



NONPOINT SOURCE SUCCESS STORY

South Carolina

Comprehensive Nonpoint Source Management Addressed Fecal Coliform Bacteria Impairment in Bulls Bay, Shellfishing Area 7

Waterbodies Improved

Malfunctioning septic systems, grazing livestock, pet waste, marine vessels, illicit discharges and wildlife contributed to high levels of fecal coliform (FC) bacteria in Shellfish Harvesting Area 7 of South Carolina's Awendaw Creek and Bulls Bay watersheds. As a result, the South Carolina Department of Health and Environmental Control (SCDHEC) added Shellfish Harvesting Area 7 to the 2002 Clean Water Act (CWA) section 303(d) list of impaired waters for FC bacteria. To improve water quality and reopen the shellfish beds, private citizens, the marine community, and local and state government collaborated to implement agricultural best management practices (BMPs), shellfish bed restorations and septic repairs. As a result, assessments for the 2014 CWA section 303(d) list showed that seven sites in the previously impaired Shellfish Harvesting Area 7 now meet water quality standards for FC bacteria and have been removed from the impaired waters list. The shellfish beds have been reopened and now fully support their designated use for shellfish harvesting.

Problem

The focus area of the Sewee-to-Santee CWA section 319 project was the Atlantic Intercostal Waterway and its adjacent marshland, from the northern boundary of Shellfish Harvesting Area 7 extending southwest to Station 07-14 (Figure 1). The watershed draining to the shellfish beds includes HUCs 030502090201 and 030502090202. The monitoring stations assessed for this project each covers a 1-square-mile area (segment) within Shellfish Harvesting Area 7. The stations include 07-02 (Graham Creek at Marker #64), 07-02A (Graham Creek and Bulls Bay), 07-03 (Awendaw Creek at Marker #57), 07-04 (Harbor River at Bulls Bay), 07-05 (Tibwin Creek at Marker #42), 07-09 (Doehall Creek at Confluence of Aiwv - North of Marker #46) and 07-14 (Doehall Creek - Third Bend).

Data collected by SCDHEC at these stations indicated a failure to attain the designated shellfish harvesting use in Shellfish Harvesting Area 7, causing Shellfish Harvesting Area 7 to be added to the 2002 CWA section 303(d) list of impaired waters for FC bacteria. These impairments were believed to be caused by malfunctioning septic systems, grazing livestock, pet waste, marine vessels, illicit discharges and wildlife. The applicable state water quality standards for shellfish FC are defined as: not to exceed an MPN (most probable number) fecal coliform 30-day geometric mean of 14/100 milliliters (mL) with daily maximum allowable values less than 43 MPN/100 mL.

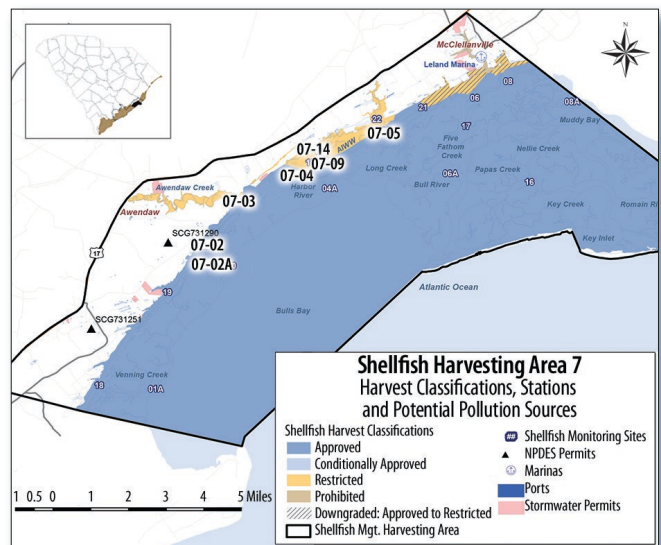


Figure 1. Shellfish Harvesting Area 7.

Project Highlights

The project included improved operation and function of on-site wastewater systems; outreach to the marine community, local governments and watershed citizens; substrate renourishment of oyster reefs; and the installation of agricultural BMPs. On-site wastewater problems were a known issue in the area, so initial efforts were focused there. A Charleston Soil and Water Conservation District (CSWCD) contractor conducted homeowner septic



Figure 2. Local students conduct a recreational boater survey at McClellanville boat landing.



Figure 3. Partners pass mesh bags of oyster shells as they help to create an oyster reef on Tibwin Creek.

system workshops and participant solicitation in summer 2009 to encourage improved septic maintenance and repairs. Over the course of the project there were 62 complete septic system replacements and four minor repairs.

Potential marine sources of bacteria were addressed by extensive outreach, including in-person surveys (2010 and 2012) at boat landings. Local high school students were recruited to conduct these surveys (Figure 2). "Our Connected Coast" signs were posted on existing information boards. With the assistance of the U.S. Forest Service, U.S. Fish and Wildlife staff, and the town of McClellanville, four stand-alone sign

stations were constructed, including one at the Sewee Visitor and Environmental Education Center.

In 2010 and 2012, The Nature Conservancy and SCDNR planted more than 11,000 bushels of oyster shells to enhance water quality and raise public awareness (Figure 3). They also installed five pet waste stations (completed in October 2012), at public areas near waterways including a National Forest Service campground, a trailhead and a boat landing.

Agricultural BMP implementation began in the spring of 2012. With U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) technical assistance, 10,300 feet of livestock fencing was installed with a 20-foot buffer around drainage ditches. This BMP included adding paddocks for animal rotation and watering pipelines. Other outreach activities undertaken by various partners included an information booth at the Awendaw Blue Crab Festival, other festivals, agricultural workshops, septic system maintenance guides and TV information spots.

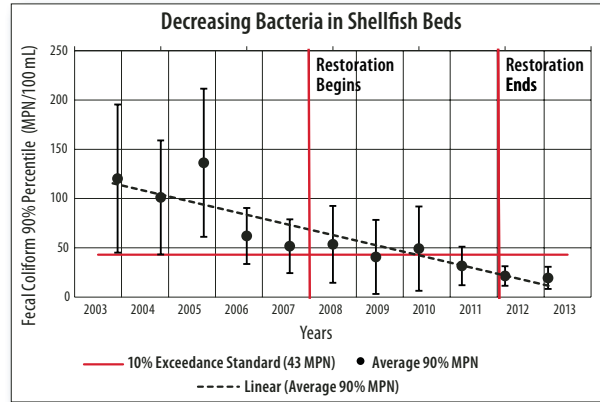


Figure 4. Trend of decreasing FC bacteria impairment. Average 90th percentiles in plot are calculated from the 3-year average 90th percentiles for the seven individual stations. Error bars represent one standard deviation above and below the average 90 percent MPN, providing some indication of how much bacteria varied spatially throughout the shellfishing areas.

Results

Monitoring data collected at the completion of this project showed FC bacteria was reduced at the seven shellfish monitoring sites (Figure 4). On the basis of these data, the seven shellfish monitoring stations located within Shellfish Harvesting Area 7 have been delisted as of the 2014 CWA section 303(d) list. These shellfish beds now support their designated use and have reopened for harvesting.

Partners and Funding

The restoration of shellfish beds in the Awendaw Creek and Bulls Bay watersheds was the result of collaboration between the U.S. Environmental Protection Agency (EPA), SCDHEC, CSWCD, SCDNR, The Nature Conservancy, Charleston County, Charleston County Community Services entitlement grant funding from the U.S. Department of Housing and Urban Development program, and individual landowners and septic contractors. The CSWCD received a \$596,660 EPA CWA section 319 grant and matched it with \$84,731. The project was managed by CSWCD, its contractor, and SCDNR. The SCDNR provided \$40,000 in funding, along with technical and education support. The Nature Conservancy and Charleston County supported the shellfish restorations and provided \$18,432 and \$18,000 to this effort, respectively. Lastly, individual landowners provided \$18,974 in funding for septic system repairs and replacements.



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