

The Connecting Environmental Water Needs to Arizona Water Planning (EnWaP) project, funded by the Nina Mason Pulliam Charitable Trust, seeks to collaborate with individuals and groups at the local, regional and state levels to explore what it means to consider the environment in water management and planning. We aim to establish dialog among water users about voluntary, stakeholder-driven options for addressing water for the environment in the context of limited water supplies and existing water rights. The project has three aspects:

1. Provide information on environmental water demands
2. Provide technical support to communities for their water management and planning
3. Create a stakeholder driven "Roadmap" for considering the environment in Arizona water planning and management

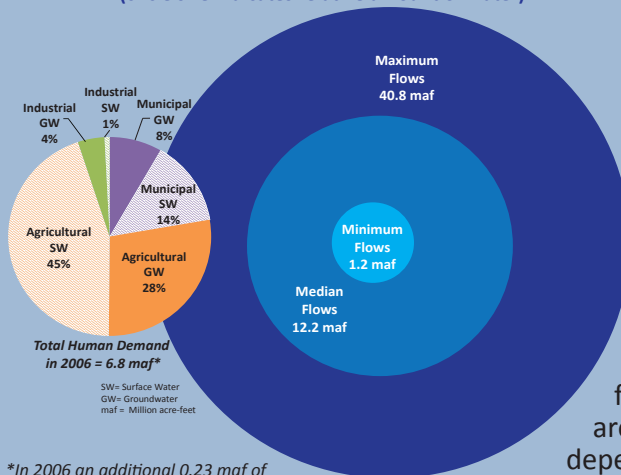
This fact sheet provides an overview of what "environmental water demands" are, how the current understanding of environmental demands could be used to consider natural resources when planning for and managing water resources, and what next steps are for the EnWaP project.



Photo Credit: Arizona Department of Water Resources

## The Environment as a Water Using Sector

**Figure 1: Human Demand and Current Flow in Arizona**  
(circle size indicates relative amount of water)



\*In 2006 an additional 0.23 maf of effluent was also used to meet demand

Data Sources: ADWR 2010 (streamflow as measured by gages), WRDC 2011 (human demand)

With Arizona's population growth and continued drought, citizens and water managers have been taking a closer look at water supplies in the state. Municipal, industrial, and agricultural water users are well-represented demand sectors, but water supplies and management to benefit the environment are not often considered. Our interconnected and interdependent relationship with the environment makes consideration of environmental water demands important as nature provides recreation opportunities, economic benefits, and water supplies to sustain our communities.

Although significant amounts of water flow through and are used by the environment, it is not generally represented as a piece of the total water demand "pie". Arizona's native flora and fauna, and their riparian and aquatic ecosystems, are sustained by water in streams and aquifers, which can vary widely depending on the year and season. Statewide water demand is shown in Figure 1 by comparing the relative scale of human water demands to the stream flows available in the environment.

## Streamflow Data, Current Quantified Flow or Environmental Demands?

When incorporating the environment in water management and planning there are three elements to consider: streamflow data (how much water is flowing *in* the stream), current quantified flow (how much water the environment *has* available) and environmental demands (how much water the environment *needs*).

### Streamflow Data:

Provides basic information about the quantity of flow in a stream. Real-time gages provide information on an hourly, daily, monthly and annual basis.

### Current Quantified Flow:

Flow that currently supports the environment:

- Annual baseflow
- Groundwater underflow
- Riparian extent
- Average annual evapotranspiration (ET)

### Environmental Demand:

The amount of water needed in a watercourse to sustain a healthy ecosystem defined in terms of:

- Magnitude (how much)
- Frequency (how often)
- Duration (how long)
- Timing (how predictable)
- Rate of Change (how variable)

The **EnWaP Database** and electronic copies of the **Environmental Flows and Water Demands** bulletin series are available for download on the EnWaP project website.

[wrrc.arizona.edu/Water-for-the-Environment](http://wrrc.arizona.edu/Water-for-the-Environment)

Contact the WRRC to participate in the **Roadmap development** process or an upcoming **focus group**.

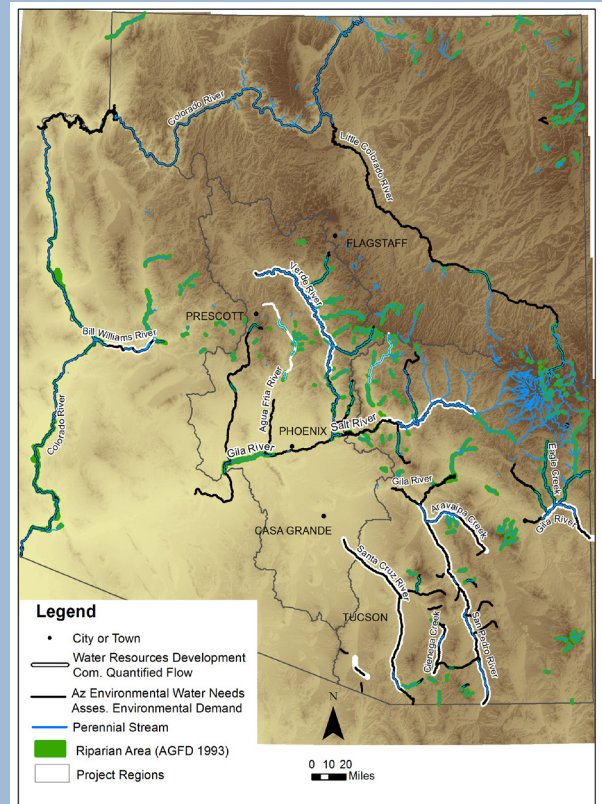
## The EnWaP Database

The EnWaP Database is a compilation of 111 published studies on environmental water demands conducted throughout Arizona between 1990 and July 2013. Information is available for the flow needs and responses to flow alteration of over 100 aquatic and riparian species. This includes, but is not limited to, flow velocity, timing, and depth to groundwater needed to support species. This database is available online or by request, see contact information below.

Current quantified flow has been calculated for at least part of only 12 of the over 380 perennial streams (those that flow year round) that exist statewide, white lines on Figure 2. Only 32% of perennial and intermittent (those that flow part of the year) stream miles in Arizona have been studied for at least one aspect of environmental water demand (black lines). As of 2013, no studies have been conducted in Arizona to quantify the demands of ephemeral streams (those that flow only after a rainfall event).

Statewide, ecosystem-level flow requirements remain poorly understood. Small scale studies that prescribe flows for a single reach exist in some areas, but cannot be applied across watersheds or regions. Two areas of agreement have emerged from studies conducted across the state: (1) riparian areas need both access to sufficient groundwater and carefully-timed flood flows to maintain water levels for established plants and for new plant growth; and (2) change to any element of flow can impact Arizona's aquatic and riparian ecosystems if flows are altered beyond the range of tolerance of native species.

Figure 2: Streams With Quantified Flows/Environmental Demands and Surface Water Resources in Arizona



Data Source: WRRRC 2013 EnWaP Database

## Next Steps: EnWaP Roadmap Development

The WRRRC is developing Arizona's first ever roadmap for if and when environmental water demands should be considered in statewide water management and planning decisions. This process is being guided by a diverse Steering Committee with representatives from agency, agricultural, environmental, industrial, mining, municipal, tribal, and research interests. Statewide focus group meetings will begin in fall 2013 to learn how water users value their water and where consideration for environmental demands may correspond with their interests. Contact us to participate in an upcoming focus group. This collective effort is designed to produce a Roadmap document that describes opportunities for considering the environment in water related decisions, which can be pursued and refined at the local level in ways that meet the needs and reflect the priorities of water users.

## How Can This Information be Applied?

1. Determine how environmental flows interact with other demand sectors
2. Identify factors putting environmental flows at risk
3. Identify studies needed to address key information gaps about environmental flows
4. Determine local priorities for ecosystems
5. Develop scenario analyses for water planning that incorporates the environment

For assistance applying information about environmental water uses and demands, participating in the Roadmap development process, or for a copy of our EnWaP Database please contact us.

## Statewide and Regional Bulletins Available

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