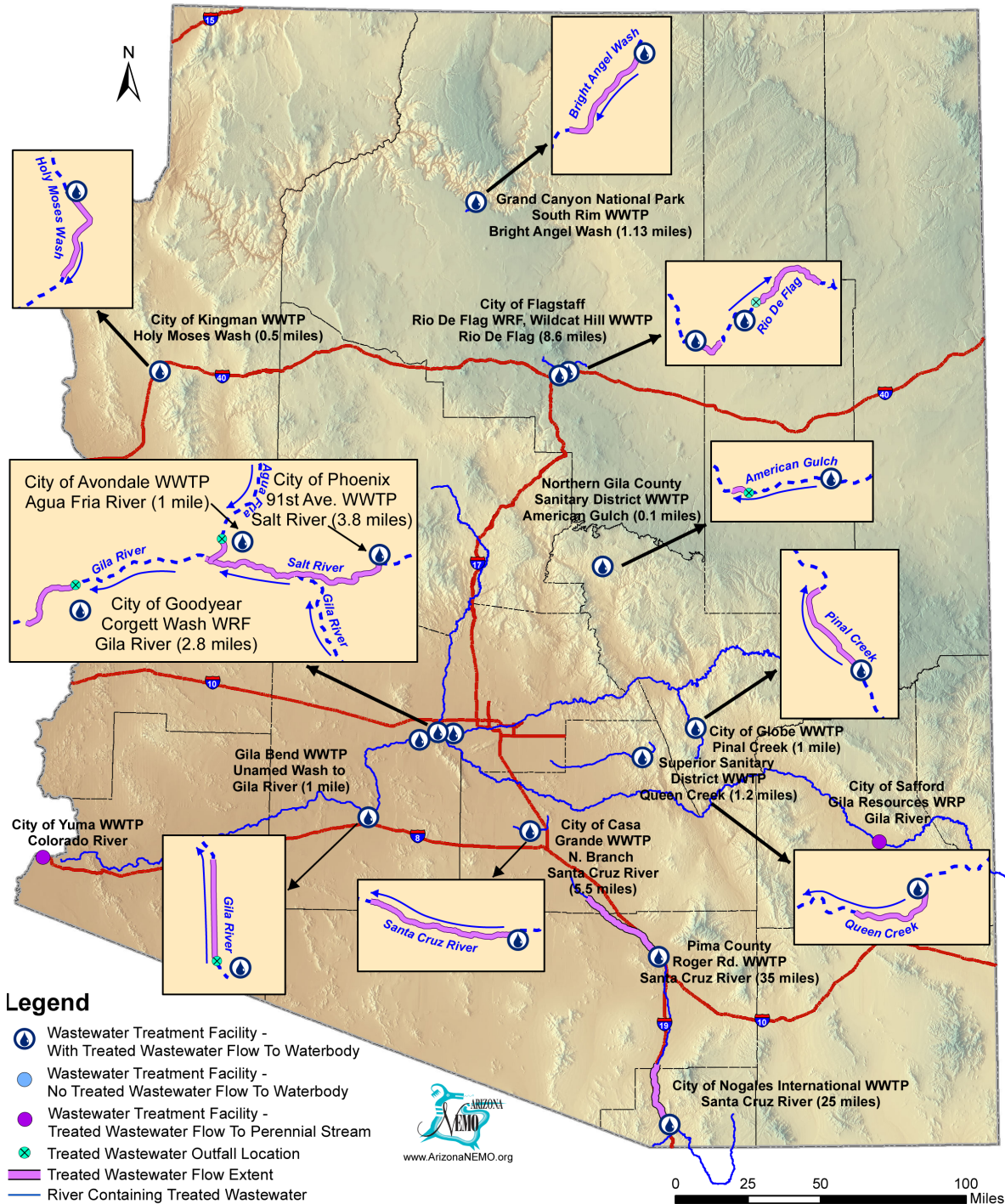


EFFLUENT DEPENDENT STREAMS OF ARIZONA

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Data Sources: Arizona Land Information Service (ALRIS 2006), USGS (USGS 2006), University of Arizona (UA 2009). Projection: Universal Transverse Mercator Zone 12, North American Datum 1983. Horizontal Units Meters Cartographic Composition by Erin Westfall, Advanced Resource Technology Group, The University of Arizona August 20, 2009 - awi_AWI_2009EDWstreams.mxd

In Arizona, **Effluent** is defined as “water that has been collected in a sanitary sewer for subsequent treatment” in a wastewater treatment facility. (ARS Section 45-101(4)) The definition of effluent is important because it is treated by the legal system as a separate kind of water—different from surface water and groundwater.

An **Effluent Dependent Stream** is generally a stream with ephemeral or intermittent flow that receives treated effluent. For some portions of the year, wastewater treatment plants may be the only source of water in such a stream for some distance below the effluent outfall. Treated effluent may also be discharged into a perennial stream, but this does not make the stream “effluent dependent”.

The Arizona Administrative Code (AAC) contains a list of stream reaches classified as effluent dependent waters (R18-11-113D) that was included in the rules when they were adopted in 1987. That list has not changed. This mapping effort generated more recent information about the location and extent of effluent dependent stream reaches in Arizona. The AAC reports 351 miles of effluent flow in 1987, whereas only 91 miles were mapped in 2009. The 1987 designations were not mapped in the field.

All effluent discharged into a stream (ephemeral, intermittent or perennial) must be permitted by the Arizona Department of Environmental Quality (ADEQ). ADEQ grants discharge permits to wastewater treatment plants for employing technologies and practices that will ensure the discharge meets water quality standards.

Many effluent dependent streams support riparian ecosystems where otherwise there would be none. This can make such areas important for environmental purposes, including economically important recreational activities such as bird watching. On the other hand, effluent is now a valuable resource in some areas and is being sold for uses like agricultural irrigation and power plant cooling. Thus, the redirection of the effluent to reuse entails a choice among values.

The map, Effluent Dependent Streams in Arizona was generated from data collected by the authors during 2007-2008 as part of a project, **Status of Generation, Reuse and Recharge of Treated Wastewater in Arizona; Evaluation of Programs, Data Sources and Utilization Opportunities** sponsored by the Arizona Water Institute, University of Arizona Water Resources Research Center, the Arizona NEMO Program (www.ArizonaNEMO.org) and Master Watershed Stewards. Working closely with ADEQ, the project team reviewed, collected and augmented available data on wastewater reuse, created a database of treatment facilities and volumes of water treated, and

surveyed public perceptions on wastewater reuse.¹ With the cooperation of the wastewater treatment facilities, Arizona NEMO team members and volunteers collected data on effluent dependent streams by hiking along the river channel and mapping the end-point of treated wastewater flow. Volunteers carried out the actual mapping, under the supervision of a NEMO project team member, after receiving training in use of GPS and personal safety. The assumptions of team members that riparian habitat necessarily accompanies effluent discharge in ephemeral stream channels were not borne out by observation.

On the map, the locations of large wastewater treatment plants with discharges to ephemeral stream channels are indicated by water drops. Rectangular pop-outs show in greater detail the measured extent of effluent flow from the discharge point or “outfall”. Wastewater treatment facilities that discharge to flowing streams are indicated by a purple dot with no pop-out, because the extent of effluent flow is coincident with the flow of the stream. Facilities that do not discharge effluent to an Arizona waterway are not shown.

¹Rock, Channah, Kristine Uhlman, Susanna Eden, Shawn Newell, Erin Westfall, and Margaret White, 2009, Survey of Public Perceptions Regarding Water Reuse in Arizona: Challenges and opportunities, available at azhydrosoc.org/MemberResources/Symposia/2009/Papers/Rock_etal.pdf



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Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Jeffrey C. Silvertooth, Associate Dean & Director, Economic Development & Extension, College of Agriculture and Life Sciences, The University of Arizona.

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