



NONPOINT SOURCE SUCCESS STORY

California

Endosulfan Reduction and Removal in the Alamo River Watershed

Waterbody Improved

Endosulfan, an organochlorine pesticide used in agriculture, binds to sediments and can bioaccumulate in fish tissue when transported to waterbodies. Endosulfan was detected in Alamo River fish tissue samples beginning in 1978. The U.S. Environmental Protection Agency (USEPA) began phasing out endosulfan in 2000. The Alamo River Sedimentation/Siltation Total Maximum Daily Load (TMDL) was adopted by the Colorado River Basin Regional Water Quality Control Board (Colorado River Water Board) in June 2001. The Imperial County Farm Bureau (ICFB) developed a Voluntary TMDL Compliance Program to assist Imperial Valley farmers in implementing best management practices (BMPs) to reduce sediment-bound pesticide runoff. Based in part on significantly reduced endosulfan concentrations in fish tissue samples, the Alamo River was delisted for endosulfan in California's 2012 Integrated Report.

Problem

The Alamo River originates about a kilometer over the border into Mexico and flows north into the United States for 57 miles through the Imperial Valley (in central Imperial County) before draining into the Salton Sea (Figure 1). The Alamo River subwatershed, impaired for sediment/siltation, pesticides and other pollutants, includes approximately 340,000 acres within the Imperial Valley. Irrigated agriculture is the major land use and is identified as a major source of pesticide and sediment impairment to the river. Due to low precipitation, the water in the Alamo River consists almost entirely of agricultural drainage from farms.

The organochlorine pesticide endosulfan was widely used during the 1970s and 1980s in the region. Because endosulfan has a strong tendency to bind to sediments, the transport of sediments from land is the primary pathway for endosulfan to reach receiving waters. Organisms bioaccumulate endosulfan from the environment and through the food-web; concentrations of endosulfan in fish tissue have been previously associated with its concentrations in sediment. Endosulfan was detected in fish tissue samples beginning in 1978. The numeric target for endosulfan in fish tissue is 100 micrograms per kilogram ($\mu\text{g}/\text{Kg}$), as established in the 1972 National Academy of Sciences (NAS) Water Quality Criteria. The Colorado River Water Board adopted a listing of the Alamo River as impaired by endosulfan on the Clean Water Act (CWA) section 303(d) impaired list in the 2010 assessment cycle.

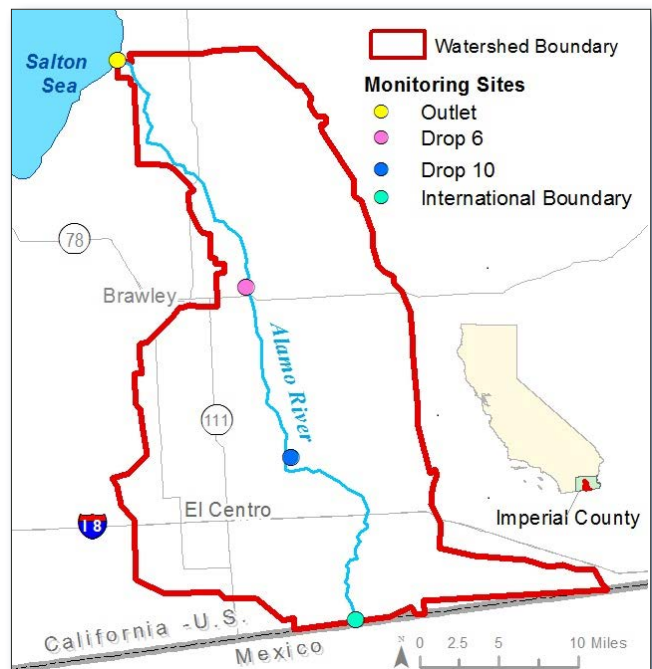


Figure 1. California section of the Alamo River watershed (red outline) and monitoring stations.

Story Highlights

USEPA began phasing out endosulfan in 2000, and the Alamo River Sedimentation/Siltation TMDL was adopted by the Colorado River Water Board in June 2001 and became effective in June 2002. The TMDL has an overall goal of reducing sediment loads in Alamo River by 53 percent.

BMPs that reduce sediment transport also reduce endosulfan transport to these waters. Concerns over endosulfan toxicity and increasing regulations led farmers in the Imperial Valley to instead use different pesticides, thereby rapidly reducing the use of endosulfan (Figure 2). All farmers stopped using endosulfan in 2014, and the use of endosulfan on any crops became unlawful after July 2016.

Implementing the TMDL relies on controlling runoff from Imperial Valley farms. To help farmers implement irrigation BMPs to reduce runoff, the Imperial County Farm Bureau (ICFB) developed the Voluntary TMDL Compliance Program. In this program, dischargers in the Alamo River and other Imperial Valley subwatersheds participate in a coalition. Implementing California's Irrigated Lands regulatory program included adopting about 25,000 BMPs on over 5,000 Imperial Valley farm fields (478,000 acres of farmland in the Imperial Valley are covered by program). Growers submitted over 6,000 farm plans to the program annually. Nine outreach and education seminars were held annually. The top five BMPs that farmers reported using to reduce sediment and pesticides in runoff are: (1) adherence to Imperial Irrigation District (IID) Regulation No. 39 for Agricultural Tailwater Structures, (2) irrigation water management, (3) land leveling, including field at proper grade near the drain box; (4) pan ditches (wide, flat tail ditches); and (5) plastic sheeting to control erosion.

Results

Endosulfan in the Alamo River was delisted based on fish tissue concentration levels that remained well below the 1972 NAS tissue guideline of 100 µg/Kg for the protection of aquatic life uses. Since 2001, tissue concentrations have been largely below the reporting limit (Figure 3), and endosulfan has not been detected in water samples. The Colorado River Water Board adopted the delisting of the Alamo River for endosulfan, which was documented in the Final California 2012 Integrated Report (303(d) List/305(b) Report).

Partners and Funding

The Colorado River Water Board, one of nine Regional Water Quality Control Boards in California, is responsible for implementing the federal CWA and state water quality regulations in the area. The ICFB developed the Voluntary TMDL Compliance Program in 2001 in response to the Imperial Valley Drains Sedimentation and Siltation TMDL and Implementation Plan. CWA 319 grants to ICFB and collaborating agencies helped implement the Voluntary TMDL Compliance Program to

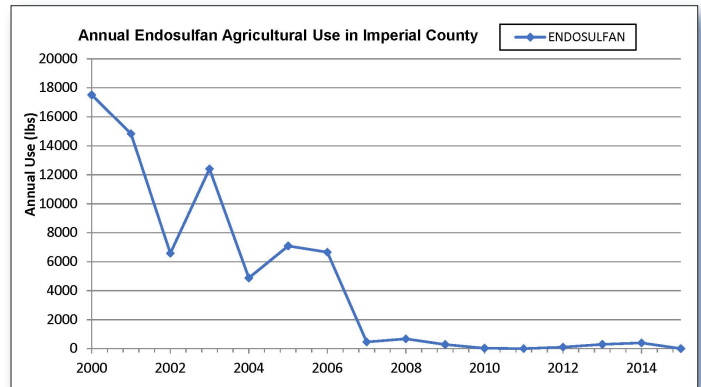


Figure 2. Endosulfan use has declined.

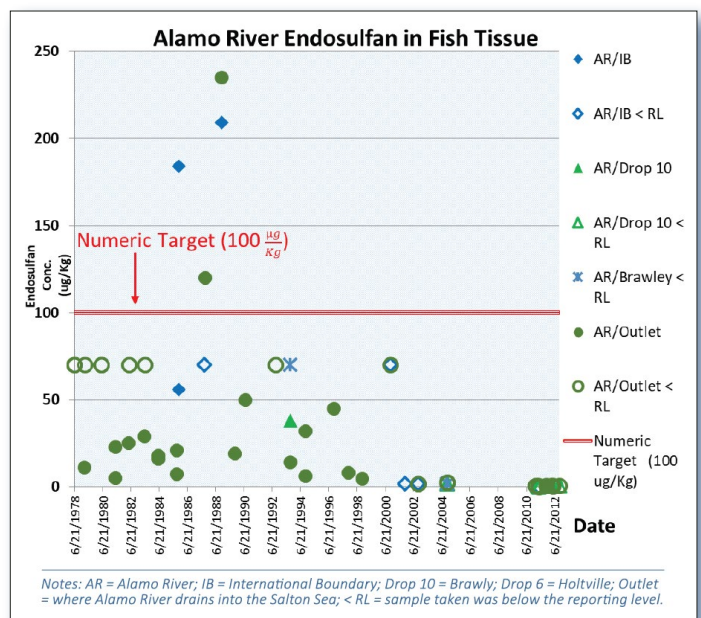


Figure 3. Endosulfan levels at each monitoring station from 1978 through 2012 on the Alamo River.

decrease runoff of sediment-bound pesticides in Imperial Valley. CWA 319 grants were awarded in 2000–2006 for Imperial Valley pollution control and totaled \$1,748,557.

IID manages more than 3,000 miles of drains and canals, making it one of the largest irrigation districts in the country. They supply almost all the water used by agricultural or municipal activities. IID is authorized by state law to provide urban runoff treatment services and is implementing a plan to treat urban runoff using constructed wetlands.



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