

**HABITAT CONSERVATION PLAN**  
**Technical Advisory Committee**  
**Tuesday, August 23, 2005 1:00 – 4:00pm**  
**Arizona Game and Fish Department Conference Room**  
**555 North Greasewood Road**  
**Tucson, Arizona 87545-3612**

**MEETING SUMMARY**

Attendees: Marit Alanen (USFWS), Guy McPherson, Mima Falk, Trevor Hare, Linwood Smith, Rich Glinski, Ann Phillips, Bruce Prior, Ralph Marra and Tim Thomure (City of Tucson – Tucson Water), Dennis Abbate, Eileen Finnerty Rae (SAHBA), Daniel DeBorde (City of Tucson – Environmental Services), Leslie Liberti and Jessica Lee (SWCA)

**1) Update on Recent SAC Meetings/Upcoming Meetings**

a. *Scheduled SAC Meetings:*

- **August 31, CANCELED**
- **September 21**, 3-5 pm, @ Game and Fish. Tentative Topics: Southlands implementation/funding options.
- **October 5**, 3-5 pm, @ Game and Fish. Tentative Topics: Avra Valley conservation strategies and implementation/funding options.
- **October 19**, 3-5 pm, @ Game and Fish. Tentative Topics: Recommendations for Santa Cruz River.
- **November 2**, 3-5 pm, @ Game and Fish. Tentative Topics: Monitoring and Adaptive Management Program and implementation/funding options.
- **November 16**, 3-5 pm, @ Game and Fish. Tentative Topics: Monitoring and Adaptive Management Program and implementation/funding options; Next steps – beginning Phase 2 of the HCP process.

b. *Scheduled TAC Meetings:*

- **September 13, CANCELED**
- **September 28**, 1-4 pm, @ Game and Fish. Tentative Topics: Continue discussion of Avra Valley conservation strategies. Begin discussion of Santa Cruz River planning area.
- **October 11**, 1-4 pm, @ Game and Fish. Tentative Topics: Recommendations for Santa Cruz River.
- **October 25**, 1-4 pm, @ Game and Fish. Tentative Topics: Monitoring and Adaptive Management Program; feedback from SAC on conservation program, especially funding and implementation issues.
- **November 15**, 1-4 pm, @ Game and Fish. Tentative Topics: Monitoring and Adaptive Management Program; feedback from SAC on conservation program, especially funding and implementation issues.
- **November 29**, 1-4 pm, @ Game and Fish. Tentative Topics: Next steps – beginning Phase 2 of the HCP process.

c. *Scheduled Joint TAC/SAC Meetings:*

- **September 6**, 1-4 pm, @ Game and Fish.

Ralph Marra and Tim Thomure from the Tucson Water Department were introduced to the TAC.

## **2) Old Business**

### *a. Meeting Minutes – May 24, 2005 Minutes*

Leslie went over the schedule of future meetings, noting the joint meeting and the SAC and TAC meetings that were cancelled. Leslie said it was discovered that the May 24 meeting minutes were not officially approved. She said that Rich and Dennis sent comments via email and that they were incorporated into the meeting minutes. Leslie asked if anyone had additional comments/edits. No TAC member said they did. The meeting minutes were approved.

She said that at one of the earlier TAC meetings someone asked about how the important riparian areas were differentiated from the Harris riparian areas. Leslie said she talked to Julia Fonseca (Pima County Flood Control District) about it and Julia said that the considerations included vegetation density based on a special land study, vegetation type, presence of water (which was also based on a special study), and whether they linked to biological core or provided connectivity near the critical landscape connection barriers. Julia said that where you see xeroriparian areas as important riparian areas, usually the later criterion (connectivity) was the reason. Rich asked if dense upland was also included. Leslie said that yes, if they were areas mapped by Harris as riparian of some type. Mima said there is no “classic uplands” in the Southlands.

Leslie said that the TAC’s draft list of conservation principles was sent out and if anyone had comments/additions to the list to let her know. She said she is working with the City GIS staff to start mapping the two conservation reserve strategies for the Southlands. She said it would be interesting to see what they would look like and to see how well each species’ modeled habitats are captured by the two different reserve options by calculating areas of habitat. She said that the maps would also be a visual tool to see how the reserve strategies tie in with regional open space and urban constraints. She said then when the TAC meets September 28, she hopes to have the maps and calculations will be ready to provide a basis for discussion of the two reserve strategies and how to build upon and/or change those ideas. Trevor said that he has comments about the two reserve strategies. Leslie said it would be best for Trevor to email his comments to the entire TAC. She said to send comments as soon as possible because the City will lose their GIS person on September 2.

Rich said that, before the presentation begins, he wanted to take a couple minutes to discuss the species of concern in the two planning areas. He said that it is his impression that it is mainly Pima pineapple cactus (PPC) and burrowing owl, and connectivity for cactus ferruginous pygmy owl (CPFO) that are important in the Southlands. He said that in Avra Valley, the concern is connectivity for CFPO, potential stop over for yellow-billed cuckoo, and burrowing owl. Leslie added that both ground and Tucson shovel-nosed snakes are included in Avra Valley. Rich asked about the pale Townsend’s long-eared bat. Leslie said that for the bat, the habitat was mapped very

broadly and is only foraging habitat. She said that in the Southlands, the TAC based their discussions mainly on the edge around the riparian habitat as being important, but also addressing the potential for native landscaping ordinances to benefit the bat. She said that the same would apply for the bat in Avra Valley where there is still native vegetation. She noted that much of the land has been heavily impacted by agriculture. Rich said that the TAC has suggested that in the Southlands the bat could benefit from limiting urban lighting and native landscaping. Trevor brought up concerns for the lesser long-nosed bat, but Leslie said that the TAC had dropped that species because there wasn't foraging habitat in the Southlands due to the lack of agave species. Leslie said that if anyone has a suggestion on how to pull all the species information together, please let her know. She said she is currently attempting to put something together.

### **3) New business**

#### *a. Preparing for Tucson's Future Water Plan: 2000-2050*

Presenters: Ralph Marra and Tim Thomure, Tucson Water Department

Tim Thomure and Ralph Marra from Tucson Water Department gave a 90-minute presentation titled, "Preparing for Tucson's Future Water Plan: 2000-2050." The first hour of the presentation was based on a PowerPoint presentation (no copies of the presentation were distributed) and the remaining half-hour was a question and answer time period. Ralph said the draft plan was given to the City of Tucson Mayor and Council last November. The draft plan is intended to initiate dialogue with the community about future water resources challenges. This plan provides a basis for this dialogue.

Ralph said that he gave a shorter presentation to the TAC approximately a year and a half ago about this topic, before the 50-year draft plan was written. He said that Tucson Water has been gathering questions throughout the community and will be accumulating them within the next year. He said they have given this presentation over 35 times to various community groups. Ralph says that he thinks Tucson Water is being very direct with the community. He said that Bruce would be logging all the questions TAC members pose today.

The slide show started out with Ralph talking about the defined goals that Tucson Water has identified. He said that those goals are: to meet water needs of the community; maximize the use of renewable water supplies; provide water of a quality that meets consumer expectations and preferences; limit ground water pumping to environmentally responsible levels (at a hydrological sustainable rate); manage costs and water rate impacts; meet all federal and state requirements (both the assured water supply laws and water quality standards).

Ralph said that the community will need to start making decisions in 2006 about the direction they want Tucson Water to take to address future water supply and quality issues. Ralph noted that the primary function of Tucson Water is to meet the water needs of the community. Ralph explained that, historically, Tucson has relied on groundwater but now that dependence has raised concerns. According to Ralph, the City now has the opportunity to shift demand to renewable water, including Colorado River water distributed through the Central Arizona Project (CAP) canal. The shift to maximizing renewable water supplies will require the community to make decisions about their water preferences relating to water quality. Ralph said it is up to Tucson Water to explain how the quality of water could change in the future. He said Tucson

Water need to see if the community is willing to accept the costs associated with those water quality changes. Tucson Water must manage costs and water rate increases, while meeting all federal and state requirements. The City and other groundwater users have been mining the Tucson Basin aquifer for many decades. Ralph explained that there must be a limit to groundwater pumping due to environmental considerations.

Ralph continued with the next slide that depicted a chart showing water use by sector from 1940-2000 in the Tucson Active Management Area (AMA). Ralph said that active management areas are an administrative unit governed by Arizona Department of Water Resources (ADWR) and are areas that have experienced groundwater declines. These areas now have more stringent regulations. He said that the Tucson Active Management Area is roughly defined by Picacho Peak to the north, the Tucson basin to the south, the Pima County line to the east, and in Avra Valley to the west (Avra Valley includes the land south to the Mexican border). He said that the three sectors of water use are municipal, industrial and agricultural. The main features of the chart showed that water use peaked in the 1970s, driven largely by agricultural water usage, approximately 300,000 acre-feet. (One acre-foot is roughly equivalent to filling a football field – minus the end zones – one foot deep with water.) After the 1970s, the amount of water the agricultural sector used declined as the City of Tucson purchased those agricultural lands in Avra Valley in order to gain water rights. The City purchased approximately 22,000 acres in Avra Valley. Municipal water use has steadily increased since 1940 and in the mid-1980s it became greater than agricultural usage. Ralph said that in the mid-1980s, municipalities gained more political power than agriculture as the Tucson area began to become increasingly urbanized. It is projected that municipal use will continue to increase in the future. Total water usage peaked around 1975 at approximately 500,000 acre-feet a year, but is now rising again towards that peak as the City demands more water. In 2000, the total water use was approximately 325,000 acre-feet. Ralph said that industrial use largely consists of the mining industry's ore processing. Mining used little water until the industry boomed in the 1960s; it subsequently peaked in the mid-1970s and has since decreased to a relatively steady level. Ralph said he doesn't anticipate the mining industry to leave the area in the near future. Until the 1990s, most of the total water use was groundwater. In the early 1990s, the City began directly using Colorado River water from the CAP, and then stopped because the difference in water chemistry caused problems in some of the old piping. Currently, CAP water is recharged in large basins in Avra Valley where it is blended with groundwater and pumped out for supply.

Ralph continued with his next slide showing an interactive demonstration that maps the change in the aquifer water table overtime from 1940 to 2000, indicated by color changes in the aquifer map as the water table decreased, red being the most severe. In the 1960s, the water table had declined by 100 feet in Avra Valley due to pumping by agriculture. By 1975, it had dropped to more than 200 feet. In 1985, the aquifer began recovering in Avra Valley due to the retiring of agricultural fields, and had risen to approximately 100 feet. But, at the same time, the aquifer began to be increasingly stressed in the Tucson Basin due to municipal use. There are large declines currently in the water table in downtown Tucson area (where the central well field is) measuring greater than 200 feet. He said that this not only causes higher pumping costs, but also it is not sustainable. This pumping has also resulted in subsidence. In the Tucson Basin, land has subsided in some places between 1 to 4 inches. He said that this has not had a significant impact in urban Tucson to date, but if municipal pumping continues at the historical rate, the rate of subsidence could be expected to increase and the

consequences could be significant. This shifting in the ground could affect not only affect flood runoff patterns, but could also affect sewer systems through infrastructure damage and possibly reverse the flow in the pipes that rely on gravity. He said that differential subsidence could also cause land fissures. Ralph said that while the Tucson community was built on groundwater, there is now a need for a shift to renewable water. He said that possible renewable groundwater resources include renewable groundwater, reclaimed wastewater and additional Colorado River water transported through the CAP canal. The Tucson allocation of Colorado River water is about 136,000 acre-feet a year. Currently the City only uses approximately 1/3 of the total amount of its effluent, while the rest is dumped into the Santa Cruz River and flows away.

Ralph's next slide showed flow charts of how Tucson Water came up with the 50-year planning process. Ralph said that Tucson Water didn't hire a private consultant to come up with the plan, but rather the department created it themselves so they would be familiar with all the inputs. Ralph said that the planning process largely relied on computer-based tools, allowing the City to look at changes in a time frame of weeks rather than months or years. It is also based on scenario planning versus one-dimensional planning, because it is an approach that embraces uncertainty to allow the City the flexibility to adapt to future conditions, needs, and priorities. Because the planning process can accommodate uncertainties, the City won't have to go back to square one if something unanticipated happens. He said that in the 1990s, Tucson Water did one-dimensional planning and when things went wrong after integrating unblended Colorado River water into the system they were stuck. Tucson Water has identified a timetable where key decisions need to be made, rather than making them all at the beginning. For this plan, Ralph said that the department looked at a range of possible futures, and mapped out how each one would happen and assumed that all were possible. He said there were 28 possible outcomes. He said that they evaluated how they would prepare for these 28 futures, and then mapped them on top of each other to see which ones had common plans.

Ralph explained that Tucson Water mapped a long-range planning area with the projected service area to 2050, including not only the City of Tucson but neighboring water utilities. He said that 40 percent of the customers are outside the City limits. He said that at times these customers feel disenfranchised because they cannot vote for change in the City. The map also showed areas of private management areas and other service areas (Davis-Monthan Air Force Base, trailer home parks, etc.). He said that this was done because although these area are planning for the future on their own, they all have to work together in the sense because they all share the same groundwater resources, have similar water resource interests, and are all expected to grow. Ralph also said in some cases, the different jurisdictions share resources, for example the transfer in wastewater between Tucson Water and Oro Valley.

Ralph continued with the next slide with a chart that showed the projected Tucson population and projected increase in Tucson Water customers to 2050. He said the Pima Association of Governments (PAG) and the U.S. Census Bureau provided the population data. Ralph said that the population of the Tucson area is currently 800,000 people and is projected to grow to 1.9 million by 2050. Tucson Water customers will double to about 1.3 million during that period. He said that after 2030, the population growth would be outside the Tucson Water service area. Ralph showed an interactive map that geographically projects by changes in color (red representing areas of the highest population density) where these customers will be living, showing densities increasing in

urban Tucson, and to the south and southeast of the city. Ralph said Tucson Water's projected water demand in 2050 is 250,000 acre-feet per year, an amount double what it is today. The demands include both potable and non-potable water.

Tim continued the presentation with the next slide showing a chart depicting the projected demand increase of water from 2000 to 2050. In 2000, the demand was approximately 125,000 acre-feet per year and it will increase to 250,000 acre-feet. Tim said currently Tucson Water doesn't have 250,000 acre-feet to satisfy that demand. He said that Tucson would need to do three things: fully utilize existing water supplies, acquire additional supplies, and increase the level of conservation. The chart also showed the percentage of all the types of water that make up the total amount of water available, including groundwater, Tucson Airport Remediation Project (TARP) water, Colorado River Water, reclaimed water, and "other" sources. He said that Tucson Water predicts that around 2012 Tucson will be using its full allocation of CAP water. He said the "other" source fills in the gap from 2020-2050 where Tucson Water doesn't have enough water.

Tim continued with the topic of acquiring additional supplies. He said that relying increasingly on groundwater in the long-term is not possible because it would cause further mining of the local regional aquifer. He said that Tucson Water could potentially pump from other areas outside the Tucson AMA and transport the water to the city; some entities in Phoenix AMA are looking at this. He said the department is not counting on this option because not only is it unsustainable, but it localizes the problems of over-pumping in other areas. He said a second option is that the City could increase the use of surface water, by trying to access additional Colorado River water rights. He said that Native Americans currently have half of Arizona's 1.5-million acre-foot CAP allocation, so there is a possibility that municipalities could lease more Colorado River from the Tribes. He said that Maricopa County is interested in this too, and competition over these resources will likely lead to an increase in the price of water, plus Phoenix has more political power. Other potential water supplies include the effluent supply, which is locally produced, even in drought conditions, since we generate it ourselves all the time. This option is used already in Scottsdale.

Tim continued with the slide about water conservation and talked about aggressive demand management. He said that increasing the level of conservation could control demand, which could increase the relative supply of water. But, he said, the City cannot conserve their way through the shortfall. Rather there needs to be a three-pronged approach: fully utilizing supplies currently available, acquiring additional supplies to augment what we have, and implementing a more aggressive conservation program. Tim said that water waste ordinances, consumer education, and assistance/incentive programs could be expanded if the community wants to invest in it – that these are lifestyle decisions. The City is also setting up a conservation task force to interact with the public to see what conservation approaches, such as rainwater harvesting and using gray water, are more attractive to the community. He said that so far the community has done volunteer conservation and that the City hasn't mandated conservation yet.

Tim continued by saying that the community will have to make decisions soon regarding the use of Tucson's CAP water. The first question is do we want to control the amount of dissolved minerals in the groundwater/CAP water blend, or do we want to let them rise to a natural equilibrium. He said that Tucson Water can currently provide the blend at current levels and up to a 450-milligram per liter (mg/l) total dissolved solids (TDS) level

for some time, but the recovery wells are now pulling up more CAP water which is increasing the mineral content of the blended supply. Around 2010, he said that we may reach 650 mg/l TDS in the blended water. He said that the community might want to build a desalinization plant to be able to maintain the mineral level in the water at about 450 mg/l TDS indefinitely and pay the higher treatment costs. He said that the community might be unwilling to pay the cost of enhanced treatment and will settle for water with a higher mineral content. He said that if the community wants mineral control Tucson Water could do that. Tim said the pluses involved with a new treatment plant include improved water quality, which not only is a taste preference to some people, but also is easier on home appliances. He said that the minuses involved would be that it would be expensive for non-potable uses, there would be high revenue needs to treat water (some of what is not even used for potable reasons), there would be a greater land/environmental impact (up to 3,000+ acres would be needed for the brine evaporation ponds), and there would be a loss of a water resources (about 15 percent of the water is lost to the reverse osmosis process). He said that the concentrated brine then has to be disposed of in a landfill. Tim said the pluses of just blending CAP water with groundwater and letting the TDS level rise include there would be lower revenue needs, less of a land/environmental impact (no brine evaporation ponds), and no water resources would be lost in the reverse osmosis process. The minuses involved with this choice include perhaps a poorer taste and that the water would be harder on home appliances.

Tim said the second question facing the community involves how do we want to use our Colorado River water. He said that Tucson will be using the last 1/3 of our CAP allocation in the future, and this is the time to decide the primary treatment of that water. He said the community will need to decide whether to continue to accept the recharge of CAP water and the natural treatment of the water through 300 feet of soil filtration. Tucson Water is doing this now with all of the CAP water currently utilized. Tim said that an option is to upgrade the treatment plant and treat the water. It may be cheaper to process additional CAP water through a treatment plant rather than through recharge. He said the pluses of just recharging all the CAP water is that it builds upon the successes Tucson Water has had with natural water quality improvement because recharging the water through soil gets out the organics, so only chlorine must be added later to disinfect the water. He said that this limits the disinfectant byproducts produced. Another plus is that Tucson Water can bank CAP water underground so the community has it available to use in dry years, which improves the reliability and flexibility of water decisions. He said that Tucson has the lowest priority in the state to receive their CAP allocation in years of drought. He said that the minuses with only using recharge is that there might be greater revenue needs to build and maintain more recharge facilities, and that there would be a greater land/environmental impact when those recharge basins are built. But, he said that Tucson Water is willing to blend the recharge basins with habitat enhancement. He said that pluses involved in the option to treat some of the CAP water and restore the treatment plant include a potential to have lower revenue needs and it would have less of a land/environment impact. The minuses with the treatment facility include less reliability and flexibility, less water quality, and the presence of disinfection byproducts. He said the question is not if the Colorado River will run into shortage, but rather it is when. He said that with recharge, the recharge source could stop but the well field could keep on pumping, and the recharge could be made up at another time.

Tim said that the next question for the community to decide within the next 10 years is should we continue riverbed effluent discharge, or do we put effluent discharged to the

channel into full use. Currently, 2/3 of the effluent is discharged into the Santa Cruz River where it flows away downstream. Should we make use of this supply for Tucson since Tucson residents and businesses produced it. If we wanted to have full use of effluent water, what do we want to do with it. If we do not want to drink it, we could put it in a recharge project away from our wells, but again, this not where we are pumping. If we recharge in one place and pump in another, it will cause groundwater mining and will likely lead to additional subsidence over time. This would only be a temporary solution. Tim said that the pluses of maintaining riverbed discharge include obtaining some recharge credits, and maintaining the narrow riparian corridor. He said the minuses include letting wet water leave the Tucson Water service area (that there will be a wet water shortfall by 2020.) He said the pluses of recharging the effluent away from the recharge facilities include a delay in wet water supply shortfall because it would retain the wet water in the Tucson Water service area, and Tucson would obtain 1,000 recharge credits. He said the minuses of this option are that it is not hydrologically sustainable, there are high costs without wet water benefits, and that there would still be a wet water supply shortfall in 2020.

Time said another option for the community to decide is whether to put effluent into the blended water supply. He said that after we treat the effluent to a very high degree, we could then recharge it and eventually recover it through wells as part of the groundwater blend. He said that recharge of highly treated potable effluent could improve the quality of groundwater because, as the Colorado River water increases in mineral content, adding treated effluent with reduced minerals to the recharge blend could lessen the higher mineral content associated with CAP water. He said that the pluses of adding treated effluent to the blended water supply include wet water supply through 2050, a use of the wet water within the Tucson Water service area, natural water quality improvement, regional salinity control and improved reliability, and flexibility. He said the minuses of this option include gaining public acceptance, more land/environmental impact (for recharge basins), the water must be treated for emerging contaminants, and will have higher revenue needs for remodeling treatment plant and brine disposal evaporation ponds.

Tim reiterated that the era of groundwater mining is over. Tucson has had years of groundwater mining, which has led to subsidence in some areas. He said that the City could not continue to ignore the situation because the problems will only get worse. Laws won't allow for growth that relies solely on groundwater. Tucson Water's goals for the future are to achieve sustainable groundwater pumping while supporting a shift to renewable sources of water.

Tim also noted that the era of inexpensive water is over. We expect increasing costs to obtain/use renewable water supplies. The cost of groundwater is cheap because the only cost revolves how much it costs to pump it and build pipelines to deliver it to customers. CAP water is more expensive. Effluent will be more expensive due to treatment costs. Tim stressed that the cost of water will go up. Tucson Water revenue will be needed for all future investments, and could amount to a 3-4 percent increase in water prices per year. If the community wants to keep mineral content low in CAP water, it will be even more expensive. Such a decision would see about a 17 percent increase in annual water prices within the next few years. Tim said that some of these costs could be recovered through water rates paid by current and future customers and through development and water resource fees. Tim said that we already do not have enough groundwater to support our community and already we should be fully implementing all

of our Colorado River water. One issue is the extent to which current consumers should be responsible for paying these long-term costs versus how much new development should contribute toward these future costs. He said they are considering a water resource/development fee to raise revenue to pay for the supplies we are developing to meet the growth that is coming.

Ralph and Tim concluded the presentation and opened it up for questions and discussion. Ralph projected a map of the current and future Tucson Water facilities and Avra Valley. Trevor said that the TAC has a fairly good sense of where the current facilities exist. Ralph pointed to CAVSARP, and then pointed out where the new recharge basins might go, a project called SAVSARP. He said that the first phase of SAVSARP would be to construct a 45,000-acre facility that will provide 100,000-acre feet of water per year (based on the current information that they have.) He said that the idea is this would give Tucson the ability to take entire Colorado River allocation and recharge it, then recover and use it. He said that the basins would also have room for any excess CAP water that is available. He said that this water would act as a "savings account" so when there are shortages in the future, Tucson will have that water beneath their recovery well fields and the ability to provide it to the community. He said that this would not provide water for a prolonged drought, in which Tucson Water would have to make some adjustments.

Ralph continued with the subject of mineral control. He said that desalination/demineralization poses problems of what to do with concentrated brine waste stream. He said that the best option is to use evaporation ponds, but that it would be expensive and require land. He said this is why the City is holding onto land so tightly in Avra Valley. He reiterated that the current TDS is about 450 mg/l, and that CAP water is 650 mg/l. He said that there is a trend of communities looking towards poorer quality water resources that they had ignored before. He said that to treat that quality of water through reverse osmosis (RO) is cheapest for inland cities to use brine evaporation ponds. He said that in the last ten years, the technology has improved and dropped the cost, so the membrane filters are better and cheaper. He said that for most communities, evaporation ponds are a very expensive endeavor because land has to be purchased. But, he said that Tucson is lucky because the land has already been purchased, thus the option to treat brine through evaporation ponds will not be as expensive for the community.

Mima asked Ralph what he sees as the worse case scenario in terms for how much land would be needed. Ralph said if there is the need to do the brine evaporation ponds, 6,000 acres would be needed, plus more for treatment plants and other infrastructure needs.

Trevor asked what is the TDS level in Phoenix water. Tim said it is approximately 650 mg/l. Ralph said that Phoenix has a double whammy in terms of minerals in their water, because both the CAP and Salt River have increased in salinity over time. Ralph said that there is a Central Arizona Salinity Study is going on, which is being led mainly by Maricopa County although Tucson is also involved.

Marit asked where the excess CAP water is going. Ralph said that the excess CAP water is going into the state water bank, where they are taking the excess water and recharging it in various places around the state; he said that some of it is being recharged in Tucson, Marana and at Pima Mine Road. Ralph said that by 2016, Tucson

Water wants 600,000 acre-feet of CAP water in the water bank in Tucson. Ralph said that Tucson is different because we are recharging the water near where our pumping fields are, instead of in the middle of nowhere like other recharge facilities. Ralph said that this is a hydrological sustainable plan. Ralph said that this is called “wet water management.” Tim said that before the water bank was established, California was talking the leftover Arizona allocation. Tim said that it took a few years for the water bank to get up and running, but in the last 4-5 years it has been able to store all the excess CAP water with the Arizona allocation. Ralph said that by Arizona taking back its legal allocation, it has forced California to make tough decisions about its water use. He said that it took this crisis for California to change, for instance water for the Imperial Valley is now being directed for municipal use. Ralph said a situation like that could happen one day with the agricultural water rights along the Colorado River in Arizona. He said that in the future, Tucson might be interested to negotiating with them to get their water rights, but it will be interesting because they have senior water rights to the river.

Rich said it has continually been water crises that have always influenced development in the Southwest for thousands of years. Although, he said that he doesn't think the public can perceive what a crisis would be like, thus has the inability to plan for one. Ralph responded that he believes the Tucson community is a bit different. This community is very interested and more environmentally aware (although you might not think they are) then they are in other communities. He said that the people who have lived here for a long time are very aware. Ralph said it is not as much as being without water, but we need to think about the future where water constrains are going to happen. Ralph said that other changes would be made if water constraints get tight, that no one is going to go without water.

Rich brought up the fact we are not seeing even the mean amount of water flow in Colorado River, and for the last several decades we have been below the average. Ralph said that Phoenix based their development on Colorado River water and the Salt River and did not envision that a drought would happen in both areas at the same time. Ralph said that the regional aquifer could support Tucson for a limited amount of time. Ralph said that the CAP allocation could come and go, but effluent will be constant. Rich asked about desalination of ocean water and pumping that into Tucson through a pipeline. Tim said ocean desalination is not in the 50-year plan because we first need to exhaust in our resources. Tim said that could be in a longer-range plan and could happen two ways. One was would be to build a salt-water desalinization plant for another community and then use their water allocations that are closer. The other possibility would be to build a desalinization plant and then pipe the water to Tucson. Ralph said that it isn't about running out of water as much as running out of the ability to pay for it. He said that it comes down to how much is the City willing to pay for the next increment of water. He said that future generations might be willing to pay the cost though.

Dennis asked why there was no mention of private wells in the Tucson Water presentation. He said he assumes this is because their use is unregulated and therefore is no reason for them to be conservation minded. He said he is curious how many exist and what their impact is on the overall water supply. Tim said there are 1,000s of private wells and it is hard to quantify the impact because there is no reporting going on. Tim said that it is a concern because they are drawing from the same aquifer, and especially because there is a proliferation of private wells. He said that there were cases of some high residential water users who after received high water bills after Tucson Water set

the new rate change paid to drill their own well, while still getting water from the City. Ralph said that people with the money could afford to build an oasis at their homes. Dennis said that although Tucson Water may be laying out the best plans, there would still be a significant percent of the population that is not going to participate in the plan and will continue to draw on the water supply with no consequences. Tim said yes, and added that would actually benefit from the actions Tucson Water is taking. Dennis wonders if there is any discussion about the possibility of regulating all these wells. Ralph said no state politician would touch the topic of regulation because water is considered a property right. He said that the law allows people to have small private wells, 35 gallons per minute (gpm), all over the place. He said that the private wells are not considered a big concern to a large municipal water provider like Tucson Water, although some areas they do cause a significant affect, especially in the Tanque Verde region where there is a small, narrow aquifer. Ralph said Tucson Water couldn't tell those well users what to do because they have legal right to the water. He said for the authority to change would require a change in State Law. He said that because it is a private property owner issue, there would not be much support from the lawmakers.

Trevor asked about effluent discharge into the Santa Cruz River and wondered if it would be possible to discharge it into the streambed upstream rather than at Prince Road. This way, he said, the City would have habitat restoration and recharge. Ralph said that there is some laws prohibiting putting effluent into areas where it hasn't traditionally been. Ralph says when talking about water supply constraints, it is important to link water supply with restoration, and that we need to tap into the Army Corps of Engineers (ACOE) and creative solutions. Ralph said that effluent is becoming very valuable, and it is too costly to not find something to do with it. Ralph said that a jurisdiction that creates effluent isn't going to want to lose it.

Guy asked if hyporheic organisms are present in the Tucson water supply. He said they have been found in the groundwater of the Gila River watershed. Ralph said he does not know.

Ann said that she is assuming that renewable groundwater is the net natural recharge number for the Tucson AMA is about 50,000 acre-feet. Ralph said that the 50,000-acre feet number was gotten from a preliminary numerical analysis that looked at how much could be pumped without exacerbating groundwater levels across the large area. He said that the biggest point for Tucson Water is to get renewable groundwater acknowledged under State Law. He said that for a municipal water provider who as an assured water supply designation, it means that under current State Law once we exhaust our groundwater credits, which could possibly be 50-70 years from now, we will not be able to pump groundwater any more. He said that the only groundwater users left would be agriculture, mines, and small private wells. He said that it would be very difficult for water providers, when groundwater levels across the state start rising, and municipalities will not be able to utilize groundwater as a source of supply. He said that this might not happen until 2025 or 2030, but it will become a critical problem. Rather, Ralph said Tucson Water is proposing to commit pumping groundwater at a hydrologically sustainable rate based on our calculations, whether renewable groundwater exists legally or not. He said Tucson Water would like the Arizona Department of Water Resources (ADWR) to engage in a dialogue with the department and other water providers to come up with a definition of what "renewable groundwater" is and then proceed to quantify it. He said that water providers would like to have a certain amount of groundwater in which they could rely on indefinitely. Ralph said that

with almost ½ of the CAP allocation that the City is using right now and the groundwater, we still need to wean ourselves off of the amount of groundwater that we are using already.

Ann said that 50,000-acre feet of water a year is roughly one percent of the rainfall that falls in the Tucson AMA. She said that the Santa Cruz River at the Congress Street Bridge is running about 38,000 cubic feet per second (cfs) earlier today. She said that if you average that out over an hour (and she admits that it only ran at 38,000 cfs at its peak flow, but she used this number for her example), 3,000-acre feet of water that just passed the Congress Street Bridge. She said that from the calculations that we have recently done with an Environmental Protection Agency (EPA) grant, about 80 percent of potable demand per year for one square mile within the city could be met by collecting groundwater on-site. She said that about 40 percent of the potable water demand is for outdoor water use. She said that when you put all the facts together, we are sitting here today watching a bunch of clean water, that has been delivered to us for free, run-off today while tomorrow we will turn on our pumps and water cactus. She questioned the logic of desalinizing water in California and pumping it all the way to Tucson? She said that she realizes that the City cannot meter for rainwater, but she said that in terms of the conservation potential in the water projection, the department hasn't even scratched the surface of it. She said the inability of Tucson Water to include the potential for water harvesting into the 50 year plan seems like a disconnect with reality. She said that she was glad Bruce was taking notes on what she was saying. Ralph asked her to be on citizen conservation task force. Ann said that she would be interested to be a part of it. Ralph said the idea of doing rainwater catchment in urban areas is a great idea.

Ann said that the other great idea for Tucson Water is that if the City managed local detention basins and got the rainwater recharged, they would have a very good rationale for going to ADWR and saying, "our renewable groundwater supply is x amount because we just harvested it off roofs and put it into the ground." She suggested that argument could be used as a tool with ADWR to try to quantify how much the groundwater balance would be. She said from a riparian restoration standpoint, we don't want the City to continue pumping groundwater because in x thousands of years the groundwater will rise and the Santa Cruz River will flow again. She said that on the other hand, with the runoff coefficient 25 percent (she guessed) off of bare dirt, once the ground is paved the coefficient becomes approximately 90 percent. So, she mentioned that the City is creating water that has not been there before because rainwater is not going into the soil any more, and is rather running off and creating a peak flow. She said that she was told that the peak flow on the Santa Cruz River today is near the 100-year flood peak flow level, near the 1993 peak flow. She said that the City is creating a 100-year flood every ten years, which is directly related to rapid urban rainwater runoff. She said that all these things could be put together so we can have our habitat and our water supply too. She said that the good thing about leaving a good portion of the groundwater in the ground is that when push comes to shove, and there is the grandmother of all droughts, that at least you can drink that groundwater and people only need two liters a day. She said that when Ralph said that Tucson is never going to run out of water, he is speaking to that, because no, no one is ever going to die of thirst in Tucson, Arizona.

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\* August 23, 2005, the day of the TAC meeting, received between 2.5-4 inches of rain in a matter of hours. The storm set the "wettest day in Tucson" record and caused severe flooding in the Santa Cruz River. It is this flooding that Ann Phillips referenced.

Ann said that there is a win-win-win situation possible both environmentally and from a water management standpoint. She said that if Tucson Water wants to dilute all that salt that is imported in the Colorado River water, why not use the rainwater. She said pump all the rainwater to the recharge basins and dilute it there. She said that distilled water is falling on our heads today. She said that since Tucson Water is talking to the community anyway about all their “draconian,” expensive, low-quality alternatives, that use fossil fuels by the way, she thinks it is time to expand the dialogue about including conservation and rainwater harvesting. Ralph said he appreciated Ann’s comments.

Leslie added that during these discussions it is important to consider what is possible under State Law. She said that at the last TAC meeting Frank Sousa (City of Tucson – Transportation) said that in order to capture City runoff there might be a need to get a surface water permit. Ralph said that it would be impossible to use the water today (there were record levels of water in the river on this day) in the Santa Cruz because trying to capture it would erode the entire infrastructure. Ann said that she was not talking about trying to redirect the flow once it was in the river, but rather talking about capturing the water at headwaters, which in this case are the individual rooftops, streets and parking lots.

Tim said that the Arizona Hydrologic Society 12<sup>th</sup> Biennial Symposium on Groundwater Recharge took place in Tucson in June. (see the website: [http://www.azhydrosoc.org/symposium\\_recharge.html](http://www.azhydrosoc.org/symposium_recharge.html)). He said that the symposium is held every two years and that the topics always change. He said that this year there were two talks on neighborhood recharge of rainfall. He said that there have been studies done, but there are legal issues that have yet to be resolved. Tim said that the community task force could bring topics like this forward and he says there will be a lot of dialogue just on that topic. He said there is going to be a lot of dialogue on the decisions, but as Tucson Water moves forward to do recharge, there will also have public comment/open houses so there can be detailed discussion. He said that in terms of the conservation discussion, there is definitely a lot of people involved and have a lot of great ideas. He said that the voice of the conservation task force would be more visible as Tucson Water moves forward. Ann said that her contention is that if the 40 percent of potable water demand could really be replaced, then Tucson Water is using the wrong demand curve when they are calculating what their trade-off points are, what your costs need to be, how much desalinization they need to do, etc. Tim responded by saying that is why Tucson Water is not making all the decisions now, rather waiting until we need to. He said that in five years from now, Tucson Water is going to be much more smarter, and thus will be able to adjust, for instance of some successful conservation program happens. He said that is why their 50-year plan is a draft.

Ralph clarified by saying that the projected potable water demand curve was based on current gallons per capita per day (gpcd) that people currently use, on average, in Tucson. He said that it based on a moderate conservation program that has been in place for 25 years that is probably the best program in the Southwest. He said that the assumption from a planning perspective is to assume that people will continue doing what they are doing in the future. He said that this does not mean that Tucson Water is saying that people shouldn’t conserve more; we just try to get a sense of what we know the community will be willing to accept now. He said that there is the possibility that people will reject higher levels of conservation because they feel that it is hurting their preferred lifestyle. He said that Tucson Water is not in a position to advocate and tell

people how to live their lives. He said that our role for us is to do what the community decides, not to tell people how they ought to live.

Ann said no, what Tucson Water is doing now is telling the community that they might get to change their lives by paying a lot more money and drinking treated effluent. Ann said that one other point is that Tucson Water is still talking about treating water to flush in toilets. She said the notion of having dual streams into houses, since Tucson Water already has dual service streams, really could save everyone a lot of hassle and money.

Ralph said that as water planners, they just look at the total demand number, rather than the percentages potable and reclaimed. He said that if the community decides to go to a dual system, then that could be embraced into the plan. He said this could be a great possibility in areas that are just growing or will grow in the future, but said that it would also be very expensive. Ann agreed, but when compared to creating a brine stream verses a dual system, it might not be as expensive.

Ann said that in Sierra Vista, the Bureau of Reclamation is putting out an RFP right now to find a way to recharge 7,500-acre feet of rainwater of stormwater management to benefit the San Pedro River. She said that this massive scale rainwater harvesting for riparian habitat is starting to be done.

Leslie said she wants to bring the conversation back to the HCP. She said that one role the TAC could take is to provide recommendations to Mayor and Council about the Tucson Water plan. She said that these are also issues that could apply to the HCP planning areas. For example, Leslie said the TAC could "recommend" stormwater harvesting in Southlands, and that it may be possible because we are so early into the development process. She said that this could be a way to feed comments, such as Ann's, into the draft HCP as well as other planning processes such as the "Lee Moore Watershed Basin Management Study" and the "Greater Southlands Planning Study." She said that there also might be good voluntary recommendations that the TAC could suggest that would go above and beyond the requirements of the HCP to encourage people to do stormwater harvesting on their own properties. And perhaps there could be incentives from the City for people to do these things. She suggested that perhaps the TAC could recommend that the City offer incentives to encourage people because it would result in having a "more environmentally-sound community."

Ralph said that the TAC is a stakeholder in the Tucson Water planning process. Trevor asked where in the water plan is there discussion of the HCP. He said that when he read it he thought it said that Tucson Water wrote that they don't believe the HCP will provide enough coverage for infrastructure and development in Avra Valley. He said he was disturbed for two reasons. He said that if a large number of acres are going to need to be mitigated (for evaporation ponds, etc.) then he said now is the time to do that while land prices are relatively cheap. Also, he said that Tucson Water might want to think for Avra Valley to sign onto Pima County's Conservation Land System (CLS) and their guidelines. He said the reason he said this is that Pima County has all the mitigation they need for basically the next 20 years of development. He said he didn't want the City to give up on coverage for Avra Valley lands that easily because there are options.

Tim he said that Tucson Water is in the process of developing the SAVSARP recharge facility master plan as if it may be built in full, including the environmental issues such as mitigation and wash protection. He said that there is an opinion that there is enough

offsite mitigation for habitat. He said that where the hydrologists want to put the recharge pit is conveniently located in poorer quality habitat. He said the area near Black Wash, where there is nice habitat, is an area Tucson Water would rather stay away from anyway. He said there is a nice connection between what Tucson Water can do to mitigate SAVSARP and maintaining habitat connectivity. Trevor said that because the City owns 22,000 acres in Avra Valley, the mitigation might not be a problem.

Ralph said he couldn't stress enough the challenges facing Tucson Water because there is so much uncertainty in what the community wants to do. He said that he thinks there is some level of flexibility to reserve some of the highest value lands. Trevor said that the same approach is being taken in the Southlands because it isn't being developed for twenty years, so we are planning blind in a similar way.

Tim pulled up Chapter 8 of the water plan (the one Trevor referenced) and read a portion of it aloud to the group. The main point was that Tucson Water feels that the HCP may not cover future endangered species, thus there might be more species mitigation in the future that Tucson Water would have to mitigate for. Leslie said that they did consider species that are likely to be listed in future, for example, the snakes. She said that they have at least made an attempt to include anything that is likely to be an issue during the planning period. Trevor said that if the HCP is a 50-year permit, it could potentially cover all the activities Tucson Water would have to do in Avra Valley.

Leslie said that the City is considering a 50-year permit for the Southlands. She said that it might be in Tucson Water's best interest to also have a longer permit, assuming the HCP addresses endangered species mitigation while maintaining the flexibility the City will need. Leslie said that this is entirely possible to do so. She suggests that the TAC might be able to do is look in Avra Valley on a parcel-by-parcel basis to identify the priority habitat areas. A list of mitigation guidelines could also be created, so if a specific parcel needs to be developed, it lists what Tucson Water has to do. She said this way we can make sure it fits in with the big picture and the conservation system makes sense, while giving the City the flexibility they need.

Trevor asked if some of the Tucson Water lands are pristine, or if they all old farmlands. Ralph said most of them have been previously irrigated. Trevor asked if Tucson Water has mapped out vegetation on their lands, indicating where natural and disturbed vegetation exist. Ralph said that the only one they have is the one that ADWR created.

Leslie she is currently working on a map with Tucson Water to try to identify vegetation areas within a parcel (riparian verses upland, natural verse disturbed drainages), and then trying to fit the modeled habitat and/or maps for individual species into this map. She said the goal is to prioritize certain sections and/or create linkages to other lands. She said that a lot of it depends on what Mike Ingraldi and Phil Rosen find out in Avra Valley this summer. Trevor asked Leslie if this thought process is also looking at private, state, county and federal lands in the region. Leslie said the recent iteration of the map is looking at ownership, including Pima County's possible acquisition lands, where development and infrastructure might go in the future, and quite a range of other factors. Trevor said this is something that Leslie is going to bring to TAC when they talk about Avra Valley. Leslie said yes, but that they have had some trouble having a consistent GIS person.

Rich asked Tucson Water about the quality of the evaporated brine salts, and assumed salts accumulated from reverse osmosis would be of poorer quality from evaporating salt water because of pharmaceuticals, etc. that are in the water. Tim said yes, but that the concentration of our salts would be much lower than ocean water. Rich said that brine ponds have been found to provide great bird habitats, and wonders if brine ponds would address the endangered species issues in the HCP. He said if there would be a constraint in the chemistry of the brine ponds that would discourage the brine ponds from becoming a public recreation area. Ralph said yes, but there might be opportunity for other recreational options. Ralph said in this time of heightened security, it has really hit the water business hard.

Ann said that the CAP brine is higher quality than effluent brine. Trevor said that Colorado River water is still coming from sewers all along the river.

Leslie asked if anyone knows of instances of recharge basins/brine ponds incorporated with recreational facilities that complemented habitat and that were successful; she encouraged any case studies to be brought to the attention of the TAC and Tucson Water.

Ralph said that the next Arizona Hydrological Society recharge symposium will be in Phoenix in 2007 and will be an international conference. Tim said that usually speakers come from the Southwest. Trevor asked if there is a national group of recharge hydrologists. Ralph said there is an international recharge group, and that they will actually have conference the same time in Phoenix in 2007.

Rich talked about the nice parks Phoenix built with detention basins, but the mosquito scare hit the parks hard.

Ralph said that Bruce Prior is Tucson Water mosquito abatement person. He said that Sweetwater Wetlands was built before the mosquito scare and the State wanted to shut it down. He said that because of Bruce's efforts, the City was able to save it. Trevor said that mosquitoes are tough to deal with because they derailed the Agua Caliente restoration plan. Trevor said Elizabeth Willot, mosquito researcher at the University of Arizona, just published a paper on conservation and mosquitoes.

Ann said in terms of water harvesting, it is important to get water underground as soon as possible, same as for detention basins. She said that ironically, when you put plants in a detention basin it is going to drain faster than slower because the plants prevent a hard clay layer from forming in the soil.

Ann said that the recent stormwater probably brought up biomat on the bottom of Santa Cruz River, allowing water to percolate quicker. Trevor asked how long it takes the biomass to build. Tim said it takes a few months, as it gradually slows down infiltration.

Ann said she read in the newspapers that a new water city group is forming in Tucson to deal with the City water plan and to encourage more regional thinking to go on. Tim said he thinks he has heard about it, and it might be a call out for interest from the Southern Arizona Water Users Association. He said that he believes their plan would be to make presentations to the different water service providers in each jurisdiction about the potential for regional perspectives. Ralph said that in terms of acquiring additional water supplies, there is potential for regional coordination instead of competition.

#### **4) Call to the public**

A call was made, but no questions or comments were posed.

#### **5) Next Steps/Future Meetings**

Leslie said she is working with the City Planning Department to take the two reserve concepts (watersheds vs. Harris riparian) and mapping them out and calculating acreages. She said they are also looking to see how this would tie into public entities in the area. She said that, at the September 28 meeting, she would have maps prepared and acreage calculations.

Leslie said that SWCA is going to go back through all the meeting minutes and try to pull together any TAC recommendations and suggestions that were raised at previous meetings. She said that SWCA would send out a revised version of this summary in time for the September 28 meeting. She said it would also be beneficial to go back to the goals/objectives of all the species and review them before the next meeting. Leslie said if anyone has other suggestions and/or information requests, SWCA would try to get these documents to you as soon as possible. She said she would like to see a good basic set of comments by the end of September.

Leslie gave an update on the SAC. She said that the SAC has been talking about implementation and funding mechanisms for the last few months. She said that the conversation largely shifted to funding because the SAC cannot talk about implementation without having the TAC's conservation recommendations. She said that after three meetings dedicated to funding discussions, she is putting together a set of questions about the funding tools and sending it to the City Attorney's Office. She said, from their responses, a summary of opportunities, constraints and equity issues for each tool would be created. She said that the goal is to have a set of possible funding tool options so that when the TAC makes their recommendations, the SAC is ready. She said the summary sheet would hopefully be ready by the end of September as well.

She said she is trying to make the joint September 6 meeting as productive as possible, so she asked the TAC to suggest agenda items for possible discussion topics.

Rich suggested that it would be helpful to get a summary of what the SAC has said are the primary funding sources, and how tight those budgets are. Leslie said she can send out the last three sets of the SAC meeting minutes so the TAC gets an idea of the discussions that the SAC has been having.

Leslie noted that this is her last meeting as a consultant with SWCA. She said that she has accepted a job with the City as the Environmental Planning Manager. She will continue to work on the Tucson HCP in her new role within the City.

