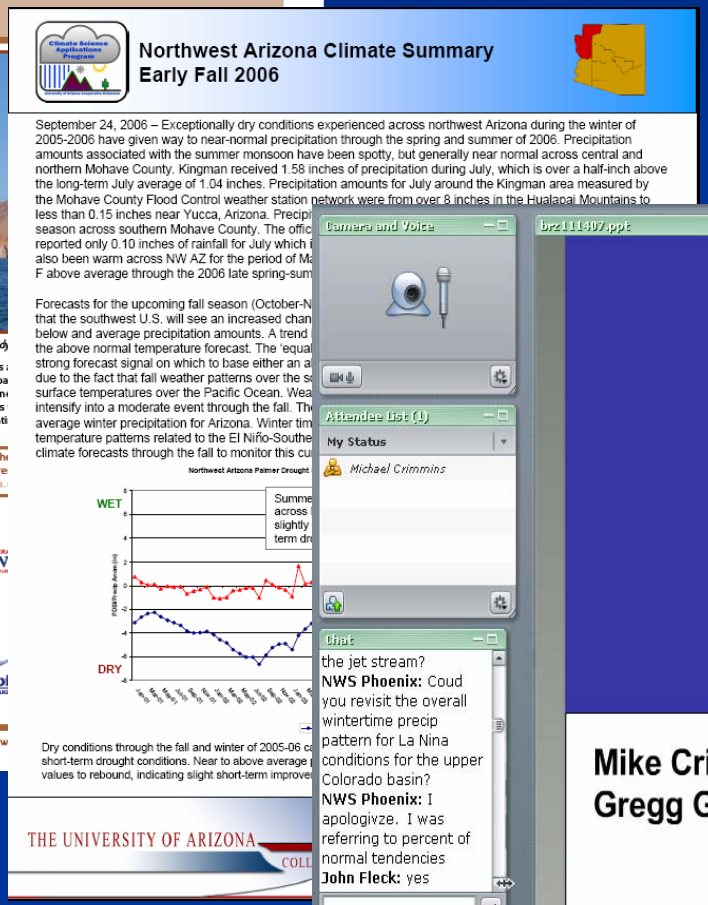
AZ-DIRS: Impact Reporting Entities

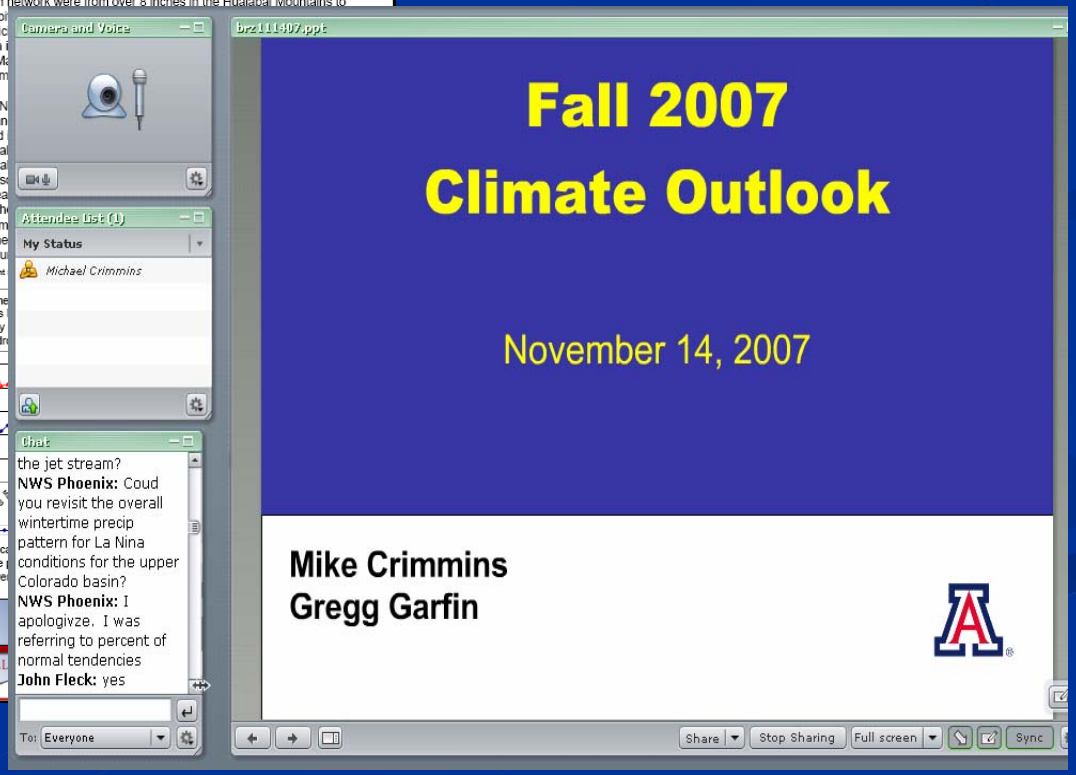
- Agricultural Operations
- Livestock Production and Rangelands
- Economic, Cultural, Recreation
- Aquatic Species/Riparian Areas
- Terrestrial Wildlife
- Plant Communities/Ecosystem Function
- Hydrology/Water Resources



Monthly to Seasonal Climate Bulletins and Briefings





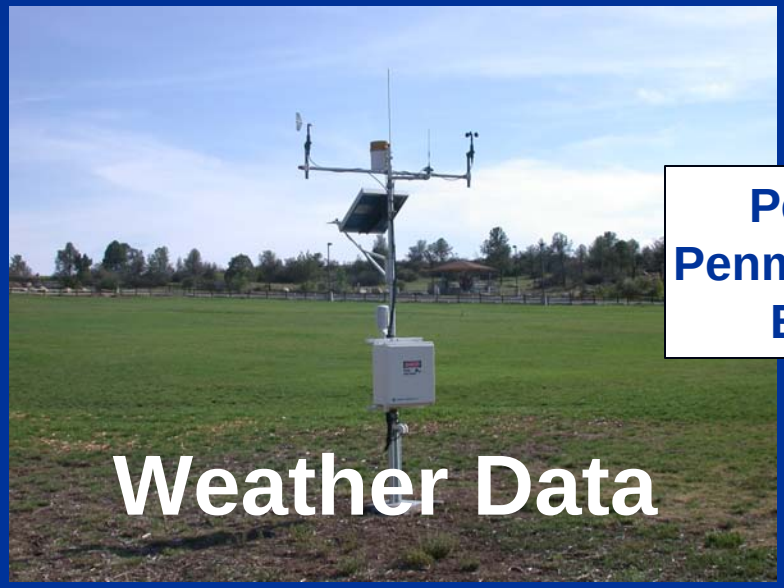



Paul Brown
Specialist, Research
Specialist

Arizona Cooperative Extension

AZMET

THE ARIZONA METEOROLOGICAL NETWORK



Penman or Penman Monteith Equation

Extension and faculty personnel within the AZMET program convert reference Evapotranspiration (ET) into estimates of crop and turf water use and provide various reports to clientele.

Crop/Turf Water Use Reports

Available: Email, Internet, Newspaper

Phoenix Area
Lawn Watering Value
NOV 13, 2001

0.23"

is needed on your ryegrass if you watered 3 days ago, unless it has rained.

Phoenix Area Turf Water Use Report

Nov. 14, 2002

Turf: Ryegrass

LOCATION	Water Use In Inches For Previous Day		3 Days		7 Days	
	AC	HQ	AC	HQ	AC	HQ
Phoenix Greenway	0.08	0.09	0.22	0.24	0.58	0.64
Phoenix Encanto	0.08	0.09	0.23	0.26	0.59	0.66
Desert Ridge	0.08	0.09	0.24	0.26	0.60	0.66
Litchfield Pk.	0.09	0.10	0.25	0.28	0.63	0.69
Waddell	0.09	0.10	0.24	0.26	0.59	0.65
Buckeye	0.09	0.10	0.25	0.27	0.63	0.69
Queen Creek	0.08	0.09	0.23	0.25	0.64	0.70
Area Average	0.08	0.09	0.24	0.26	0.61	0.67

AC: Acceptable Quality Turf
HQ: High Quality Turf

LAWN WATERING GUIDES

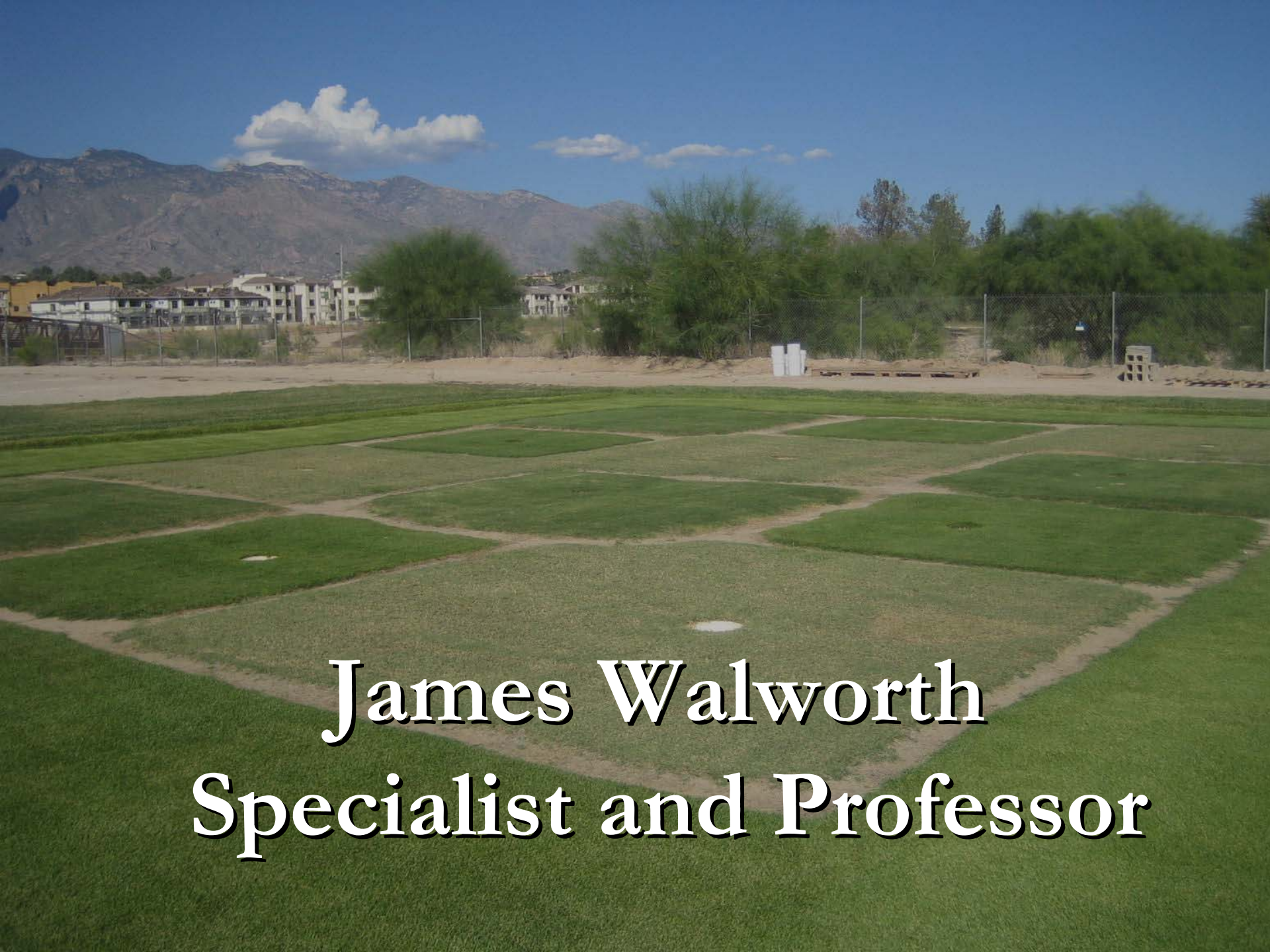
TURF WATER USE REPORTS

Location	Alfalfa		Pecan		Pistachio	
	Last Week	This Week	Last Week	This Week	Last Week	This Week
Bonita	2.3"	2.4"	0.7"	0.7"	0.6"	0.8"
Bowie	2.3"	2.4"	0.7"	0.8"	0.6"	0.8"
Kansas Set.	2.2"	2.4"	0.6"	0.7"	0.6"	0.8"

Research Interests

- Deficit Irrigation
- Irrigation Uniformity
- Impact of Salinity on Golf Courses
- Weighing Lysimeters (Yuma)

Initial Focus: Water Use of Vegetable Crops


James Walworth
Specialist and Professor

Current Drought Stress Programs/Research

- Turf varieties were subjected to drought stress cycles to evaluate ET demand and ability to withstand drought.
  - Sea Isle 1 seashore paspalum
  - Tifway bermudagrass
  - A138 Inland saltgrass

Program Goals

- What we don't know
  - The minimum amount of water to maintain acceptable turf performance for golf course use
  - How much can we 'cheat' and still have adequate growth and turf quality?
  - What degree of deficit irrigation (less than optimum ET demand) can be applied to various cultivars of bermudagrass and seashore paspalum on Arizona golf courses?

Charles Sanchez
Resident Director YAC, Professor & Research Scientist

Programs of YAC

- **Water Quantity**

  Irrigation studies in cooperation with USDA Arid lands Research Center and the USBR.

- **Water Quality**

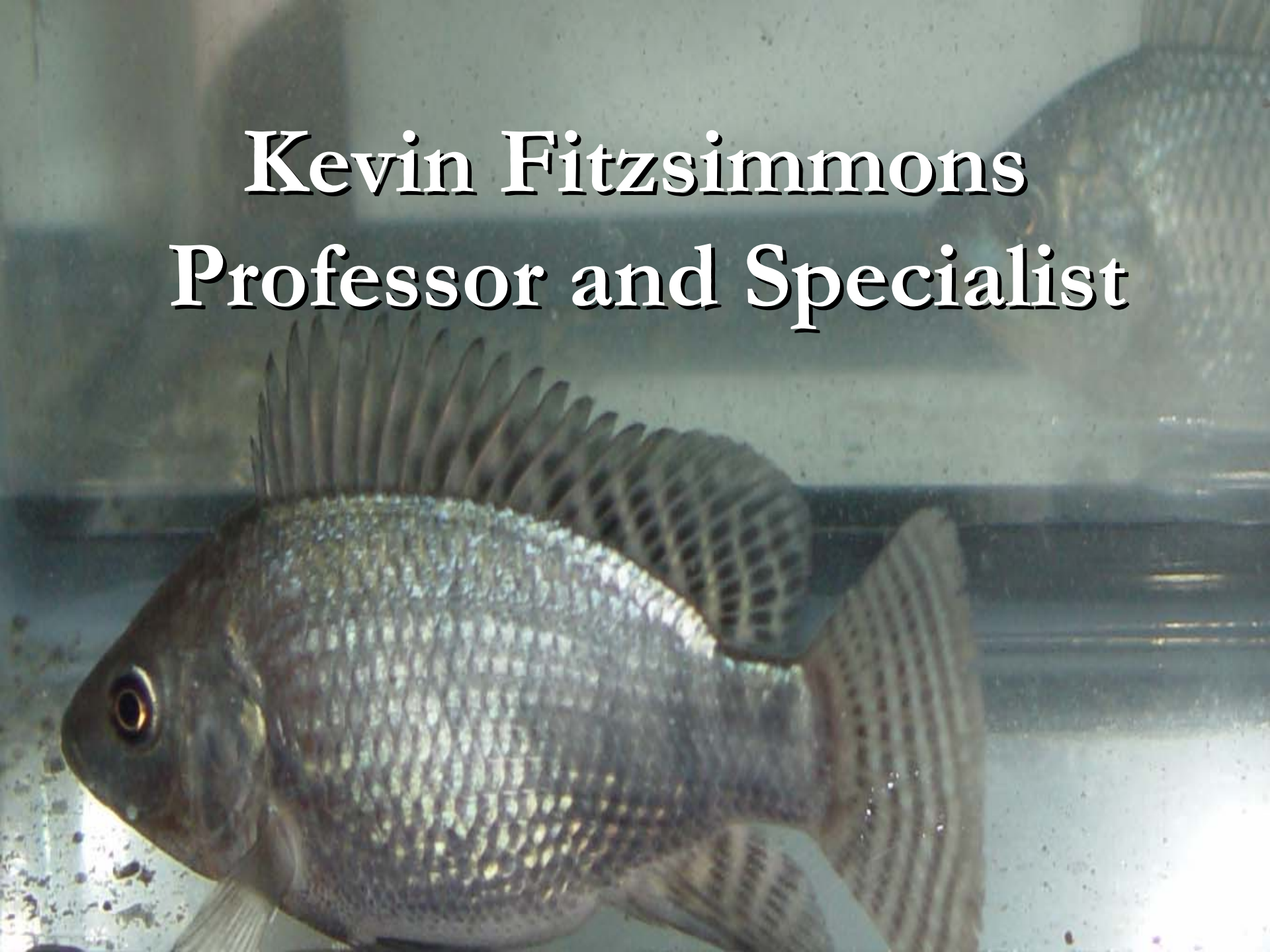
  Contaminants in Colorado River, waste streams discharged into River, and surface waters diverted from river for urban and agriculture use.

Irrigation

- Weighing lysimeters for ET determination
- Modeling surface irrigation systems to develop management criteria
- Flow measurement for improved management
- Surface Irrigation automation

Contaminants in Surface Waters

- Microbial quality of irrigation water and impact on food safety
- Abiotic contaminants (perchlorate, heavy metals, pharmaceuticals) in surface water and potential food chain transfer


Kevin Fitzsimmons
Professor and Specialist

Aquaculture

Aquaculture is the fastest growing sector of agriculture in the US and globally. It is especially important in arid regions where water is limited and every drop must be used efficiently. U of A has an international reputation as a leader in arid lands aquaculture.

- Multiple use of water for production of aquatic plants and animals and irrigation of field crops.
- Tilapia farming
- Shrimp farming
- Aquaculture in schools

Invasive Aquatic Plants and Wetland Restoration

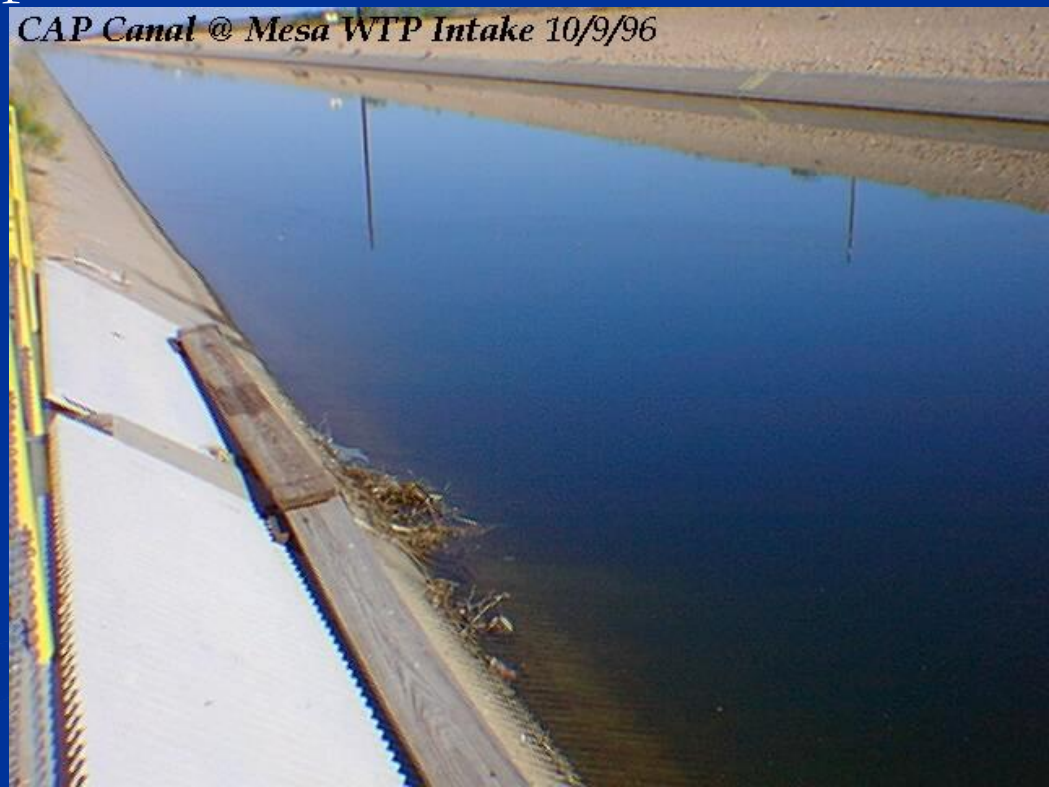
Protection and restoration of riparian zones in the desert is critical for native species and human residents.

- Aquatic Nuisance Species
- Riparian study, restoration & protection
- Constructed wetlands
- Integrated pest management of aquatic weeds

Watersheds, Phycology, and Water Quality

The study of algae and their role in aquatic systems in the desert has proven to be important to understand native fisheries, the movement of water in irrigation systems and to improving the quality of drinking water.

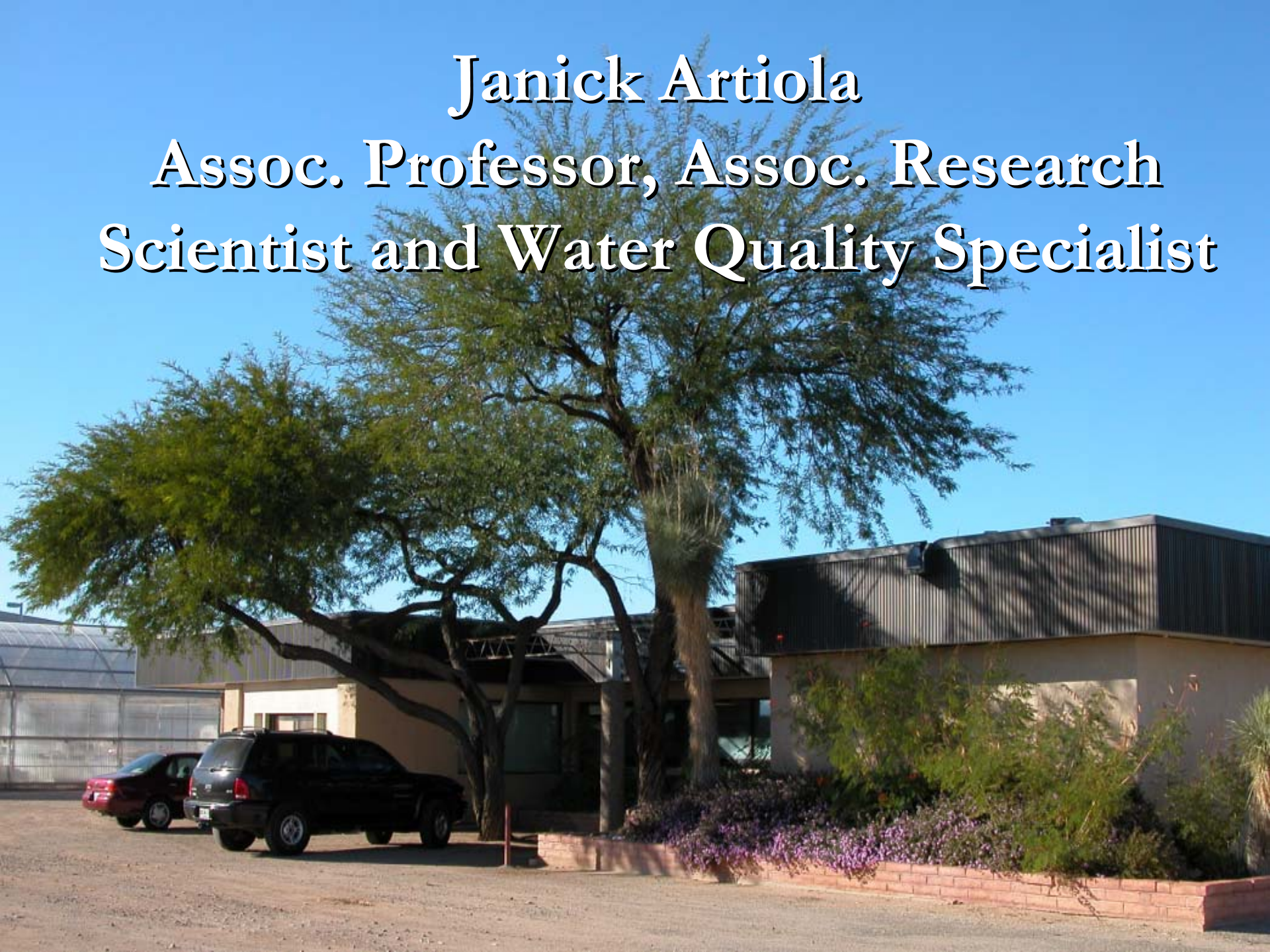
- Algae impacts on drinking water
- Control of taste and odor problems in municipal water supplies
- Watershed impacts on aquatic biology and water quality



Use of Saline Wastewater for Halophytes

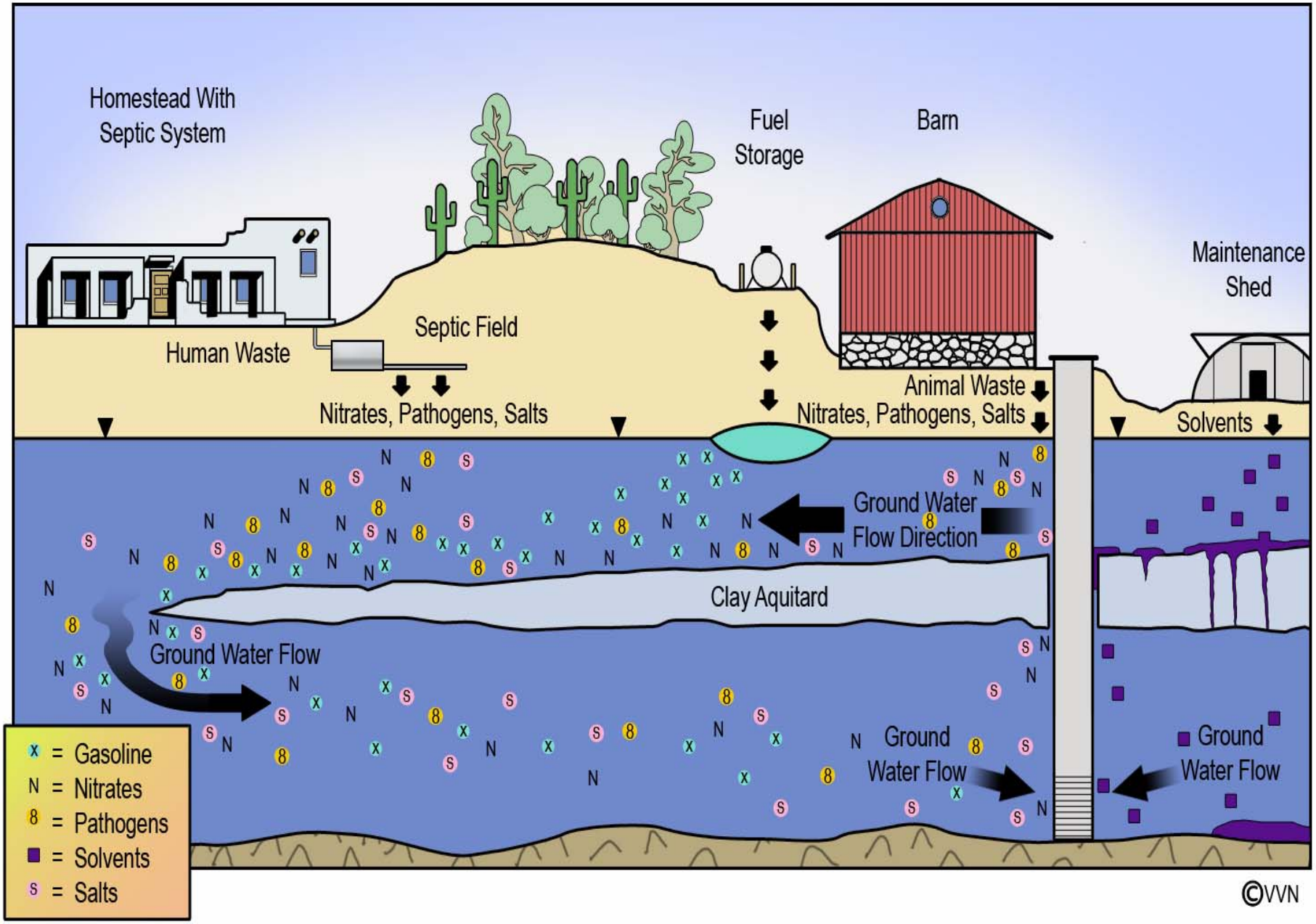
Salt tolerant plants are used for a variety of purposes and are native to the desert Southwest

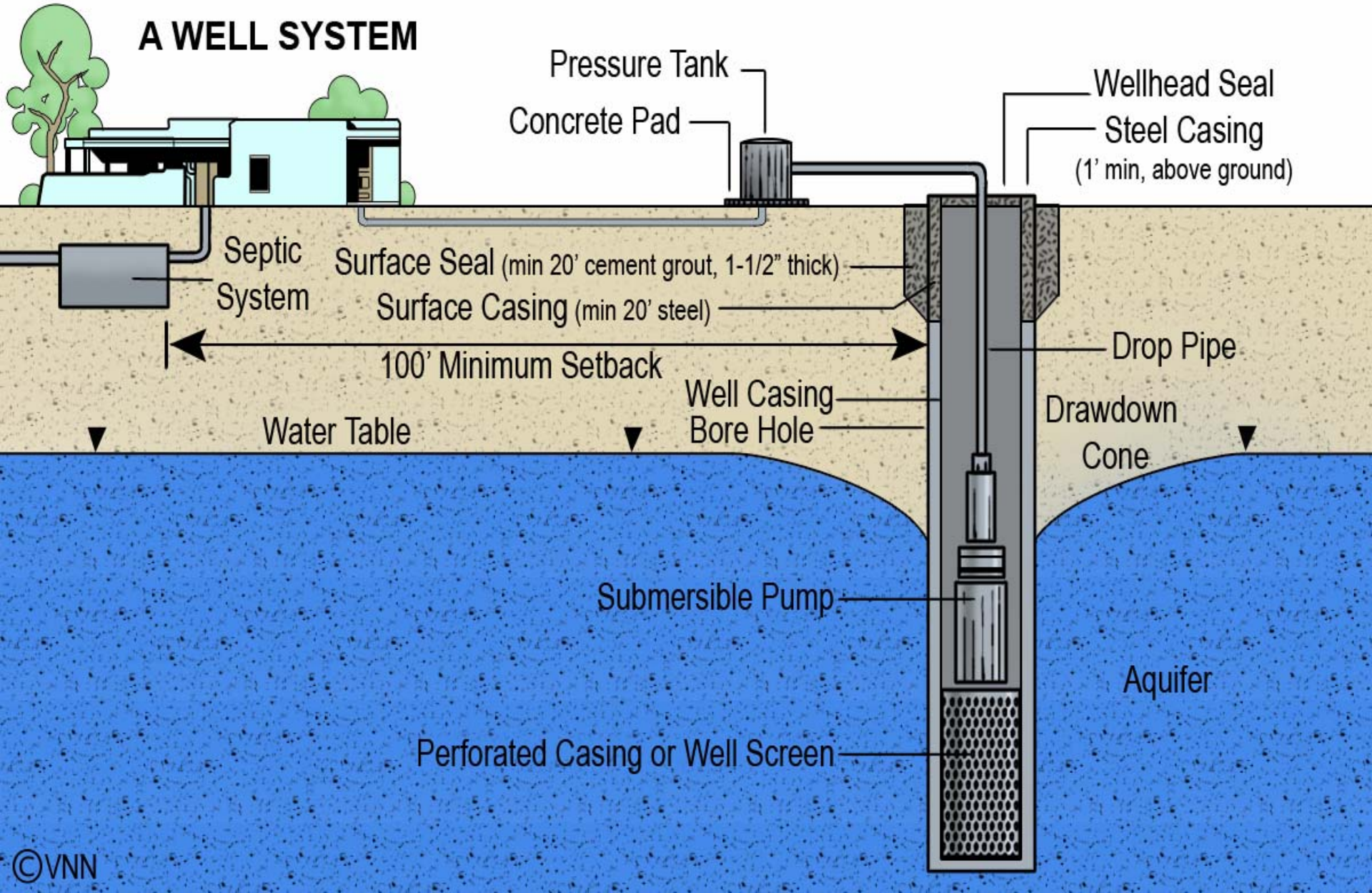
- forage crops & ornamental plants
- Restoration & bioremediation
- wildlife habitat & human consumption


Janick Artiola
Assoc. Professor, Assoc. Research
Scientist and Water Quality Specialist

Education/Extension Activities

- Co-director of UA Superfund Basic Research Program Science Translation Core
  - Two Sci Transfer bulletins (co author, English+Spanish versions)
- Extension Specialist
  - Booklet on water treatment for home users (co-author/co-translator, English+Spanish versions)
  - Biosolids in AZ.. Bulletin AZ1426
  - Home Energy tips.. Bulletin: in review
  - AZ Well Owners Guide.. Booklet: in review


Homestead With
Septic System
Fuel
Storage
Barn
Maintenance
Shed
Septic Field
Human Waste
Nitrates, Pathogens, Salts
Animal Waste
Nitrates, Pathogens, Salts
Solvents
Ground Water
Flow Direction
Clay Aquitard
Ground Water Flow
Ground
Water Flow
Ground
Water Flow
x = Gasoline
N = Nitrates
8 = Pathogens
= Solvents
s = Salts
©VVN


A WELL SYSTEM
Pressure Tank
Concrete Pad
Wellhead Seal
Steel Casing
(1' min, above ground)
Septic System
Surface Seal (min 20' cement grout, 1-1/2" thick)
Surface Casing (min 20' steel)
100' Minimum Setback
Drop Pipe
Well Casing
Bore Hole
Water Table
Drawdown Cone
Submersible Pump
Aquifer
Perforated Casing or Well Screen
©VNN

Research Interests/Publications

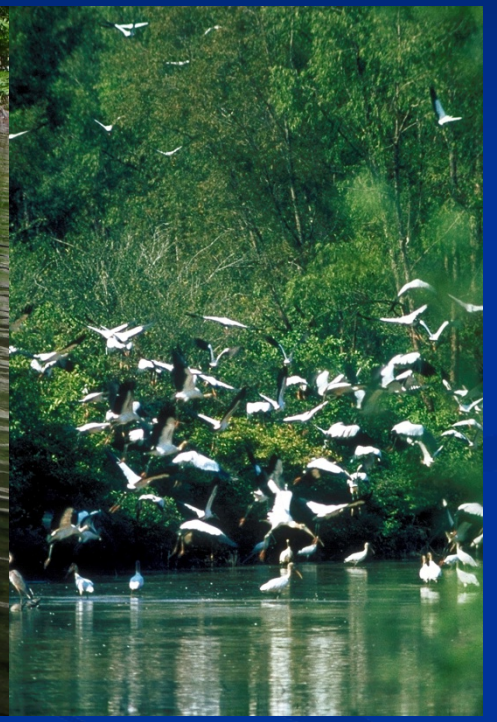
- Management of biosolids and water quality-related issues
- Water quality related to organic matter in irrigated semi-arid soils
  - 2006 Carroll, K.C., J.F. Artiola, M.L. Brusseau. Transport of molybdenum in a biosolid-amended alkaline soil. *Chemosphere*. 65:778-785.
  - 2008 O Shaughnessy, S.A., I. Song, J. F. Artiola, and C. Y. Choi. Nitrogen loss during solar drying of biosolids. Environmental Technology, Vol 29. 55-65.
  - 2008 Artiola, J.F. Soil Organic Carbon influenced by irrigation water quality in a semi-arid climate. Comm. In Soil Science and Plant Analysis. In review.

Channah Rock
Assistant Specialist and Professor

Future Water Demand in Arizona

- Increasing human populations are changing the Arizona landscape drastically
- Increased Water Demand
  - Residential
  - Commercial
  - Agricultural
- Questions
  - Quality
  - Quantity

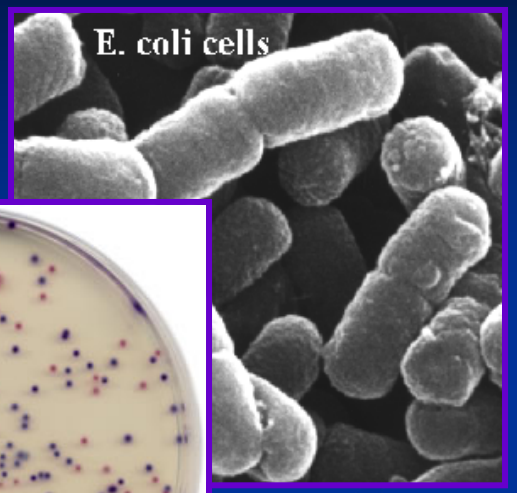
Surface Water Contamination



Wastewater **Recreation** **Wildlife**

Water Quality Programs and Research

- Emerging Contaminants
  - Pathogens
  - Endocrine Disrupting Compounds
  - Pharmaceuticals
  - Personal Care Products
- Microbial Monitoring and Source Tracking
  - TMDL (Total Maximum Daily Load)
  - Antibiotic Resistance
  - Molecular Profiling
- Biosolids
  - Microbial/Chemical Transport
- Reclaimed Water
  - Quality Concerns
  - Identify Benefits
  - Potential Uses
  - Factors that motivate people to use recycled water



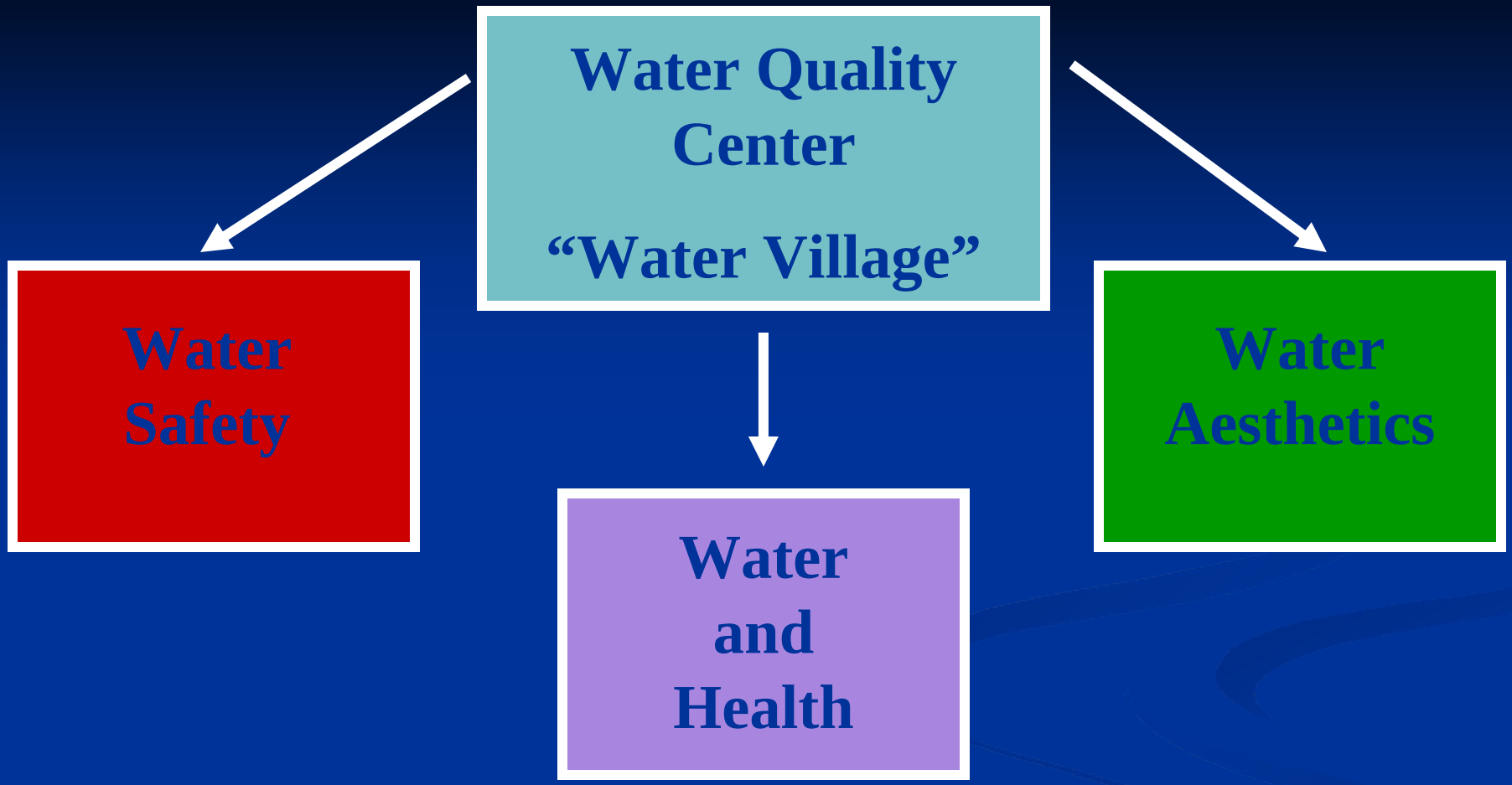
Research Resource

Educational Resource

The University of Arizona, National Science Foundation
WATER QUALITY CENTER

Water Village

I.L. Pepper
The University of Arizona



Research Areas of the 'Water Village'

Water Safety

- Real-time monitoring for water intrusion of distribution lines.
- Development of new technologies
- Intermediate field scale testing at Water Village

Water and Health

- Influence of distribution systems on water quality

- Chemical and biological contaminants
  - opportunistic pathogens
  - endocrines
  - arsenic
  - perchlorate

Water Quality Center Laboratory


The University of Arizona
National Science Foundation
WATER
QUALITY
CENTER
The University of Arizona
National Science Foundation
Water Quality Center
Director
Ian L. Pepper
An Industry/University
Cooperative Research
Center (I/UCRC)

The University of Arizona, National Science Foundation

WATER QUALITY CENTER

Center Outreach

Current Research (U of A)

- Nineteen (19) projects currently underway

Research Focal Areas (U of A)

- Water security
- Fate & remediation of commercial industrial contamination
- Agrochemical products and practices that influence water quality
- Municipal waste treatment and reuse
- Mining
- Potable water quality