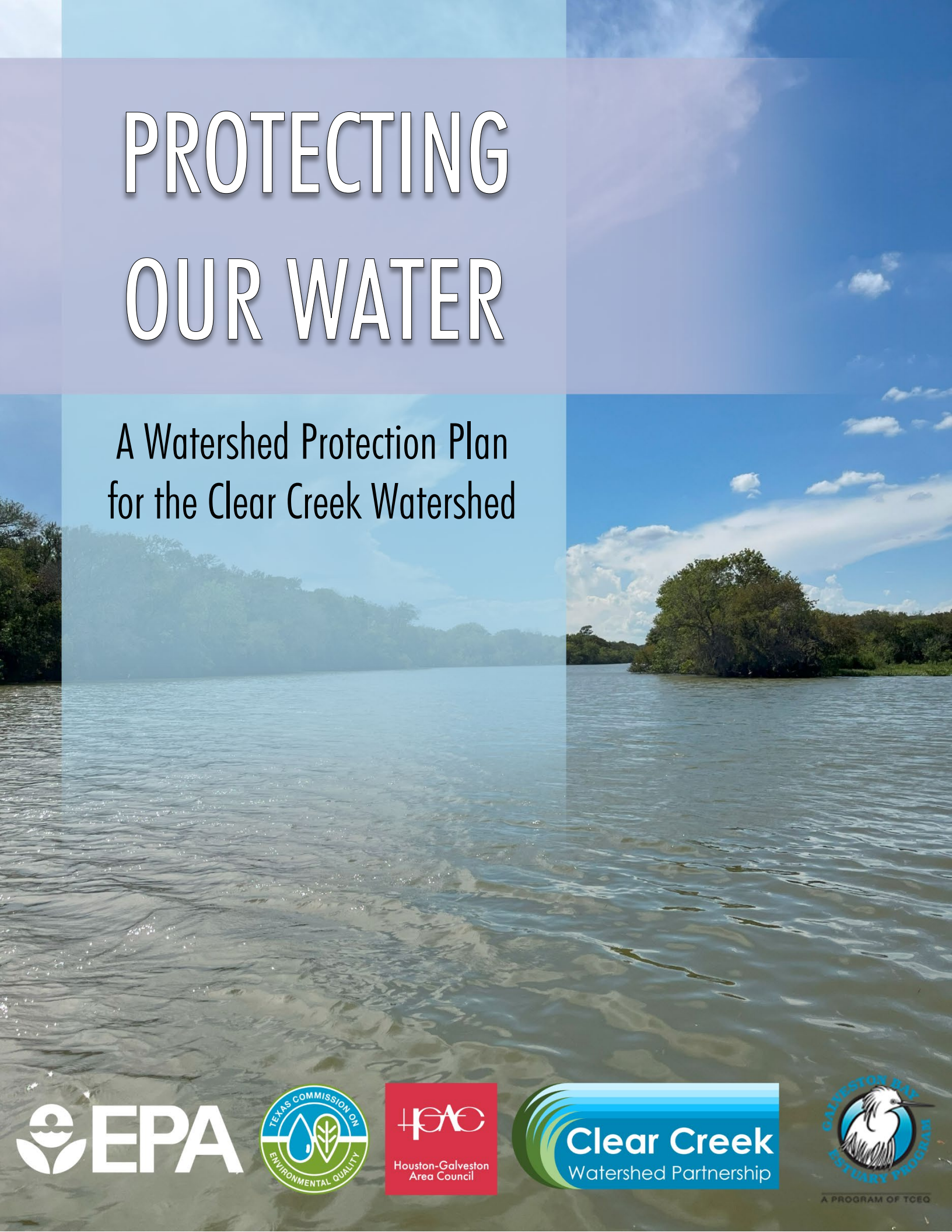


PROTECTING OUR WATER

A Watershed Protection Plan for the Clear Creek Watershed

EPA

Texas Commission on Environmental Quality

Houston-Galveston Area Council

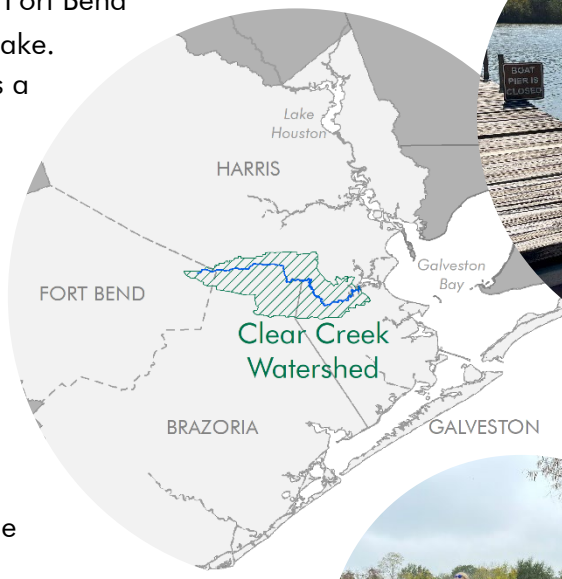
Clear Creek Watershed Partnership

Galveston Bay Estuary Program

A Program of TCEQ

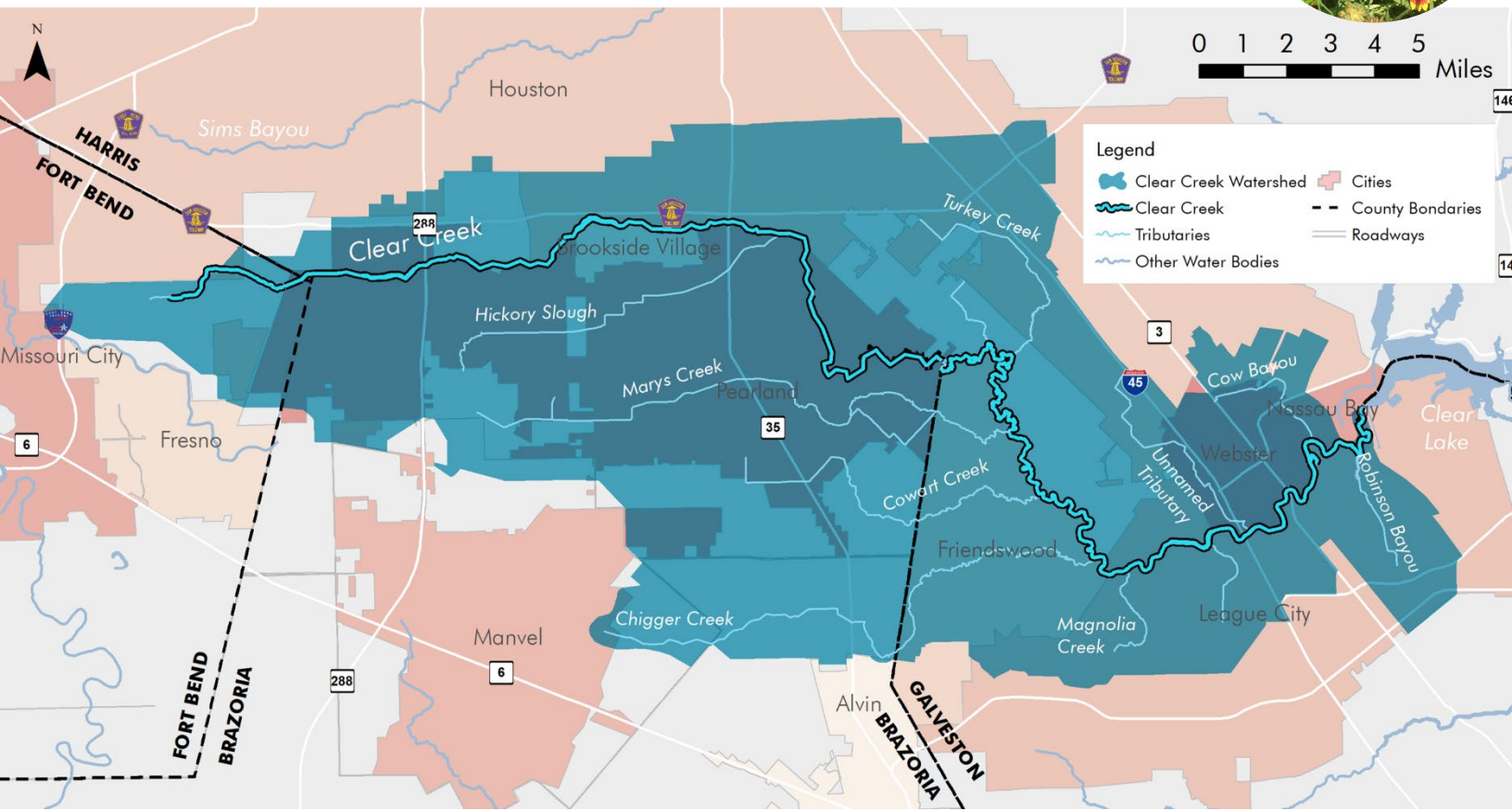
ABOUT THE PROJECT

Clear Creek flows east from its headwaters in Fort Bend County toward its eventual confluence with Clear Lake. The creek connects many local communities across a diverse landscape of remnant undeveloped areas and the developed land uses that constitute most of its watershed.

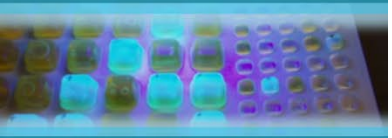


Approximately 172 square miles of land covering parts of Brazoria, Fort Bend, Harris, and Galveston counties form the drainage area or **watershed** of Clear Creek. This watershed is essential to supporting local economies, recreation, and a diverse ecology. Everything that happens in the watershed affects the water quality and uses of the waterway.

Water quality challenges in the Clear Creek watershed include elevated levels of fecal bacteria, low dissolved oxygen, and high nutrient concentrations. These factors can impact public and ecological health. To address these challenges, the Houston-Galveston Area Council (H-GAC) worked with local stakeholders to form the Clear Creek Watershed Partnership (Partnership) that worked closely with the Texas Commission on Environmental Quality (TCEQ) and the U.S. Environmental Protection Agency (EPA) to create and implement a Watershed Protection Plan (WPP).



WATER QUALITY



Waterways in Texas have a variety of uses. They provide drinking water, offer recreational opportunities, and support aquatic life. The State of Texas establishes water quality standards for waterways based on the uses they serve. If water quality samples show that a waterway is unable to support one of these uses, it is considered to have an **impairment**. When waterways have impairments, the State is required to take action to bring the waterway into compliance with the applicable standard. Some pollutants or conditions do not have specific criteria but may be serious enough to warrant a **concern**.

FECAL WASTE POLLUTION

The most common impairments in the Clear Creek watershed are elevated levels of *Escherichia coli* (*E. coli*) and Enterococcus bacteria exceeding the water quality standard for contact recreation. Bacteria such as *E. coli* and Enterococcus are found in the digestive systems of warm-blooded animals and indicate the presence of fecal waste in waterways when detected in surface water samples. Sources of fecal waste pollution include human waste sources, such as overflows from sanitary sewers and on-site sewage facilities; waste from domestic animals, such as pets and livestock; and natural influences, such as waste from wildlife and invasive species. Harmful pathogens associated with fecal waste can endanger public health during contact recreation, such as swimming or wading.

Technical analyses informed by local knowledge are shown on the following page. These charts show observed (2020) and projected (2035) contributions from fecal waste sources. The primary focus of the Partnership is to address sources of fecal waste pollution, but the WPP considers a number of other water quality issues.

OTHER CHALLENGES

Nutrients & Dissolved Oxygen - Nutrients (nitrogen and phosphorus) from fertilizers, fecal waste, and other sources can lead to algal blooms that reduce oxygen levels, limiting aquatic life and causing fish kills.

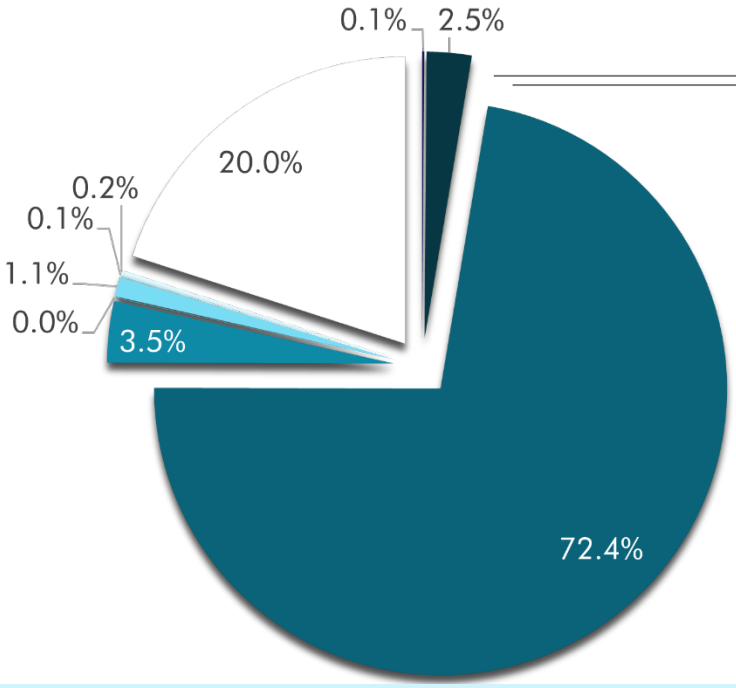
Trash - Trash from stormwater runoff and illegal dumping can affect aquatic life, degrade the beauty of our local communities, and expose people to hazardous substances.

Sediment - Sediment in the waterways from erosion, development, and mining operations can have a significant impact on aquatic life, drinking water, and flooding.

Growth - H-GAC estimates that the region's population will grow by 4 million by the year 2045. This will bring additional bacteria sources (onsite sewage facilities, pets, *etc.*) and increased paved surfaces. With careful planning, the impacts of growth on future water quality can be mitigated.

POLLUTION SOURCES

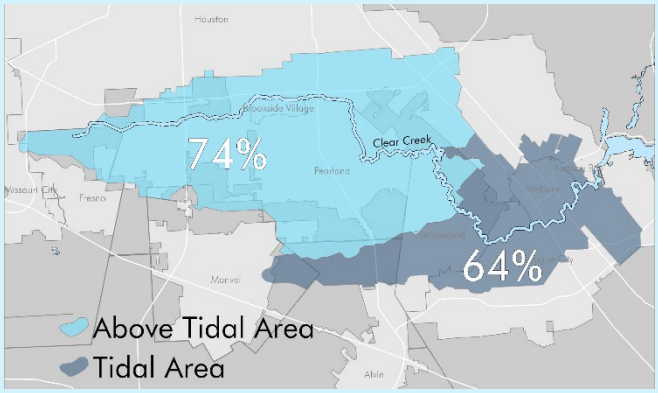
2020 FECAL WASTE POLLUTION



- Wastewater Treatment Facilities, 0.1%
- Onsite Sewage Facilities, 3.4%
- Pet Waste, 72.4%
- Cattle, 3.5%
- Horses, 0.0%
- Sheep and Goats, 1.1%
- Deer, 0.1%
- Feral Hogs, 0.2%
- Other Animals, 20.0%

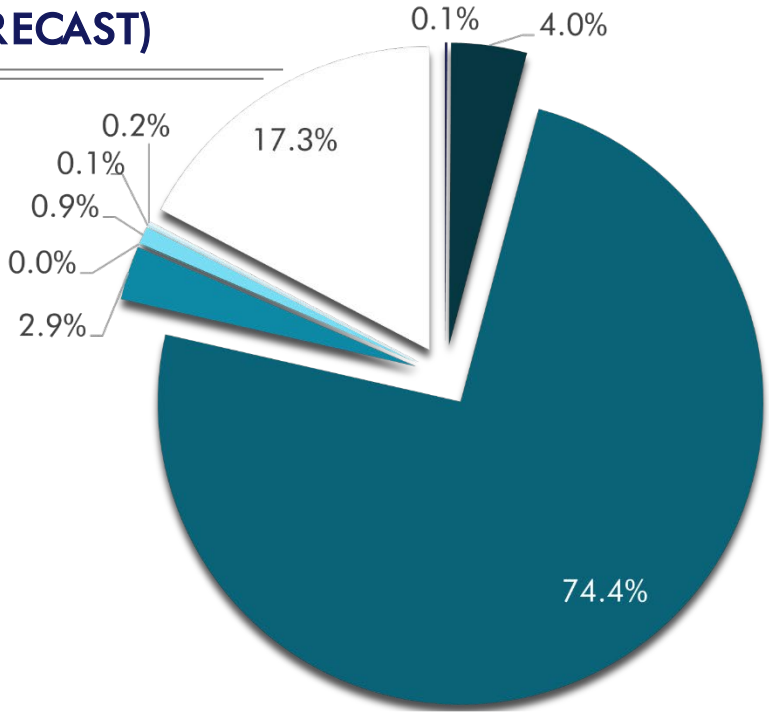
PERCENT REDUCTION NEEDED

While water quality influences vary spatially, pet waste is the major contributor to fecal waste pollution throughout the Clear Creek watershed. According to estimates based on observed data, a **74% reduction** in pollution is needed in the above tidal area to meet the state water quality standard for contact recreation. To meet the standard in the tidal portion of the watershed, a **64% reduction** in pollution is needed. Pollutant sources related to human activity will continue to increase in the watershed. Without action, this could lead to a 16% increase in pollution levels by 2035, the WPP's goal year.



2035 FECAL WASTE POLLUTION (FORECAST)

- Wastewater Treatment Facilities, 0.1%
- Onsite Sewage Facilities, 4.0%
- Pet Waste, 74.4%
- Cattle, 2.9%
- Horses, 0.0%
- Sheep and Goats, 0.9%
- Deer, 0.1%
- Feral Hogs, 0.2%
- Other Animals, 17.3%



TAKING ACTION

LOCAL KNOWLEDGE, LOCAL SOLUTIONS

Local concern over water quality issues and the future of Clear Creek led to the formation of the **Clear Creek Watershed Partnership**—a group of local stakeholders representing residents, government, industry, agricultural producers, community groups, and other local partners. Supported by H-GAC and TCEQ, the Partnership used a variety of methods to evaluate the causes and sources of water quality issues. Then, the Partnership worked to address fecal waste sources and other concerns by identifying voluntary, cost-effective solutions reflecting community priorities. While specific focus was given to reducing fecal waste, which can directly impact human health, many of the solutions are intended to have multiple water quality benefits.

The Partnership's strategies will empower local decision-making, accent outreach and education, and make good use of existing, proven programs and resources. Because pollutant sources are diverse, the Partnership's recommendations represent a flexible range of solutions designed to adapt to changing conditions.

ENSURING SUCCESS

Implementation of the WPP will require the continued coordination, cooperation, and commitment of the local partners. The solutions in the WPP are designed to **coordinate** with flood mitigation, conservation, and other efforts in the watershed to broaden the plan's reach. The Partnership will evaluate ongoing water quality testing and periodically review the success of WPP actions as they relate to serving the communities of the watershed, reducing risks to human and environmental health, and bringing water quality closer to compliance. The timeline on page 5 is a guide to the contents of the WPP, including various recommendations, responsible parties, and general timeframes for implementation.

TIMELINE

STRATEGIES FOR HUMAN WASTE

G	Support local utility improvements	Early, Ongoing
G	Recommend increased testing to better characterize effluent	Early, Ongoing
G	Remediate collection system infrastructure; consider preventative measures	Ongoing
G, R	Remediate failing onsite sewage facilities	Ongoing
G	Improve onsite sewage facility spatial data	Ongoing
G, R, C	Convert onsite sewage facilities to sanitary sewer where appropriate	Ongoing
G, C	Minimize fats, oils, and grease in sewage through education and outreach	Ongoing

STRATEGIES FOR URBAN STORMWATER

G, R, C	Install stormwater inlet markers	Early, Ongoing
C, G	Investigate drainage channels in urban areas for potential pollutant sources	Early, Ongoing
G, R, B, C	Promote maintenance and restoration of riparian buffers	Ongoing
G, B, C	Promote and implement low impact development practices	Early, Ongoing
G, R, B, C	Promote urban forestry as a stormwater solution	Ongoing

STRATEGIES FOR PET WASTE

G, B, C	Install pet waste stations	Early, Ongoing
G, B	Expand dog parks	Late
G, C	Promote spay and neuter events	Ongoing
G	Consider increased enforcement	Ongoing

STRATEGIES FOR AGRICULTURE, WILDLIFE, AND FERAL HOG MANAGEMENT

G, R, B	Implement voluntary agricultural plans and technical assistance	Ongoing
G, R, B, C	Restore/maintain/enhance riparian buffers, upland habitat, and tree canopy	Ongoing
B, C	Implement horse manure composting program	Early, Ongoing
G, R, B	Support efforts to remove feral hogs	Ongoing
R, C	Manage wildlife feeding and deter feral hogs	Ongoing

COORDINATION AND EDUCATION

G, R, B, C	Continue to foster the Clear Creek Watershed Partnership	Ongoing
G, R, B, C	Support existing outreach programs and partnerships in the watershed	Ongoing
G, C	Hold educational workshops for major strategies and train volunteers	Ongoing
G, R, B, C	Hold trash clean-up events	Ongoing
G, C	Provide educational materials for major strategies online	Ongoing

G: Government • R: Residents / Landowners • B: Business / Industry • C: Community Organizations

Early: 2023 - 2028 • Late: 2029 - 2035 • Ongoing: 2023 - 2035

Note: The responsible parties for each strategy represent categories of local partners that may be involved with these voluntary measures, not specific entities. The actual participants in any specific project may vary based on resources and location. Some strategies are ongoing through the project term and some are specific to certain time periods. All will be subject to opportunities as they arise.

MAKE A DIFFERENCE

RESIDENTS

- ✓ Pick up after your pet to keep waste out of the storm sewer.
- ✓ Maintain your septic or aerobic system.
- ✓ Become a volunteer Texas Stream Team Monitor or report pollution in your community.
- ✓ Reduce your fertilizer use on lawns and consider planting native vegetation.
- ✓ Support water quality initiatives in your local government decision-making.

LOCAL GOVERNMENTS AND DISTRICTS

- ✓ Consider ordinances or incentives to reduce sources of waste in your jurisdiction.
- ✓ Address wastewater treatment challenges, especially sanitary sewer overflows; consider participation in the Texas Commission on Environment Quality's Sanitary Sewer Overflow Initiative.
- ✓ Consider green infrastructure, urban forestry, riparian buffers, and other development practices for government facilities and design codes.

AGRICULTURAL COMMUNITIES

- ✓ Work with U.S. Department of Agriculture Natural Resources Conservation Service, Texas State Soil and Water Conservation Board, and Texas A&M AgriLife Extension to implement voluntary land management practices and plans.
- ✓ Get support in managing feral hog activity on your property.
- ✓ Consider voluntary conservation, especially in riparian areas, to preserve rural character and water quality.

BUSINESSES AND INDUSTRY

- ✓ Where applicable, ensure all permit requirements for wastewater discharge are being met.
- ✓ Consider green infrastructure, riparian buffers, and low impact development in site design.
- ✓ Support community water quality initiatives through involvement and sponsorship.

COMMUNITY ORGANIZATIONS

- ✓ Promote and implement voluntary land conservation projects.
- ✓ Provide or participate in public education and outreach campaigns.

EPA

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