The visitor logs showed that 16,150 non-resident visitors traveled to the Preserve in the twelve-month period from June 2000 to May 2001. It was estimated that one in five visitors did not sign the visitor book, resulting in a visitor estimate of 19,380 for the period.

Visitation in the early 1990's was as high as 28,000 at the Ramsey Canyon Preserve (Crandall, Leones, and Colby 1992). Observers knowledgeable about visitation patterns suggest that the stock market decline and its financial ramifications particularly on the retired population of visitors, and the introduction of an entrance fee at the Preserve in August 2000 have contributed to the more recent, lower visitor numbers.

Estimating an annual visitor count for the SPRNCA proved far more challenging. No visitor records are maintained for the SPRNCA. In addition, the San Pedro House access point (the collection point for the purpose of this study) represents just one of the numerous access points to the 56,000-acre conservation area. To provide some estimate of total annual visitation at the site, the daily visitor counts recorded during the survey collection days were compared to the more formal visitor records maintained at the Ramsey Canyon Preserve. The survey records indicated that the visitor count is similar at both sites, resulting in the estimate of 19,380. However, it should be noted that visitors entering the SPRNCA through other access points have not been recorded. Key informant estimates suggest that the visitation through other access points could account for a third more visitors (5,814 visitors). The visitation at the SPRNCA was therefore estimated at 25,194.

To avoid double counting visitors frequenting both sites, the total visitation estimate was adjusted. The adjustment reflected the survey results that 50% of the total visitors traveled to both sites. Total non-resident visitation estimates for both the Ramsey Canyon Preserve (19,380) and the SPRNCA (19,380 plus 5,814) were therefore adjusted downward to 31,977 for the year June 2000 to May 2001. This number was then used to estimate the aggregate monetary willingness to pay for riparian area preservation. The aggregate monetary willingness to pay by the defined sub-set of non-resident visitors was $2,536,095.

Given the variability in visitation patterns since the early 1990's, the estimated WTP was also calculated using a visitation range. The low estimate (25,582) represents a 20% decrease in visitation over the estimate from June 2000 to May 2001. The high estimate (38,372) represents a 20% increase in visitation again over the June 2000 to May 2001 estimate. The aggregate monetary willingness to pay for riparian area preservation in the form of a one-time contribution to a non-profit foundation was $2,536,095, with a range from $2,028,908 to $3,043,283.

6. The Policy Options

The federal government, states, organizations and communities have a number of legal, regulatory, and other strategies they may consider in order to protect riparian areas. The primary objective of this analysis is to review these protection mechanisms and assess their applicability to preserving the ecological integrity of the riparian areas of the Upper San Pedro River Basin. Theoretical investigations of policy instruments led to the definition of three broad categories of policy instruments spanning legal, institutional and community initiatives. The categories are command-and-control (CAC), incentive based economic instruments, and cooperative/suasive strategies. This analysis reviews the theoretical context and analyzes the mosaic of instruments policy makers can evoke in their attempt to create a successful governance structure to protect riparian resources of this basin.

6.1 Policy Instruments:The Theoretical Categorization

Three broad categories of policy instruments spanning different legal and institutional settings are available to policymakers attempting to manage riparian area water needs in concert with other water users. The categories are command and control (CAC) regulatory instruments, incentive-based economic instruments and cooperative/suasive strategies (Figure 6.1). In some cases the instruments overlap between categories, particularly those with regulatory and market-based economic characteristics. Traditionally, CAC and incentive-based economic instruments have been used

independently. In a more recent approach, policy-makers have begun to utilize a mix of policy tools, sometimes spanning all three categories.

6.1.1 Command-And-Control Strategies

The command and control approach is based on legislative and regulatory provisions, and is implemented through directives from regulatory authorities in order to achieve a socially desirable objective. The command-and-control policy approach has been criticized in a variety of contexts as being overreaching, intrusive, and unnecessarily costly in achieving environmental objectives. While the criticism that some CAC approaches are quite crude and excessively costly, in reality the CAC approach encompasses a very broad and diverse set of regulatory techniques and the dividing line between so-called CAC and incentive-based policies are not always so clear. In addition, incentive-based economic policies can be integrated into the more traditional standard-setting CAC framework offering an advantageous blend of policy instruments. The blend of CAC and incentive-based economic instruments offers the potential of obtaining the management objective with less-obtrusive flexible compliance mechanisms.

6.1.2 Incentive-Based Economic Strategies

Incentive-based economic strategies operate through market processes and other financial mechanisms offering adaptive choice and decentralized decision-making. The instruments signal resource scarcities to users, creating incentives to alter individual decision-making. Water resources, for example, can be exploited by users often at little or

no cost, leading to depletion of the resource. Incentive-based economic systems can induce more conservative behavior and the reallocation of resources among users without top-down directives.

Incentive-based economic instruments are most often touted on the grounds of their ability to harness economic gains. Efficiency gains are derived from a trade-off between the value of economic damage potentially inflicted on the community by human activity and the costs of preventing, mitigating and remedying such damage. Achieving an efficient solution requires that the sum of these two costs be equated with the marginal costs of the environmental protection objective. Incentive-based economic instruments, in theory, are capable of achieving this condition.

Despite the theoretical advantages of incentive-based policy instruments, practical limitations exist. Incentive-based economic instruments do not guarantee the attainment of management objectives. Moreover, in many cases incentive-based economic instruments are reliant on a well-functioning market that can be burdened by high transaction costs, few participants and other challenges. Spatial differentials and costly and administratively burdensome procedures also challenge the more widespread use of incentive-based economic instruments.

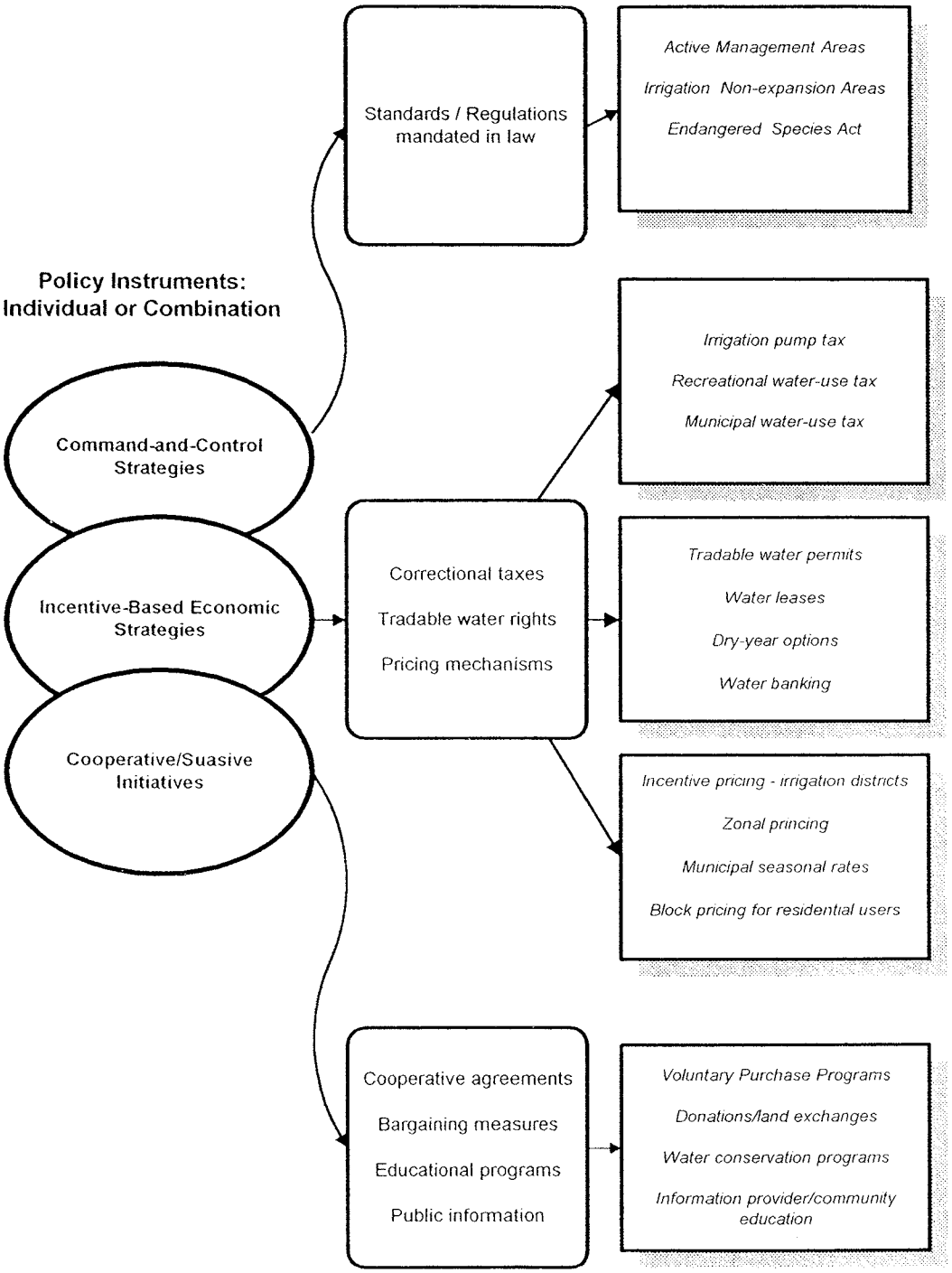


Figure 6.1. A Summary Presentation of Policy Instruments

6.1.3 Cooperative And Suasive Strategies

Cooperative and suasive strategies include voluntary bargaining, education programs and cooperative agreements. Such strategies can offer information, facilitate communication, and provide training programs. Cooperative and suasive strategies are an attempt to resolve conflicts at more localized levels, avoiding more intrusive top-down interventions. Cooperative or suasive strategies can serve to educate all parties and encourage consideration of factors normally not addressed in exclusively economic decision making. All parties should be better equipped to consider the system-wide, economic consequences of more sustainable practices and methods, and to balance these considerations with the alternatives of not reaching a cooperative solution.

In the water arena, cooperative and suasive strategies are an attractive mechanism that can be used by policymakers when all parties see that it is in their best interest to avoid costly and prolonged litigation. Communicative strategies are more likely to occur if legal standing has been established for environmental concerns. When legal standing has been established, environmental interests have the bargaining power to bring other parties to the negotiation table in the hope of finding a mutually beneficial compromise.

Agreements formed under a cooperative and suasive strategy can be legally binding, with obligations for both parties, but they may also be non-binding. An "agreement in principle or memorandum of understanding" is an example of a unilateral commitment recognized by public authorities. Such agreements can bring about effective

measures in advance of legislation, and thus reduce the volume of regulatory and administrative actions. Clauses defining "best-effort" and quantified targets can improve the transparency and credibility of cooperative and suasive agreements. Third party verification as well as publication of the agreement is recommended (Golub 1998). Water conflicts for non-consumptive uses such as instream flow requirements are suited to cooperative and suasive strategies and resolutions. In some cases water resources need not be expended to enhance instream flow. Beneficial solutions may be found that simply adjust current allocation methods to route water at different times with alternative release patterns (Hickey and Diaz 1999). In these and other cases, cooperative and suasive strategies - when coupled with a proactive stance - can bring interest groups together early and greatly reduce costs, legal constraints, polarization and even environmental damage through early intervention.

6.2 Policy Instruments: Potential Applications

6.2.1 Command-And Control Applications

Despite the evolution of water laws over the past 100 years, the challenge of managing Arizona's water resources and especially the water resources of the Upper San Pedro River Basin remains daunting. The federal government, states, and communities have a host of legal powers and programs that could be used to protect riparian areas. Some of these measures could follow directly from the legal framework already established, while others require new initiatives.

6.2.1.1 Active Management Areas

The Groundwater Management Act provides a comprehensive groundwater management code governing the allocation and use of groundwater. This code was formed on the finding of the Arizona legislature that the people of Arizona are dependent in whole or in part upon groundwater basins for their water supply. The withdrawal of groundwater was found to exceed what is deemed a safe annual yield, which threatens to destroy the economy of certain areas of this state and cause substantial injury to the general economy and welfare of the state and the citizens of Arizona.

The legislature found that it was in the best interest of the general economy and welfare of the state and its citizens for the legislature to evoke its police power to best uses of its groundwater, Ariz. Rev. Stat § 45-401A (ALIS 2000). It was therefore declared to be the public policy of the State of Arizona to conserve, protect and allocate the use of groundwater resources of the state. This goal is to be accomplished by providing a framework for the comprehensive management and regulation of the withdrawal, transportation, use, conservation and conveyance of rights to use the groundwater in the state, Ariz. Rev. Stat § 45-401B (ALIS 2000).

The 1980 Code created four Active Management Areas (AMA's) with specific regulations on groundwater pumping, and two Irrigation Non-expansion Areas (INA's) in which expansion of irrigated agriculture is prohibited (Lacher 1994). While most Arizona urban areas were designated Active Management Areas by the state legislature, Sierra Vista was exempted after heavy lobbying by opponents. Outside of these areas the beneficial rule is still applicable to groundwater rights. Presently, the Upper San Pedro

River Basin is not defined as within an AMA or INA. The director of the ADWR has the power to designate the area an Active Management Area (AMA) if "management practices are necessary to preserve the existing supply of groundwater for future needs." The designation of an AMA for the Upper San Pedro River Basin would restrict groundwater withdrawals by cities, towns, private water companies and irrigation to a use and quantity as specified by groundwater withdrawal permits to ensure safe yields.

In October 2000, the San Pedro Alliance, an international coalition of more than 50 organizations filed a petition with the Arizona Department of Water Resources to designate the Upper San Pedro River Basin an AMA (Udall Center for Studies in Public Policy, 2000). These organizations favor the designation of an AMA to provide a comprehensive groundwater management strategy that governs the allocation and use of groundwater for the entire Upper Basin.

6.2.1.2 Irrigation Non-Expansion Area

Irrigation Non-Expansion Areas (INA's) can be created by the director of ADWR in the event there is both insufficient supply of water for irrigation and an AMA is determined to be unnecessary. Designation as an INA limits allowable acreage that may be cultivated to the highest amount cultivated during any one year of the previous five years prior to the creation of the non-expansion area. Other provisions in the INA pertain to various regulations on well construction and registration as well as provisions for enforcement and appeal (Ashley and Smith 1999).

The designation of the Upper San Pedro River Basin as an INA would be a mechanism to indirectly protect and maintain the riparian area and the needed base flows. However, the code does not mention protection of aquatic environments (Commission on Environmental Cooperation, 1998). The designation of an INA would preclude instances like what ensued after the Nature Conservancy purchased and retired 500 acres of irrigated land to limit water stress in the area. The intended impact of this purchase was immediately counteracted when the same farmer who sold the agricultural land subsequently commenced irrigating on another 500-acre parcel a short distance away (Commission on Environmental Cooperation 1998). While irrigated agricultural production occurs on about 3% of the land area of the entire San Pedro River Basin (Environmental Protection Agency 2000), privately owned inactive farmland can be brought into production at any time (Arizona Department of Water Resources 1991). In the late 1990's the farmland acreage actually under irrigated production in the Upper Basin is only 1/7th the total land available for irrigated agriculture (Dunn and Clark 1997). The designation of an INA would preclude any new or additional acres from being brought into irrigated production and would formalize the land and water rights associated with existing irrigated agricultural production.

The Whitewater Draw drainage in the Elfrida-Douglas area of Cochise County, an agricultural area adjacent to the Upper San Pedro River Valley is a designated "Irrigation Non-expansion Area" (INA). The design of the INA is to limit the amount of irrigated acreage to historic levels. While existing irrigated lands are not affected, no new irrigated lands can be brought into production. In contrast to the Active Management Areas

designation elsewhere in the state, mandatory conservation measures and the levying of a pump tax are not enforced in Cochise County (Dunn and Clark 1997).

6.2.1.3 State Instream Flow Programs

In Arizona, the Legislature has not provided protection for instream flows to the fullest range of its powers, however administrative initiatives have been responsible for the creation of instream flow programs. An instream flow right is a legal entitlement to use surface water within a specific area or a stream channel for fish, wildlife or recreational uses, but this use must be non-consumptive. The permits (or certificates which replace permits once it has been confirmed that the conditions of the application are being met) detail the amount of water appropriated and the date of priority. The instream flow right then protects a designated flow through a specific reach of a stream from depletion by new water users (Kulakowski and Tellman 1994).

The Arizona instream flow program was initiated in 1979, in a precedent-setting act, when the Arizona Nature Conservancy submitted two instream flow applications to the Arizona Department of Water Resources (Kulakowski and Tellman, 1994). The Nature Conservancy was relying in part on a 1976 court decision that had ruled that in situ uses of water were permissible under state law McClellan v. Jantzen 547 P.2d 454, Arizona Court of Appeals 1976 (BLM, 1987). ADWR required the Nature Conservancy to prove the appropriation was for a beneficial use, would not be in conflict with vested rights, or would not be a menace to public safety or against the interests and welfare of the public. ADWR granted the permits in 1983 (Gillian and Brown 1997).

In 1987 the Bureau of Land Management prepared an "Assessment of Water Conditions and Management Opportunities in Support of Riparian Values of the San Pedro River." The assessment reviewed legal strategies including the establishment and protection of minimum flows for maintenance of instream fisheries resources, recreation values, wildlife water, and riparian area water table conditions. The management of existing water rights and the possible acquision of additional water rights were part of this review (BLM, 1987). The BLM subsequently filed for instream flow permits under Arizona law on the San Pedro River. One of those applications received a permit in 1992. They filed four additional instream flow permits in the early 1990's and these permit applications are pending (ADWR Department of Hydrology, personal communication with Dr. Bonnie Colby, University of Arizona, December 2001).

6.2.1.4 State Wetland and Shoreline Protection

Many states including Arizona have passed legislation to protect wetlands and shorelines. This legislation may apply to riparian corridors (Lamb and Lord 1992). Arizona has established a riparian acquisition trust fund for the purpose of acquiring, from willing sellers, lands located in riparian areas for public purposes consistent with the conservation of wildlife and recreation Ariz. Rev. Stat. § 37-1156 (ALIS 2000).

The riparian trust fund was established in the state treasury. The trust consists of funds received from the sale or use of sovereign stream-bed lands and resources, damages collected from the United States, pursuant to Ariz. Rev. Stat. § 37-1131 and any other appropriations, gifts, grants, or donations designated by the donor for that purpose Ariz.

Rev. Stat. § 37-1156A (ALIS 2000). The state land commissioner has authorization to use these funds for public purposes consistent with the goal of conserving wildlife and recreation Ariz. Rev. Stat. § 37-1156B(ALIS 2000). The state land commissioner is required to consult with and receive advice from the Arizona State Parks Board and the Arizona Game and Fish Department regarding the acquisition and management of land and interests in land pertaining to this trust fund Ariz. Rev. Stat. § 37-1156C (ALIS 2000).

This mechanism could be used to purchase additions parcels of riparian land along the Upper San Pedro River. The fund could provide an equitable means of purchasing and retiring agricultural land or land zoned for hobby farms and ranchettes that may negatively impact the river. The mechanism has potential only when used jointly with other measures; otherwise the mechanism is like a band-aid on one spot of a rusty bucket.

6.2.1.5 Federal Reserved Water Rights

When Congress acts to set aside a parcel of land for the public domain for a particular purpose, there arises by implication, a water right of sufficient quantity to satisfy the primary purposes of the reservation in and to waters unappropriated at the time of the reservation (Bureau of Land Management 1987). Federal reserved water rights are a important tool used by the federal government. These rights are usually said to have been created by the court decision in Winters v. United States, heard by the United States Supreme Court in 1908. A court decision in 1963 in Arizona v. California, and in 1976 in Cappaert v. United States the United States Supreme Court reaffirmed and further defined reserved water rights (Gillian and Brown 1997; Lamb and Lord 1992).

The rulings in these cases could have important ramifications when taken in the context of the U.S. Forest Service and the Bureau of Land Management's interests where groundwater pumping threatens surface water resources needed to fulfill the purpose for which SPRNCA was set aside. If this right were exercised, it would provide the federal government the power of enactment to take a more aggressive stance than the state in regulating groundwater pumping (Gelt 1994). To-date, no filing for federal water rights has been made pertaining to the Upper San Pedro River.

6.2.1.6 Endangered Species Act

The Endangered Species Act (ESA) of 1973 is sometimes described as the 1,000-pound gorilla or the pit bull of environmental legislation (Gelt 1996). Its purpose is to conserve the nation's biological heritage of animal and plant species. The Department of the Interior's U.S. Fish and Wildlife Service is the entity that surveys species status and lists those found to be "threatened" or 'endangered". The ESA is responsible for identifying and designating "critical habitat" to provide for the species' survival and recovery (Gelt 1996).

On a state level Arizona does not have specific laws to protect species (Gelt 1996). In Arizona, agencies such as the Arizona Department of Water Resources indirectly considers the general public interest (i.e.that no harm will occur to any native habitat and/or species) when reviewing water management issues.

On the ESA front in the Upper San Pedro River Basin the U.S. Fish and Wildlife Service has designated critical habitat to two threatened fish: the Loach minnow and the

Spikedace. Both fish species could be upgraded to the status of "endangered." Habitat was designated in the lower San Pedro River for the endangered Cactus ferrunginous pygmy owl in June 1999, as has habitat for the endangered Huachuca water umbel. As recently as July 2000, the Center for Biological Diversity and other groups filed suit in a Portland federal court to list the Yellow-billed Cuckoo as an endangered species. The San Pedro River Basin is listed as one of the few remaining strongholds where the Yellow-billed Cuckoo can be found (Southwest Center for Biological Diversity 2000).

6.2.2 Incentive-Based Economic Strategies

Incentive-based economic strategies operate through market processes and other financial mechanisms offering adaptive choice and decentralized decision-making. These strategies work within existing legal and regulatory provisions and require that property rights be clearly defined. In many cases the dividing line between command-and-control and incentive-based economic strategies is not always so clear and often these instruments overlap. Incentive-based economic systems can induce socially desirable behavior either without top-down command-and-control directives or by integrating flexibility and individual decision-making into these directives.

6.2.2.1 Transferable Water Withdrawal Permits

A permit system can be part of an incentive-based policy instrument used by a control authority as a water allocation mechanism. While permits can be either non-transferable or transferable (marketable) in nature, the discussion here focuses on the latter. The control agency can authorize a person to hold and exercise a water right

involving the withdrawal of a specific quantity of water at a specific time and place for a specific reasonable use as described in the authorization (American Society of Civil Engineers 1997). Permits can be permanent, seasonal, or ad hoc in nature.

Fundamentally, permits are like a standard in that they specify a maximum level of water withdrawal but with the added advantage of giving the affected parties flexibility to determine technology choices and other forms of compliance in an unobtrusive management form. Despite the advantages, permit systems are prone to challenges including search costs, strategic behavior and the need for approval process to be short enough not to reduce the value of the right.

Within the legal and institutional foundation of an active management area or an irrigation non-expansion area designation, an incentive-based economic strategy such as transferable water withdrawal can be established. The permits within a market framework can be used as conservation and reallocation mechanisms. For example, if an active management area was instigated in the Upper San Pedro River Basin, this basic top-down directive could be extended with water withdrawal permits to facilitate flexibility. The permits could accommodate economic and other social ends without compromising the base-line safe yield objective.

6.2.2.2 Water Leases

A water lease is a similar concept to that of a lease of land or other property. The lessee obtains use of the water for a specified period of time for an agreed-upon price, but the lessor retains ownership of the actual water right and resumes use of the water, or

leases the water again, after the original lease expires (Gillian and Brown 1997). Water leases reduce the long-term threat to the agricultural community as compared to permanent water transfers. They also reduce the fear that instream right holders would gain legal standing to object to agricultural water transfers (Anderson and Snyder 1997). In this regard, water leases can temper some of the sensitivities surrounding water markets and water transfers. However, as water leases and other water allocation instruments become more commonplace, any arising threat or legal challenge to traditional water right holders would dampen the incentive of the traditional right holders to enter into what is otherwise be a very promising water allocation instrument. This mechanism could provide protection to the San Pedro Riparian National Conservation Area in dry years where more senior water right holders would have legal priority to the water needs and rights of the Conservation Area.

6.2.2.3 Dry-Year Option

A "dry-year option" is a temporary transfer that can be used to protect instream flows and other intermittent or periodic needs. Under the terms of a dry-year option, the purchaser pays the water-right owner a fee to maintain the option of leasing water during years in which water supplies fall below a specified amount. In years in which ample water is available, no lease occurs, but the right owner receives the agreed-upon option fee. In years in which flows fall below the specified amount, the lease goes into effect and the purchaser pays the right owner an additional amount for the water that is transferred into the new use (Gillian and Brown 1997). Natural area managers could use this mechanism

to protect the riparian area from climatic factors, such as drought. Under such a scenario, water could be leased from the agricultural sector in times where critically low water levels threaten the ecological integrity of the riparian habitat.

6.2.2.4 Water Banking

Water banks are an institutionalized mechanism specifically designed to facilitate the transfer of water use entitlements. The water bank is the intermediary between water buyers and sellers and can manage different types of water use entitlements. The process operates similar to that of any trading bank, subject to certain conditions such as paying a fee. A water bank can also provide water right holders with a facility to accrue water storage credits for use at a future date. Water banks offer a highly flexible framework within which water transfers can occur.

The water-banking concept involves "rotating" water among users and can play an important role in the balancing of seasonal agricultural and environmental water needs, including augmenting instream flows along critical reaches of the San Pedro River. The water banking mechanism can provide clear, well-defined rules and procedures for water transfers, thereby reducing the complexity of making trades for individual sellers and buyers.

Smoothing the complexity of making trades reduces transaction costs which are incurred in searching for trading partners, ascertaining the characteristics of water commodities, negotiating price and other terms of transfer, and obtaining legal approval for the proposed change in water use (Colby 1990). Water banks can also facilitate

transfers to users outside their original delivery system and for uses other than irrigated agriculture. However, such transfers can cause negative third party impacts, which are one of the potential adverse effects of water banking (MacDonnell et al. 1994).

6.2.2.5 Zonal Pricing

Spatially-differentiated water rates are often referred to as zonal pricing. Such pricing mechanisms are often thought of in terms of municipalities adopting rate differentials between internal (within the city) and external (outside the city) consumers (Spulber and Sabbaghi 1998). However, the concept of zonal pricing could be extended to resource management projects on a watershed basis, such as the San Pedro watershed, where different areas in a watershed are more susceptible to water depletion problems such as the existence of cones of depression and subsidence. Water use could be managed in such geographic hot spots through zonal pricing incentives.

6.2.2.6 Municipal Seasonal Rates

Seasonal rates provide realistic signals to consumers by indicating the cost savings that can result from changing the time pattern of usage. Seasonal rate design assigns higher costs for peak consumption and lower costs for usage in off-peak periods when water supplying systems are not stressed (Spulber and Sabbaghi 1998). Seasonal pricing incentives are applicable to watershed management scenarios where seasonal stress on the water flow level threatens the viability of a riparian area or a watershed ecosystem. Seasonal rates could be used to promote municipal water conservation during summer months when water resources may be lowest and where agricultural users may have senior

water rights. Unlike conservation programs in the City of Tucson, none of the three large water providers in the Benson area have felt the need to implement any type of conservation program (including low-flow toilets and faucet encouragement programs) (Finan and West 2000).

6.2.2.7 Pump Taxes

A logical point for introducing a tax strategy for the control of riparian water resource would be "at the source pump." This is the point where the water is diverted from the stream-flow or drawn from groundwater wells depleting the groundwater table. Taxes provide regulators with a means manipulating, directly or indirectly, the price of the scarce resource. The concept is logical and straightforward; if regulators levy taxes on environmentally harmful activities in an amount equal to the expected damage caused, users will then account for the resulting harm in their production and consumption decisions, resulting in the internalization of their external costs. The taxing system in essence is delegating the detailed decision making down to individual users, a process that is thought to offer significant advantages over continuing to rely on regulatory standards to accomplish the same goal. By placing the decision making in the hands of the user, the taxation system gains efficiency-enhancing properties encouraging the adoption of new technologies and best management practices to reduce the amount of water used. Taxes also have the potential to generate revenues for the control authority. These revenues, a by product of the tax system, can be revenue-neutral (i.e. rebated back to taxed sector), can be used for research and development for pollution control technology,

or can be used to fund existing or new environment protection and restoration programs. The possibility of generating often much needed tax revenues in the process of protecting the environment is an attractive and enabling characteristic. In addition to generating revenues, a taxation system has the inherent ability to tap detailed and diverse data that could be used to create a base for the development of improved policy instruments.

Despite the acknowledged advantages, taxation has rarely been used in environmental regulation. A major challenge facing policy makers embracing a taxation strategy is the amount of information required at the implementation stage of the policy adoption strategy. The successful implementation of a taxing-control system requires continuous adjusting not only at the outset but also as economic and technological conditions change. Such requirements are administratively burdensome and costly. In addition, the initial tax would have to be well researched since "getting it wrong" could result in large and possibly irreversible damages especially to an environmental sensitive area as the Upper San Pedro River Watershed.

6.2.2.8 Irrigation District Incentive Pricing

With incentive pricing, a base price per unit of water is charged for all water deliveries up to a certain amount, or block. Water use in excess of this block is then charged at a higher unit price. In this pricing structure one of more levels or tiers may exist (U.S. Bureau of Reclamation 2000). A tiered or increasing block rate pricing structure can encourage optimal water use decisions by charging the true price for the last units of water consumed. The water pricing structure of most irrigation districts consist of

either a fixed charge (a constant fee assessed to landholdings or acres in production), or a water rate (a price per-acre-foot of water delivered), or some mixture of the two. The combination of fixed charges and water rates defines the district's rate schedule. Incentive pricing moves away from rate schedules based solely on per-acre fixed charges and toward rate schedules that incorporate both fixed charges and per acre-foot water (U.S. Bureau of Reclamation 2000).

The incentive of water demand management techniques involve cost, flexibility, revenues, accountability and equity. The costs of implementing a new rate schedule are relatively low compared to the physical alteration of an irrigation system, provided the district has an adequate measurement system in place. In terms of flexibility, the district can respond to changing conditions quickly and easily by adjusting its rate schedule so that conservation can bring about a reduction in water use while maintaining or enhancing district revenues.

Incentive pricing also lets farmers make their own decisions. When a farmer's water bill tracks the costs directly attributable to his or her actions, the farmer receives more informative signals regarding the district-wide consequences of those actions. Equity is also addressed in incentive pricing in that the water users are charged only for their own use. If a district has all fixed charges, a farmer who uses water excessively pays the same as a farmer who uses water efficiently. With per-acre-foot water rates, farmers are responsible for paying their own water applications.

A key disadvantage of the incentive pricing process is the effort involved in gathering technical details to support the design and administration of workable rate

schedules. This effort can be costly in terms of time needed to collect such technical information and the funding needed to support such information gathering. Implementing an incentive pricing process can also be difficult from the perspective of finding consensus. Simply defining what the district's goals should be could raise many differing opinions on fairness and efficiency. Such differing opinions may not be easy to resolve.

There are two irrigation water providers in the Upper San Pedro River Basin, the Pomerene Water User Association and the St. David Irrigation District. The St. David Irrigation supplies both surface water and groundwater to its customers. The Pomerene Association supplies only surface water to its users but the canal system can be used to convey privately pumped groundwater as well (Arizona Department of Water Resources 1991). Incentive pricing for irrigation districts in the Upper San Pedro River Basin would only apply to the water supplied by the irrigation districts. Current water use data are not available for either provider.

6.2.3 Cooperative/Suasive Strategies

Cooperative and suasive strategies include voluntary bargaining, education programs and cooperative agreements. Such strategies can offer information, facilitate communication, and provide training programs. Cooperative and suasive strategies are an attempt to resolve conflicts at more localized levels, avoiding more intrusive top-down interventions. Cooperative or suasive strategies can serve to educate all parties and encourages consideration of factors normally not considered in exclusively economic decision making. All parties should be better equipped to consider the system-wide,

economic consequences of more sustainable practices and methods, and to balance these considerations with the alternatives of not reaching a cooperative solution.

6.2.3.1 Voluntary Purchase Programs

State, federal, and non-government purchase programs offer an important tool for reallocating water from willing sellers in the agricultural sector to environment needs. These voluntary acquisitions have several economically and politically desirable features. Sellers are compensated for their water rights making this reallocation mechanism a more politically palatable option. Purchase programs can target operations where soil types and other farming characteristics create the greatest water waste or environmental damage. Furthermore, the water users receiving the lowest returns to water are enticed to sell their water rights. This strategy therefore promotes a more efficient use of scarce water resources. A voluntary purchase program in the Upper San Pedro River Basin could provide a mechanism where irrigators of lower value crops, such as alfalfa and wheat, would be enticed to sell part of their land or water rights. These irrigators could then reallocate their farming efforts to a smaller acreage, but higher value crops such as watermelons and apples.

6.2.3.2 Voluntary Transfers of Irrigation Development Rights

Voluntary transfers of irrigation development rights are another example of cooperative/suasive strategies. In Arizona landowners receive considerable tax breaks on land in agricultural uses. The elimination of differential property tax treatment between agricultural and other land uses would remove an important obstacle blocking voluntary

transfers of irrigation rights (Commission on Environmental Cooperation, 1999). Currently, land is classified as used for agricultural purposes if the land has actually been used for and has been in active production for seven of the previous ten years A.R.S. § 42-167 [A][1] (The Commission for Environmental Cooperation 1998). The difference in property tax valuation between different land use categories can be immense. In the case of Stewart Title and Trust v. Pima County, 751 P.2d 552, 553 (Ariz. App. 1987), the tract of land under inquiry was worth US $3,455 as agricultural land and US $2,227,260 as non-agricultural land (The Commission for Environmental Cooperation 1998). This tax differential between agricultural and non-agricultural land can act as an obstacle to the voluntary retirement of irrigation water rights and the cessation of agricultural production if the will to retire land results in a much higher land value to be taxed. However, this strategy only produces net savings if irrigated agriculture is likely to develop.

6.2.3.3 Land Exchanges

Land exchanges are another voluntary strategy available to policy makers juggling water management issues in critical areas such as the Upper San Pedro River Basin. Land exchanges are a feasible option in Arizona where BLM federal lands within the basin could be exchanged for state land outside of the critical watershed area. Such land exchanges could focus on lands most prone to create negative impacts on the riparian areas. Many legal obstacles complicate land exchanges, but they are nevertheless a potential option.

6.2.3.4 Education to Promote Conservation and Demand and Supply Management

Water conservation is defined as any beneficial reduction in water use or in water losses (Harberg 1997). Water demand management is a subset of conservation techniques that result in lower water use. More specifically water demand management relates to the lower level of water use in the future that would have accrued had the techniques been implemented. Water-saving demand management mechanisms focus on low-flow plumming fixtures, water user audit, public information and education programs, drought-tolerant landscaping, and conservation-minded plumbing code. Supply management focuses on water providers and mechanisms such as system water audits, system leak control or repair, and corrosion control that can reduce water waste on the supply-side. Such water conservation and management programs evolve in response to internal and external factors. The Water Wise program in Cochise County is an example of one such initiatives aimed at reducing water use in the Upper San Pedro River Basin (University of Arizona, Cooperative Extension Program 2001).

6.2.3.5 Agricultural Environmental Management

Agricultural environmental management (AEM) is a voluntary and incentive-based approach to build mutual accommodation and recognition of the different user needs and problems (Landre and Travis 2000). The approach provides for the instigation of an AEM planning coordinator who goal is to assess the status of water needs and problems from the perspective of both the agricultural and environmental sectors. Once needs and challenges are identified, an AEM initiative sets about finding win-win situations, such as

irrigation technology improvements, drought plans, and water diversion time-planning to reduce the stress on areas with scarce water resources. Given the complexity of the water management challenges in the Upper San Pedro River Basin, such voluntary and incentive-based approaches to build mutual accommodation can only further the understanding of the difficulties of achieving safe yield in the basin, while creating venues for creative cooperative solutions.

7. CONCLUSION

The effects of surface water diversions and groundwater depletion increasingly threaten the ecological structure, function and high biological diversity of the Upper San Pedro River Basin. The collective problem of groundwater pumping, particularly by rapidly urbanizing areas and to a lesser extent by irrigated agriculture, jeopardizes the integrity of the Basin's riparian areas, including the congressionally designated San Pedro Riparian National Conservation Area (SPRNCA). While vast groundwater resources underlie the Basin, it is mainly the floodplain aquifer that maintains the riparian ecosystem and servers most of the agricultural irrigation. Recharge through direct runoff and regional aquifer contributions are not keeping pace with depletion rates. As a result, a sub-surface cone of depression has formed and models suggest continued urban growth coupled with agricultural irrigation will result in further water table decline.

The economic ramifications associated with water policy decisions are great and yet complex. A common problem faced in water allocations is the lack of information about the economic value of water for maintenance of resources such as riparian areas. Creel and Loomis (1992) suggest that more efficient allocation of water might be facilitated if information on the economic value of water in environmental uses was available to the policy maker.

To help inform the decision making process, this research addressed three fundamental questions pertaining to the allocation of water to riparian area preservation in the Upper San Pedro River Basin:

(1) What are the socio-demographic characteristics of nature visitors and why are they willing to contribute to the preservation of the SPRNCA?

(2) What monetary value do nature tourists place on preservation of the ecological integrity of the SPRNCA?

(3) What are the aggregate total benefits associated with the preservation of the SPRNCA?

The majority of visitors traveling to the SPRNCA and the Ramsey Canyon Preserve in the Upper San Pedro River Basin are enthusiastic bird-watchers. This research found these San Pedro visitors spend on average 53 days per year bird watching. According to the Fish and Wildlife Service they are part of a growing population of more than 50 million bird-watchers in the United States, outnumbering hunters and anglers combined (Relly 2001). The Upper San Pedro visitors represent a mature and affluent population, with the average age of 55 years and an average annual household income (before taxes) in the year 2000 of $94,000. The number of retired persons almost equals the number of full-time employed individuals in the visitor population. The high representation of full-time and retired persons is not surprising given the attractive climate of southeastern Arizona for seasonal residents and the growing popularity of bird-watching as Americans' leisure time and disposable incomes increase. The finding that 87% of visitors surveyed at the SPRNCA and the Ramsey Canyon Preserve visited the Upper San Pedro River Basin for its birding sites and natural areas suggests that bird watching is an important component of the tourism dollars spent in the area.

These visitors place considerable economic value on the preservation of the riparian resources of the Upper San Pedro River Basin. A heteroskedastic tobit model determined an estimated per person willingness to pay for preservation of $79.31. The contribution represented a one-time contribution to a non-profit foundation. This studies findings are consistent with earlier studies conducted over the past several decades demonstrating that individuals place substantial positive economic value on water levels associated with sustaining natural resources (Table 1.1 Wilson and Carpenter 1999). The unit specific benefits and the actual values that are reported in these earlier studies vary widely and are not directly comparible with the results of this study.

The aggregate total benefits for riparian area preservation by the annual population of visitors to the two study sites, the SPRNCA (through the San Pedro House access point) and the Ramsey Canyon Preserve in 2001, was estimated at $2.5 million. Existence value of the riparian habitat was the major motivation of the nature tourists in contributing towards the preservation efforts. The visitor characteristics influencing this willingness to pay for preservation were income, expenditures per person per day, age, days bird watching and whether of not the visitor was a repeat visitor to the area. The finding of this study highlight how riparian area preservation has an economic value manifested in the form of a willingness to pay for riparian area preservation by the visitors traveling to the Upper San Pedro River Basin.

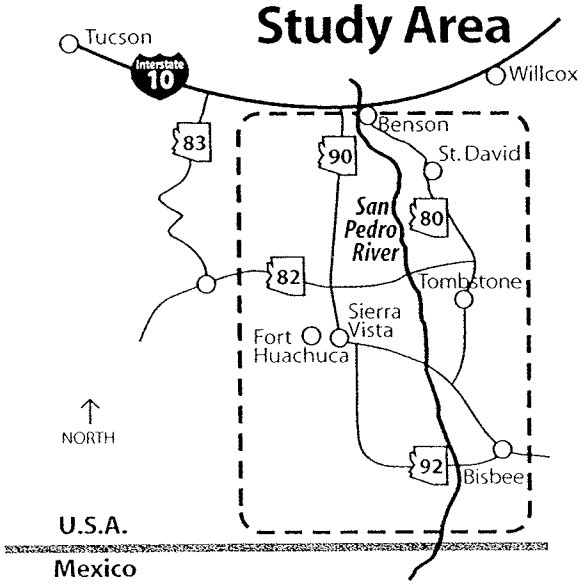
On an aggregate level the willingness to pay for preservation places an economic value on water in environmental uses that can be used by policy makers faced with difficult water allocation and management decisions. The valuation of riparian area water can be

compared to consumptive uses through integrated water use trade-off models to help policy makers evaluate different allocation options. Economic information with which to integrate non-consumptive water uses can be provided through contingent valuation. The resulting values provide policy makers the foundation for a variety of policy intervention options. They can capitalize on the clarity of command-and-control strategies, the flexibility and less obtrusive nature of many incentive-based economic strategies, and the benefits community efforts can bring in the form of mutual recognition and consideration. The more ways the natural and social values of natural areas are communicated to policy makers, the more informed the policy debate and the better the policy and management initiatives will be.

Appendix A. Non-Resident Survey

Your trip to the Upper San Pedro River Basin in Southeastern Arizona

WHAT DO YOU THINK?



1. On **this trip** how much time did you spend in the Upper San Pedro River Basin (the study area)? See Map.

   _____ (total # of hours on this **day trip**)

   OR

   _____ (total # of days on this **multiple-day** trip)

2.. Was this your first visit to birding sites/natural areas in the Upper San Pedro River Basin (the study area) of southeastern Arizona? Yes ☐ No ☐

   If no, how many trips have you made to birding sites/natural areas within the study area in the years:

   1999 _____ (number of trips)
   2000 _____ (number of trips).

3. In terms of your overall visit to the study area, which best describes the purpose of your trip **(Check ONLY one).**

   ☐ Visiting birding sites/natural areas is the **main purpose** for this trip.

   ☐ Visiting birding sites/natural areas is **one of several important reasons** for this trip.

   ☐ I visited the study area for **other reasons** and just happened to make a side-trip to birding sites/natural areas.

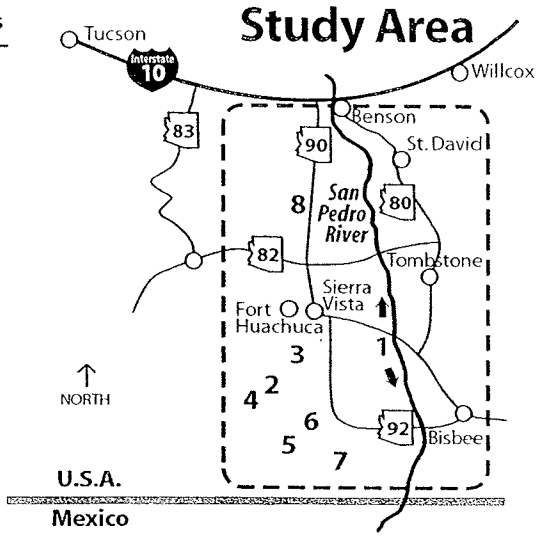
Thank you for participating in this survey being conducted by the University of Arizona to learn more about visits to southeastern Arizona. We are only contacting a small portion of visitors. Therefore, your survey responses are especially valuable. We do not require your name or contact information. Your answers are strictly confidential. By completing this questionnaire, consent for use of this survey information is granted. You can obtain further information from the principal investigator Dr. Bonnie Colby at (520) 621-4775 or, call the University of Arizona Human Subjects Committee office at (520) 626-6721.

ID# 1000 1

4. During **this trip,** how many people were in your party? _____ (number of people)

5. On **this trip,** about how much time will you spend at the following birding sites/natural areas (see map)?

Map #		Number of hours
1	San Pedro Riparian National Conservation Area	_____
2	Ramsey Canyon Preserve (Nature Conservancy)	_____
3	Garden Canyon (Fort Huachuca)	_____
4	Carr Canyon	_____
5	Coronado National Memorial	_____
6	Beatty's Orchard	_____
7	Miller Canyon	_____
8	Kartchner Caverns State Park:	
	▪ Birding and hiking on trails	_____
	▪ Cave tours	_____
Other	birding sites/natural areas in the study area, please specify:	
	_____	_____
	_____	_____



6. In terms of the birding sites/natural areas you are visiting on this trip, please indicate your top 2 reasons for going to those sites?

Top 2 Reasons (1 = most important reason, and 2 = 2nd most important reason)

_____ General birding
_____ To look for a specific bird, please list species _____
_____ Walking, hiking, and viewing wildlife
_____ To enjoy the riparian area environment
_____ To visit historical/archeological sites near these birding sites/natural areas
_____ Other, please describe _____

7. Where did you depart from when you set out for your trip to the study area?

☐ Phoenix ☐ Tucson ☐ Flagstaff ☐ Other area in Arizona: _____

☐ Out of state (US): _____ ☐ Out of U.S.: _____

8. Approximately how many **days per year** do you spend birding or hiking/walking?

_____ Birding (days per year)
_____ Hiking/walking in natural areas (days per year)

9. Please help us understand **visitor-spending patterns** by estimating your total expenses **in the study area.** We understand that you may be in the middle of your trip. Please indicate below how much money you have already spent and your estimated expenses for the rest of your time in the study area. If you had no expenses in a particular category, **write in zero.**

Are you reporting expenses for: ☐ Yourself, as an individual ☐ A group **If for a group,** how many people were in your group?_____ (# of persons)

Study area expense description:	**Estimate HOW MUCH you will spend in the study area (see map)**
Lodging	_____
Gas for vehicle	_____
Groceries, restaurant and bar expenses	_____
Miscellaneous retail (maps, books, clothing, art, crafts, souvenirs, etc.)	_____
Other study area expenses	
Admission fees	_____
Car rental (# of days rented: _____)	_____
Fees paid to tour company	_____
Other expenses in study area, please describe:	
_____	_____

10. During your stay in the study area, how many nights will you stay in each type of accommodation? (Please indicate how many nights)

	Number of nights				
Location:	Bed & Breakfast	Hotel / Motel	RV Park/ Campground	Home of Family/Friend	Other
Sierra Vista / Huachuca City	____	____	____	____	____
Benson	____	____	____	____	____
Bisbee	____	____	____	____	____
Tombstone	____	____	____	____	____
St. David	____	____	____	____	____
Other towns or rural areas (please specify):_____	____	____	____	____	____

ID#____1000____

The word *riparian* refers to an area where plants and animals thrive because of water availability at, or just below, the land surface. Water is the critical element. Without adequate water the riparian ecosystem will gradually degrade—represented in Photograph 2 (the Santa Cruz River, 50 miles east of the study area).

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11. Congress created the 56,000-acre San Pedro Riparian National Conservation Area (RNCA) in order to protect and enhance this desert riparian ecosystem. The diversity of birds and other wildlife found at the San Pedro RNCA is largely due to the lush riparian forest along the river's bank, which depends on adequate water (Photograph 1). To remain healthy, this riparian area requires the continual movement of groundwater from the underground aquifer of the San Pedro River valley into the riparian area. It is this underground water that keeps the river flowing, even during long dry periods.

Suppose that these water flows are threatened and a non-profit foundation has been formed to acquire water and to promote regional water conservation in order to maintain the San Pedro RNCA as it is today. If the foundation does not receive enough contributions from individuals like you, adequate water flows will not be available. Trees and other plants would begin to die, degrading the riparian habitat and reducing the abundance and diversity of birds and other wildlife (Photograph 2).

a. Have you **previously** visited the San Pedro Riparian National Conservation Area (#1 on map, page 2)?

☐ Yes ☐ No

The following questions are included to help us learn more about your values for riparian areas.
We are not soliciting contributions and your answers are confidential.

b. Please check the most, you as an individual, would be willing to contribute to this non-profit foundation, in the form of a **one-time** contribution, in order to permanently preserve the San Pedro RNCA habitat as it is today (Photograph 1):

☐ $00 ☐ $10 ☐ $20 ☐ $30 ☐ $50 ☐ $75 ☐ $100 ☐ $150
☐ $200 ☐ $300 ☐ $500 ☐ $750 ☐ $1,000 ☐ *other amount:* _____

Photograph 1: Healthy riparian habitat supported by adequate water flows

Photograph: Bureau of Land Management, San Pedro RNCA.

c. Suppose that water flows have not been preserved and the riparian area has declined (Photograph 2). Under these conditions, **how often** would you visit the San Pedro RNCA over the next **two** years?

0 times ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ 11 ☐ 12 ☐

d. **How often** do you plan to visit given the healthy riparian habitat at the San Pedro RNCA over the next **two** years (Photograph 1)?

0 times ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ 11 ☐ 12 ☐

Photograph 2: Degraded riparian habitat, due to inadequate water flows

Photograph: B. Tellman, Arizona Water Resources Research Center, Santa Cruz River.

e. If your answer to question 11b was **zero,** or you left this space **blank,** please check the **one** reason below that best explains why you answered this way:

- ☐ I would not benefit from preservation of the San Pedro RNCA riparian habitat.
- ☐ Preservation of this riparian habitat should be undertaken at no cost to me.
- ☐ I can go to other locations to enjoy riparian habitat and diverse bird and wildlife species.
- ☐ I need to spend money on other priorities.
- ☐ I did not fully understand what I was being asked to do.
- ☐ I found the question offensive or implausible.
- ☐ I'd rather make an annual contribution of $ _____ (please fill in)
- ☐ Other, please explain: _____

f. If your answer to 11b was **greater than zero,** please answer the following question: In order to actually make the contribution you checked for 11b, you would need to reduce spending on other items. Please indicate which **one** of the following categories you would spend less on:

☐ Groceries ☐ Entertainment ☐ Contributions to environmental causes ☐ Other

☐ Savings ☐ Vacations ☐ Charitable contributions (not environmental causes)

g. Now that you have thought about how you would rearrange spending to make the contribution that you answered for 11b, do you want to change the amount that you indicated? ☐ Yes ☐ No

If yes, please go back to 11b, cross out your first answer, and circle the revised amount.

h. If your answer to question 11b was **greater than zero,** please check the **one** reason that best explains why you are willing to contribute to the foundation.

☐ I am a regular visitor to the San Pedro RNCA.
☐ I plan to become a regular visitor to the San Pedro RNCA.
☐ I want this riparian area to be maintained so that others can enjoy it.
☐ I receive satisfaction from knowing that the riparian habitat will be maintained.
☐ Other, please explain: _____

The last few questions ask about you and your household.
They are essential to help us understand visitor characteristics.

12. Age: ____ (years)

13. Female ☐ Male ☐

14. Your home zip code: _____

15. Please indicate level of education:

☐ High School ☐ Some College/Technical School ☐ Completed College/Technical School
☐ Some Graduate/Professional School ☐ Completed Graduate/Professional School

16. Please indicate **household income** (before taxes) last year?

☐ Less than $10,000	☐ $30,000 - $34,999	☐ $60,000 - $69,999	☐ $150,000 - $199,999
☐ $10,000 - $14,999	☐ $35,000 - $39,999	☐ $70,000 - $79,999	☐ $200,000 - $249,999
☐ $15,000 - $19,999	☐ $40,000 - $44,999	☐ $80,000 - $89,999	☐ $250,000 - $500,000
☐ $20,000 - $24,999	☐ $45,000 - $49,999	☐ $90,000 - $99,999	☐ $500,000 - $750,000
☐ $25,000 - $29,999	☐ $50,000 - $59,999	☐ $100,000 - $149,999	☐ $750,000 - $1,000,000

17. What is your employment status?

☐ Employed full-time ☐ Employed part-time ☐ Retired ☐ Homemaker ☐ Unemployed ☐ Student

18. Are you a member of any organization which supports conservation, environmental or wildlife concerns?

Yes ☐ No ☐ If yes, please specify: _____

19. Were there items or services you wished to purchase in the study area that were not available?

Yes ☐ No ☐ If yes, please specify: _____

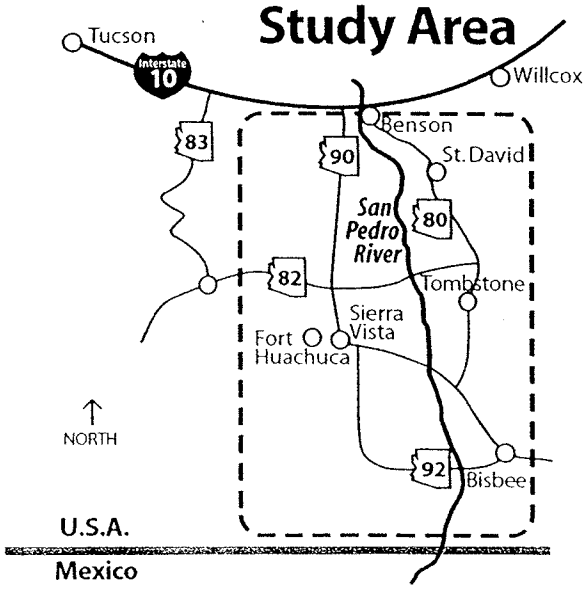
20. Please rate your satisfaction with the informational displays found at this site.

Did **not** see displays	**Very** informative / interesting	**Somewhat** informative / interesting	**Not** informative interesting
☐	☐	☐	☐

Thank you for completing this survey! Additional comments welcome:

Appendix B. Resident Survey

Your visits to birding sites/natural areas in the Upper San Pedro River Basin



1. On **this trip** from home, about how many miles (one-way) have you traveled to visit this birding site/natural area? _____ (number of miles).

2. How many years have you lived in the study area? _____(number of years)

3. Are you: ☐ A year round resident of the study area
   ☐ A seasonal resident of the study area

4. During **this trip** from home how many people were in your party? _____ (number of people)

5. Approximately how many **days per year** do you spend birding or hiking/walking in natural areas?
   _____ Birding (days per year)
   _____ Hiking/walking in natural areas (days per year)

Thank you for participating in this survey being conducted by the University of Arizona to learn more about visits to southeastern Arizona. We are only contacting a small portion of visitors. Therefore, your survey responses are especially valuable. We do not require your name or contact information. Your answers are strictly confidential. By completing this questionnaire, consent for use of this survey information is granted. You can obtain further information from the principal investigator Dr. Bonnie Colby at (520) 621-4775 or, call the University of Arizona Human Subjects Committee office at (520) 626-6721.

ID#_____ 1

6. Was this your first visit to a birding site/natural area in the Upper San Pedro River Basin?
Yes ☐ No ☐
If no, how many trips have you made to birding sites/natural areas within the study area in the years:

Map#		1999 Number of Trips	2000 Number of Trips
1	San Pedro Riparian National Conservation Area	_____	_____
2	Ramsey Canyon Preserve (Nature Conservancy)	_____	_____
3	Garden Canyon (Fort Huachuca)	_____	_____
4	Carr Canyon	_____	_____
5	Coronado National Memorial	_____	_____
6	Beatty's Orchard	_____	_____
7	Miller Canyon	_____	_____
8	Kartchner Caverns State Park		
	• Birding and hiking on trail	_____	_____
	• Cave tours	_____	_____
Other	birding sites / natural areas in the study area, please specify:		
	_____	_____	_____
	_____	_____	_____

7. In terms of the birding sites/natural areas you are visiting on this trip, please indicate your top 2 reasons for going to those sites?
Top 2 Reasons (1 = most important reason, and 2 = 2nd most important reason)
_____ General birding
_____ To look for a specific bird, please list species _____
_____ Walking, hiking and viewing wildlife
_____ To enjoy the riparian area environment
_____ To visit historical/archeological sites near these birding sites/natural areas
_____ Other, please describe _____

8. Age: ____ (Years) **9.** Female ☐ Male ☐ **10.** Your home zip code: _____

11. Please indicate level of education:
☐ High School ☐ Some College/Technical School ☐ Completed College/Technical School
☐ Some Graduate/Professional School ☐ Completed Graduate/Professional School

12. What is your employment status?
☐ Employed full-time ☐ Employed part-time ☐ Retired ☐ Homemaker ☐ Unemployed ☐ Student

Thank you for completing this survey! Additional comments most welcome:

Appendix C. Visitor Contact Sheet – San Pedro House

Upper San Pedro River Basin Survey
Contact Recording Form

Begin a new tally sheet at the beginning of each survey day.

1. Visitor Contact: Informally make contact with visitors ***after*** they have walked through the conservation area. Ask where they have traveled from and find out if they live in the study area or not.

   Introduce the survey in the following manner:

   "I am assisting the University of Arizona with a study regarding outdoor recreation. We're asking visitors to the San Pedro National Riparian Conservation Area to help us understand how visits to natural areas affect the economy of nearby towns and businesses, and to learn about visitors values for natural areas.

   Completing the survey will take approximately 10 minutes of your time. All information provided by you is confidential and neither your name nor contact information is required. Once you have completed the survey you can place it in the survey drop-box (indicate where the drop-box is). Would you be willing to help out by completing the survey? We just need one volunteer per household."

   If no, thank them and discretely note their response on the tally sheet.

   If yes, note the visitor's willingness to participate on tally sheet.

   - **Offer the visitor a survey, noting whether they live in the study area or not.**

     Local visitors (i.e. visitors living within the study area) should be given the survey titled *"Your visits to birding sites/natural areas in the Upper San Pedro River Basin."*

     Visitors from outside of the study area should be given the survey titled " *Your trip to the Upper San Pedro River Basin in Southeastern Arizona --- What do you think?"*

   - Indicate to visitors that *"we would be very grateful if you could complete the entire survey. We understand that you may be in the middle of your trip to the area and therefore, we ask that you anticipate the answers to some of the survey questions".*
   - Try to ensure the visitors have some privacy when completing the survey, and indicate if there are chairs or picnic tables available where they can complete the survey.
   - Once the visitors have completed the survey thank them for agreeing to participate and wish them an enjoyable trip.
   - If time allows, ask the visitors if they have a favorite birding book or web-site. Note the response on the tally sheet.

3. Complete the tally sheet summary information at the end of each survey day.

4. Visitor Comments/Interviewer Remarks: _____

Thank You!

Appendix D. Visitor Contact Sheet – Ramsey Canyon Preserve

San Pedro River Basin
Nature-Based Tourism Study

Ramsey Canyon Volunteer Checklist

✓ **Morning setup:**

The display map, drop box for completed surveys, and the box with the clipboards and pens should already be out. Get 8 fresh surveys from box in Lisa's office (going numerically by id number). Prepare 8 clipboards with surveys (in numerical sequence, by id number) and pens. Begin the daily tally sheet filling in your name, the date, time, and the first survey number that will be used.

✓ **Contacting Visitors:**

"The volunteers at the Ramsey Canyon Preserve are assisting the University of Arizona with a nature-based tourism study. The study will provide information about how visits to natural areas affect the local economy, and the values that visitors have for natural areas. We are asking non-resident visitors to the Upper San Pedro Valley (the study area, see display map) to take approximately 10 minutes of their time to complete the survey. Are you a visitor to the study area? Would you be willing to help out by completing a survey?"

✓ **For filling out the survey, mention to the visitors something like:**

"There are benches where you can complete the survey at the main entrance or in the hummingbird viewing area. Once you have completed the survey you can place it in the drop box at the main entrance. Thank you very much for agreeing to participate."

- ✓ **On the daily tally sheet, keep track of:** the number of surveys given out (i.e. the number of participants). We also need to keep track of the number of non-participants. Non-participants include visitors who have already filled out a survey (i.e. repeat visitors either at the Ramsey Canyon Preserve or the San Pedro House) and the number of refusals. Note the reason for the refusal on the tally sheet, if at all possible). The total number of hash marks on your tally sheet should equal the number of non-resident visitors you asked to participate in the survey.

- ✓ **Number of surveys per day**: we are aiming to get 6-8 completed surveys per day at Ramsey, and would like to spread out the collection of the surveys across different times of day (as much as possible). So, the morning shift (which tends to be busier) can aim to collect between 4 and 5 surveys, the afternoon shift can fill the gap to reach a total of 8.

- ✓ **End of volunteer shift:** write down the identification number (id) number for the last survey handed out and the time the shift ended.

- ✓ **End of day:** Take all completed surveys and the tally sheet and place them in the box marked "Completed Surveys and Tally Sheets" in Lisa's office.

- ✓ **Please note (on the back of the tally sheets):** any problems with the survey or frequently asked questions that you would like more information on.

- ✓ **Volunteers, thank you!** We couldn't do this survey effort without your dedication and help. The study will provide important economic information that will assist in the protection of the water resources that sustain critical natural places like Ramsey Canyon and the entire Upper San Pedro River Basin.

San Pedro House - Tally Sheet

Volunteer's Name: _____ Date: _____

Time Started _____
Time Ended: _____

Beginning **Non-Resident** Survey #: _____
Ending **Non-Resident** Survey #: _____

Beginning **Resident** Survey #: _____
Ending **Resident** Survey #: _____

Participants (i.e. filled out survey)	**Non-Participants**			
(Sample entry: ///)	*Same Household*	*Repeat Visitors* (Ramsey or San Pedro)	*Refused*	*On the trail but not approached* (including children)
Non-Resident:				
Resident:				

Ramsey Canyon - Daily Tally Sheet

Volunteer's Name: _____ Date: _____

Time Started: _____ Time Ended: _____

Beginning Survey #: _____ Ending Survey #: _____

Participants (i.e. filled out survey)	Non-Participants	
(Sample entry: 𝍸)	***Already Completed A Survey*** *(Repeat visitor San Pedro or Ramsey)*	***Refused (note reason if possible)***

Appendix G: Visitor Spending Patterns

The demographic profile, travel patterns, and expenditures of 843 nature visitors are summarized from the survey responses collected at two key visitor focal points in the Upper San Pedro River Basin. This information is presented to more fully explain the population of visitors touring the Upper Basin and their direct economic impact on the local economy.

The target population for the survey were nature visitors living outside the Upper San Pedro River Basin as defined by the study area map (Figure 1). The data were collected over two time periods in 2001. February through May (spring migration season) and in August (the return migration season). The main collection sites, the Nature Conservancy's Ramsey Canyon Preserve and the Bureau of Land Management's San Pedro Riparian National Conservation Area (SPRNCA), are among the best known birding sites and natural areas in the Upper San Pedro River Basin of southeastern Arizona. A small portion of the surveys (less than 5%) were collected at the 2001 Southwest Wings Birding Festival hosted in Sierra Vista.

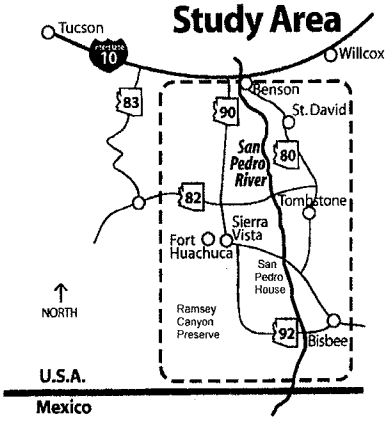


Figure 1. Location of the study area and the collection sites.

The visitors surveyed ranged in age from 18 to 92 years (Table 1). The mean age of the visitors participating in the survey was 55 years, and almost half had completed graduate or professional school (Table 2). The survey population was divided evenly divided between full-time and retired persons (Table 3). The mean household income of these respondents (before taxes) in the year 2000 was $94,000. Over 72% of the survey respondents indicated they were members of organization that supported conservation, environmental or wildlife concerns. The organizations most often cited were the Nature Conservancy, the Audubon Society, and the Sierra Club.

TABLE 1. Age distribution of survey respondents.

Age (in years)	Frequency	%
18-29 years	14	1.7
30-39 years	79	9.8
40-49 years	165	20.5
50-59 years	224	27.8
60-69 years	217	26.9
70-79 years	93	11.6
80-89 years	12	1.5
90 and older	1	0.1

TABLE 2. Level of education of the survey respondents.

1. Level of Education	Frequency	%
2. High School	39	4.8
3. Some College/technical School	102	12.7
4. Completed College/Technical School	197	24.5
5. Some Graduate/Professional School	102	12.7
6. Completed Graduate/Professional School	364	45.3

TABLE 3. Employment status of survey respondents.

Employment Status	Frequency	%
1. Employed full-time	358	43.9
2. Employed part-time	80	9.8
3. Retired	335	41.1
4. Homemaker	23	2.8
5. Unemployed	14	1.7
6. Student	5	0.6

Visitors frequenting the collection sites came individually, in couples and small groups, and in large groups up to 40 persons. The mean group size was 3.6 persons and the median was 2. During the research period, larger groups observed at the San Pedro House and the Ramsey Canyon Preserve included the Elder Hostel, Geronimo Educational Travel Studies, Cub Scouts, BLM researcher trainees, Columbia University and University of Arizona student field trips, locally organized equestrian tours, Botanical Gardens Society of Tucson, Friends of the San Pedro guided tours, and many school groups. Only one respondent was solicited per household and no more than three or four members of a group were asked to complete the survey.

On average, overnight visitors spent 4.7 nights in the study area. During their stay 66% of the visitors chose accommodations in Sierra Vista, 16% in Benson, the remaining in St. David, Bisbee, Tombstone and other locations (Figure 2). The overnight visitors primarily chose hotels and motels (38%) and recreational vehicle (RV) parks and campgrounds (35%) for their accommodation (Figure 3). The remaining visitors stayed at the homes of family or friends, at Bed and Breakfasts, or at other types of accommodation.

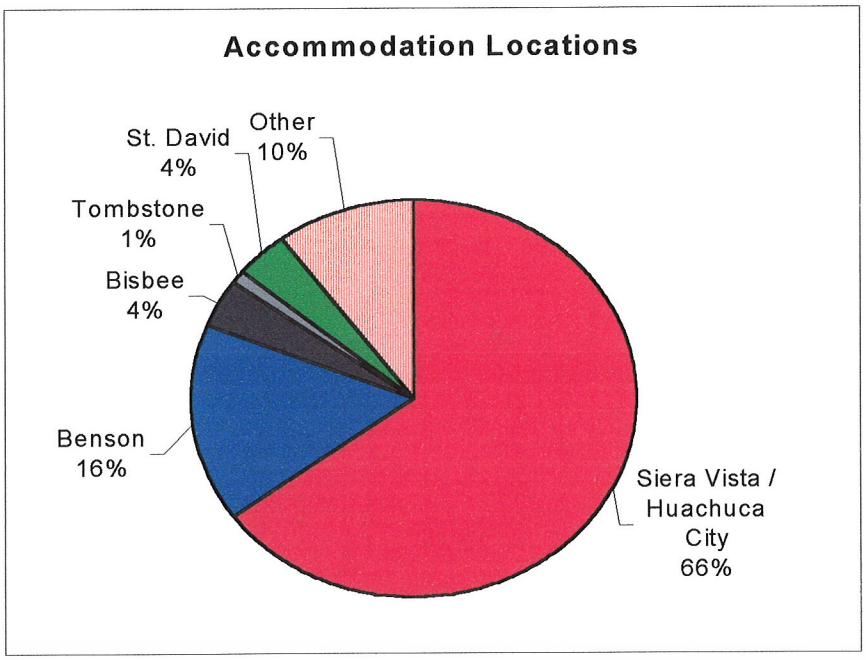


FIGURE 2. Accommodation locations.

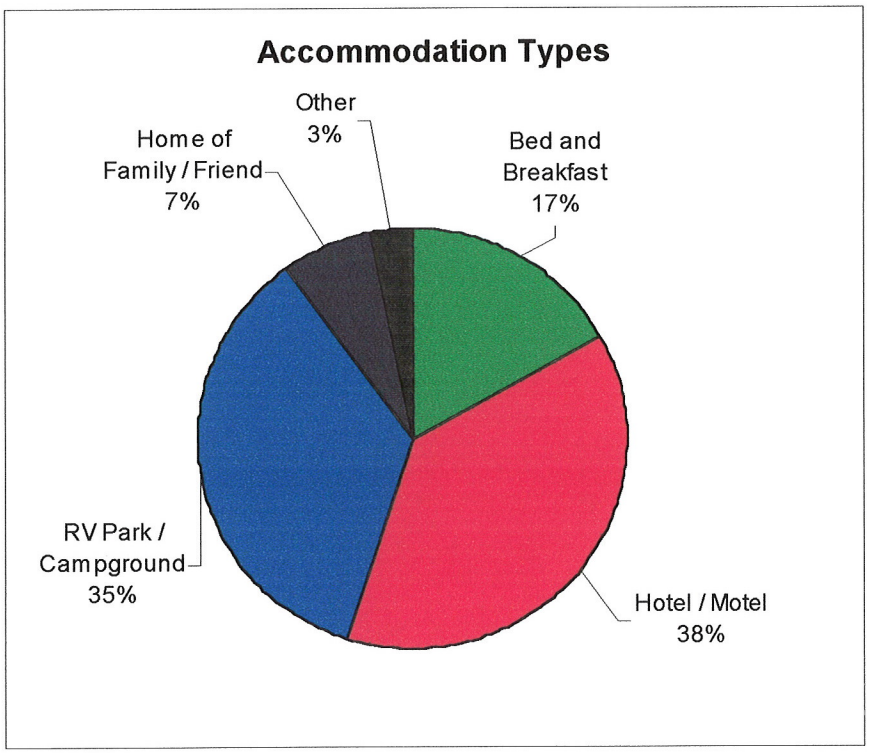


FIGURE 3. Accommodation types.

The monthly visitation patterns at the Ramsey Canyon Preserve were estimated using a sign-in log at the visitor center, the only entrance point to the Preserve. Visitors are invited to sign the log on arrival at the Preserve. They are asked to note where they had departed from for the trip. For this research, information was used to distinguish resident and non-resident visitors of the Upper San Pedro River Basin, and to estimate an annual non-resident visitor count for the Preserve. These logs showed that 16,150 non-resident visitors traveled to the preserve in the twelve month period from June 2000 to May 2001 (Table 4). It was estimated that one in five visitors do not sign the visitor book, resulting in a visitation estimate of 19,380 for the time period.

Visitation in the early 1990's was as high as 28,000 at the Ramsey Canyon Preserve (Crandall, Leones, and Colby 1992). Observers knowledgeable about visitation patterns suggest that the stock market decline and its financial ramifications particularly on the retired population of visitors, and the introduction of an entrance fee at the Preserve in August 2000 have contributed to the more recent, lower visitation numbers.

TABLE 4. MONTHLY NON-RESIDENT VISITOR COUNTS

Month	Non-Resident	%
June 2000	1,250	7.7
July 2000	1,550	9.6
August 2000	1,150	7.1
September 2000	1,050	6.5
October 2000	850	6.3
November 2000	1,000	6.2
December 2000	800	5.0
January 2001	725	4.5
February 2001	1,200	7.4
March 2001	2,100	13.0
April 2001	2,450	15.2
May 2001	2,025	12.5
Total per log book	**16,150**	**100%**
Estimated one in five visitors who did not sign the log	3,230	+20%
Total estimated visitation	**19,380**	

Estimating an annual visitor count for the SPRNCA proved far more challenging. No visitor records are maintained for the SPRNCA. In addition, the San Pedro House access point (the collection point for the purpose of this study) represents just one of the numerous access points to the 56,000-acre conservation area. To provide some estimate of total annual visitation at the site, the daily visitor counts recorded during the survey collection days were compared to the more formal visitor records maintained at the Ramsey Canyon Preserve. The survey records indicated that the visitor count is similar at both sites, resulting in an estimate of 19,380. However, it should be noted that visitors entering the SPRNCA through other access points have not been recorded. Key informant estimates suggest that the visitation through other access points could account for a third more visitors (5,814 visitors). The visitation at the SPRNCA was therefore estimated at 25,194.

To avoid double counting visitors frequenting both sites, the total visitation estimate was adjusted. The survey results suggested 50% of the total visitors traveled to both sites. Total non-resident visitation estimates for both the Ramsey Canyon Preserve (19,380) and the SPRNCA (19,380 plus 5,814) were therefore adjusted downward to 31,977 for the year June 2000 to May 2001.

In terms of direct spending, 774 of the surveyed visitors documented their spending patterns while in the study area. A total of 639 visitors (83%) indicated they were overnight visitors while 135 respondents (17%) indicated they were day-trip visitors

to the study area. On average these overnight visitors spent $97.18 and the day-trip visitors spent $24.42 per person per day. On average overnight visitors spent 4.7 nights in the study area, while day-trip visitors spent on average 4.9 hours.

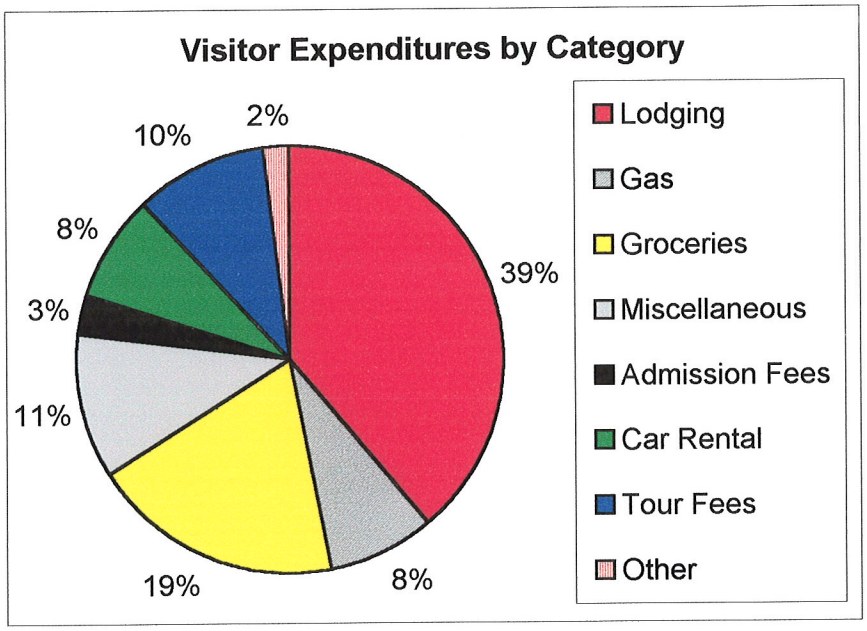


FIGURE 4. Visitor expenditures in the study area.

Expenditures on lodging (39%) and groceries (19%) represented the larger spending categories for these visitors (Figure 4). Direct visitor impacts on the study area were calculated by extrapolating the mean per person expenditure multiplied by the number of days or nights spent in the study area over the estimated annual visitation at the Ramsey Canyon Preserve and SPRNCA. Given the variability in visitation patterns since the 1990's, the estimated direct spending was extrapolated using a range of visitation counts (Table 5). The lower estimate (25,582) represents a 20% decrease in visitation over the visitation estimates from June 2000 to May 2001. The high estimate

(38,372) represents a 20% increase in visitation again over the June 2000 and May 2001 estimate. Direct visitor spending ranging from $9.8 to $14.7 million was injected into the local economy by this subset of visitors during their stay in the study area.

Table 5. Direct Visitor Spending

Visitation Estimates (Range)		Direct Spending		
	Visitation Estimate All Visitors	Day-trip Visitors $ (17%)*	Overnight Visitors $ (83%)**	Total $
Low (-20%)	25,582	106,202	9,698,115	9,804,317
Estimate June 2000-May 2001	31,977	132,749	12,122,454	12,255,203
High (+20%)	38,372	159,298	14,546,903	14,706,201

*Day trip visitors were multiplied by $22.42 (average expenditure).
** Overnight visitors were multiplied by $97.18 per night for the mean visitation period (4.7 nights).

In terms of direct spending, the visitors indicated there were several types of goods and services that were not available in the study area that they wished to purchase. These items included binocular rental, global positioning systems (gps), topographic maps, hiking socks and boots, and butterfly and bat guides for Arizona, bat guide, and picture postcards. Additional coffee shops and lower end restaurants were also suggested.

The majority of visitors traveling to the Ramsey Canyon Preserve in the Upper San Pedro River Basin are enthusiastic bird-watchers (Table 6). These visitors spend an average of 53 days per year bird watching. They are part of a growing population of what the Fish and Wildlife Service estimates to be more than 50 million bird-watchers in the United States, outnumbering hunters and anglers combined (Relly, 2001). The vast majority of respondents (87%) tie the purpose of their visit to birdwatching as either the main purpose of their trip (63%) or one of several important reasons (24%) (Table 6).

TABLE 6. Purpose of the trip to the Upper San Pedro River Basin

Reason	Frequency	%
1. Visiting birding sites/natural areas is the main purpose for this trip.	528	63
2. Visiting birding sites/natural areas is one of several important reasons for this trip.	205	24
3. I visited the study area for other reasons and just happened to make a side-trip to birding sites/natural areas.	109	13

The respondents were also asked to indicate the primary reason for visiting birding sites and natural areas, as opposed to visiting the study area in general. A total of 468 (51%) respondents noted general birding as the single most important reason for visiting specific birding sites and natural areas (Table 7). A further 65 respondents (8%) noted that looking for a specific bird was the most important reason. The specific species attracting visitors to the birding sites and natural areas in the Upper San Pedro River Basin were the Elegant Trogon, Montezuma Quail, Rufour Copper Warbler, Vermillion Flycatchers and the Blue-throated, Magnificent and White-eared hummingbirds. Walking, hiking, and viewing wildlife, enjoying the riparian area, and visiting archeological and historical sites accounted for the remaining visitors.

TABLE 7. Reason for visiting birding sites and natural areas.

Reason	Frequency	%
1. General birding	468	57
2. To look for a specific bird	65	8
3. Walking, hiking, and viewing wildlife	210	25
4. To enjoy the riparian area environment	42	5
5. To visit historical/archeological sites near these areas	12	1
6. Other	29	4

The other birding sites and natural areas visited were Garden Canyon, Carr Canyon, Coronado National Memorial, Beatty's Orchard, Miller Canyon, and Kartchner Canyon (Table 8). Of all the visitors samples, 52% were repeat visitors to the Upper San Pedro River Basin. Repeat visitors were defined as those who traveled to the study area during the years 1999 and 2000, and anticipated returning to the SPRNCA within a two-year period (Figure 5). In terms of actual visits, the 434 repeat visitors visited the basin, 1,337 times in 1999 and 2000, an average of 1.6 visits per person.

Table 8. Other birding sites and natural areas visited.

Birding Sites and Natural Areas	# of Survey Visitors Frequenting the Site
Garden Canyon (Fort Huachuca)	254
Carr Canyon	139
Coronado National Memorial	140
Beatty's Orchard	190
Miller Canyon	215
Kartchner Caverns State Park – Birding and hiking trails	75
Kartchner Caverns State Park – Cave tours	79
Other birding sites and natural areas in the study area. French Joe Canyon and the Saint David Monestary were frequently mentioned.	85

When asked about their opinion of information displays at the San Pedro House and the Ramsey Canyon Preserve, the majority responded favorably. The majority of these visitors were very satisfied with the informational displays found at the Ramsey Canyon Preserve. Over 73% found the informational displays very interesting with the remaining visitors (27%) finding the displays somewhat interesting or reporting that they did not see the displays during their visit.

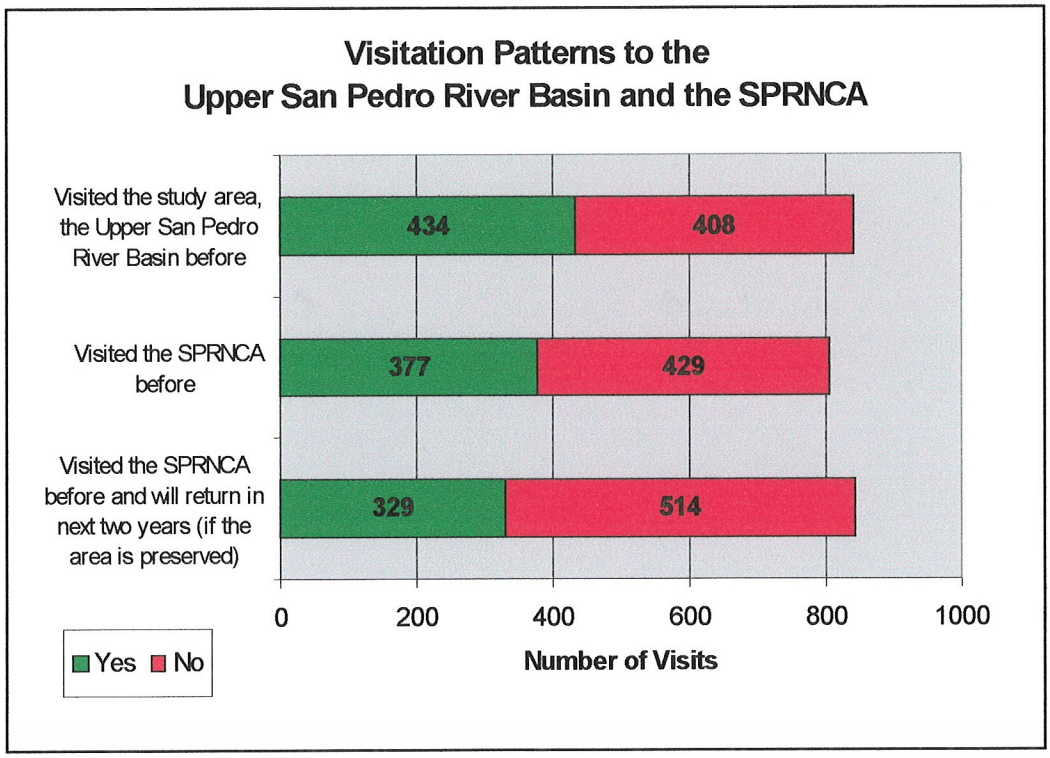


Figure 5. Visitation to the SPRNCA and the Upper San Pedro Basin.

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