CANAL OWNER'S GUIDE

A guide to living along the canals of:

Bayou Vista

Original Bayou Vista

Omega Bay

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Introduction

Think about it. Our canal communities are almost entirely surrounded by water!

The portion of Galveston Bay that touches our communities -- and feeds our canal systems -- is probably a big reason why we all live here. We fish, swim, boat and/or kayak, and play in these waters. We watch the sun rise and set and count our blessings to live in such a beautiful place. Thus, we also have an obligation to understand how the canal system works and how to care for it.

So, this Canal Owners' Manual is for YOU. Like the operator's manual for your car or your lawnmower, this guidebook will be your reference tool to help you understand the beauties as well as the responsibilities of having a part of Galveston Bay in your backyard.

Note that you can also find an electronic copy of this handbook on the *Bayou Vista Water Quality Initiative* Facebook page, including links to environmental resources.

A winter view of the marsh – and its many inhabitants – along Blue Heron

Chapter 1: Highland Bayou Watershed and How Our Canal System Works

Water Flow in Bayou Vista, Original Bayou Vista and Omega Bay

There are two major water flow inputs for all three of our communities: (1) The larger (saltwater) bay, as it flows under the railroad bridge at the end of Barracuda Drive, and (2) the flow of freshwater that comes directly from Highland Bayou. These flow in a "closed canal system" which means that water does not flow OUT of the canal system at the other end. Water exchange within the system occurs through tidal actions.

The saltwater inflow comes through the grassy areas on the other side of the railroad bridge, which can absorb harmful nutrients before they get into the canals. It can also bring the occasional trout, redfish, crab, etc.! Unfortunately, the railroad also blocks larger inflows that would be helpful in flushing our canal system.

The freshwater flow into our canal system is the result of rainwater upstream. When rain hits the ground, some is absorbed, and some runs off streets and other hardened surfaces into our canals and then travels to the bay.

As water runs off, it picks up a variety of things including sediments, trash, fertilizers, pesticides, and oils washed off streets and lawns. The more runoff there is, the more foreign material flows into the canal system. We need to remember: **If it falls on the ground, it can end up in the water!**

All the water that flows from Highland Bayou – including everything that it carries – passes through Bayou Vista, Original Bayou Vista and Omega Bay.

Thus, Highland Bayou has a great deal of influence on the water quality in our canal system – from the salinity level, the soil, and the potential pollutants from upstream hazards such as broken sewer lines, chemicals, or excrement from domesticated animals.

Chapter 2: Our Local Environment and Wildlife

Our canal system is home to both animals and vegetation, all of which contribute either to its health or to its detriment. For example:

Aquatic Vegetation and Algae

Green and brown algae abound in Galveston Bay and are often seen in our canal system. They will grow on anything that is immersed in water and receives sunlight. including submerged debris, crab traps, oysters, piers, boats, etc. Underwater grasses, or seagrasses, grow in shallow areas of the Bay with clear water (we see some of these in the marsh across from Blue Heron).

Healthy seagrass beds, like wetlands, are an important habitat for juvenile species of fish and shellfish. When there are too many nutrients in the water, such as from excess lawn fertilizer, dog waste etc., algae can grow and block the light from getting to these important seagrasses, overwhelming them and causing them to die off. (This may contribute to the denigration of the seagrasses that has occurred in the marsh across from Blue Heron in the last few years.)

Crabs and Shellfish

Many types of crabs can be found in the saltwater of Galveston Bay. The most familiar is the blue crab, whose meat is edible and quite tasty (although cleaning the crabs requires perseverance). While it is possible to catch crabs in our canal system, eating them is not recommended.

Fish

Some of the more common fish in our saltwater canals are mullet, trout, redfish, black drum, sheepshead and flounder. Redfish and trout are the more recognizable. Mullet have flat heads and often jump out of the water. Sheepshead are somewhat round and have thick, black, vertical stripes. While all are edible in our area, trout and redfish are the most popular (and tasty). However, it is recommended that we NOT eat fish caught in our canal system due to bacteria concerns.)

For a listing of all consumption bans and advisories, and a listing of areas tested where no bans or advisories have been issued, visit the Texas Department of State Health Services (TDSHS) Seafood and Aquatic Life group website at www.dshs.texas.gov/seafood, call (800) 685-0361 (shellfish) or (512) 834-6757 (fish), or email seafood.regulatory@dshs.texas.gov.

Also observe seafood advisories, especially if you are pregnant or under the age of 12. (See www.dshs.texas.gov/seafood/advisories-bans.)

Oysters and Barnacles

The shelled, flat animals attached to docks and seawalls are oysters. Smaller, mountain-shaped structures are barnacles. Both animals are filter feeders, taking tiny particles out of the water column for food.

Oysters are edible (and delicious) but cannot be harvested in any area close to shore – including our canal system – due to bacteria concerns.

Ducks and Birds

The ducks that we see around our canals are wild and, as such, perfectly attuned to eating in their natural environment. That environment will support as many ducks as it can feed naturally. Feeding the ducks (particularly if we feed them "people" food) can result in more eggs and baby ducks – more than the environment can support. Feeding them also results in their excrement on our docks and patios, which then gets on our feet (our children's and our pets' feet) and into our homes. Their excrement contains microbes that are unhealthy for humans. It is recommended that we NOT feed the ducks, but rather watch and enjoy them in their natural habitat.

Alligators and Other Wildlife

Occasionally, we will find that an alligator has made its way into our marsh or canal system.

We have only two rules regarding them: Stay away and do not feed them. When addressed or cornered, an alligator will defend itself by lashing out. This is true whether it is on your dock or in the water. Keep your pets away from them. Do not swim in the canal if one has been seen (even if it is on another canal). Because a canal is not the idea habitat for them, they will soon leave.

Sunset over Bayou Vista

Chapter 3: Protecting Our Canal System: Home and Yard Care

There are many things that we as individuals and as a community can do to protect and preserve our canal system. The following chapters provide suggestions as well as resources to assist us.

Swales

The low grassy areas in the middle of some of our streets are "swales" and are designed to manage water runoff from our yards, filter pollution and increase rainwater infiltration into the soil. Water collects in them and some eventually flows into the canal system – carrying with it whatever is in the swale, including dog waste, bird feathers, empty cans and other trash.

- Pick up dog waste, remove empty bottles/cans, and any other debris in these areas before they get into the canal system.

Landscaping

After the next heavy rain, look around your yard in relation to the canal next to it. Is there a lot of runoff? Is there a drain that runs from the front of your yard to the back to drain water out of the yard and into the canal -- carrying pollutants with it?

- When choosing plants for your lawn and garden, select native plants that are well adapted to our climate and need little water. Mulch to help reduce erosion and promote water infiltration into the soil.
- Use landscaping techniques such as porous walkways and grass swales to reduce erosion and promote water infiltration into the soil.
- Keep compost piles away from the edges of your yard. These piles have nutrients that could leach out during storms, run off into canals and cause excessive plant and algae growth. Decomposing vegetation in the waterways can also use up oxygen needed by fish.

Fertilizers and Pesticides

Given the usual slopes and soil conditions in this area, fertilizer and pesticides placed on plants or grass within 50 feet of a canal can potentially end up in that canal. Alternatives for yard care:

- Soap or oil sprays are effective against aphids and whiteflies. Other remedies include beer for slugs and snails, organic powders (i.e., diatomaceous earth, boric acid) for roaches and fleas, and salt for weeds and grasses in sidewalk cracks.
- Before discarding pesticide and fertilizer containers, rinse thoroughly and use rinse water on the plant or grassy area. Do not dump excess fertilizers or pesticides down household drains or storm drains or on the ground.
- It is illegal to dump yard waste into the canals. Grass clippings will decompose and use up the oxygen in the water that is needed by the fish and shrimp, etc. Less oxygen in the water can result in fish kills.

- Mow your lawn at the highest setting to establish a healthier root system, which can significantly reduce your need for pesticides and fertilizers. It also allows native pollinator plants to regrow in a healthy cycle to provide food for important insects and birds.
- If you can, leave your grass clippings where you mowed for natural nutrient fertilizing. If you need to clean up your clippings, add them to a compost pile. If you frequently treat your grass with pesticides (ex., for mosquitos) and fertilizers, it is best to bag them and throw them away to keep those out of our canals.
- When mowing next to the canal, mow in a direction to ensure that the grass clippings fall into the grass and not into the canal.

Irrigation

Learning about how much water your yard needs will help to conserve water for all of us (and prevent runoff, as mentioned above.) To maintain the health of your grass, it needs ½ inch of water once or twice a week, slightly more in very hot weather.

- When watering your garden or lawn, use trickle irrigation or soaker hoses to reduce runoff and increase watering efficiency.
- If using sprinklers, position them so that water falls only on the lawn or garden, not on the sidewalk, driveway or street -- or in the canals.
- Refer to **https://watermyyard.org** to get weekly watering recommendations based on local rainfall data and your sprinkler information.

Chapter 4: Protecting Our Canal System: Toxic Chemicals and Waste Disposal

Any litter or waste on the ground in our watershed is likely to end up in our canal system and then in Galveston Bay by being washed down storm drains or blown by the wind. If you see toxic chemicals or waste, you can report it to the County or the Texas Commission on Environmental Quality (888-777-3186). The following are a number of suggestions to help protect our canals from toxic chemicals and waste. If you see signs of dumping or other pollution, please contact the appropriate resource (listed in the Appendix.)

Household Trash

- Utilize the recycling/refuse center in Galveston to dispose of things our trash service cannot take.
- Use phosphate-free laundry, dish- and car-washing soaps. Phosphorus attaches to soil particles, which then contaminate the water with erosion. (See www.epa.gov/nutrientpollution/what-you-can-do-your-yard.)
- Do NOT pour chemicals down drains or toilets. Minimize water flow by using water-saving devices in showers and toilets.

Cooking Grease and Oil

Putting bacon grease or cooking oil into the canal system will contaminate the bay and kill fish, crabs, etc., as well as their food sources and the nearby vegetation. There are a few options for disposal. The first is to jar it up and throw it in the trash or recycle it at a local drop-off location. See www.ceasethegrease.net for additional information.

Freshwater Aquariums

Aquarium water, plants, fish and other animals should NOT be dumped into the canals. While some may not survive in salt water, others could flourish as invasive species in the canal system.

Boater Waste

- Keep boat motors in good repair to prevent oil and gas leakage.
- Never empty bilges into canals.
- Use onshore bathrooms and empty holding tanks at designated pump-out stations.
- Do not spill fuel or overfill the tank.

Cars

- Never dump oil, antifreeze, etc. into canals, storm drains, ditches or soil. Take oil to the ECO Recycling Center on Galveston Island or take advantage of household hazardous waste collection events. Information can be found at www.galvestontx.gov/172/Galveston-Recycle-Center.

- Properly dispose of used motor oil and antifreeze at facilities that accept recyclable automotive fluids (most auto parts retail stores, gas stations and auto repair shops will accept these as well as the ECO Recycling Center. One quart of oil can contaminate up to two million gallons of water!)
- Wash cars in sodded areas instead of driveways to reduce runoff. This also helps to irrigate lawns.
- Wash your car at a commercial car wash rather than in your own driveway to prevent soaps and other chemicals from running off the pavement and into the canals.

Fishing Line

- Never leave monofilament line around, including bits left over from changing lures. Pelicans and other birds can become entangled and die. The wind can also take them into the canals, where fish can ingest them.

Pet Waste

- Pet droppings should be put into a proper waste system. Carry a scoop and bag when you're out with pets. Throw pet feces away in the trash.
- Do not flush or bury feces because of the risk of introduction into our water system.
- See the following chart on how fecal bacteria can get into our canal system and its effect on us and our environment. (Source: Galveston Bay Foundation).

Fecal Fallout

GALVESTON BAY FOUNDATION

What Affects Bacteria Levels?

Boater Waste
Dumping waste overboard releases both bacteria and pollution into the surrounding waters

Rain
Runoff washes pollutants from yards and streets into water bodies

Sediment
Stirred up sand or mud from wind, waves, and boat movement can release bacteria into the water and reduces clarity

Algae
Plankton and algal blooms triggered by high nutrient levels can consume all the oxygen in the water and block out the sun

FECAL BACTERIA

Used to assess water quality, these naturally occurring bacteria are most commonly found in the gut of birds and mammals. They enter the water through stormwater runoff.

Low Transparency
Bacteria are destroyed by UV rays found in sunlight, they thrive in cloudy water

Low Oxygen
Less oxygen makes bacteria grow faster

Temperature
Hot water holds less oxygen than cold water

How Does Bacteria Affect You?

Rashes or Infection
Swimming in contaminated water can lead to skin irritation, or eye, ear, and respiratory infection

Toxic Seafood
Bacteria can contaminate fish and shellfish, leading to restrictions on harvesting

Beach Advisory
Locations with high concentrations of bacteria can be closed to the public, including beaches, bayous, and bays

Fish Kills
When oxygen levels drop, fish, shrimp, and shellfish can all die

Chapter 5: How You Can Protect Our Canals

Following is a summary of actions we all can take to protect our canal system, with links to online resources for information and/or assistance. (For additional resources, see **Chapter 8: Other Resources and Contacts**.)

1. Reduce your use of herbicides, pesticides and fertilizers. Green lawn care can not only save you money, but also ensure healthy waterways are not impacted by introduced chemicals. Native plants thrive without using these chemicals or added water, while also providing the perfect habitat for local wildlife and pollinators.
2. Incorporate landscaping techniques that require less fertilizer, like growing a garden with native plants.
3. Pick up after your pets and properly dispose of pet waste. Walk them in grassy areas, parks, or undeveloped areas so that any liquid waste is absorbed by the land and does not runoff into the waterway. (Pets are believed to contribute approximately two percent of the total bacteria in Galveston Bay, but it is likely higher in residential areas.)
4. Use phosphate-free or phosphate-reduced laundry, dish and car-washing soaps. Runoff containing phosphorus can spur algae growth in the water which can lead to low-oxygen areas referred to as "dead zones" that are unsuitable for fish and aquatic life.
5. Dispose of your household hazardous waste properly and securely. Check with our local waste disposal provider about recycling events for hazardous chemicals.
6. Do not put fats, oils, grease, or wipes down the drain, each of which can damage and clog pipes. Sewer overflows introduce harmful bacteria into local waterways and make conditions unsafe for recreation. Instead, throw away leftover kitchen grease in the trash or recycle it at an approved location. Learn where these recycling locations are located with Galveston Bay Foundation's recycling website at www.ceasethegrease.net.
7. Be a clean boater – pump out your waste instead of dumping into the Bay! Sewage from boats is one of the primary sources of human fecal bacteria in Galveston Bay, and one of the most avoidable. Find a pump-out station near you at Galveston Bay Foundation's site www.pumpdontdump.org.
8. Install a rain barrel, plant a rain garden, or reduce your lawn irrigation to slow your runoff! This will ensure that a proper amount of freshwater is entering the Bay and reduce the amount of pollution and bacteria being carried into local waterways in stormwater runoff. Register for a rain barrel workshop at www.galvbay.org/events and sign up for a Texas A&M Agrilife Extension workshop at www.watermyyard.org to get custom yard watering recommendations based on your zip code and sprinkler type.
9. Become familiar with the Galveston Bay Report Card from Galveston Bay Foundation for up-to-date information about the health of our waterways at www.galvbaygrade.org.
10. Report any evidence of a fish kill at Texas Parks and Wildlife's website www.tpwd.texas.gov/landwater/water/environconcerns/killsandspills or call 512-389-4848.
11. Never release or dispose of unwanted plants or animals into the local environment. Support legislation that prioritizes the preservation of natural nesting and feeding habitats. Plant native plants when available and know which plants are invasive in our area. See the website from Houston Advanced Research Center at www.galvbayinvasives.org .
12. Learn about how changing temperatures affect coastal environments, including the amount of oxygen in the water, as well as the plants and animals that are able to live in our estuary in

Galveston Bay Foundation's Coastal Change Summary: https://www.galvbaygrade.org/coastal-change.

13. After a heavy rain – and before swimming -- refer to the Galveston Bay Foundation's Swim Guide to check bacteria levels at www.theswimguide.org or www.galvbaygrade.org.

Your water quality monitor landed a big one in the marsh.

Chapter 6: Community Activities that Support Our Canal System

Following are suggestions for activities that can get people involved in actively protecting our canal system and the watershed that feeds it:

1. Learn about our watershed and join the Highland Bayou Watershed Project team.
2. Spread the word about protecting our canal system at local organizational meetings.
3. Help your child create a presentation on the canal system for his/her school class.
4. Become a volunteer water quality monitor with Galveston Bay Foundation.
5. Organize a storm drain stenciling project for our community.
6. Organize or join a community clean-up or recycling day.
7. Organize a project to install rain barrels throughout the community.
8. Partner with the BV Water Quality Initiative in its communication efforts.

Preparing for Oyster Gardening

Chapter 7: Water Quality Testing and Reports

Why We Do It

Water quality is a term used to describe the chemical, physical and biological characteristics of water, usually with respect to its suitability for a particular purpose. We test to ensure that our water quality is up to certain standards to support contact recreation (such as swimming and boating) as well as support the fish, crabs etc. living in these waters.

We have conducted two separate testing programs in the last few years:

1. An organized effort to obtain baseline data to prepare for potential canal improvements (if/when needed) was conducted for two years beginning in 2021. Data was collected at 12 sites around our three communities, which is saved and available through our water quality team.
2. Ongoing water quality testing at four sites is conducted monthly as a part of a broad project by Galveston Bay Foundation and all data is available through our water quality team. This data includes 12 years of testing at the end of Barracuda (near the railroad bridge). (Note that the testing site in Omega Bay was damaged during Hurricane Beryl and is not currently available.)

What We Test For

Following are brief descriptions of the things we test for and why. Actual data measurements over time are collected in our database as well as at Galveston Bay Foundation.

1. **pH** is a measure of the acidity of the water. A pH range of 6.0 to 9.0 will generally support fish and bottom-dwelling aquatic organisms such as crabs and oysters.
2. **Dissolved oxygen (DO)** is the measure of usable oxygen in water. A certain level of DO in the water is critical for fish to "breathe". Low levels of DO can result in fish kills. Many things influence the amount of DO in water, including the amount of water flow in the canal system, the climate and season, as well as the amount of nutrients in the water, among other things.
3. **Fecal bacteria** are microscopic organisms found in the feces of humans and other warm-blooded animals. Because they occur naturally, in small amounts they are usually not harmful. But a significant level of fecal matter in the water is an indicator of potentially harmful pathogenic organisms like bacteria, viruses and parasites that can cause illnesses and/or infections. Fecal bacteria feed on nutrients in the water such as nitrogen and phosphorus, so we test for these nutrients as well.
4. **Water temperature** is a critical factor in understanding and managing the biological and chemical processes that occur in the water. Temperature affects the pH, salinity, bacterial growth, oxygen content and the metabolic rates of aquatic organisms such as fish and crabs. Water temperature can be changed by weather (rain or the lack of it), stormwater runoff and other things.
5. **Salinity** is a measure of dissolved salts and can influence the types of plants and animals living in the water. Drought, heavy rain, and certain types of pollution can cause fluctuations in salinity, which affect the survival of organisms.

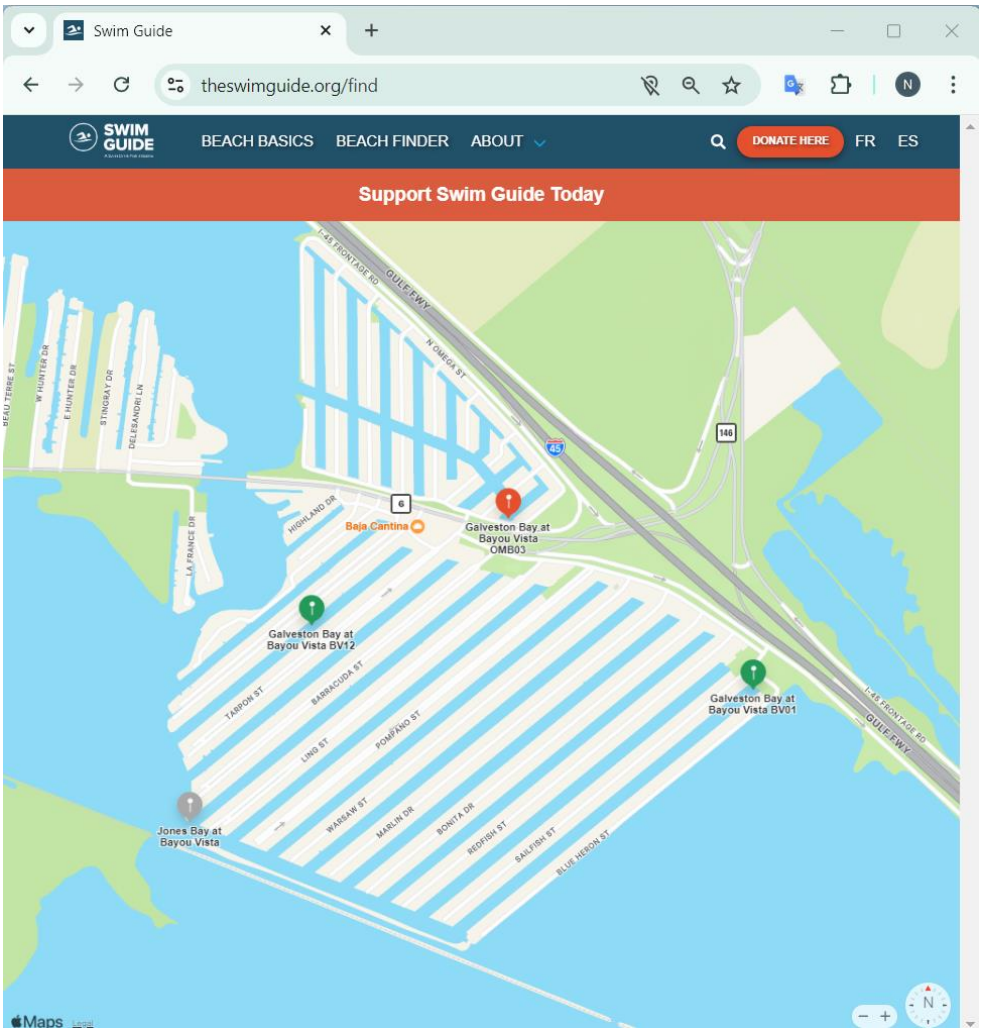
6. **Field Observations** are very important elements in understanding the health status at the testing site. Is there a lot of trash around? Dog feces? An oil sheen on the water? Or grass clippings? Anecdotal information from the water sampler adds to the understanding of all the other data.

When Is It Safe to Swim?

Rain and runoff will carry enterococcal bacteria from the soil, animal waste, and other sources into the canal system. This can cause gastrointestinal illness if swallowed and can cause infections if it comes in contact with an open sore or wound.

It is important to **wait three days** after heavy rainfall before swimming in the canal system or bay – or on the beach! Bacteria and pollutants from stormwater runoff can impact water quality and make less than ideal swimming conditions.

Check GBF's The Swim Guide at www.theswimguide.org for bacteria concentrations in your area if you have questions about the water's safety.



Bayou Vista, Original Bayou Vista and Omega Bay Testing Sites

The Presence of Vibrio Bacteria

Vibrio bacteria is naturally present in warm salt and brackish water; thus it is in our canal water. It can cause wound infections (from swimming) and gastrointestinal illnesses (from eating raw or undercooked seafood). However, contracting vibrio is rare and it most commonly impacts people with pre-existing health conditions or open wounds. People who are healthy are much less likely to get an infection than those who are immuno-compromised or have an open wound.

If you are concerned:

- Avoid eating shellfish or undercooked seafood.
- Practice good hygiene by washing your hands with soap and water.
- Protect open wounds and avoid exposure to seawater.
- Stay informed.

For learn more, including if there are current vibrio alerts in our area, go to the Centers for Disease Control at www.cdc.gov/vibrio, as well as the Galveston County Health District at www.gchd.org.

What Makes the Bottom of the Canals Turn Over?

Essentially, the longer days in the summer lead to more light entering the water, which results in increased algae growth along the bottom. This leads to a buildup of oxygen in the algae mat, which can then loosen and float off the bottom. The only way we can have some control over this natural process is to reduce the amount of nutrients entering the waterway – dog feces, fertilizers, grass clippings, etc. – and encourage the growth of seagrass and other things instead.

Chapter 8: Other Resources and Contacts

NB: these references are generic and intended as a beginning point for resources.

- Bayou Preservation Association: www.bayoupreservation.org/BPSSite/media/BPA/Education/Resources/Bayou PlantingGuide 2014.pdf)
- Bayou Vista City official site: www.bayouvista.com
- Bayou Vista City Hall/Police/Fire: www.bayouvista.us
- Bayou Vista Facebook pages: www.Facebook.com
- Bayou Vista Water Quality Facebook page: www.Facebook.com/BayouVistaWaterQualityInitiative
- Galveston Bay Foundation https: www.galvbay.org
- Galveston Bay Report Card (GBF): www.Galvbaygrade.org
- Galveston County Extension Office: https://galveston.agrilife.org/
- Galveston County Mosquito Control: www.galvestoncountytx.gov/county-offices/mosquito-control
- Galveston County MUD 12: www.mud12galveston.com
- Galveston Recycling Center: www.galvestontx.gov/172/Galveston-Recycle-Center
- Galveston Hazardous Materials Waste Disposal: www.usahazmat.com/us/tx/galveston
- Highland Bayou Watershed Protection Plan: www.agrilife.org/highlandbayou/highland-bayou-watershed-protection-plan/
- Nature Conservancy: www.nature.org/en-us/
- Texas A&M Agrilife Extension Service: www.agrilifeextension.tamu.edu
- Texas Commission on Environmental Quality: www.tceq.texas.gov
- Texas Dept of Environmental Protection (incl. Agriculture, Land Office, Parks & Wildlife, Water Development): www.texasattorneygeneral.gov/divisions/environmental-protection
- Texas Fish and Wildlife Conservation: www.fws.gov/office/texas-fish-and-wildlife-conservation
- Texas General Land Office (GLO): www.glo.texas.gov
- Texas Parks and Wildlife Department: www.tpwd.state.tx.us
- Texas Sea Grant (Texas A&M University): www.texas-sea-grant.tamu.edu
- Texas Water Development Board: www.twdb.texas.gov
- Texas Water District Management: www.wdmtexas.com
- Texas Water Resources Institute (TAMU): www.twri.tamu.edu
- U.S. Environmental Protection Agency: www.epa.gov
- U.S. Fish and Wildlife Service: www.fws.gov
- Waste Management (Galveston): www.wm.com/us/en/location/tx/galveston
- Waste Oil Collection: www.ceasethegrease.net
- Wildlife Alert Hotline: myfwc.com/contact/wildlife-alert/

This brochure was prepared by the Bayou Vista Water Quality Initiative in close collaboration with Galveston Bay Foundation (GBF) which is a valued partner in helping our communities maintain the health of our canals. We are grateful to GBF for all of their support and assistance.

If you have any questions, comments or ideas to be included in future editions of this manual – or if you want to volunteer as a water quality monitor -- please contact our monitor, Chris Roper (christineoroper@gmail.com) and/or the water quality monitoring team at Galveston Bay Foundation at www.galvbay.org/?s=water+quality+monitoring.

Thank you for your interest in maintaining the health of our canal system!

A sunset cruise on the transverse canal