

## **Arizona Project WET Intergovernmental Agreement**

### **PROGRAM DESCRIPTION:**

**Purpose:** To educate K-12 students about Arizona's interconnected water resources and their importance to Arizona's future in support of Tucson AMA's statutory goal of safe yield.

**Goals:** Work towards an understanding of:

- Surface water in terms of a watershed's components, its dynamics, and its role in the hydrologic cycle.
- The groundwater system in terms of its components, composition, and its role in the hydrologic cycle.
- The effect of snow pack on water flow in a watershed
- The movement of water through diverse substrates
- Surface water and groundwater rights in the Arizona
- Surface water management through containment and distribution
- Colorado River system allocations and uses.
- The Central Arizona Project and the Shortage Sharing Agreements on the Colorado River
- Groundwater recharge and the Arizona water bank
- Water reuse and augmentation
- Water Conservation Technology
- The Engineering Design Process

**Audiences:** The proposed programs benefit public, charter and private school teachers and students in the Tucson AMA.

**Methodology:** Arizona Project WET offers a three-pronged approach to promote water stewardship and STEM literacy. First, our Teacher Academies offer professional development that evolves teachers' instructional practice and water-related content mastery through STEM integration, student-directed learning, and collaborative work. For the past three years, we've focused our professional development on STEM learning, due to the need for education that integrates these subjects into real world, rigorous, and relevant learning experiences for students. We use the relevant topic of water to model this process. All professional development incorporates: 1) Making claims and arguments based on evidence and reasoning (Common Core & Next Generation Science Standards), 2) Incorporating authentic data sets and informational text regarding issues that directly affect students (Common Core & Next Generation Science Standards), 3) Using technology and math skills for relevant inquiry and 4) Identifying and motivating STEM careers.

Second, APW's direct student outreach delivers or extends classroom learning by facilitating exploration and discovery. Groundwater flow models, watershed models, water efficient devices and whole body simulations are used to drive exploration and inquiry. Learning in this way builds foundational knowledge, from which students can then construct a deeper understanding of a subject. The School Water Audit Program (SWAP) and the Water Scene Investigation (WSI) Program offer project based learning experiences that incentivize water conservation through student-driven inquiry and students acting to install technology that saves water.

Third, APW involves community volunteers in effective K-12 education programs that make the

experience meaningful for both provider and recipient.

**Background:** Arizona Project WET (APW), a recipient of ADWR Assistance Program funds since 2001, has developed and provided teacher workshops, Arizona-specific instructional materials, water education festivals and other innovative and valuable educational resources that promote the awareness, appreciation, knowledge, and stewardship of Arizona water resources. In 2008, funds were rescinded as a result of the state budget shortfall. In 2014, APW re-established a 2-year IGA with the Phoenix AMA to provide pertinent education to Phoenix Valley teachers and students (\$50,000 per year). The request herein (\$44,100 per year) will augment Arizona Project WET programming in the Tucson region which includes curriculum components, STEM lessons, water saving projects and professional development for teachers. This funding will also expand existing programs to the entire Tucson AMA region.

**Description:** Education is a key to Tucson AMA achieving its statutory goal of safe-yield by 2025 and sustaining it thereafter. Tucson's water resources, specifically groundwater and Colorado River water via the Central Arizona Project, need to be understood as interconnected systems. Since all APW programs are made locally relevant, drought is a pervading theme in them. Also, the existing conservation ethic in Arizona needs to be expanded beyond behavioral methods to the use of water efficient technology. Through a deepened understanding of water resources and reliability, we will develop a water literate citizenry prepared for decision-making that ensures societal wellbeing and economic growth.

All Arizona Project WET programs are developed in consultation with regional district specialists using the logic model format of inputs, outputs and short, medium and long-term outcomes. Using clear objectives, APW has developed assessment tools for all programs. APW programs in Tucson all achieve measureable learning gains using pre and post assessments. Programs are evaluated and altered based on data and new programs are developed based on need. Our water audit programs can actually achieve measureable water savings through meaningful STEM education.

In the 2014-15 fiscal year, Arizona Project WET programs in the Tucson area reached 584 teachers, 26,634 students and 4,714 adults with 2,275 hours of instruction. During this school year, 221 teachers improved their mastery of content knowledge and instructional practices by an average of 52% through participation in professional development academies and workshops. This positively affects the 9,017 students that they teach annually. In direct instruction provided by APW, 9,448 students from 363 teachers' classes gained knowledge about water resources and efficiency with knowledge gains ranging from 13 - 48% (program and grade level dependent). Student-driven school water audit projects resulted in a projected 2.1-million gallons/year water savings. Public outreach events engaged 7,803 students and 4,164 adults in water education activities.

#### SCOPE OF WORK:

APW shall perform the following annually for the next 2 years:

##### **Task 1: Teacher Multi-Day Academies**

APW shall conduct a multi-day engineering academy, potentially reaching 20, 5-12th educators from the Tucson AMA. Educators will engage in, learn and practice the engineering design process. They will leave this workshop with practical applications of engineering design to utilize in their classrooms. The Central Arizona Project (CAP), an essential water source for the Tucson AMA, will be the focus of this academy. Augmenting APW's well-established instruction on the groundwater system, participants will also build and test models of the CAP delivery system, which delivers water from Lake Havasu to Southern Arizona. They will also design, test and build an aquatic Remotely Operated Vehicle (ROV). CAP operators use

ROV's to inspect the canal lining for cracks and protrusions; thus protecting against future breaches. With the ability to operate with full water flow in the canal, ROV's reduce the human risk of sending a diver into the canal. Educators will develop an understanding of energy, buoyance, hydrodynamics, forces, electrical circuitry, wiring, soldering, control systems and instrumentation, but most importantly they will have project based learning options to integrate technology and engineering in to science and math instruction.

**Education Links to ADWR Programs:** Colorado River, Compliance, Assured Adequate Water Supply and Arizona Water Bank

**Deliverable:** The Annual report shall include a description of the progress of the academy, including location, syllabus, marketing efforts, attendance, results and evaluation.

### **Task 2: Direct Student Outreach Programs**

Arizona Project WET has developed an extensive direct student outreach program through Tucson Water funding and easy access to UA students to train and deliver facilitated lessons. These lessons are scripted, yet through the use of models and teaching tools, water educators (trained UA students on an hourly wage) facilitate learning through inquiry and exploration. Those programs include:

1. Conduct Sweetwater Wetland Water Festivals for at least 12 classes and 300 3rd or 4th grade students within the Tucson Active Management Area.
2. Conduct at least 12 in-classroom Groundwater Flow Model presentations for at least 300 3rd or 4th grade students.
3. Conduct at least 12 in-classroom Groundwater Flow Model presentations for at least 350 6th grade students.
4. Provide relevant STEM learning in the region with middle and high school teachers by conducting two school or home water audits including but not limited to water efficient aerator installation with at least 200 students and reporting water savings.
5. Provide relevant STEM learning in the region with middle and high school teachers by facilitating 2 investigation days at Sweetwater Wetlands or a regional riparian area utilizing existing programs (e.g. Discovery Program, Phenology Trail, water investigations) for up to 200 students.

**Education Links to ADWR Programs:** Drought and Conservation, Colorado River, Assured Adequate Water Supply and Arizona Water Bank

**Deliverables:** The Annual report shall include a description of the progress of each of the direct student outreach programs, including location, marketing efforts, attendance, results and evaluation.

### **Task 3: Arizona Water Festivals**

APW will work to coordinate at least one additional festival in the Tucson AMA. APW will contact local leaders in each new community to create interest and investment for the future sustainability of this festival. Support from ADWR will satisfy one-third of the cost of each new festival.

**Education Links to ADWR Programs:** Drought and Conservation

**Deliverable:** The Annual report shall include a description of the progress the festival, including location, school district participants, marketing efforts, attendance, results and evaluation.

**Task 4: Equipment Loan Program**

Continue to loan out classroom drinking water and stream water testing kits to teachers that have been trained in their use.

**Deliverable:** The Annual report shall include a record of equipment checked out and the number of students that it was used with including location and school district.

**Education on all ADWR Programs could be disseminated**

**SCHEDULE OF DELIVERABLES AND PAYMENTS:**

**Deliverables:** APW shall submit copies of the Semi-Annual Progress Reports to the Department’s Technical Administrator according to the schedule listed below.

DELIVERABLES	DUE DATE(S)	PAYMENTS (Not to exceed)
Annual Progress Reports July 2016 to June 2017	August 15, 2017	\$44,100
July 2017 to June 2018	August 15, 2018	\$44,100
<b>TOTAL AMOUNT</b>		<b>\$88,200</b>