Notes for the State of the Knowledge Workshop for the Cienega Watershed and Sonoita Valley
sponsored by the Sonoita Valley Planning Partnership
Saturday, September 17th, 2005
Arizona-Sonora Desert Museum

9 am–9:10 am. Welcome and Introduction—Jeff Williamson, The Phoenix Zoo

Need to:
  Know the landscape we are in to be able promote it
  Obtain good information
  Be better informed
  Improve management
  Help fill resource gaps in Las Cienegas & the watershed
  Promote: sustainable use, natural resource and cultural protection

9:10 am – 9:30 am. Land Use Planning and Socioeconomic Trends—Barbara Strelke, Encore Planning Group and Emily Brott, Sonoran Institute

Factors Affecting Land Use and Planning in Cienega Watershed:
  Public lands
  State Trust Lands
  Infrastructure
  Laws, Plans, Policies (Federal, State, Local)
  Pima County, Santa Cruz County
  Cienega Corridor Conservation Council/Sonoita Valley Planning Partnership plans

Socioeconomic trends (Tucson, Vail, Sonoita and Patagonia):
  Pima County & Santa Cruz Country growing rapidly
  Retirement income very important for the area
  Intact natural resources attract people

9:30 am -9:50 am. Condition of the Riparian Area—Phil Rosen, University of Arizona

Cienega, Bosque, Grassland
Fate of Cienegas
  Upper Cienega Creek – Healthiest
Erosion
Key aquatic species
Limiting non-natives
Construction dams, pools, lakes
Native fish less abundant
Change in grazing, leading to eutrophication
Rarity of ranid frogs: bullfrog impacts


Habitat Fragmentation:
Landscape permeability
Home range of large mammals

Infrastructure:
Encroaching into the mountains
Isolation effects
Wildlife corridor effects
Road kill

Critters are using the landscape… Protect it!

Endangered and Threatened Species:
Gila Chub (associated w/ Cienega-like habitats)
Huachuca water umbel (Empire Gulch)
Lesser long-nosed bats
Southwestern Willow Flycatcher (Gardner Canyon)
Not found this year
Chiricahua Leopard Frog (Empire Gulch)
Gila Topminnow (Cienega)
Desert pupfish, aplomado falcon, Mexican Garter snake
Black tailed Prairie Dogs


Grasslands:
Las Cienegas – 30 Million Acres
Shrub encroachment
Landscape scale assessment
Identify native grasses and restore them
12.2 acres of grassland
36% historical
12% non-native
Upland monitoring
Grassland conditions decline north bound

10:45 am – 11:05 pm. Water Balance for the Cienega Watershed and Sonoita Valley—Gary Woodard, Sustainability of semi-Arid Hydrology and Riparian Areas (SAHRA)
Water balance for the Cienega Watershed and Sonoita Valley:
Challenges facing rural basins
  Insufficient data
  Groundwater Management Act ignored
  What if development continues?
  Trends over the last decade
Measuring precipitation: http://www.rainlog.org
Gallons per day?
  Estimate amount of groundwater recharge from Cienega Watershed
  Groundwater model – still being completed

Need to know:
  Precipitation
  Ground/Surface water – inflows & outflows
  Recharge
  Number of wells, location, amount of water (domestic)
  Septic tank information

11:05 pm – 2:45 pm. Break out discussions: Riparian, Wildlife, Grasslands, and Water.
Facilitation by Sonoita Valley Planning Partnership members. Purpose: to identify
priority data gaps and strategies for addressing data gaps.

Questions for all groups:
What do we know? (How current is it? How quality is it?)
What don’t we know?
What do we need to know?
How do we acquire it?
What are the top priorities?

Grasslands group

Participants: Mac Donaldson (The Empire Ranch), Dave Gori (The Nature Conservancy),
Dave Bertelsen (Sonoita Valley Planning Partnership), John McDonald (Open Cross Ranch),
Joanne Roberts (Arizona State Parks)

What we know/need to know:
  • Southern portion of allotment in better shape than northern
  • Is this related to soil type? Historical land use? Lack of fire? Greater precipitation?
  • What other inventory and monitoring sites/allotments exist?
  • What does Emilio’s data cover?
  • Does Coronado National Forest have any applicable data?
  • Data on Rose Tree is being collected
  • No information on Empirita
  • Dan Robinette has seen significant improvement (despite all of the ups and downs) in
    perennial grass cover over the last 25 years in the Las Cienegas area
  • Need data on State Lands if available
  • Ranchers need to pool resources and data—they need data to evaluate and validate their
    use
  • Government agencies may not have sufficient resources
- Need mapping of invasive species—both exotic and native invites
- Satellite imaging and would help in mapping mesquite (State Parks, Santa Cruz County, Arid Lands studies)
- What effects do roads have on the health of grasslands? (erosion, spread of exotics)
- Can Lehman's lovegrass be controlled?
- Preventing increased degradation of native species is important
- Pre-, during, and post-monitoring of fire it is essential—need to consider multiple species, not just mesquite or burroweed. Need to view this as a long-term process
- What other fire data is available that we can use? Muleshoe, Research Ranch, Malpai, Buenos Aires, Ft. Huachuca, etc.
- Need to try to develop protocol for control—not just give up
- Road system as it applies to recreation needs to be addressed
- Do we have spatial layers for whole Watershed (ecological sites, etc)? We need a full map including grassland condition, shrub encroachment, erosion potentials. All we have right now is for the Empire Ranch allotment
- Need more site-specific soil data to make good management decisions
- Forest Service needs to be involved — the wider the view, the more agencies involved, the greater the likelihood money will be available
- You can't manage a watershed in bits and pieces
- Need a network of monitoring sites through the watershed
- Need macro and micro scale monitoring to help with focus
- Contrast areas with historic shrubs to new shrub areas
- How are shrub control methods working? (like on Babocomari)
- Little property owners (ranchettes) need to be involved. Need to educate people, especially newcomers, about ecosystem - An “Environmental and Ecological Welcome Wagon”

Priorities:
- Mesquite invasion and Lehmann invasion
- Effects of roads on grassland health
  - Recreation
- Distribution of exotics in Watershed
- Understand grass as land managers
  - What can we do?
  - Experiments (grazing prescription)
- Network monitoring sites
  - Rain gauges
  - Shrub encroachment (Pima Association of Governments, Aerial photos)
  - Current/ Historical picture contrast
- More knowledge on fire effects (objectives)
  - Prescribed fire burns
  - Other shrub control methods

How?
- Watershed approach — reach out
  - Sonota Valley Planning Partnership, strategy outreach
  - Contact people
- Networking sites (SWAT team)
  - Need monitors
Communication, raise the volume
Natural Resource Conservation Service ($) -- monitoring research

- Perform the above tasks on a micro/macro scale

Riparian group

Participants: Jeff Simms (Bureau of Land Management), Doug Duncan (U.S. Fish and Wildlife Service), Jennifer Litteral, Ken Kingsley, Carianne Funicelli (RECON)

Issues:
1. Stream hydrology information—surface quality, habitat
2. Food web
3. Fragmentation—good/bad
4. Non-native species
5. Historical changes
6. Riparian quantity and quality
7. Special Status species

What we have:
- Delineation of Watershed
- Groundwater data
- Information on riparian vegetation (mostly at Colossal Cave Mountain Park)
- Aquatic habitat types on Las Cienegas National Conservation Area
- Wildlife corridors
- Vertebrates (fish and herps)
- Land cover
- Range projects (sources or impacts)—Can we make these a positive impact for native fish?
- Many of the above are piecemeal short-term projects--superficial large scale projects and intensive small-scale projects
- Extrapolate and integrate—can we map it? (would be a challenging but useful project)
- Flora—not known (only species lists—not mapping). There are inventories from approximately 10 to 15 years ago but the riparian area has developed. More species are now present.
- Fish—known
- Herps—there are gaps (we have Empire Ranch)
- Insects—we know very little
- We should make a review document of what we know

What we need:

1. Hydrological information for headwaters of Cienega Creek—surface flow (also throughout the Creek though we understand the hydrological function in the lower half)
   - Divide Cienega into two bedrock systems
   - Headwaters have receded
   - We don't know if it has declined or just spread out (flow is no longer sufficient for good conditions for fish)
   - We don't have cause and effect data
• Sediment flow—upstream management is causing sediment deposition (especially lower Cienega)
• Erosion
• Water quality—what is being transported and how much and where—geomorphic changes
• Surface water quantity—need extent of wetted stream channel and contraction over time
• Riparian quality/quantity: follow woody regeneration and habitat variables and effect on species
  • The immediate concern is habitat character being changed (by plant changes and geomorphic changes)
    ➢ Less open water runs
    ➢ Hypoxia
    ➢ Fewer deep pools
    ➢ Quantity surface water
    ➢ Quality
    ➢ Timing of flows (we do have this information) (this is not a management issue)
• Yearly mapping of perennial surface water (and summarize)
• Productivity
• Eutrophication and water quality
  ➢ Understanding dissolved oxygen (causes of declining dissolved oxygen) (by looking at gradients or taking an experimental approach)

2. Aquatic species
• Herps (concerns) low oxygen, areas where ecosystem is in decline (lower Empire)
• We are missing historical data for primary productivity
• We have historical data on canopy cover and algal mats, fish surveys (Jeff Simms’ original fish surveys), also dissolved oxygen—temperature spot checks, spotty insect samples
• We don’t know what these changing conditions do to herps
• Changing competitive interactions
  ➢ Mexican Garter (other garter snakes)
  ➢ Ranid frogs
  ➢ For both of the above groups and also fish a declining food web (productivity) may be an issue

3. Riparian Quality/Quantity
• Woody regeneration (no regeneration at Sonoita Creek)
• Information includes—Southwestern Willow Flycatcher habitat suitability surveys, Bureau of Land Management surveys

4. Fragmentation—Good/bad (as hydrologic or physical fragmentation)
• Good to keep invasives out
• Bad to separate populations

5. Non-native species
• Risk Analysis—stock ponds (fish, crayfish)
  ➢ Crayfish (esp. in small pools) are devastating predators
We may not have data for risks of invasion by non-native plants (woody perennials) (buffelgrass, Bermuda grass)

Are there species that are getting loose from cities and ranches?

ACTION ITEM: Early detection and evaluation as an organized effort

- What we need to know
  - Where and what are the most serious threats?
    - Early detection of non-native plant threats
    - Where are stock tanks and what is in them? (We have 1991 data, but we need an update)—this is also a sociological issue
    - How are non-natives working through the food web? (which direct and indirect effects are important?)

6. Food Web Decline
- Primary productivity (from sunlight) may be going to secondary productivity (detritus broken down to become food base) but we don’t have baseline data
- Find out how changes in food base effects system

7. Quality and Quantity of historical data
- Grazing and fire are big issues here—influence habitat type and quality
- Fire could burn across the entire grassland
- Fire timing and intensity makes a difference as to whether it will benefit native versus non-native vegetation and herbaceous versus woody cover
- Monitoring after fire to see how fire affects processes
- What are the desired conditions? What is the potential of the area?
- Many ecological niches are important (hard data on species richness and biodiversity could be used to evaluate and monitor)

8. Need to continue to monitor special status species!
- Efforts to monitor trends in different taxa and relate these trends to mechanisms (hypothesis testing)

Conclusions:
- Did the effects of the management practice confirm suspected mechanisms?
- This should always be a question to keep in mind with adaptive management. This can be acquired through observation and possibly experimentation.
- These data must be standardized and centralized.

Wildlife group

Participants: Terry Austin (U.S. Forest Service), Karen Simms (Bureau of Land Management), Janice Przybyl (Sky Island Alliance), John Windes (Arizona Game and Fish Department), Jim Clampett (Cienega Corridor Conservation Council), Allyson Armstrong (Arizona State Parks), Susan Cotty, Leslie Liberti (City of Tucson)

The following are wildlife data that did not seemed to be captured in the data compilation for the workshop:
- Tracking data—Sky Island Alliance
- Data Dictionary—U.S. Forest Service
• Arizona Game and Fish data—too numerous to easily summarized
  ➢ HDMS database (integrated data management system of maps, computer files, and paper files that helps to identify elements of concern)—sensitive species locations
  ➢ Research reports from research branch—specific
  ➢ All GIS layers
  ➢ Game survey data
  ➢ Non-game species data including fish
• Janet Ruth—report on grassland sparrows
• Connecting isolated data sets on the landscape (geography project)—mapping
• Joanne Roberts’ (Arizona State Parks) information was missing. She submitted it for the survey
• Julia Fonseca’s (Pima County Flood Control District) information also missing.
• Colossal Cave Mountain Park also has 10 ft. data interval contour maps for the area around the Park, and aerial photos taken for the whole township

Questions to ask about the data:
• Trend
• Length/duration
• Intensive/extensive

What do we need to know/New data?

Connectivity/fragmentation

• Road kill analysis--Highway 82/83 and dirt roads (900)
  ➢ Note: Arizona Game and Fish Department is now focusing on connectivity issues and collecting this type of data.
  ➢ Poor data so far, not systematic
  ➢ Arizona Department of Transportation is going to create a database—it may be stalled
  ➢ Badgers
  ➢ Good volunteer project with systematic protocol
  ➢ Citizen scientists with web page—biased to megafauna

• Why do we need to know road kill data?
  ➢ Needed for input on construction projects (Arizona Department of Transportation and Arizona Game and Fish Department)
  ➢ Needed for managing motorized recreation
  ➢ Needed for planning and zoning
  ➢ Also need traffic count data on highways and dirt roads to look at correlations
  ➢ Saguaro National Park has collected information on road kill
  ➢ City of Tucson would like to know this information for roadway design and dispersed use areas for wildlife
  ➢ Arizona Department of Transportation has a big database on what each culvert type, etc. are at each crossing—to interface with the database locations in terms of milepost numbers (to the nearest 10th mile). May have GIS layer.
• What are critical linkage areas between the valley and Sky Islands?
  ➢ Migratory animals information?
  ➢ U.S. Forest Service has a big road inventory effort

• Corridor width and configuration?
  ➢ City of Tucson has tried to get some information on this
  ➢ Very hard to identify these
  ➢ Missing Link project, Paul Baier—linkage design project (Northern Arizona
    University)

Wildlife Species:
• Management indicator/keystone species may help focus the area? For example, Sky
  Island Alliance tracking looks at mountain lion, bear, bobcat, coati, wolf, jaguar
• Would like more information on box turtle and badger—Martie Tuegel at Fish and
  Wildlife Service has a database on box turtles
• Stock pond survey—cameras out—who is using them?
• Bureau of Land Management has remote cameras at six to eight locations—not a
  specific research design but opportunistic—generally in riparian areas/drainages and
  not at stock ponds
• Monitor periphery—with cameras—not just internally
• Include information from grazing permitees as they see a lot

Wildlife Species - Four B's: bats, box turtles, badgers, biodiversity:
• What do badgers and box turtles tell us?
• Field-study (5 yr) on management indicator species—Rick Gearhart
• Bats: pollinator, indicators of plants—agave
• Light tagging/radio telemetry on the leptos, roost surveys (Dalton)
• Biodiversity: Good overall species richness, biodiversity/investigation—example is
  inventory on Saguaro National Park (Don Swann)—inventory is planned every 10
  years plus and takes cooperation of all agencies, groups, requires systematic protocol
  with training—central coordination

As part of the Sonoran Desert Conservation Plan, Pima County has to do monitoring and
adaptive management—may be a focal point for this

Sonoita Valley Planning Partnership 501 c 3 may address this as a need and could seek
funding

What are human impacts on wildlife and habitat?
• Physical fragmentation
• Interaction
• Border impacts
• Increased recreation use
• Impacts of urban development
• Trash
• Disease
• Disturbance
• Light
• Sound
Action

Stewardship and Education:
• Develop Citizen Steward Wildlife Program—Web-based project to input species information, etc.
• Develop Manual/Handout for Newcomers (information packets)? (Could be a Sonoita Valley Planning Partnership project)
• How To’s
• “Environmental and Ecological Welcome Wagon”
• Conduct Biological Survey → Don Swann concept → trends over time in biodiversity
• Engaging people – Volunteer Program
• Citizen Tracking & Recording team

Wildlife group: priority needs

1. Data Management/fragmentation
   • Need to compile fragmented data and keep updated
   • Web-based
   • Data organization-interactive annotated bibliography

2. Corridors/connectivity/fragmentation
   • Road kill/road crossings
   • Critical linkage areas between the valley and Sky Islands
   • Corridor size/configuration

3. Species
   • The 4 B’s: bats, badgers, box turtles, and biodiversity
   • Others? Management indicator species

4. Human interactions with species and habitats
   • Border impacts (physical barriers and disturbance barriers)
   • Increased recreation use
   • Urban development
   • Education-Create manual for new homeowners

Water group:

Participants: Staffan Schorr (Pima Association of Governments), Jeff Williamson (The Phoenix Zoo), Dale Armstrong (Golder Associates), Dan Moore (Bureau of Land Management), Gary Woodard (Sustainability of semi-Arid Hydrology and Riparian Areas), Lynsey Gould (Rincon Institute), Jon Martin, Steve Cohn (Bureau of Land Management), Linda Stitzer (Arizona Department of Water Resources), Jim Notestine (Sonoita Crossroads Community Forum)

What do we know?
• Some water levels and changes over time
• Number of wells and approximate locations
• Precipitation
• Locations of perennial and intermittent streams
• Water quality exceedances
• Two stream gauges (Cienega/Sonoita)—multiple decades, 2004 real-time data
• Flood gauges
• Groundwater flow direction (roughly to the North)
• Estimate water in storage (5 to 11 million acre-feet.)
• Maps: geological, soils, wells, perennial streams, land use
• San Pedro Model
• Stock pond registration (potential water demand)
• Surface water inventory

**Unknown/need to know:**
• Pumpage, water withdrawal
• Recharge
• Riparian evapotranspiration
• Fate of water into septic tanks, % to aquifer recharges?
• Cross-sections (geological), basin profile
• Demand (domestic, wildlife, agriculture)
• Building permits and trends (lot size), public lands management
• Changes in basin water levels (some areas)
• Vegetation shifts
• Private well reports
• Carrying capacity (without diminished landscapes)
• Drought monitoring (be able to predict outcome)
• Wells—destroyed, inactive, uncounted, unreported, misrepresented
• Volume in storage
• Who are the beneficiaries?

**Water group: priority needs**

1. Mirror San Pedro model/methods, riparian evapotranspiration
2. Distributed rainfall data
3. Demands
4. Recharge (estimates)
5. Expand water level programs/data

**Ultimate goal:** Three dimensional groundwater model, considering demand trends


**2:45 pm – 4 pm. Large group brainstorming. Facilitation by Sonoita Valley Planning Partnership members. Purpose: to reach consensus on the most critical priority data gaps and to recommend funding options.**

Four groups: water, riparian, wildlife, grasslands
Need to know influences: Present (domestic, economic), future
Need to understand the composition, state, and capacity of each of the four categories
Understanding these will help us understand trend.
No good trending models for the four categories
No high quality information for the existing conditions
The model needs to include socioeconomics
Futuring models are a potential: multifactor analysis (who are the right parties? Where are the right data sets?)

Environmental futures:
Tom Maddock—integrating groundwater-surface water models with other models
(development models, land use/land cover models, etc.)
Alternative futures models
Wrote a book—model for San Pedro
Models not expensive (months not years)
Gary Woodard will discuss with Tom and set up meeting

Need to find ways of engaging folks—citizen monitoring
Master Watershed Stewards—40 hrs training, 50 hrs volunteer/labor
Sky Island Alliance volunteer tracking—long term commitment
Importance of documentation

Big information gap—water
Especially groundwater/surface water relationships
Baseline information
Need to get State to recognize the link and interaction of groundwater/surface water
Not recognized by the law/state regulators

Develop system of bringing data together and reporting quality of data
Watershed bigger than Las Cienegas National Conservation Area

Need to actively seek participation of U.S. Forest Service, Arizona State Land Department, ranchers
Get as many people to work together as possible
Invasive species—early detection systems needed

www.roadkill site? Who could host it? State-wide

How to use information to influence public policy?

Governor’s executive order: invasive species advisory group
Our group can help influence their policies by giving input

Information needs to reach those who may not be looking for it—e.g. hunters
Let them know how it affects them

Work to ensure that State Land is not disposed for houses (as much as possible)
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<td>Integrated approach to whole watershed</td>
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<td>Data managing</td>
<td>Partnership and education</td>
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<td>Monitoring (volunteers)</td>
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<td>Water level budget and data</td>
<td>Education Tucsonans and planning committees</td>
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<td>Narrow uncertainties of water demand</td>
<td>Funding?</td>
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<td>(practical data)</td>
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<td>Rain gauges</td>
<td>Scenario analysis of basin changes → Effects on water supply</td>
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<td>Long-term tracking of watershed changes</td>
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<td>Communication</td>
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<td>Clear markings of water in basin</td>
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<td>Watershed vegetation assessment – where high priorities</td>
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<td>Involve ranchers, people critical out in specific area</td>
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