UPPER SAN PEDRO PARTNERSHIP

Working together to meet the water needs of area residents while protecting the San Pedro River and building a model for the future

2004 Water Management and Conservation Plan

February 11, 2004

A Working Plan

EXECUTIVE SUMMARY

In February of 2003, the Upper San Pedro Partnership (USPP or Partnership) adopted its first working plan to address water issues in the Sierra Vista Sub-watershed (*Working Water Conservation Plan, USPP, 2003)*. The purpose of this second working plan is to inform the public of the Partnership's progress and efforts to date with respect to water management and conservation measures since the release of last year's plan. In addition, this plan sets the stage for the development of a report to Congress by December 31, 2004 as required by Section 321 of the FY 2004 Congressional Defense Spending Bill – referred to herein as Section 321. A list of key issues in the sub-watershed, as agreed upon by the Partnership, are listed in this plan, including issues related to population, economic vitality, hydrology and the San Pedro Riparian National Conservation Area (SPRNCA).

The 2003 planning tasks that the Partnership agreed to undertake are presented along with a summary of how these tasks were accomplished. Progress on specific projects that the Partnership recommended in the 2003 working plan is also summarized. An overview of member agency activities underway is also presented in this plan with an updated accounting of water yield, both actual and projected, as well as a refinement of the status of each project and how it contributes to the overall water budget. This iteration of the working plan attempts to make distinctions between those projects that result in actual savings (reduction or elimination of an existing water use), avoidance projects (activities that preclude future pumping of water) and recharge projects (those projects that put water back into the aquifer directly, including run-off and effluent). The Partnership has agreed to use the year 2000 as a baseline for estimating the effectiveness of water saving measures taken on by its members once an accurate picture of the water budget *since* 2000 has been established. An update of member agency and/or Partnership-sponsored studies is also provided.

A total of $425,000 dollars was appropriated by the Partnership in 2003, through a challenge grant process, to the City of Sierra Vista for the construction and recharge monitoring of a detention/retention basin and a toilet replacement rebate program; to Cochise County for a toilet replacement rebate program; and to the University of Arizona's Cooperative Extension Water Wise Program for expansion of the audit program.

The Partnership and its members have agreed to pursue a variety of water management and conservation actions in 2004 falling under the categories of codes, incentives, water conservation surcharges, public conservation awareness, public facilities and school districts, irrigated agriculture restrictions, and water demand management tools. Several new supply management options are being investigated by the Bureau of Reclamation for the Partnership. These findings, along with other supply management options already evaluated, will be taken under consideration in the spring of 2004 and incorporated into the report for Congress.

A chapter devoted to the state of the watershed presents potential indicators for measuring the success of past and future water management and conservation activities, through the monitoring of wells, streamflow and alluvial ground-water conditions. In addition, data regarding the overall demand in the sub-watershed, as defined by the Arizona Department of Water Resources (ADWR,) is presented to set the stage for a more complete water budget this year. According to the ADWR estimates, a net of 12,400 acre feet of ground-water was pumped for human consumptive use in 2002 compared to 14,900 acre feet pumped in 1990. Although municipal demand increased in this time period, irrigated agriculture decreased and artificial recharge activities were implemented. Current best estimates of the annual overdraft, based on a variety of sources, range between 3,000 and 6,000 acre-feet. A better and more critical indicator of the Partnership's success will be the measurement and monitoring of water table levels in the sub-watershed. Through intensive monitoring of the sub-watershed, data indicate annual declines in the regional aquifer are between

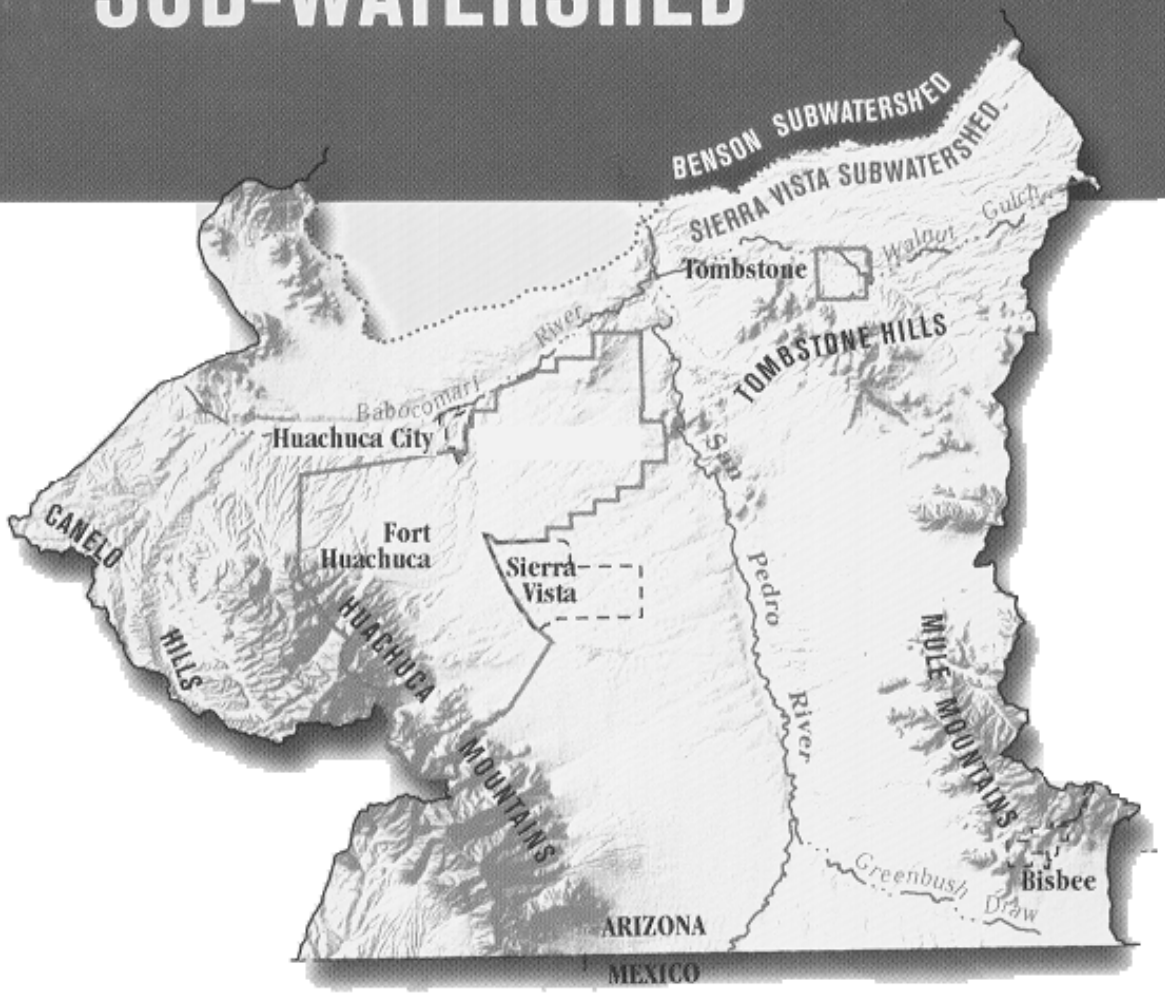
0.1 and 0.6 ft per year since the mid-1990s. The monitoring of ground-water and streamflow conditions at the river have better defined the frequency and duration of flood, baseflow, and no-flow periods, as well as the behavior of ground-water in the stream alluvium. Other potential indicators will be the increase or decrease of the 'wetted' channel lengths at the driest time of the year, as well as the percentage of cover of riparian vegetation in the SPRNCA.

In addition to the recommendations for water management and conservation actions, the Partnership has several planning tasks to address in 2004 to move forward on its recommendations, as well as to assist the Department of the Interior in its reporting requirements to Congress, per Section 321. These tasks will be:

1. Review and incorporation of BOR supply management findings.
2. Review and incorporation of ADWR water budget.
3. Summary of legislative impediments and additional funding needs.
4. Challenge grants 2004.
5. Section 321 report.
6. Incorporation of preliminary findings from Partnership-sponsored studies into ongoing planning considerations, decision-making, and reporting. Most notably, the results of the SPRNCA Water Needs Study, USGS Ground-Water Model, Decision Support System and Stormwater Feasibility Study will be available this calendar year.

Lastly, an Outreach and Communication Plan is presented that describes the givens, principles and methods the Partnership intends to use in a public involvement strategy. The Partnership will need public help to create an ongoing water management and conservation plan that is feasible, effective, and supported by those to whom our water matters most.

SIERRA VISTA SUB-WATERSHED



Base from U.S. Geological Survey

Partnership Advisory Commission

Chairman: Robert Strain, *Sierra Vista City Council*
Vice-Chair: Pat Call, *Cochise County Board of Supervisors, District 1*
Paul Newman, *Cochise County Board of Supervisors, District 2*
Les Thompson, *Cochise County Board of Supervisors, District 3*
Tom Hessler, *Mayor, City of Sierra Vista*
Rick Mueller, *Sierra Vista City Council*
Billy McLain*, Town of Huachuca City*
Robert Reames, *City of Tombstone*
Ted White*,BisbeeCity Council*
Tom Whitmer, *Arizona Department of Water Resources*
Sharon Reid, *Arizona Association of Conservation Districts*
Bill Dowdle, *Arizona State Land Department*
Susan Keith, *Arizona Department of Environmental Quality*
COL Lawrence Portouw, *Fort Huachuca, US Army*
Bill Childress, *Bureau of Land Management, USDOI*
Steve Gunzel, *Forest Service, USDA*
Dale Thompson, *National Park Service, USDOI*
Sherry Barrett, *Fish and Wildlife Service, USDOI*
Nick Melcher, *US Geologic Survey, DOI*
Dr. Dave Goodrich, *Agricultural Research Service, USDA*
Mike Hayhurst, *Hereford Natural Resource Conservation District*
Dr. Bill Branan, *Audubon Arizona*
Tom Collazo, *The Nature Conservancy*
Judy Gignac, *Bella Vista Water/Ranches*
George Michael, *Ex-officio,Coordinating Manager*

Administrative Committee

Chairman: Chuck Potucek, *Sierra Vista City Manager*

Staff Working Group Committee

Chairman: Jody Klein, *Cochise County Administrator*
Mark Apel, Plan Writer, *Cochise County*

Technical Committee

Chairman: Dr. Holly Richter, *The Nature Conservancy*

Public Outreach Committee

Chairman: Carl Robie, *Cochise County*
Lynn Slagle, *Ex-Officio Coordinator*

Acknowledgments: The work of the Partnership involves an ever-changing and dynamic host of member agency representatives, staff people and interested parties. Their participation often overlaps committees and has substantially contributed to this plan as well as the purpose of the Partnership. They are, in no particular order: *Congressman Jim Kolbe (US House of Representatives), Gretchen Kent (Ft H), Bill Steinkampf (USGS), Mike Shaughnessey (Ft H) Marie Hansen (SV), Pat Bell (SV), Dan Moore (BLM), Bernadette Polley (Congressman Kolbe's Office), Jim Chambers (Ft H), Tricia Gerrodette (Audubon), Jean Calhoun (TNC), Cado Daily (Water Wise), Susan Pater (UofA Cooperative Extension), Dr. Anne Browning-Aiken (Udall Center), MaryFrances Clinton, Allon Owen (CC), Karla Jensen (CC), Doug Duncan (USFWS), Don Pool (USGS), Linda Stitzer (ADWR), Ginny Sciarrino (Ft H), Lorraine Buck (BLM), Joan Vasey (Ft H), Susan Moran (ARS), Dr. Jim Leenhouts (USGS), Lainie Levick (ARS), Dr. Russell Scott (ARS)*, *Dr. Kevin Lansey (SAHRA),* and all others inadvertently overlooked.

The Upper San Pedro Partnership

In 1998, the Upper San Pedro Partnership (Partnership) was formed through a Memorandum of Understanding (MOU) to facilitate and implement sound water resource management and conservation strategies in the Sierra Vista Sub-watershed. It is a consortium of agencies and organizations that (1) own land and/or (2) control land or water, and/or (3) make policy with regard to land or water use in the Sierra Vista Sub-watershed of the Upper San Pedro River Basin and will provide significant resources to help the Partnership accomplish its purpose; or agencies and organizations that will provide significant technical or financial resources to help the Partnership accomplish its purpose (USPP Organizational Structure, adopted May, 2002). The purpose of the Partnership is:

> *To coordinate and cooperate in the identification, prioritization and implementation of comprehensive policies and projects to assist in meeting water needs in the Sierra Vista Sub-watershed of the Upper San Pedro River Basin.*

Member Agencies

Land Owners And/Or Land Or Water Use Controllers

Resource Agencies

Local Agencies

Cochise County *
Sierra Vista *
Huachuca City
Bisbee
Tombstone

Hereford NRCD
(Natural Resource Conservation District)

Arizona State Agencies

State Land Department
Dept. of Water Resources*

Dept. of Environmental Quality
Assoc. Conservation Districts

Federal Agencies

Fort Huachuca *
Bureau of Land Management *
Forest Service
National Park Service

US Geological Survey*
Agricultural Research Service*
Fish & Wildlife Service

Non-Governmental Agencies

The Nature Conservancy *
National Audubon Society
Bella Vista Ranches/ Water

***Denotes current Funding Partner/Agency (member of Administrative Committee)**

Other Outside Contributing Entities

Congressman Jim Kolbe – US House of Representatives
National Fish and Wildlife Foundation
University of Arizona – SAHRA (Sustainability of semi-Arid Hydrology and Riparian Areas)
University of Arizona Cooperative Extension Program

Plan Contents

INTRODUCTION

In February of 2003, the Upper San Pedro Partnership (USPP or Partnership) adopted its first working plan to address water issues in the Sierra Vista Sub-watershed (*Working Water Conservation Plan, USPP, 2003)*. The focus of that plan was to provide a background for understanding and addressing the regional water issues as well as to identify completed, ongoing and future projects and activities of the Partnership's member agencies. In addition, the 2003 working plan provided preliminary recommendations and a framework of support for member agency efforts. As our understanding of the sub-watershed evolves, so will each subsequent working plan.

Water Issues In Sierra Vista Sub-Watershed

The 2003 Working Plan provided detailed descriptions of the issues in the Sierra Vista Sub-watershed, including Geographic-Demographic Background, Hydrological-Environmental Background and Legal Issues. For a review of the background and issues, please refer to the 2003 Working Plan or visit the Partnership's website: www.usppartnership.com/documents.html#consplan . Below is a summary list of key points and issues:

- Approximately 70,500 people share the Sierra Vista Sub-watershed with the San Pedro Riparian National Conservation Area (SPRNCA).
- The U.S. Army's Fort Huachuca is located adjacent to Sierra Vista and is one of the largest employers in southern Arizona, with approximately 11,629 military, temporarily stationed military students, civilians, and contractor employees. The Fort plays a critical role in national defense through its military intelligence and information missions, and is integral to the economic vitality of Cochise County and the State of Arizona.
- The SPRNCA was established by Congress in 1988 and is considered one of the most significant perennial desert river reaches in the United States. It serves as a primary corridor for the annual migration of approximately 4 million birds representing 250 species.
- Ft. Huachuca has committed to implement a series of water conservation and management measures through 2011, as part of the Biological Opinion issued by the U.S. Fish and Wildlife Service in 2002. The Biological Opinion was prepared in accordance with Section 7 of the Endangered Species Act of 1974, which requires federal agencies such as the Fort to consult for actions that may affect listed species or designated critical habitat.
- Area residents and the riparian vegetation all use portions of the ground-water resources in the basin. The combined demand is greater than the natural recharge.
- The ground-water system in the Sierra Vista Sub-watershed can support human uses for many generations to come, but removal of water from storage reduces the amount of water potentially available to the SPRNCA.
- Riparian vegetation is sensitive to any changes in the level of the water table.
- Only a part of the water stored in the aquifer can be economically pumped – potentially resulting in decreased water supply, increased pumping costs and land subsidence.
- Without an adequate long-term water supply, neither the people of the area nor the river will thrive.
- Responsible use of ground-water involves managing it in a way that can be maintained for an indefinite period of time, without causing unacceptable environmental, economic or social consequences.

Recent Developments

In November of 2003, Congress passed legislation currently referred to as Section 321 of the FY 2004 Congressional Defense Spending Bill (herein Section 321), clarifying the responsibilities of the Fort and recognizing the Upper San Pedro Partnership and its members as the vehicle for mitigating water use impacts in the Sub-watershed. Section 321 calls for the Secretary of the Interior, in consultation with the Secretaries of Agriculture and Defense and in cooperation with the Upper San Pedro Partnership, to report on the water use management and conservation measures that have been implemented and are needed to restore and maintain the sustainable yield of the regional aquifer by and after September 30, 2011. The report is due to Congress no later than December 31, 2004. The purpose of this working plan is to set the stage for the development of that report to Congress by December 31, as well as inform the public of the Partnership's progress and efforts to date with respect to water management and conservation measures.

Partnership Objectives

The following objectives were agreed upon by the membership of the Partnership in November of 2001 and are used to guide the Partnership as a whole and its individual members in the development of the annual working plan:

1. Develop an annual "working" conservation plan for the Sierra Vista Sub-watershed, which will be updated to incorporate the most recent strategies and scientific findings. The plan will identify strategies that can be implemented and verified as well as possibilities to be explored in the future.

2. Provide the necessary leadership to accomplish the following:
   - Leverage private, local, state and federal funding to implement projects in support of the Partnership goal;
   - Develop the political support necessary for effective water policy formation and project implementation;
   - Support member agencies in their efforts to conserve water resources.

3. Encourage collaboration with Mexican counterparts regarding water resources in the Upper San Pedro basin.

4. Encourage activities that ensure an adequate ground-water supply to support a diverse economy and meet the needs of the San Pedro Riparian National Conservation Area.

5. Define an acceptable range of hydrologic conditions necessary to meet the Partnership goal, including depth to ground-water, ground-water deficit, ground-water gradients and natural variability of river surface flows. Then recommend strategies to maintain favorable conditions and monitor to assess performance and to guide future actions.

6. Develop and implement a public education and participation plan that encourages citizens and businesses to conserve and use water wisely.

SUMMARY OF 2003 ACCOMPLISHMENTS

Partnership 2003 Planning Tasks

The 2003 Working Plan outlined six planning tasks that would be undertaken throughout 2003 by the different committees of the Partnership to further its goal and objectives. Following is a recap of those six tasks, followed by a short summary of the progress or completion of each one:

1. *Prioritize water conservation alternatives presented in the report titled Preliminary Cost/Benefit Analysis for Water Conservation, Reclamation and Augmentation Alternatives for the Sierra Vista Sub-watershed, based on technical, public and political considerations. Conduct additional feasibility and/or design analyses for those high priority alternatives that lack sufficient information to begin implementation.* **Alternatives were ranked by Cost-Yield ratio and further evaluated for political and implementation feasibility. From this analysis, a list of approximately 40 alternatives to pursue in the immediate future was developed and grouped into the categories outlined in the "2004 Recommended Water Management and Conservation Actions" chapter of this plan. The remaining alternatives were then divided into those that warrant consideration in the near future and those deemed infeasible or not possible at all. Others were identified as supply management options, some of which warrant further investigation by the Bureau of Reclamation. A number of options have been funded for design and/or construction in 2003 and are discussed further in the plan.**

2. *Develop an array of possible water management scenarios for subsequent evaluation by the Decision Support System (DSS) under development by SAHRA of the University of Arizona, and the new ground-water model under development by the USGS. Assess these scenarios with a preliminary version of the DSS model this year, and secure additional funds to refine the DSS model so that it can address more specific management scenarios utilizing the new USGS model in the coming year.* **SAHRA's preliminary DSS was developed and used to estimate, to a finer degree, the potential effectiveness of the alternatives agreed upon for the year 2004. Funds for the continuing refinement of the DSS and incorporation of the USGS ground-water model have been budgeted for this year.**

3. *Establish a working dialogue with key scientists and decision-makers in Mexico regarding possible collaborative projects addressing conservation and effective management of ground-water resources across the international border. Secure funds and/or begin implementation of at least one "on-the-ground" collaborative cross-border project this year.* **Members of Technical Committee met with hydrologists from the Cananea mine, in a meeting facilitated by the Udall Center for Studies in Public Policy, to share ground-water data. Follow-up meetings were held in Naco, and Cananea between interested parties from both countries, resulting in a commitment to continue the dialogue and seek opportunities for cooperation. Partnership members attended EPA Border 2012 Meeting to investigate funding opportunities for international infrastructure projects from NADBank and BECC.**

4. *Incorporate preliminary findings from additional Partnership-sponsored studies, including the SPRNCA Water Needs Study, USGS studies and groundwater model development, detention basin improvements at the Mall and Fry basins, erosion control and recharge pilot projects, and the stormwater recharge technical feasibility analysis, into ongoing planning considerations and decision-making.* **Funding has been appropriated for monitoring/instrumentation of the Summit and Woodcutters stormwater basins. Preliminary findings from ongoing studies are**

pending. Information will be exchanged between the Technical and Staff Working Group committees.

5. *Develop an Outreach and Communication Plan, with associated budget and timeline, that will promote public understanding and support for the Partnership's Working Water Conservation Plan and encourage feedback to be incorporated into future working plans.* **The firm of Kezziah-Watkins, with members of the Partnership, developed an outreach and community input plan that will be implemented in 2004. The details of this plan are included in the "Outreach and Communications Plan" chapter.**

6. *Update and revise the 2nd annual Working Plan to include new findings and member agency project implementation and activities, and report on progress associated with current projects. Recommend additional new policies and conservation projects that merit support by the Partnership for the coming year.* **This 2nd iteration of the Working Plan does include new findings, reports on the implementation of projects, and makes new recommendations for action by Partnership members for the year 2004 and beyond.**

Recommended Projects from 2003

The 2003 Working Plan included a section titled "Preliminary Assessment and Recommendations" and included six project areas that the Partnership identified for its support over that calendar year. It was noted that they would serve as the basis for evaluating progress towards meeting the Partnership's objectives in subsequent working plans. Many of these projects/activities are also listed in slightly more detail in the overview of member projects underway in the next chapter. Following is a list and summary of progress on those activities specifically identified by the Partnership in 2003 for its support:

1. ***Maximize Effluent Reuse/ Recharge***
    a. *Bisbee/ Naco/ Naco Effluent Treatment/ Reuse/ Recharge Feasibility Study:* **The scope of work is drafted and consultant identified. A contract will be negotiated within the first quarter of 2004 and it is expected that the study will be completed and funding will be sought next fiscal year.**
    b. *Huachuca City/ Ft Huachuca Effluent Treatment/ Recharge Project:* **The preliminary design is completed. The MCA funding request has been submitted. Funding for the Huachuca City portion of the project has been identified and final design plans are being commissioned.**
    c. *Golden Acres/ Sierra Vista Effluent Treatment/ Recharge Project:* **Sierra Vista has completed plans and is seeking funding assistance.**
    d. *Identify Future Opportunities (within and outside of city limits)*: **None identified at this time.**
2. ***Increase Public Awareness and Action in Conserving Water***
    a. *Expand Water Wise Program, i.e., funding, infrastructure (staff and space):* **The USPP, through its challenge grant process, funded a new auditor position to expand the program.**
    b. *Increase Implementation of Conservation Technology (identify methods and incentives, e.g., increase funding for voluntary rebate/retrofit programs):* **The USPP provided funding to the County and Sierra Vista, through the challenge grant process, to continue and expand these programs.**

3. ***Assist in Implementation of Sierra Vista Water Management Plan in support of Ft Huachuca Biological Opinion***

    a. *Urban Runoff Detention/ Retention Basins*: **The USPP has provided funding to Sierra Vista for Woodcutters basin. Sierra Vista and a local developer funded the construction of the Summit basin. Plans have been prepared for Country Club basin, School basin and others and funding plans are being pursued.**
    b. *Rebate and Incentive Conservation Programs*: **As noted above, USPP provided funding to continue the toilet rebate program.**
    c. *Flood/ Erosion Control Structures (Check dams to improve recharge)*: **The USPP-funded design of two pilot check dam projects is completed and construction by the County with USPP funding will start soon. Sierra Vista has completed one or two other erosion control/ check dam projects also. All are expected to increase recharge of the additional runoff that results from urbanization.**
    d. *Support Adoption of Water Mitigation Ordinance*: **Although not done in 2003, USPP is planning to draft a model ordinance for consideration by the County and cities this calendar year.**

4. ***Assist in Implementation of Watershed Improvements by Land Management Agencies***

    a. *Prescribed Fire Programs*: **BLM conducted some burns in 2003 with a reduction in evapotranspiration losses.**
    b. *Native Grass Restoration Programs*: **Ongoing.**
    c. *Quantification of Hydrological Benefits of Programs*: **None at this time.**
    d. *Identify Others*: **No new projects in 2003.**

5. ***Reduce Pumping***

    a. *Conservation Easement Programs (voluntary/ willing sellers)*: **Several in negotiation.**
    b. *Fee Purchase Programs (voluntary/ willing sellers)*: **Several in negotiation.**
    c. *Exploration of Irrigation Non-expansion Area (INA) Designation (or other methods of limiting expansion of agricultural irrigation)*: **Forwarded to USPP 2004 legislative agenda.**

6. ***Support Mexican Water Conservation and Quality Efforts***

    a. *Technical Information Exchange*: **Several successful meetings in Cananea and Naco sponsored by Udall Center.**
    b. *Cananea Sewage Treatment/ Effluent Reuse/ Recharge Project*: **No progress other than better awareness of the issue and searching for funding sources.**
    c. *Other Watershed Improvement Projects*: **No others at this time.**

MEMBER AGENCY ACTIVITIES UNDERWAY

Overview of All Projects Underway

Last year, the Partnership catalogued over 100 projects and reported details on over 60 of those that fell within one of the Partnership's strategies of *Reclaim*, *Re-Use* or *Augmentation*. These strategies have provided the framework for member agencies developing their own water conservation plans and the basis for awarding contracts to analyze the viability of different options under each of the strategies. Per the Section 321 reporting requirements, it will be necessary for member agencies to characterize the effectiveness of their projects and activities with regard to water management and conservation. ***Note:*** Quantities of savings or yield summarized in the tables are estimates only and should not be construed as official tallies for the purposes of a water budget. They were reported by member agencies as estimates and were intended for comparison purposes only. Member agencies should be contacted directly for questions, details or status of any project listed in this plan.

This iteration of the working plan attempts to make distinctions between those projects that result in actual savings (reduction or elimination of an existing water use), avoidance projects (activities that preclude future pumping of water) and recharge projects (those projects that put water back into the aquifer directly, including run-off and effluent). The Partnership has agreed to use the year 2000 as a baseline for estimating the effectiveness of water saving measures taken on by its members once an accurate picture of the water budget *since* 2000 has been established. The following definitions of project status are considered:

Completed – Part of Baseline: These are projects that physically occurred prior to the year 2000, and whose savings were an inherent part of the baseline for 2000.

Recurring – Contributes to Baseline: These are projects that began prior to the year 2000, whose savings or benefits have contributed to the baseline for 2000, and whose savings or benefits will continue to be reflected in the most current water budget.

Completed since 2000 or Completed in 2003: Refers to projects that were not calculated as part of the supply and demand scenario for the year 2000, but were started and completed after the year 2000 and whose savings or benefits should be reflected to some degree in future water budgets.

Recurring since 2000: Refers to projects that were not calculated as part of the supply and demand scenario for the year 2000, but have been initiated, implemented or in progress since the year 2000 and whose actual savings or benefits should be reflected in future water budgets.

Planned: Refers to projects that have received approval and/or funding and are scheduled to be implemented in the future.

Reduction of Existing Water Use Projects

Name of Project, Policy or Program	Brief Description	Actual Savings	Project Status	Responsible or Assisting Agency
Demolish excess real property	Phase 1: Demolish 1.38 million SF of old temporary buildings. Remove/shut off leaky potable water. Phase 2: Demolish excess/poor quality permanent construction.	Approx 400 ac ft/yr	Completed Part of Baseline	Fort Huachuca
Replace older, higher use fixtures to reduce water use	1) Replaced toilets, add aerating faucets. 2) Replaced over 3600 2.5 gpm with 1.5 gpm showerheads. 3) Over 450 waterless urinals installed from 1997 to present.	250 ac ft/yr	Completed Part of Baseline	Fort Huachuca

	4) 280 Horizontal axis washers 5) Others include 25 on-demand faucets and over 50 Purell dispensers.			
Survey for leaky infrastructure and repair	1) Potable lines surveyed in 1997, leaks repaired. 2) Reservoir repairs and adjustments in 1999, 2002 3) Sewer line leak detection began in FY2000.	Potable: 30 ac ft/yr WW: 50+ ac ft/yr	1 and 2 Completed Part of Baseline 3 Recurring since 2000	Fort Huachuca
Reduce non-essential water use by residents and employees	Water Wise conservation education program on post. Publications and presentations tailored for Fort. Program began in October 1998.	20 ac ft/yr	Recurring Contributes to Baseline	Fort Huachuca
Convert turf sports fields to artificial turf	Reduce irrigation through replacement with lower new generation artificial turf. Drain system also generates urban runoff for reuse and recharge.	100 ac ft/ yr plus urban runoff for reuse or recharge	Planned	Fort Huachuca
Air-cooling for new construction will be refrigeration	Replacement will be during normal replacement cycle and renovations or facilities replacement. New family housing will have AC.	Approx. 100 ac ft/ yr at completion in 2013	Recurring since 2000	Fort Huachuca
Toilet Rebate Program	Provides cash incentive for residents to replace high-flow toilets with low-flow alternatives.	23 ac ft since 2000	Recurring since 2000	Sierra Vista (underway) Cochise County (planning phase)
Home Retrofit Program	Free residential program to modify high-flow water fixtures into low-flow units.	14 ac ft since 2000	Recurring since 2000	Sierra Vista
Water Wise	Conservation education outreach component administered by UofA Cooperative Extension.	270 ac ft/yr estimated cumulative impact per BBC/Fluid Solutions	Recurring Contributes to Baseline	Sierra Vista Cochise County Bella Vista Ranches Fort Huachuca
Public Outreach	Water Conservation Guide, Leak Detection Guide, Watertight Calendar creates water conservation awareness.		Recurring Contributes to Baseline	Sierra Vista
Evaporative Cooler Replacements on County Buildings	Replaced 23 evaporative coolers in 2003 on County Health Dept. Building in Bisbee with air conditioning units.	Approx. 0.63 ac ft/yr (45 gals. per day x 200 days x 23 coolers)	Recurring since 2000	Cochise County
Fee Acquisition of Agricultural Lands	BLM and TNC work together to retire agricultural pumping through full fee purchase of tracts with a documented history of agricultural irrigation. Lands are purchased from willing sellers, and subsequently resold to BLM as additions to the SPRNCA.	20,500 ac ft/yr retired prior to year 2000	Completed Part of Baseline	The Nature Conservancy BLM
Purchase of Conservation Easements (Retire Irrigated Ag)	DOD, TNC and BLM are working together to pay willing sellers to retire agricultural pumping on private lands through conservation easements that place restrictions on their deeds.	1139 ac ft/yr since year 2000 approx. 3440 ac ft/yr that could be potentially retired	Recurring since 2000	The Nature Conservancy BLM Dept. of Defense (Fort Huachuca)

Water Use Avoidance Projects

Name of Project, Policy or Program	Brief Description	Water Use Avoided	Project Status	Responsible or Assisting Agency
Modify Native Grasslands Project	Modify irrigation activities related to restoration of retired irrigation fields at the City's EOP.	200 ac ft not used for the start-up year of this project	Completed in 2003	Sierra Vista
Code: Pool Covers for new pools	Requires new pools to have a cover.	1 ac ft/yr (based on approx. 20 permits/yr, 38 gals per sq. ft. evaporative loss, and 479 sq. ft. avg. size)	Recurring since 2000	Cochise County
Code: Waterless urinals in new commercial development	Requires waterless urinals in new commercial development.	1.5 ac ft/yr based on a total of approx. 11 urinals@45,000 gals. per urinal avoided	Recurring since 2000	Cochise County Sierra Vista
Code: Golf Course Restrictions (New Courses)	Golf courses shall use low-water type turf; 5 acre turf limit per hole; ponds discouraged; special or conditional use permit required; landscaping with drought-tolerant species.	To be determined	Recurring since 2000	Sierra Vista Cochise County
Code: Lakes, Ponds Restrictions and Outdoor Misters	All artificial lakes, ponds or other water features limited to 500 square feet in size. and Prohibits the installation of water misters in commercial development.	To be determined	Recurring since 2000	Sierra Vista
Code: Car Wash Recycling	New commercial car wash facilities are required to recycle 75 percent of the water utilized.	One facility in operation since code change –no data yet	Recurring since 2000	Sierra Vista
Reduce irrigation on Fort Huachuca	March 1994 (and updates) policy restricts all watering to low-evaporation times of day; Residential watering to two months per year.	300 to 400 ac ft/yr	Recurring Contributes to Baseline	Fort Huachuca
Use AC units in lieu of evaporative coolers on County buildings	New county structures to have air conditioning units instead of evaporative coolers as was the common practice.	Approx. 1 ac ft/yr for every 30 units installed	Recurring since 2000	Cochise County
Code: Turf Restrictions and Drought Tolerant Plant Requirement	Use of turf prohibited in new government, commercial and industrial development.	Approx 490 ac ft./yr per BBC/Fluid Solutions	Recurring since 2000	Sierra Vista Cochise County
Code: Irrigation Standards	Regulates watering on steep slopes, narrow medians, adjacent to curbs, etc.	Approx. 60 ac ft/yr per BBC/Fluid Solutions	Recurring since 2000	Sierra Vista
Code: Hot Water Re-circulation Pumps	Pump required, time and/or temperature control required, pipes insulated, multi-family development independently metered or equivalent.	8.79 ac ft/2003 (based on 573 residential bldg. permits @5000 gal. saved per res.)	Recurring since 2000	Sierra Vista
Purchase of Conservation Easements (Precluding Future Ag or Subdivision)	BLM and TNC are working to limit future subdivision or irrigation on key habitats near SPRNCA on private lands through conservation easements that place restrictions on their deeds, using Land and Water Conservation Funds.	0.15 (residential) to 5 ac ft/yr (ag) per acre under easement	Planned	The Nature Conservancy BLM
Purchase of Land or Conservation Easements- Mexico	Acquire key parcels working with Mexico partner agencies/organizations via land acquisition or conservation easements to conserve key habitats, and ground-water resources.	Potential to increase base-flow in SPRNCA	Planned	The Nature Conservancy

Use of treated effluent where irrigation required, if cost effective	1) Effluent used for Chaffee Parade Field, outdoor sports complex, academic complex, and Golf Course. 2) New ET monitoring system to reduce watering.	400-450 ac ft/yr	Recurring Contributes to Baseline	Fort Huachuca

Recharge Projects

Name of Project, Policy or Program	Brief Description	Amount Recharged	Project Status	Responsible or Assisting Agency
SV Water Reclamation Project	Treats and recharges City's wastewater.	1644 ac ft /yr (actual to date)	Recurring since 2000	Sierra Vista
Huachuca City Wastewater Reclamation Project	Transfer of wastewater from Town of Huachuca City to Fort Huachuca Recharge Facility for treatment and recharge.	up to 170 ac ft/yr	Planned	Huachuca City Fort Huachuca
Bisbee-Naco, AZ – Naco, Sonora Wastewater Reclamation Feasibility Study and Bisbee Wastewater Treatment Project	A study to investigate the feasibility of using treated effluent to irrigate Turquoise Valley golf course and recharge balance into the ground-water system.	600+ ac ft/yr	Planned	City of Bisbee Naco, AZ Naco, Sonora Partnership
Erosion Control Project (North of Highway 82)	Used various erosion control methods to stabilize arroyos and bare land in highly erosive area. Monitor to test effectiveness of methods.	Increased infiltration to be determined	Completed Part of Baseline	BLM
Aquifer Recharge	Major state of the art shallow basins effluent recharge project on the East Range are completed. Additional urban runoff basins are in various phases from design to completion.	750 ac ft/yr treated effluent 250 ac ft/yr stormwater	Recurring since 2000	Fort Huachuca
East Range Watershed Improvement	Improve storm water infiltration and recharge, reduce erosion - 5 year project, began in FY 2001 (check dams, basins, infiltration galleries).	Up to 650 ac ft/yr, precipitation dependent 260 ac ft/yr in avg. rainfall year	Recurring since 2000	Fort Huachuca
Castro Basin and EOP Stormwater Recharge	Eliminate 90 acres of treatment basins at old wastewater facilities capturing and recharging storm water run-off in addition to effluent.	94 ac ft./yr	Recurring since 2000	Sierra Vista
Code: Stormwater Detention	Detention or retention of the difference between pre and post development runoff is required for all commercial projects and subdivisions.	To be determined	Recurring since 2000	Sierra Vista Cochise County
Surface Water Plan And Implementation	Delineates locations of regional detention/retention basins that serve to mitigate residential subdivision water runoff impacts. 5-6 basins are either completed or under construction	To be determined	Recurring since 2000	Sierra Vista

Check Dams	These slow runoff velocities and increase infiltration. Partnership is monitoring pre- and post construction to determine the potential increase in recharge.	Increased infiltration to be determined	Recurring since 2000	Sierra Vista Cochise County Tri-Core Engineering GeoSystems Analysis
Agricultural Field Berm	Retained 3 miles of berm on the west side of the abandoned ag fields. Retention of water, increased infiltration, stabilization of soils & sediments improvement.	Increased infiltration to be determined	Recurring Contributes to Baseline	BLM
Re-introduction of Beaver	Transplant up to 15 beaver from other locations to SPRNCA, allow natural reproduction. Monitor population using implanted radios, Monitor activities. Harvest of 1" to 6" DBH size cottonwoods/ willows.	Increased infiltration to be determined	Recurring since 2000	BLM
Riparian and Upland Vegetation Restoration	When BLM acquired the lands through the two major exchanges lands were closed to mineral entry, designated OHV uses, and placed a moratorium on livestock grazing to restore riparian vegetation.	Increased infiltration to be determined	Recurring Contributes to Baseline	BLM
Agricultural Field Restoration	Restoration of farm fields to native grass will promote proper upland watershed management reducing brush invasion and erosion. Use mechanic means & re-seeding of native plants.	Increased infiltration to be determined	Recurring Contributes to Baseline	BLM
Prescribed Fires and Fuels Reduction Project	Re-introduce controlled fire to allow natural processes that reduce brush invasion, lower the risk of catastrophic fire & increase grassland health, mown fuel breaks & remove dead & down materials.	Increased infiltration to be determined	Recurring Contributes to Baseline	BLM
Watershed Restoration Projects-Mexico	Work with Mexico partner agencies/organizations to improve watershed condition through restoration projects with willing private landowners.	Increased infiltration to be determined	Planned	The Nature Conservancy
Manila, Lyle Canyon and Canelo Allotment Management Plans	Improved upland, riparian and T&E management of allotments in the Lyle Canyon watershed. This project contains 17,850 acres of Lyle Canyon that is part of the Upper San Pedro Watershed. Project improved grazing practices on National Forest lands.	Increased infiltration to be determined	Recurring since 2000	Forest Service
Lone Mt. Allotment Management Plan	Improved upland and riparian management on the Lone Mountain Grazing allotment on 52,000 acres of the Upper San Pedro Watershed. Project includes improved grazing practices and riparian exclosures.	Increased infiltration to be determined	Recurring since 2000	Forest Service

Challenge Grants 2003

In May of 2003, the Partnership considered water-related project proposals brought forth by member agencies for funding by USPP. They were evaluated from a technical perspective – how will the project contribute to reducing demand or increasing recharge? – and from a policy perspective – how does the proposed project fit with the Partnership's goal and objectives? The following projects were approved by the Partnership for funding:

- $250,000 to City of Sierra Vista to finish construction of the Woodcutters Detention/ Retention Basin
- $100,000 to measure recharge in Woodcutters and Summit Basins
- $25,000 to the City of Sierra Vista to supplement their toilet replacement rebate program
- $25,000 to Cochise County to supplement their toilet replacement rebate program
- $25,000 towards funding a Water Auditor under the Water Wise Program

Total: $425,000

Member Agency and Partnership-Sponsored Studies

An important agreement established at the inception of the Partnership was that policies and recommendations would be based on sound science. In pursuit of data and an understanding of the region's hydrologic characteristics, the United States Geologic Survey (USGS), the Agricultural Research Service (ARS), Bureau of Land Management (BLM), Fort Huachuca and other outside entities are conducting important studies. We have learned that the aquifer system is more complex than has been assumed in the past, and that these complexities appear to explain variations in water levels and stream flow from year to year. Partnership studies are exploring these complexities, and are providing new data, information, and knowledge that will help us better quantify how the system responds to climate change, pumping, and riparian-zone changes. These studies are describing many aspects of the Sub-watershed: the physical characteristics of the aquifer and how they interact; the distribution and densities of vegetation types in the SPRNCA and quantification of how much water they respectively use and require to remain healthy; where, when, and how much recharge is occurring; and how the river, the aquifer system and the riparian vegetation are related.

Name of Study	Brief Description	Responsible or Assisting Agency	Funding Agency
Walnut Gulch Experimental Watershed near Tombstone	Basic and applied research to understand semiarid hydrology and the effects of watershed management and climate variability, including intensive long-term monitoring of watershed, hydrology, and meteorology.	ARS	ARS
SPRNCA Water Needs	Objectives: 1) Determine the spatial and temporal water needs of riparian vegetation to ensure its long-term ecological integrity, 2) Quantify total consumptive water use of riparian vegetation, and 3) Determine the source of water consumed by key riparian plant species. Final report completion in early 2004.	ARS USGS Arizona State University SAHRA (UofA)	USPP USGS Fort Huachuca SAHRA ARS

Ephemeral Channel Recharge	Estimate runoff transmission losses, ephemeral channel evapotranspiration, and ground-water recharge in the lower reaches of the Walnut Gulch Experimental Watershed and conduct an initial scaling over the entire Upper San Pedro. Peer reviewed publication of results due in 2004 in the American Geophysical Union Monograph on Recharge.	ARS USGS	USPP ARS Water Resources Research Center Cochise County
Technical Feasibility Analysis of Storm Water Recharge Options	Apply AGWA runoff modeling system to estimate additional runoff and recharge that results from urbanization and to estimate the additional recharge that might be achieved by detaining and slowly releasing flood flows through detention basins.	ARS GeoSystems Analysis	USPP ARS
San Pedro Community Monitoring Network	Production of annual maps showing spatial distribution of surface flows along the mainstem San Pedro at the driest time of the year, each year.	The Nature Conservancy BLM	The Nature Conservancy
Streamflow Monitoring	Monitoring of surface flow in San Pedro and other major tributary streams (Greenbush Draw and Banning Creek).	USGS	USPP Fort Huachuca BLM Cochise County ADWR
Summer Run-off Decline	Assess the cause of reduced run-off from watershed above Charleston.	USGS	USPP
Stream-Aquifer Interactions	Improve understanding of interactions between the San Pedro and the regional aquifer using monitoring wells, gravity stations and transects.	USGS BLM	USPP Cochise County
Ground-water Model	Using knowledge developed in USPP and earlier descriptive studies, develop dynamic tool that can be used to determine how the ground-water system will respond to resource development and management scenarios, and improve model with new information.	USGS	USPP
Preliminary Cost-Benefit Analysis for Water Conservation, Reclamation and Augmentation Alternatives	An in-depth analysis of potential costs and yields of conservation measures that fall under public education, recreation, residential and commercial or irrigated agricultural categories. Completed.	BBC Research and Consulting/Fluid Solutions	USPP
Decision Support System	A user-friendly tool that will integrate the USGS ground-water model, information from other Partnership studies, and other approved data sources, and allow decision-makers to ask "what-if" questions regarding various water conservation alternatives.	SAHRA (UofA)	SAHRA (Phase 1) USPP (Phase 2)

RECOMMENDED WATER MANAGEMENT AND CONSERVATION ACTIONS

2004 Partnership Recommendations

The quantitative assessment of potential or ongoing water conservation projects was the primary objective of the contracted study titled: *Preliminary cost/benefit analysis for water conservation, reclamation and augmentation alternatives for the Sierra Vista Sub-watershed* conducted by the firms of BBC and Fluid Solutions. This report provided the basis for further prioritization, feasibility analysis and sorting of options by the Partnership this past year into categories with the most promise for implementation by one or more of the member agencies in the near future. A complete listing of the options can be found in Appendix 2 of this plan. At its regular meeting in September of 2003, the Partnership Advisory Commission recommended the following activities, grouped by project area, to be pursued by its membership in 2004. Their order does not reflect any prioritization at this time. The timing and implementation will largely depend on the schedule of the lead agency.

Codes

1. The Partnership will pursue developing a **model ordinance(s)** for subdivisions, residential permits and non-residential permits that may incorporate codes regarding gray water re-use, rainwater harvesting, outdoor water use restrictions, landscaping standards, along with others to help member jurisdictions achieve a goal of reducing demand. Lead Agency: Cochise County

2. The Partnership will pursue **state legislation** to grant the county authority to enforce a water wasting ordinance and **a Water Wasting model ordinance.** Lead Agency: Cochise County

Incentives

The Partnership will continue to support and fund, through its Challenge Grant Process, those programs that provide **rebates and retrofit options for the replacement or enhancement of existing uses**, such as landscaping with drought-tolerant vegetation, outdoor irrigation efficiency improvements, low-flow indoor plumbing, and swimming pool covers. An important component of any replacement/rebate program will be the accounting for water saved as well as education. Lead Agency: Any

Water Conservation Surcharges

The Partnership will pursue, with the Arizona Corporation Commission, the potential for **water conservation surcharges for excessive** use of water and, through its outreach efforts, will **educate the public** on this potential option. Lead Agency: Bella Vista Water Co.

Public Conservation Awareness

PAC recommends that cities, member agencies and other entities either begin or increase their funding for the Cooperative Extension's Water Wise program, with an added emphasis on "counting drops" to better monitor progress towards water reduction goal. The Partnership as a whole will also continue **funding Water Wise**, as feasible, through its challenge-grant process. Lead Agency: Any

Public Facilities and School Districts

The Partnership will support the efforts of **public entities, like school districts, seeking grants** to develop new water-conserving parks or water conservation projects such as urinal replacements or air conditioning in their facilities, which schools in the sub-watershed have already been actively replacing through the state facilities process. Lead Agency: USPP

Irrigated Agriculture Restrictions

The Partnership will pursue a legislative proposal for a "modified" Irrigation Non-expansion Area designation for the Sierra Vista Sub-watershed that would preclude any **new** irrigated agriculture from being established. Lead Agency: USPP Government Affairs Sub-committee

Water Demand Management Tools

The Partnership will pursue state legislation that will give the county authority to establish a modified **"transfer of development rights"** (TDR) program that could have the effect of **geographically shifting demand** to areas in the sub-watershed that are better equipped, infrastructure-wise, to handle growth – areas on sewer, for example. Cities currently have the authority to establish a TDR program. Once authorized, the TDR program may be developed through the committees of the Partnership. Lead Agency: Cochise County

Partnership Activities for 2005-2011

Section 321 of the FY 2004 Congressional Defense Spending Bill has specific requirements of the US Department of the Interior, in cooperation with the Upper San Pedro Partnership, to report on the water use management and conservation measures to be undertaken by Partnership members that will contribute to the reduction of the overdraft for each fiscal year from 2005 to 2011 and beyond. In addition to those measures that the Partnership has already agreed to pursue for 2004, others will be identified by mid-summer of 2004. The Bureau of Reclamation has agreed to assist the Partnership with an appraisal study of certain supply management options – such as the relocation of well fields, importation alternatives and other sources of water. This appraisal study, expected to be completed by March of 2004, will help the Partnership decide on options that will have the highest chances for funding and success in reducing the overdraft.

Decision Support System

The Upper San Pedro partnership is working with the University of Arizona-Center for Sustainability of semi-Arid Hydrology and Riparian Areas (SAHRA) to develop the decision support system (DSS) for use by USPP members. The DSS is a water management planning tool based on modeling various planning scenarios in dynamic simulation for the Sierra Vista Sub-watershed .

Through a user-friendly interface, users select options for water management planning and the resulting impact on water use over a period of interest is estimated by the model. At present the model is being checked for consistency of relationships with Partnership assumptions. To demonstrate its utility, a sample set of conditions was evaluated for "Codes" –one of the 2004 recommended project areas described earlier in this chapter. In general, the report titled *Preliminary cost/benefit analysis for water conservation, reclamation and augmentation alternatives for the Sierra Vista Sub-watershed* (BBC and Fluid Solutions,

2003) was the basis for computations. Some options and assumptions were slightly modified to account for Partnership-recommended changes.

Alternative conservation measures were selected from the list of potential code requirements shown in Table 1. Note, at present, a good estimate for volume of wasted water is not available so the DSS assumes no benefits from measure R/C 15. Also, R/C 11 is an avoidance project rather than a savings measure, and further clarification on benefits is necessary before inclusion in the DSS.

Four cases were then run to examine the sensitivity to the measures and summarized in Table 2. When the DSS is fully developed, more visual results will be displayed in graphical form for easier understanding. Scenario 1 includes all code requirements and results in an average annual reduction of consumptive use of about 400 ac-ft in year 1. (For the purposes of this simulation, consumptive use savings is water that would otherwise be used and evaporated to the atmosphere through plants or from evaporation ponds or pools rather than returned to the aquifer via recharge.) The DSS accounts for changes in population and implementation of some of these codes in pre-existing uses. Given this, the savings increase to more than 2800 ac-ft in year 20 as, over time, more households would be subject to measures R/C 2, 5, 11 and 16.

Comparing the different scenarios allows one to distinguish the effect of subsets of the measures. For example, Scenario 2 includes all code requirements except outdoor use restrictions (R/C 14) and the savings decreases from 418 to 375 ac-ft in year 1 that can be directly attributed to R/C 14. Similarly, Scenario 4 does not consider restrictions on new development for landscaping, rainwater harvesting and gray water use. The overall benefits of codes without these factors are relatively small compared to Scenario 1, particularly in year 20.

Table 1: List of sample code requirements (BBC-Fluid Solutions, 2004)

Category	**Measure Number**	**Measure description**
R/C	15	Water Wasting Ordinance
R/C	11	Use Mitigation with BMPs – Offsets for New Development
R/C	2	Gray Water Reuse
R/C	16	Rainwater harvesting
R	11	Restrict New Swim Pools **(size and number)**
R/C	14	Outdoor Use Restrictions
R/C	5	Landscaping Standards (New Users)
R	2	Restrict Landscaping (Parks/Golf)
R	3	Restrict new golf course

Table 2: DSS results for combinations of code requirements implemented first year of a 20 year simulation

		Potential Consumptive Use Savings (ac-ft/yr)		
	Conservation measures implemented	**Year 1**	**Year 20**	**Total Savings (sum of years 1 through 20)**
Base condition	None	-	-	-
Scenario 1	RC2, 5, 14, 16, R2, 3, 11 (all)	418	2820	30712
Scenario 2	RC2, 5, 16, R2, 3, 11	375	2769	29780
Scenario 3	RC2, 5, 14, 16, R11	337	2738	29079
Scenario 4	RC14, R2, 3	125	149	2711

Note: these numbers are preliminary for the cases considered. Coordination between SAHRA staff and the Partnership regarding assumptions and benefits is ongoing. As the DSS is more fully developed, it is likely that the numerical results will be altered. The results are intended to give an idea of the types of evaluations that can be completed.

STATE OF THE WATERSHED

Quantity of Water Withdrawn From the Regional Aquifer

The total quantity of pumped water can only be estimated at best for the Sierra Vista Sub-watershed at this time. Private water companies are required to report the total gallons they pump to the Arizona Corporation Commission (ACC) annually. There are 15 private water companies within the subwatershed: Antelope Run, Arizona, Bella Vista, Cloud Nine, Cochise, Coronado Estates, East Slope, Holiday, Horseshoe Ranch, Indiada, Lucky Hills, Miracle Valley, Naco, Pueblo del Sol, Southland Utilities. However, other water providers in the sub-watershed are not required to report to the ACC, although their wells may be metered, and the owners may record pumping. These wells include Ft. Huachuca, the municipal providers of Huachuca City and Tombstone, the City of Sierra Vista (owns wells for use on city property), Pueblo del Sol Golf Course and Turquoise Valley Golf Course, and the Sierra Vista School District.

In addition to the above, there are a large quantity of unmetered residential and private wells within the Sub-watershed and a small community water system. The Arizona Department of Water Resources has registered a large proportion of these wells, but the quantity of water pumped is not metered and therefore can only be estimated. Due to the great variety of lot sizes and water use activities particular to rural properties (horse stables, farm stock, orchards, large gardens, irrigated agriculture), assigning average per capita water use numbers is speculative for these areas.

The Arizona Department of Water Resources has prepared a preliminary estimate of water *demand* within the Sierra Vista Sub-watershed. Table 3 is presented as an estimate until a more complete water budget is developed for the area, which will additionally include supply data (natural recharge) and estimates of an annual overdraft – the amount of water not replaced in storage for a given year.

Current best estimates of the annual overdraft are in the range of 3,000 and 6,000 acre-feet. It is important to recognize that this is an annual deficit, and that the total system deficit is the cumulative sum of each year's storage change. This increasing change in storage is reflected in the continuing decline of the water table. If annual overdrafts continue, water levels generally will continue to decline. Estimating and projecting an annual overdraft is an important exercise, but is difficult due to climatic variability (drought, higher or lower temperatures) and undocumented water demands year to year. A better and more critical indicator of the Partnership's success will be the measurement and monitoring of water table levels in the sub-watershed.

PRELIMINARY
Sierra Vista Sub-area Demand
12/30/03

SECTOR	1985	1990	2002	2010	2020	2030
AGRICULTURAL						
Irrigated acres	2,000	1,400	800	800	800	800
Demand (CU[1])	**5,900**	**3,900**	**2,500**	**2,500**	**2,500**	**2,500**
Source (CU)	*5,900*	*3,900*	*2,500*	*2,500*	*2,500*	*2,500*
Surface Water	0	0	0	0	0	0
Effluent	870	1,100	0	0	0	0
Groundwater	*5,000*	*2,800*	*2,500*	*2,500*	*2,500*	*2,500*
MUNICIPAL						
Population	52,500	56,900	70,500	76,800	85,500	92,000
Demand	**12,300**	**12,600**	**13,900**	**15,100**	**16,800**	**18,200**
Water Provider	6,600	6,700	9,700	10,900	12,300	13,300
Fort Huachuca	3,300	3,100	1,500	1,500	1,500	1,500
Domestic Well	2,400	2,700	2,700	2,700	3,000	3,300
Sources	*12,300*	*12,600*	*13,900*	*15,100*	*16,800*	*18,200*
Surface Water	240	160	160	160	160	160
Effluent	340	340	420	370	370	370
Groundwater	11,700	12,100	13,300	14,600	16,300	17,600
(Less) Incidental Recharge[2]	*(1,300)*	*(1,400)*	*(1,900)*	*(1,900)*	*(2,100)*	*(2,300)*
(Less) Artificial Recharge[3]	*0*	*0*	*(3,000)*	*(3,900)*	*(4,500)*	*(5,100)*
Groundwater (net use)	*10,400*	*10,700*	*8,400*	*8,800*	*9,700*	*10,200*
INDUSTRIAL						
Demand	**1,200**	**1,200**	**1,300**	**1,300**	**1,300**	**1,800**
Sources	*1,200*	*1,200*	*1,300*	*1,300*	*1,300*	*1,800*
Surface Water	0	0	0	0	0	0
Effluent	0	0	0	570	570	570
Groundwater	1,200	1,200	1,300	700	700	1,200
(Less) Incidental Recharge	*(40)*	*(40)*	*(40)*	*(40)*	*(60)*	*(60)*
Groundwater (net use)	*1,200*	*1,200*	*1,300*	*660*	*640*	*1,100*
OTHER (Stock)						
Demand	**160**	**160**	**160**	**160**	**160**	**160**
Source: Groundwater (net use)	*160*	*160*	*160*	*160*	*160*	*160*
TOTAL						
Total Water Use	**19,600**	**17,900**	**17,800**	**19,100**	**20,800**	**22,600**
Total Groundwater (net use)	*16,800*	*14,900*	*12,400*	*12,100*	*13,000*	*14,000*

NOTE: all units are in acre-feet unless otherwise noted. Numbers have been rounded to the nearest hundred or ten. This may result in slight discrepancies when calculating totals.

[1] consumptive use

[2] incidental recharge is recharge that occurs from septic tanks, turf watering and effluent discharge

[3] artificial recharge is recharge of effluent in recharge basins or channels

(Table 3)

Monitoring and Verification Activities

Regional ground-water conditions

Annual ground-water measurements can be used to define long-term trends that occur over a decade or longer. In addition to documenting annual trends, bi-monthly measurements document response of the aquifer to seasonal changes in recharge and ground-water withdrawals. Multi-year continuous monitoring of water levels documents aquifer response to daily, seasonal, and annual changes in recharge and ground-water withdrawals. Collection of continuous water-level data at deep wells drilled into the regional aquifer and shallow wells in the river alluvium near the San Pedro River document changes in ground-water flow from the regional to shallow aquifers.

Water levels at many wells in the regional aquifer have been monitored by Fort Huachuca, ADWR, BLM, and USGS. Fort Huachuca personnel measure 11 wells on the Fort bi-monthly. On Ft. Huachuca, ADWR measures water levels at 2 index wells, only one of which is instrumented; USGS has continuous recorders at 3 wells. BLM continuously monitors water levels at 8 deep wells within the SPRNCA. USGS has maintained continuous water-level monitoring—30 minute intervals—at 17 wells throughout the entire subwatershed and conducts frequent measurements at 3 additional wells.

Bi-monthly and continuous data collected since the mid-1990s have revealed measurable water-level changes in the regional aquifer related to recharge changes and pumping. The period was dominated by declines that were interrupted by short-term water-level rises. Annual rates of decline have ranged between 0.1 and 0.6 ft per year since the mid-1990s.The greatest rates of decline commonly occur near the centers of areas where large-capacity wells are most numerous and aggregate pumping is the greatest. The greatest observed rates of short-term water-level rise generally are near recharge areas, especially near the mountains. The short-term changes can be much greater than annual declines and are typically caused by major recharge events. For example, the largest recharge event since the mid-1990s occurred during October 2000. Water levels recovered or stabilized following October 2000 at most monitored wells. Water levels at many wells had resumed pre-October 2000 rates of decline by winter 2003, but reduced rates of decline or recovered water levels persisted at others.

Ground-water and streamflow conditions at the river

Changes in streamflow conditions during the course of the year are driven by many factors. Baseflows that occur during dry periods are supported by ground-water contributions from the alluvial aquifer into the stream channel. The amount of ground-water that is available to enter the stream channel is determined by many factors, as previously described. Sub-surface geology and soil conditions also play an important role in determining where perennial, intermittent and ephemeral stream reaches occur. In areas where bedrock and/or heavy clays are near the surface, stream flow is more likely to persist all year, compared to stream reaches where deep, coarse sediment lies beneath the channel. Larger flood flows occur periodically, primarily as a result of winter frontal systems or intense monsoon storms.

Seventeen hydrologic monitoring transects were established within the SPRNCA to measure streamflow and alluvial ground-water conditions, including about 75 wells and 14 streamflow monitoring locations that were equipped with data recorders in 2000 and 2001. The data from these sites will be used to describe how streamflow, the ground-water system, and riparian vegetation are related.

Each monitoring device records the water level or river stage every 30 minutes, enabling identification and analysis of system stresses such as daily evapotranspiration and individual flood events. The wells also

help track the vertical and horizontal flow of ground-water in the stream alluvium and movement of water between the regional aquifer, the stream alluvium, and the stream. The stage recorders have helped define the location of perennial, intermittent, and ephemeral reaches, as well as the frequency and duration of flood, baseflow, and no-flow periods.

The data collected have highlighted important system processes and patterns. For example, ephemeral and intermittent locations generally flow (and go dry) twice each year. One flow period is during the summer monsoon because of rainfall runoff. The other is in winter, even if there is little winter rain, because water uptake by riparian vegetation is much less than in summer and ground-water levels recover sufficiently to maintain flow in the river. Data also show that storage of flood water in the river alluvium is an important process. The large flow event (25–year return interval) in October 2000 resulted in substantial recharge and bank storage; the effects of this storage were observed in higher ground-water levels and stream flows for as long as 18 months after the flood. In generally ephemeral and intermittent river reaches, the river flowed or the dry periods were shorter during this same 18-month period. The behavior of ground-water in the stream alluvium also has been better defined. Changes in ground-water levels during the year that are caused by evapotranspiration and flooding are generally larger in ephemeral and intermittent stream reaches than in perennial reaches. After the October 2000 flows, however, these water-level changes were smaller during the 18-month influence period.

Streamflows were mapped during the third week in June for the past four years within the SPRNCA through a collaborative volunteer effort led by The Nature Conservancy. This is generally considered to be the hottest and driest time of the year, when streamflow is lowest. The results of their findings are summarized below in Table 4. The lasting effects of the October 2000 flood are again evident in the higher percentage of wetted channel (76.2%) observed during June of 2001.

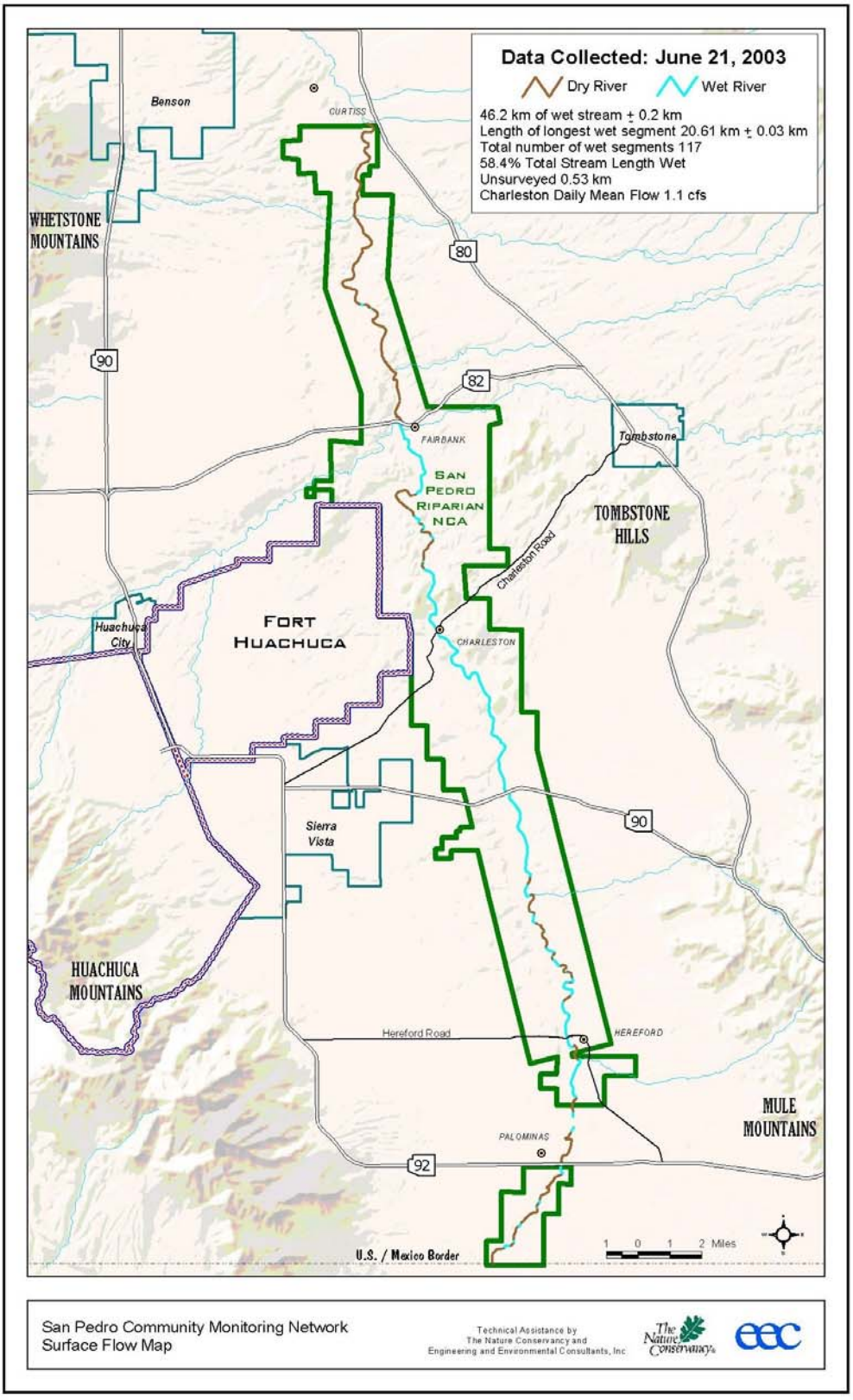
Surface Water Survey Summary

Date	Length of Wetted Channel (km)	% of total length that is wet	USGS Stream Gauge at Charleston Flow (cfs)
6/17/2000	*36.7*	*46.1%*	*1.7*
6/21/2001	*60.7*	*76.2%*	*3.1*
6/22/2002	*43.1*	*54.1%*	*1.5*
6/21/2003	*46.2 ± 0.2*	*58.4%*	*1.1*

- values estimated from TNC website graphic

(Table 4)

Map 2 shows spatially where baseflow persisted during late June, 2003. Similar information was collected for the Mexico portion of the river in June 2003 as well.



Map 2

Riparian Vegetation Condition

Periodic analysis of vegetation data can also be used to define long-term change and the natural variability of riparian vegetation along the Upper San Pedro. The riparian corridor responds to daily, seasonal, and annual changes in streamflow and ground-water conditions. These hydrologic factors are in turn driven by climatic variability and associated natural recharge rates and human influences including artificial recharge rates and ground-water withdrawals. Vegetation change should also be considered in conjunction with additional natural disturbance factors, including fire history, flood disturbance and beaver use.

Three riparian condition classes have been identified with the SPRNCA as part of the SPRNCA Water Needs Study:

- Class 3: Abundant streamside vegetation and trees associated with perennial flow more than 95% of the time, and very shallow ground-water depth (1.3-3.1 meters)
- Class 2: Streamside vegetation scarce beneath trees and shrubs, intermittent flow, and shallow ground-water (1.6 meters to 4.1 meters)
- Class1: Cottonwood and willow less abundant than trees such as saltcedar, flows that occur 29-67% of the time, and deeper ground-water depth (2.7-5.3 meters)

The percentage of vegetation within each condition class within the overall riparian corridor was quantified for 2001-2003 as part of the Partnership's SPRNCA Water Needs Study. Approximately 38% of the river length at that time was in Class 3 condition, 52% of the river length was in Class 2 condition, and 6% of the river length was in Class 1 condition. The remaining 4% of the SPRNCA has yet to be assessed.

As noted previously, many factors can affect ground-water conditions. However, it is important to note that regardless of cause, in general, if the depth of ground-water across the floodplain exceeds approximately 3 meters below the ground surface, and/or when the frequency of surface flow drops below 75% of the time, both the abundance and diversity of age of cottonwood and willow trees decline.

The U.S. Topographic Engineering Center, a Corps of Engineers research facility, mapped vegetation types throughout the SPRNCA in 2000, and will repeat this data collection effort in 2004 and 2008, as part of Southwestern Willow Flycatcher monitoring efforts, funded by Fort Huachuca and associated with the Fort's Biological Opinion. Detailed vegetation maps of the entire SPRNCA, in addition to private lands in the "Gap" along the river near Palominas, and the floodplain of the Babocomari were produced. Large-scale (1:6000) color aerial photographs were used to produce these vegetation maps. The Agricultural Research Service subsequently defined the geographic extent of the riparian corridor for their evapotranspiration modeling studies, and used the classification system developed by the Corps of Engineers to describe the composition of vegetation within this more specific area. Total abundance of riparian vegetation within this area in 2000 is shown below in Table 5, as are the various types of vegetation present, which is another important metric in determining long-term ecosystem trends.

VEGETATION TYPES IN RIPARIAN CORRIDOR	Total Acres	% of Total Cover
Forests		
Cottonwood	847	7.05%
Mesquite	1,894	15.77%
Salt Cedar	52	0.44%
Willow	5	0.04%
Herbaceous		
Johnson Grass	42	0.35%
Mixed Forbs	1,005	8.37%
Mixed Graminoids	1,126	9.37%
Mixed Grass-Scrub	188	1.57%
Sacaton	1,428	11.89%
Sacaton/Tobosa	179	1.49%
Tobosa	76	0.63%
Shrubland		
Beebush/Acacia	51	0.42%
Creosote-Tarbush	247	2.06%
Mesquite	1,635	13.62%
Mesquite/Sacaton	1,059	8.82%
Mixed Upland Scrub	126	1.05%
Rabbitbrush	128	1.06%
Salt Cedar	318	2.65%
Spiny Aster	24	0.20%
Whitethorn	112	0.93%
Woodlands		
Cottonwood w/grass	92	0.76%
Cottonwood w/open	212	1.77%
Cottonwood w/shrub	117	0.98%
Mesquite w/grass	353	2.94%
Mesquite w/shrub	84	0.70%
Mesquite w/open	8	0.07%
Salt cedar w/shrub	7	0.06%
Willow w/grass	9	0.08%
Other		
Barren Land	322	2.68%
Developed Land	93	0.77%
Water	169	1.41%
Grand Total	**12,010**	

(Table 5)

2004 PARTNERSHIP PLANNING TASKS

In addition to the recommendations for water management and conservation actions, the Partnership has several planning tasks to address this year in order to move forward on its recommendations, as well as to assist the Department of the Interior in its reporting requirements to Congress, per Section 321. These planning efforts will be addressed by the various committees and serve as the underpinning of future decisions. As always, new information and technology will continually enhance the Partnership's ability to make informed decisions and recommendations. The planning tasks for 2004 will be the following:

1. *Review and Incorporation of BOR Appraisal Findings:* The Bureau of Reclamation's appraisal study of various supply management options should be completed by the spring of 2004. At this time, the Partnership will review their findings and decide which supply management options should be pursued and planned for. The results of this review and decision-making will be incorporated into the report for Congress as required by Section 321.

2. *Review and Incorporation of ADWR Water Budget:* The Arizona Department of Water Resources, in August of 2003, released their recent data with regard to overall consumptive *demand* in the sub-watershed, factoring in artificial and incidental recharge activities. When completed, the Partnership will review and incorporate the findings of ADWR's investigation of the overall water budget, including supply and overdraft data. This budget should serve to frame the range of overdraft that the Partnership and its members will be responsible for mitigating in order to achieve a "sustainable yield" by the year 2011 and beyond per Section 321.

3. *Summary of Legislative Impediments and Additional Funding Needs:* The Partnership, through its newly-formed Subcommittee on Funding and Legislation (FAL), will identify those legislative impediments (local, state and federal), as required by Section 321, to implementing specific water management and conservation activities. In addition, this process should also result in the identification of funding needs for these activities.

4. *Challenge Grants 2004:* Member agencies and outside entities have been notified of Partnership funds available to implement water management and conservation projects. Like last year, the Partnership will evaluate these requests in 2004 and approve activities based on availability of funding, as well as other criteria related to Partnership objectives and recommendations.

5. *Section 321 2004 Report:* As required by Section 321, this report is due to Congress on December 31, 2004. Part of this task will involve defining the terms of Section 321 in consultation with the legislative offices involved with the amendment and familiar with the legislative intent. The Partnership will incorporate the findings and tasks noted above, along with other provisions of the amendment, into a report that will be transmitted through the Secretary of the Interior to Congress by the deadline.

6. *Incorporate preliminary findings from Partnership-sponsored studies into ongoing planning considerations, decision-making, and reporting:* This task includes the review and incorporation of findings from the SPRNCA Water Needs Study, Decision Support System Modeling, USGS studies and groundwater model development, erosion control and recharge pilot projects, the stormwater recharge technical feasibility analysis and other information as it becomes available.

OUTREACH AND COMMUNICATION PLAN

The Partnership needs the public's help to create an ongoing water conservation plan that is feasible, effective, and supported by those to whom our water matters most. Water is an essential resource. Whether there is enough of it to sustain our communities and the San Pedro Riparian National Conservation Area is a complex question.

The Partnership Outreach Committee has developed an extensive public involvement process to reach area residents. Four major areas of emphasis have been identified for the process, which will be implemented in 2004. They include:

- Two-way communication: The Partnership will provide the technical information it has developed in clear terms and learn more about the hopes, issues and concerns people have as water issues are addressed;
- Relationship-building: The Partnership will work to respond to water user concerns, increase the public's understanding of Partnership goals and encourage public participation in the process;
- Community support: Leaders throughout the sub-watershed need to make informed decisions about policies and actions; the public can help frame and communicate the issues and the Partnership can encourage water conservation as a community value;
- Potential resources: Partnership resources may not be enough and community resources may need to be directed toward water issues.

The Partnership Advisory Commission will apply insights learned from the public involvement process in the development of the 2005 Working Water Management and Conservation Plan.

Givens

To help determine the direction of community discussions, and keep them focused and productive, the following non-negotiable "Givens" have been established:

- The intent of the Upper San Pedro Partnership planning process is to work together to meet the water needs of area residents while protecting the San Pedro Riparian National Conservation Area and the region's economic base;
- Discussion will be limited to projects that benefit the Sierra Vista Sub-watershed of the Upper San Pedro River Basin and fall within the goal and objectives of the Partnership;
- The Partnership has accepted a number of technical concepts related to how the watershed functions, and will be guided by those concepts as it considers public response;
- All elements of the Working Water Management and Conservation Plan will be based on technical analysis, public responses, and approval by the Partnership Advisory Commission;
- Implementation of any Plan element is subject to funding availability and the approval of the responsible implementing agency (s) within legal constraints.

Principles

The following principles apply to the development of the public involvement process:

1) Public involvement methods should reach residents in communities and in rural areas, and results should flow back to their own community leaders as well as to the Partnership; and
2) Methods should reach people who are unlikely to attend a public meeting and allow opportunities for people to hear and understand each other's perspectives face-to-face.

Objectives

All individuals and entities in communities and in rural areas within the sub-watershed will be encouraged to participate in the public involvement process. The process will be open to all.
Objectives include the following:

- Impart information on the 2004 Working Water Management and Conservation Plan;
- Solicit individual responses on the plan and water issues;
- Provide information on individual actions that can be accomplished and local contacts.

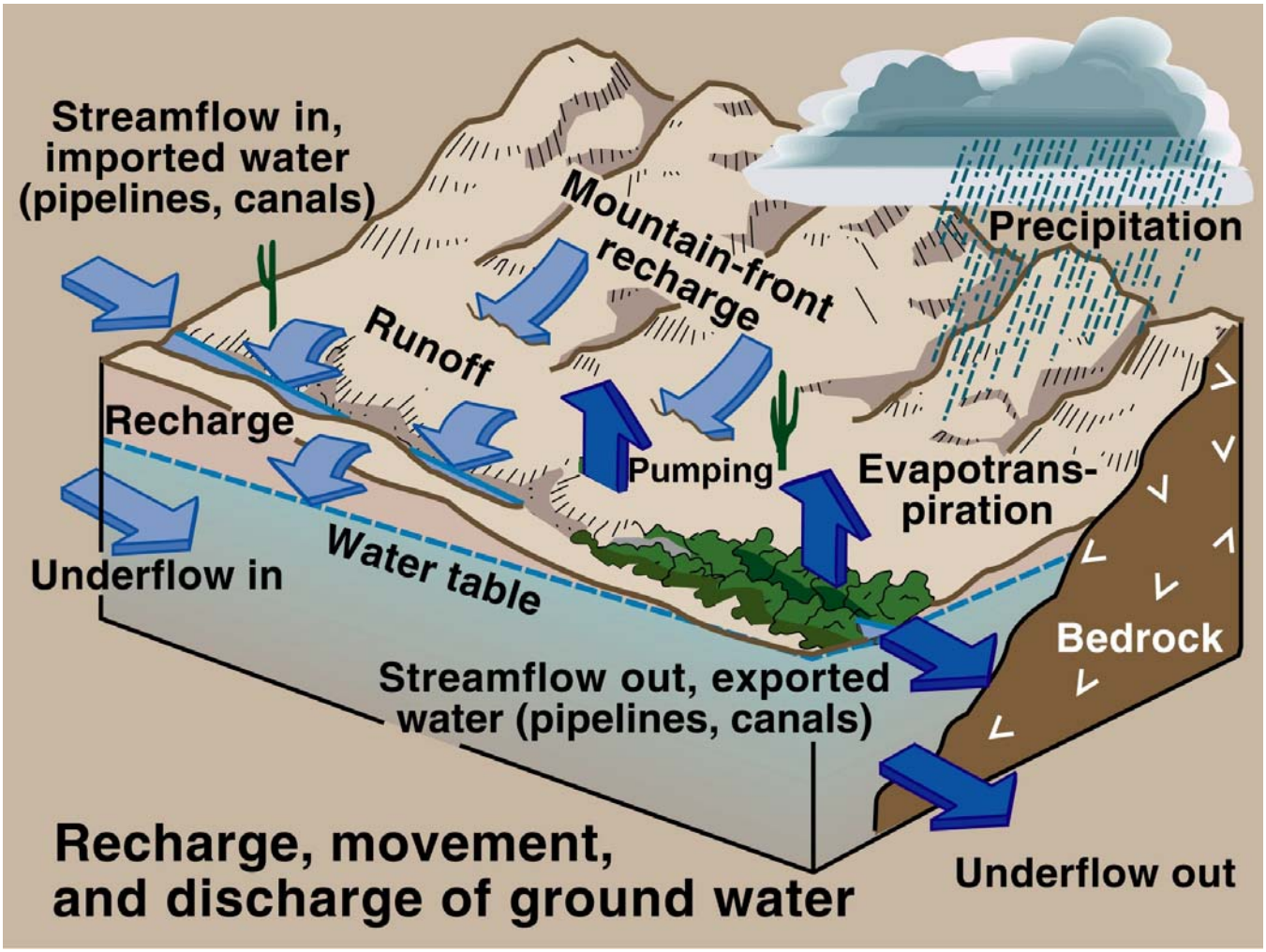
Methods

The Partnership Outreach Committee will implement the public involvement process in addition to its ongoing responsibilities for Partnership presentations as requested, news releases as appropriate and bi-monthly news articles. The following steps will be taken to inform and involve the public in discussing water issues:

1) Conduct a survey to measure public awareness and perceptions of water issues. The survey will also attempt to identify people willing to participate in future discussions on water issues.
2) Produce a summary of the 2004 Water Management and Conservation Plan. The summary will be distributed as a newspaper insert and posted on the Partnership web site. Copies will also be made available through various community organizations.
3) Hold a series of Community Connector meetings in the communities of Bisbee, Tombstone Hereford/Palominas, Huachuca City and Sierra Vista. Community Connector meetings are small, hosted meetings in people's homes or workplaces. Meetings hosted by neighbors have been proven to be an effective way to gather people who otherwise would not attend a traditional public meeting or workshop. In addition, Public Connector meetings will be held to supplement hosted meetings.
4) Produce a summary of the results of the Community Connector meetings. The results summary will be distributed as a newspaper insert and posted on the Partnership web site.
5) Use the responses from the Community Connector meetings as the basis for a series of Public Workshops open to all area residents. The Public Workshops will be designed to develop priorities for elements of the desired water future and assess level of support for specific actions.
6) Produce a summary of the results of the public involvement process. The results summary will be distributed as a newspaper insert, posted on the Partnership web site and mailed to all participants.
7) Integrate the results of the public involvement process with the technical analysis in the development of the 2005 Working Water Management and Conservation Plan.
8) Conduct a survey to measure public awareness and perceptions of water issues. The survey will identify any changes in public awareness and perceptions to help guide future outreach and communication efforts.

APPENDIX 1

Hydrologic Cycle



APPENDIX 2

Summary of Alternatives Considered from *Preliminary cost/benefit analysis for water conservation, reclamation and augmentation alternatives for the Sierra Vista Sub-watershed.*

This is a summary of the findings presented in the above report, ranked by Cost/Yield Ratio (last column: Cost per Acre Foot of Yield). For a complete description of the alternatives and their assumptions, please refer to the report noted above. Note: the alternatives as described in the report provided a point of departure for evaluation and discussion, and will not reflect any revisions or modifications to the assumptions or alternatives themselves, as discussed by the Partnership.

REDUCE CONSUMPTION STRATEGY (PUBLIC EDUCATION)								
						2000	2010	
ALT #		OPTIONS	CAPITAL	O & M	ANNUAL	WATER (ac ft/yr)	WATER (ac ft/yr)	C/Y
IA	3	Use Audits (Agriculture)	$15,000	$10,000	$11,000	200	200	60
PE	1	Incremented version	$0	$100,000	$100,000	275	328	300
PE	2	Enhanced version	$0	$300,000	$300,000	549	656	450
R/C	9	Use Audits (Large water users)	$20,000	$20,000	$21,000	30	30	770
PE	3	Net Zero Users	$315,000	$48,000	$71,000	69	82	890
R	5	Use Audits (parks/ golf)	$20,000	$20,000	$21,000	43	43	2,050
R	9	Use Audits (swimming pools)	$0	$70,000	$70,000	17	22	3,180

REDUCE CONSUMPTION STRATEGY (Residential/Commercial)								
						2000	2010	
ALT #		OPTIONS	CAPITAL	O & M	ANNUAL	WATER ac ft/yr	WATER ac ft/yr	C/Y
R/C	12	Conservation Water Rates	$600,000	$0	$44,000	231	294	100
R/C	15	Restrictions on Specific Uses	$0	$60,000	$60,000	397	397	150
R/C	8	Water System Leak Detection/ repair	$376,357	$0	$28,000	170	170	160
R/C	6	Growth Restrictions	$0	$203,000	$203,000	0	1,234	170
R/C	11	Use Mitigation w/ BMP (new developments)	$0	$203,000	$203,000	0	780	250
R/C	4	Landscaping Stds/ Regs (Exist Users)	$25,000	$90,000	$92,000	313	313	300
R/C	5	Landscaping Stds/ Regs (New Users)	$25,000	$30,000	$32,000	0	157	400
R/C	14	Outdoor Use Restrictions	$25,000	$60,000	$62,000	89	89	690
R/C	3	Outdoor Irrigation Efficiency Improvements	$0	$70,000	$70,000	62	62	1,170
R/C	10	Water saving Incentive Contracts ($20,000 to $850,000)	$0	$285,000	$285,000	300	300	1,450
R/C	1	Indoor Plumbing Retrofits	$13,000,000	$26,840	$983,000	646	646	1,510
R/C	2	Gray Water Reuse	$16,914,941	$40,000	$1,285,000	226	748	1,720
R/C	13	Pressure Reduce Valves	$15,810,000	$0	$1,163,000	219	268	4,310
R/C	16	Rainwater harvesting	$18,749,722	$0	$1,380,000	54	208	5,920
R/C	7	Reduce Car washes	$3,100	$5,000	$5,200	0	0	26,000
R/C	17a	Replace septic w/ Sewer (Sierra Vista)	$5,100,000	$0	$375,000	6	6	61330
R/C	17b	Replace septic w/ Sewer (County)	$42,000,000	$0	$3,090,000	7	14	220,710
R/C	17	Replace septic w/ Sewer	$47,000,000	$0	$3,466,000	13	20	172,900

REDUCE CONSUMPTION STRATEGY (RECREATIONAL)								
						2000	2010	
ALT #		OPTIONS	CAPITAL	O & M	ANNUAL	WATER ac ft/yr	WATER ac ft/yr	Cost per acre foot ($)
R	3	Eliminate one New Golf Courses	$0	$0	$0	398	398	0
R	7	Limit Water Use (parks/ Golf)	$0	$0	$0	155	155	0
R	11	Restrict New Swim Pools	$0	$0	$0	0	29	0
R	2	Restrict Landscaping (Parks/ Golf)	$2,065,860	$0	$152,000	382	382	410
R	8	Landscape Modification (Parks)	$429,211	$0	$32,000	71	71	460
R	13	Discharge Pool Water to Dry Well or Gray Water System	$167,807	$0	$12,000	20	26	500
R	4	Eliminate two Existing Golf Courses	$5,000,000	$0	$991,000	726	726	500
R	12	Eliminate Existing Swim Pools	$1,040,794	$20,000	$97,000	100	100	970
R	6	Conservation Incentives (Golf) ($25,000 to $500,000)	$0	$187,500	$188,000	125	125	2,100
R	10	Reduce Swim Pools (Pool Cover Voucher))	$2,907,431	$20,000	$234,000	8	10	23,400
REDUCE CONSUMPTION STRATEGY (AGRICULTURAL)								
						2000	2010	
ALT #		OPTIONS	CAPITAL	O & M	ANNUAL	WATER ac ft/yr	WATER ac ft/yr	Cost per acre foot ($)
IA	2	Restrict New AG (INA, Special District, zoning)	$150,000	$0	$11,000	0	841	10
IA	2a	Restrict New AG (easements) (970 acres @$1600)	$1,552,000	$0	$114,000	0	4,207	30
IA	1	Irrigation Technology Incentives	$78,280	$2,303	$8,000	250	250	30
IA	4	Pay for water conservation * ($5,000 to $115,000/ year)	$0	$46,875	$47,000	1,250	1,250	50
IA	2b	Restrict New AG (Fee Purchase((970 acres @ $3000)	$2,910,000	$0	$214,000	0	4,207	50
IA	8	Production Loss Payments (Annual Payment)	$0	$127,000	$127,000	2,298	2,298	60
IA	6	Conservation Easements (Existing Use) (530 acres @ $1600)	$848,000	$0	$62,000	2,298	2,298	90
IA	5	Fee Acquisition (Existign Uses) (530 acres @ $3000)	$1,590,000	$0	$117,000	2,298	2,298	110
IA	7	Restrict Application Rates (AMA)	$300,000	$0	$22,000	136	136	160
RECLAIM WATER STRATEGY								
						2000	2010	
ALT #		OPTIONS	CAPITAL	O & M	ANNUAL	WATER ac ft/yr	WATER ac ft/yr	Cost per acre foot ($)
MRW	1	Sierra Vista Effluent Recharge	$6,212,503	$460,523	$306,000	2,218	3,024	100
R	1b	Sierra Vista Effluent Recharge Upstream	$3,900,800	$286,800	$574,000	2,218	3,024	190
MRW	4	Bisbee Effluent Recharge	$3,015,688	$126,945	$116,333	544	570	200
MRW	1b	Effluent (HC/ FtH) Irrigation to SV Golf	$844,200	$3,384	$66,000	312	312	210
MRW	1c	Effluent (Bisbee/Naco) Irrigation TV Golf	$2,300,000	$2,313	$172,000	604	650	260
MRW	1a	Effluent (SV) Irrigation SV Parks/ Golf	$1,945,520	$17,330	$160,000	507	507	310
MRW	2	Ft Huachuca Effluent Recharge	$6,000,000	$0	$147,000	528	435	340
MRW	5	Naco Effluent Recharge	$253,500	$8,987	$28,000	30	40	700
R	2a	Ft Huachuca Effluent Reuse	$6,000,000	$0	$441,000	472	472	930
R	3	Huachuca City Effluent Recharge	$4,626,000	$35,200	$376,000	172	172	2,160

AUGMENT WATER STRATEGY (IMPORT WATER)								
						2000	2010	
ALT #		OPTIONS	CAPITAL	O & M	ANNUAL	WATER ac ft/yr	WATER ac ft/yr	Cost per acre foot ($)
WIE	2	Move SV/FtH/HC Wells- North SPRNCA (100% Recovery)	$51,244,800	$1,719,720	$5,490,000	7,230	8,430	630
WIE	1a	Move Bisbee Wells to Douglas Sub-Basin	$6,465,760	$220,180	$696,000	1,000	1,010	690
WIE	2	Move SV/FtH/HC Wells- North SPRNCA (50% Recovery)	$30,760,960	$1,247,388	$3,511,000	3,783	4,148	820
WIE	1c	Move SV/FtH/HC Wells to Douglas (100% Recovery)	$89,577,600	$1,972,620	$8,564,000	7,230	8,430	980
WIE	1b	Move Tombstone Wells to Douglas	$3,256,904	$49,785	$289,000	250	270	1,070
WIE	1c	Move SV/FtH/HC Wells to Douglas (50% Recovery)	$54,847,200	$1,435,208	$5,471,000	3,783	4,148	1,250
WIE	3	Import CAP water	$121,659,660	$6,960,000	$16,477,000	7,230	8,430	1,850
WIE	4	Replace Tombstone Pipeline	$5,505,920	$129,493	$535,000	250	270	1,980

APPENDIX 3

SEC. 321. COOPERATIVE WATER USE MANAGEMENT RELATED TO FORT HUACHUCA, ARIZONA, AND SIERRA VISTA SUBWATERSHED.

(a) LIMITATION ON FEDERAL RESPONSIBILITY FOR CIVILIAN WATER CONSUMPTION IMPACTS.—

(1) LIMITATION.—For purposes of section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1536), concerning any present and future Federal agency action at Fort Huachuca, Arizona, water consumption by State, local, and private entities off of the installation that is not a direct or indirect effect of the agency action or an effect of other activities that are interrelated or interdependent with that agency action, shall not be considered in determining whether such agency action is likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of designated critical habitat.

(2) VOLUNTARY REGIONAL CONSERVATION EFFORTS.—Nothing in this subsection shall prohibit Federal agencies operating at Fort Huachuca from voluntarily undertaking efforts to mitigate water consumption.

(3) DEFINITION OF WATER CONSUMPTION.—In this subsection, the term ‘‘water consumption’’ means all water use off of the installation from any source.

(4) EFFECTIVE DATE.—This subsection applies only to Federal agency actions regarding which the Federal agency involved determines that consultation, or reinitiation of consultation, under section 7 of the Endangered SpeciesAct of 1973 (16 U.S.C. 1536) is required with regard to an agency action at Fort Huachuca on or after the date of the enactment of this Act.

(b) RECOGNITION OF UPPER SAN PEDRO PARTNERSHIP.—Congress hereby recognizes the Upper San Pedro Partnership, Arizona, a partnership of Fort Huachuca, Arizona, other Federal, State, and local governmental and nongovernmental entities, and its efforts to establish a collaborative water use management program in the Sierra Vista Subwatershed, Arizona, to achieve the sustainable yield of the regional aquifer, so as to protect the Upper San Pedro River, Arizona, and the San Pedro Riparian National Conservation Area, Arizona.

(c) REPORT ON WATER USE MANAGEMENT AND CONSERVATION OF REGIONAL AQUIFER.—

(1) IN GENERAL.—The Secretary of Interior shall prepare, in consultation with the Secretary of Agriculture and the Secretary of Defense and in cooperation with the other members of the Partnership, a report on the water use management and conservation measures that have been implemented and are needed to restore and maintain the sustainable yield of the regional aquifer by and after September 30, 2011. The Secretary of the Interior shall submit the report to Congress not later than December 31, 2004.

(2) PURPOSE.—The purpose of the report is to set forth measurable annual goals for the reduction of the overdrafts of the groundwater of the regional aquifer, to identify specific water use management and conservation measures to facilitate the achievement of such goals, and to identify impediments in current Federal, State, and local laws that hinder efforts on the part of the Partnership to mitigate water usage in order to restore and maintain the sustainable yield of the regional aquifer by and after September 30, 2011.

(3) REPORT ELEMENTS.—The report shall use data from existing and ongoing studies and include the following elements:

(A) The net quantity of water withdrawn from and recharged to the regional aquifer in the one-year period preceding the date of the submission of the report.

(B) The quantity of the overdraft of the regional aquifer to be reduced by the end of each of fiscal years 2005 through 2011 to achieve sustainable yield.

(C) With respect to the reduction of overdraft for each fiscal year as specified under subparagraph (B), an allocation of responsibility for the achievement of such reduction among the water-use controlling members of the Partnership who have the authority to implement measures to achieve such reduction.

(D) The water use management and conservation measures to be undertaken by each water-use controlling member of the Partnership to contribute to the reduction of the overdraft for each fiscal year as specified under subparagraph (B), and to meet the responsibility of each such member for each such reduction as allocated under subparagraph (C), including— (i) a description of each measure; (ii) the cost of each measure; (iii) a schedule for the implementation of each measure; (iv) a projection by fiscal year of the amount of the contribution of each measure to the reduction of the overdraft; and (v) a list of existing laws that impede full implementation of any measure.

(E) The monitoring and verification activities to be undertaken by the Partnership to measure the reduction of the overdraft for each fiscal year and the contribution of each member of the Partnership to the reduction of the overdraft.

(d) ANNUAL REPORT ON PROGRESS TOWARD SUSTAINABLE YIELD.—

(1) IN GENERAL.—Not later than October 31, 2005, and each October 31 thereafter through 2011, the Secretary of the Interior shall submit, on behalf of the Partnership, to Congress a report on the progress of the Partnership during the preceding fiscal year toward achieving and maintaining the sustainable yield of the regional aquifer by and after September 30, 2011.

(2) REPORT ELEMENTS.—Each report shall include the following:

(A) The quantity of the overdraft of the regional aquifer reduced during the reporting period, and whether such reduction met the goal specified for such fiscal year under subsection (c)(3)(B).

(B) The water use management and conservation measures undertaken by each water-use controlling member of the Partnership in the fiscal year covered by such report, including the extent of the contribution of such measures to the reduction of the overdraft for such fiscal year.

(C) The legislative accomplishments made during the fiscal year covered by such report in removing legal impediments that hinder the mitigation of water use by members of the Partnership.

(e) VERIFICATION INFORMATION.—Information used to verify overdraft reductions of the regional aquifer shall include at a minimum the following:

(1) The annual report of the Arizona Corporation Commission on annual groundwater pumpage of the private water companies in the Sierra Vista Subwatershed.

(2) The San Pedro base flow monitoring record of the Charleston flow gauge of the United States Geological Survey.

(3) Current surveys of the groundwater levels in area wells as reported by the Arizona Department of Water Resources and by Federal agencies.

(f) SENSE OF CONGRESS.—It is the sense of Congress that any future appropriations to the Partnership should take into account whether the Partnership has met its annual goals
for overdraft reduction.

(g) DEFINITIONS.—In this section:

(1) The term ‘‘Partnership’’ means the Upper San Pedro Partnership, Arizona.

(2) The term ‘‘regional aquifer’’ means the Sierra Vista Subwatershed regional aquifer, Arizona.

(3) The term ‘‘water-use controlling member’’ has the meaning given that term by the Partnership.