A LANDOWNER'S GUIDE: Aquatic Site Visits

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When having a professional come to your property for a pond evaluation, it is important to be prepared to ensure they receive adequate information to create an informed management plan. This is a checklist to guide landowners on what information to have available for professionals, such as their County Extension Agent, prior to them visiting the waterbody. This checklist may also be a useful tool to conduct your own initial assessment of the current state of your pond or when purchasing a new property with an existing pond.

☐ Note the region of the state, location, and surrounding landscape.

What are some of the nearby land uses, such as row crops, livestock, golf courses, or housing developments? Management practices on surrounding lands, such as turf fertilization on a golf course or homeowners association (HOA) property, or a large livestock or agricultural operation, can contribute significantly to the pond's nutrient load. This can result in large amounts of aquatic vegetation, algae blooms, and increased potential for low-dissolved oxygen issues. Look at the surrounding area within the watershed. Identify surrounding ponds, streams, lakes, and rivers, along with their current conditions.

Is the water clear, turbid, or choked with vegetation? Does it have the potential for undesired fish and plant species to invade the pond? Areas upstream in the watershed may be further investigated using satellite imagery available via many online and digital platforms. Aquatic organisms (i.e., fish, snails, amphibians, roots, tubers, and other plant fragments) can be transferred easily through natural stream channels and flooding during rain events. Also note signs of wildlife and livestock, which can increase turbidity, accelerate bank erosion, and contribute to the water's nutrient load through defecating in or near the water.

What is the typical rainfall for the county/region? At times, drought and heavy rainfall can adversely affect ponds. Is the pond dug deep enough with sufficient watershed to withstand a drought—typically an average depth of 10 to 12 feet? Is the pond designed properly to mitigate the effects of heavy rain and potential flooding? Is the area currently experiencing drought, which could concentrate nutrients and result in excess algae or plant growth, or create low-dissolved oxygen issues?

Figure 1. A satellite image from Google Earth showing an existing pond, as well as surrounding water bodies, land use practices, road access, and vegetation cover.

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☐ Determine your management goals.

First and most importantly, determine your management goals for the pond. *What is the main use of the water?* Is it irrigation; livestock watering; fishing; wildlife viewing; fire prevention/mitigation; recreational water sports, such as swimming, boating, or kayaking; or human consumptive use? Is there a secondary use? Primary goals and water use will help direct what management practices are safe and feasible for your operation, which prevents wrong recommendations from being made. For example, some active ingredients used in aquatic herbicides have water use restrictions for livestock and irrigation.

What is your current issue with the pond? When did this problem begin, and is this a recurring problem? Identifying how long the problem has occurred and the season it occurs in can help point toward the cause of the issue. If this is a recurring problem, what previous management technique was implemented, and what were the results?

☐ Determine the size of the pond.

What is the surface area and average depth? If possible, determine the mean depth when built and the current depth, as well as the average surface area (double-check using satellite imagery). Online tools like Google Earth Pro, Find Pond Size, and United States Geological Survey Soil Maps and Data can be used to determine surface area. To determine the mean depth, a weighted string can be used to measure depth in intervals using a small boat in the pond.

Are there any obvious slope or erosion issues? Key signs of erosion issues are banks with steep slopes; undercut banks; large areas of shallow water; shallow, tapering banks; cattle paths; and gullies or washes.
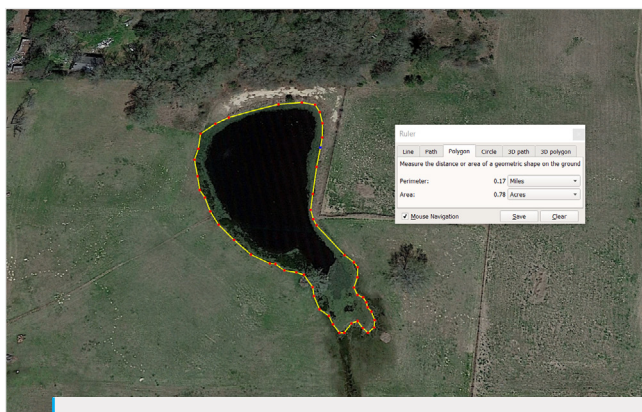

Figure 2. A satellite image from Google Earth Pro demonstrating how the measurement tool can be used to accurately determine a pond's exact surface area and identify areas of surface coverage by aquatic vegetation.

☐ Identify the water sources for the pond.

Is the pond fed by a well, rainwater, a creek, etc.? Water quality within the pond and its subsequent ability to support a fishery are largely dictated by the water source and the minerals and nutrients present in the surrounding landscape.

☐ Determine your budget and management intensity.

How much are you willing to spend on management? If you have a very limited budget, it will change what solutions are available, so make sure the professional knows and understands your budget. Also, keep in mind your knowledge, skills, and capability to implement the management practice.

Do you prefer not to use physical, biological, or chemical control options when managing aquatic vegetation? When it comes to management, communicate your preferences and what you feel the most comfortable with. Someone may decide that physical options, like raking, are too labor-intensive for their operation. Others may decide they are not comfortable with using certain chemicals or any chemicals at all in water.

☐ Try to identify which aquatic plants need managing, and identify non-target plants or plants surrounding the water that you would like to keep.

What is the percent coverage? Aquatic vegetation covering more than 20 to 30 percent of a pond area may result in low-dissolved oxygen issues. Identify treatment issues, including desirable trees or plant species that may be present on the bank, which you do not want management to affect. AquaPlant (*https://aquaplant.tamu.edu/*) is an online tool designed to help pond owners identify the plant species present; determine if they are native, invasive, beneficial, or nuisance species; and determine what management options are available for each plant species.
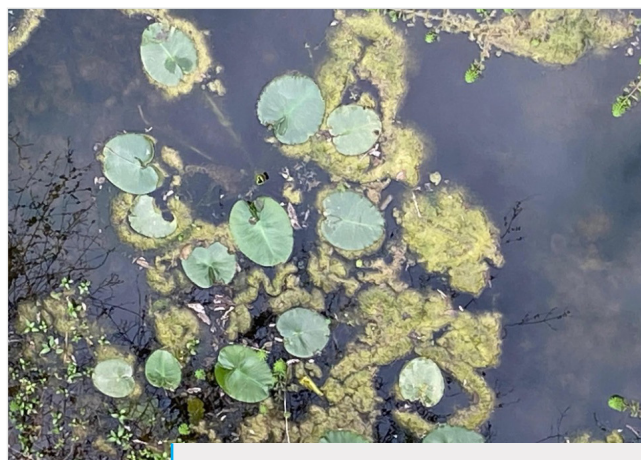

Figure 3. An image showing a mixture of native vegetation species, many of which are nuisance species and undesirable in a pond.

Figure 4. A bluegill sunfish caught by a landowner. The catch needs to have the species, length (and possibly weight), date of catch, and whether it was harvested or released recorded in a log so that the professional has fish data available to accurately assess the fish population.

Figure 5. A largemouth bass caught by the landowner being measured and recorded for their records.

☐ Provide any fish population records and include species present.

Record-keeping of catch and harvest is critically important in pond management. *So, how do you assess the fish population present?* Many assessment methods are not practical during a site visit, and professionals will need to rely on you for most information other than what they can see during the site visit. Be prepared to answer questions related to species, quantity, and size of fish stocked, species that have been caught and released, and how many of each species have been harvested.

If you do not have records, you will be asked to describe in as much detail as possible what you have caught in the past from the pond and what species are known to be present. If you are unsure of the species caught, provide photos for the professional to visually identify the fish.

You can start collecting records to determine more about the fish population present. Using a seine, cast net, and/or fish traps to collect information on the fishery are the most reliable methods but are usually not feasible. Luckily, data can be collected through scientific angling (i.e., fishing). The objective of fishing scientifically is to catch fish that represent the range of different species and fish sizes present in the pond. An angler should fish numerous times under varied weather conditions and seasons using a variety of natural baits and artificial lures of all sizes to ensure the range of species and fish sizes present in the pond is captured and is not biased toward a particular species or fish size. Fish each lure/bait and size for 30-minute intervals. Fish all areas of the pond. All fish caught should be weighed and measured. With these fishing methods, you or a professional can use the data collected to calculate the population structure indices for the fish populations present.

Finally, note any dead, floating fish; fish with obvious signs of disease, such as growths and ulcers; and distressed fish with irregular swimming patterns. If the fish are trained to feed on pellets or feeders are present, dispensing a quantity of feed to the pond usually brings fish to the surface for better observation.

Figure 6. A channel catfish juvenile showing hemorrhages, indicating a bacterial pathogen is present.

☐ Provide water chemistry analysis if known.

Water quality can be determined by using a field-testing kit or submitting a water sample to one of the Texas A&M University laboratories mentioned at the end of this publication. Some parameters, like dissolved oxygen, can only be accurately measured on-site and fluctuate throughout the day. Alkalinity and pH also fluctuate throughout the day based on photosynthesis. Water quality cannot be visually determined without chemical testing, but note any apparent odors or visual cues, such as the appearance of spilled paint or an oil sheen, discolored or dark water, or turbid or muddy water. These could be indicators of cyanobacteria (blue-green algae) blooms that could produce toxins, phytoplankton die-offs, or other water chemistry issues, such as the presence of tannins or suspended clay particles.

Any dead aquatic life, such as fish, ducks, turtles, and frogs, should also be noted, and close-up pictures should be taken when possible. Water chemistry is one of the most overlooked aspects of pond management but is critical to supporting a quality fishery, limiting nuisance aquatic vegetation growth, and the health of livestock and wildlife that consume it.

Figure 7. Have a quality laboratory perform a standard water quality test for fisheries to determine if the water quality is suitable to support a fishery or if an amendment is needed to improve the existing fishery.

Figure 8. Water quality can also affect chemical treatments, such as herbicide applications, and may prevent the ineffective application of herbicides, resulting in the loss of hundreds to thousands of dollars.

☐ Be familiar with possible management solutions that use different types of control.

Integrated pest management strategies often offer longer-term control, but any type of control may not be possible in your specific situation. For example, to apply for a triploid grass carp permit from Texas Parks & Wildlife Department, there must be an escapement barrier on any inflow or outflows.

Are there prevention measures that could be put into place after management? Are there potential application or management issues? An herbicide use restriction, such as no livestock watering for 7 days or no irrigation of turf or crops for 25 days, may prevent an herbicide from being applied to a pond that is used for watering livestock or irrigating crop fields. Another example is that supplemental stocking with select species or sizes of fish, along with selective harvest, may be used to correct issues in a fish population compared to a pond renovation in which you kill off all the fish and start over.

Are you able to reach aquatic vegetation from the bank? Alternative application equipment and methods may need to be suggested. Do you possess the equipment and ability to make an herbicide application? If not, a professional may need to be hired.

Figure 9. A pond spillway demonstrating a grass carp escapement barrier to prevent unintended release of triploid grass carp to the wild.
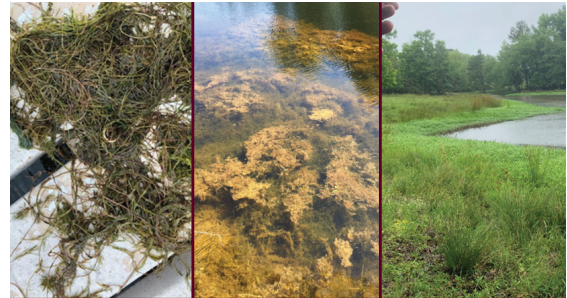
Identifiable

| Plant stems and leaves are in focus and mostly spread out. | Plant material is next to a scale item (ruler, penny, thumb, etc.) | Plant material is against a contrasting background. |

Figure 10. Examples of aquatic vegetation photos to submit for identification.

Unidentifiable

| Plant stems and leaves are NOT spread out. | Plant is still in the water and at a distance. | Plants needed for identification are NOT separated or up close. |

Figure 11. Examples of aquatic vegetation photos that are inadequate for identification.

☐ Contact your local County Extension Agent or Specialist if you need further help.

Information gathered from the guiding questions above should be summarized and given to the professional conducting the site visit, but more information may be needed. In this instance, you should contact your local County Extension Agent (https://counties.agrilife.org/). Here are some tips for common issues that you may need help with:

▶ **Identifying aquatic vegetation.**

There are several identification tools to assist in the identification of both target and non-target aquatic vegetation. The AquaPlant website (https://aquaplant.tamu.edu/) is a great tool to use for identification, but trickier plants may require outside help from your County Extension Agent or other professional. Photos should be taken to highlight key characteristics like flowers, leaf arrangements, and nodes—the stem areas from which leaves or branches originate. The unidentified plant should be taken out of the water and placed against a contrasting background—preferably white—with stems and leaves spread out. The photo should then be taken up close—preferably within 1 foot or until the plant fills the frame—with the plant material in focus and eliminating any shadows. Including scale items, like a hand, coins, or other readily available items, will also help for size comparison. See Figures 10 and 11 for examples.

▶ **Sending photos for identification of fish species.**

Photos should be taken that show the entire fish in full frame, as well as specific photos to highlight key characteristics like fins, tails, mouth, barbels, eyes, and any other unique-looking characteristics. The unidentified fish should be placed against a contrasting background—preferably white—with fins and tail spread to the best extent possible when dealing with a live fish. Fish should be clean and not covered in grass or dirt from being allowed to flop on the ground. The photo should then be taken up close—preferably within 1 foot or until the fish fills the frame—eliminating any shadows. Including scale items, like a ruler, dollar bill, or other readily available items, will also help for size comparison. See below for an example.
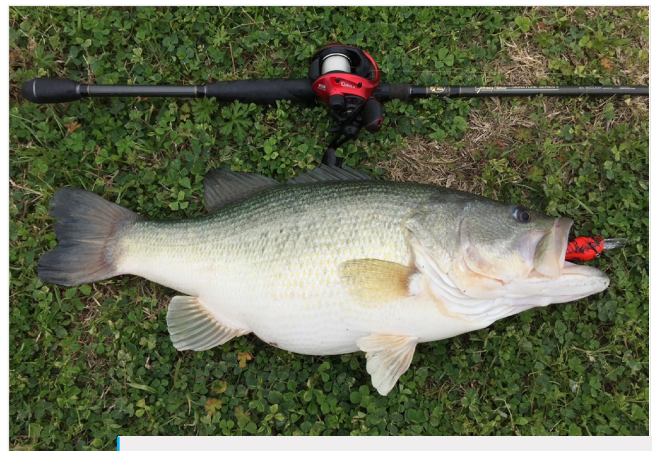

Figure 12. Example of fish photo for identification.

▶ **Submitting a water sample.**

For water analyses intended to determine the suitability of water to support fish and develop a fishery, clear a muddy pond, or lime a pond, water samples should be sent to the Texas A&M Aquatic Diagnostic Laboratory (*https://fisheries.tamu.edu/aquatic-diagnostics-lab/*). Samples should be collected in a new, clean plastic bottle with a screw cap. A 16- to 20-ounce drinking water bottle can be reused if you rinse the bottle three times with the water source to be submitted to the laboratory. Ensure the cap is tight prior to shipping. Clearly identify each bottle with a simple sample I.D. using the format of last name, date, and source (i.e., "Smith, 4/19/2012, well").

When collecting a water sample, be sure not to disturb any bottom sediments or aquatic vegetation prior to or during sample collection. Sediments picked up along with the water sample will potentially change the water chemistry, and results of the water tests may not be accurate. The water sample is acceptable "as is" if sediment is already suspended in the water column despite no disturbance from the collection process. Also, make sure the sample bottle contains no vegetation, insects, snails, tadpoles, small fish, or other organisms, as they will change the water chemistry, and the result of the water test will not be accurate. To collect a sample, place a thumb over the mouth of the empty collection bottle, place the bottle 6 to 24 inches below the surface of the water, and remove your thumb allowing water to fill the sample bottle. Make sure all the air has been removed from the bottle, and place the cap on the bottle before removing it from the water. Check the sample to determine that no air is trapped inside the bottle. If air is trapped inside the bottle, empty the bottle, and repeat the process again.

For water analyses that are geared toward determining the suitability of water for turf or crop irrigation, livestock watering, or metal or heavy metal analysis, water samples should be sent to the TAMU Soils, Water, and Forage Testing Laboratory (*https://soiltesting.tamu.edu/*).

Congratulations, you completed the aquatic site visit checklist! Once you have completed this process, you will have provided a solid background on your pond. If management recommendations are provided, offer feedback on whether suggestions are feasible in your situation. If you decide that you are not capable of carrying out recommendations, reconsider other management options or consider hiring a professional for management services.

▶ Hire a professional for aquatic vegetation management: *https://aquaplant.tamu.edu/applicators/*

▶ Hire a professional for pond and lake management: *https://fisheries.tamu.edu/texas-pond-and-lake-management-companies/*

▶ Hire a professional for pond stocking services: *https://texasaquacultureassociation.com/wp-content/uploads/2021/12/TAA_Availability-List-December-scaled.jpg*

CHECKLIST SUMMARY

☐ Note the region of the state, location, and surrounding landscape.

☐ Determine your management goals.

☐ Determine the size of the pond.

☐ Identify the water sources for the pond.

☐ Determine your budget and management intensity.

☐ Try to identify which aquatic plants need managing, and identify non-target plants or plants surrounding the water that you would like to keep.

☐ Provide any fish population records and include species present.

☐ Provide water chemistry analysis if known.

☐ Be familiar with possible management solutions that use different types of control.

☐ Contact your local County Extension Agent or Specialist if you need further help.

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