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AQUATIC SITE VISIT CHECKLIST FOR PROFESSIONALS

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Going to meet a landowner for a site visit can be exciting and anxiety-inducing all at once, as one never knows what to expect. When arriving at a location, it may be possible to gather over 30 years or just 30 days of history regarding a pond. This is a checklist to guide County Extension Agents and other consulting professionals in Texas on considerations when visiting a waterbody for the first time.

☐ Before leaving or on the way to the site, note the region of the state, location, and surrounding landscape.

What are some of the nearby land uses? Row crops, livestock, golf courses, housing developments? Management practices on surrounding lands—for example, turf fertilization—can contribute significantly to the pond's nutrient load, resulting in large amounts of aquatic vegetation, algae blooms, and increased potential for low-dissolved oxygen issues. Look at the surrounding 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 species invading the pond? Areas upstream in the watershed may be further investigated using satellite imagery available via many 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 contribute to the water's nutrient load through defecating in or near the water, increase turbidity, and accelerate bank erosion.

What is the typical rainfall for the county/region? At times, drought and heavy rainfall can adversely affect parts of Texas. Is the pond dug deep enough with sufficient watershed to withstand a drought? 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 low-dissolved oxygen?

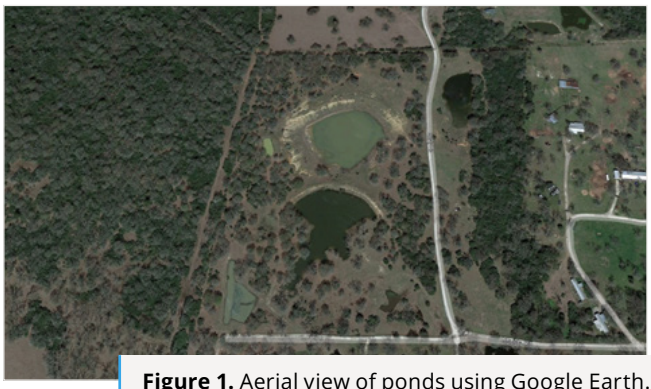

Figure 1. Aerial view of ponds using Google Earth.

☐ After arriving, speak with the landowner before any assumptions are made.

First and most importantly, determine their management goals for the pond. Do not assume what their management goal is. For example, initial assumptions may lead professionals to believe the owner's primary goal is to support good fishing or to water livestock, when their actual goal is crop irrigation or wildlife viewing. This can result in a wrong recommendation, such as an herbicide that will kill crops irrigated from the pond.

What is the main use of the water—irrigation; livestock watering; fishing; wildlife viewing; fire prevention/ mitigation; recreational water sports such as swimming, boating, or kayaking; or human consumptive use? Is

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there a secondary use? Water use will help direct which management practices are safe and feasible for the owner's operation. For example, some active ingredients used in aquatic herbicides have water-use restrictions for livestock and irrigation. Determine their main perceived problem. Is it really a problem or just a perception? Determine if it is a problem that requires management or education. For instance, a pond owner may want to have a crystal-clear pond with no phytoplankton so they can see their fish, and their primary goal is fish management for trophy fish. This is a case in which the landowner may need to be reeducated because the phytoplankton provide 80 percent of the pond's surplus oxygen.

When did this problem begin, and is this a recurring problem? How long a problem has been occurring and the season in which it is occurring can help point toward the cause of the issue. If this is a recurring problem, ask about previous management and results. If the issue was temporarily resolved, try to determine why it is recurring and what management practices may offer longer-term solutions.

Is the problem impacting the main use of that pond? Is education needed on different or more concerning issues? Landowners may be acting based upon limited knowledge or incorrect assumptions of what is considered a healthy aquatic habitat. Educate owners on detrimental water quality and plant or fish species present, such as green sunfish, bullheads, cattails, or giant reeds. Conversely, educate on beneficial water quality and species present, such as bryozoans, which are indicators of good water quality, or American pondweed, which produces food that attracts waterfowl and creates habitat for larval fish.

Common scenarios:

- A landowner says their main issue is aquatic vegetation along the bank and wants to treat everything. It may be noted that several species they have growing along the bank are native, are not aggressive growers, and help with soil stabilization. Educate the owner that some native aquatic vegetation species present along the bank will help prevent erosion and serve as a nutrient buffer from runoff, increasing the overall life of the pond. If they need more access in certain areas, they should manage small patches versus the entire shoreline.
- A landowner's primary goal is supporting a fishery, yet they are concerned that their pond is not crystal clear and they cannot see their fish. Educate the owner that clear water is not always good. As previously noted, the phytoplankton in the water that gives a pond a slight green tint and causes some cloudiness provides up to 80 percent of the surplus oxygen in a pond. However, at the same time, phytoplankton is the basis for the entire pond's food chain, and if the pond was crystal clear, the fishery would collapse due to a lack of food and oxygen.

☐ Accurately determine the size of the pond.

What is the surface area and average depth? If possible, determine mean depth when built and current, as well as average surface area (double-check using satellite imagery). Previous and current depth and surface area provide clues as to erosion, sedimentation rate, and organic buildup that can cause problems in a pond. Sometimes, landowners may not accurately know this information. Online tools like Google Earth and Find My Pond Size can be used to determine surface area. To determine 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 a slope of more than 2:1; undercut banks; large areas of shallow water or shallow, tapering banks; cattle paths; and gullies and washes. Vegetation may need to be established to protect the banks. In some cases, riprap or geotextile fabric may need to be installed to protect the banks, and in severe cases, the pond may need to be dug out with heavy equipment and the banks or levees rebuilt.

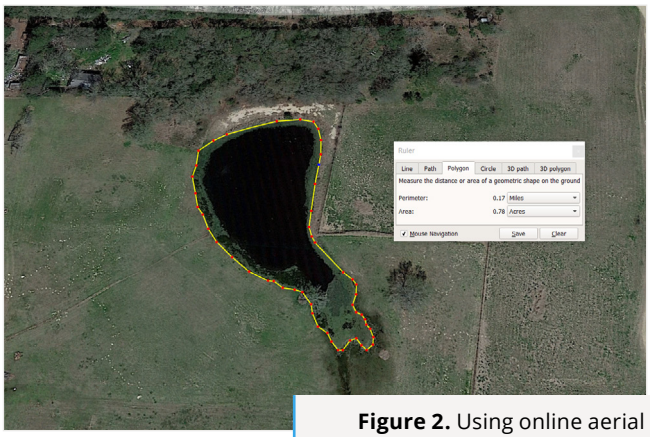

Figure 2. Using online aerial maps to determine surface area.

☐ Identify the water sources for the pond.

Is the pond fed by a well, rainwater, creek, etc.? For instance, well water may not be the best source, as it may have high levels of potentially problematic compounds (i.e., arsenic, iron, alkalinity, calcium hardness, sulfates, etc.). One common problem with well water is it is typically completely devoid of oxygen. This can create anoxic (low dissolved oxygen) areas and localized fish kills around water inflow or inlets. Surface water, such as creeks and drainage ditches, may not be

a good source because it can contain undesirable fish species, diseases, parasites, snails, aquatic vegetation, and excessive nutrients, depending on upstream land uses. Rainwater runoff can contain excess nutrients from fertilizer runoff, oils from parking lots, or newly paved roads. However, when the landscape is properly managed, most of these issues can be avoided, reducing pollution.

☐ Determine the landowner's budget and management intensity.

How much is the landowner willing to spend on management? If the landowner has a very limited budget, it will change what solutions are available. Attempt to tailor management recommendations not only to the pond owner's budget but also to their knowledge, skill, and capability to implement the management practice.

Does the landowner prefer not to use physical, biological, or chemical control options when managing aquatic vegetation? When it comes to management, each landowner will have their own preference for what they feel the most comfortable with. Someone may decide that physical options, like raking, are too labor-intensive for their operation, whereas others may decide that they are not comfortable with using certain chemicals or any chemicals at all in water.

☐ Identify all aquatic plants present, including non-targets surrounding the water.

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 like flowing water or desirable trees that may be present on the bank. If a pond has more than 10 percent bottom or surface coverage with aquatic vegetation, or if any species on the Federal Noxious Weed List is present (*https://www.aphis.usda.gov/plant_health/plant_pest_info/weeds/downloads/weedlist.pdf*), a management practice may need to be implemented to prevent the issue from getting out of hand.

☐ Assess fish population and species present.

Record-keeping of catch and harvest is of critical importance in pond management. Unfortunately, many pond owners do not know this until a problem arises, and they may not have any records to share regarding the fish population. Conversely, a pond owner may have newly acquired the property and not know much, if anything, about the fish population present.

Figure 3. An assortment of aquatic vegetation.

So, how can the fish population present be assessed? Seining is preferred but not practical for a site visit. Cast nets are often easier to operate for a single person on a site visit, but catch rates can be variable based upon operate skill and experience, season/time of year, current weather conditions, access to the pond, and obstructions, such as aquatic vegetation and brush or other woody debris. Fish traps can be useful in catching and identifying the smaller species of fish in a pond, but they do require the person conducting the site visit to return to the site multiple times to set and collect the traps. Most often, traps are set in the late afternoon and retrieved the following morning. Another disadvantage is the opening is often too small to reliably collect larger species of fish, such as largemouth bass, catfish, carp, buffalo, etc. Unfortunately, it is often necessary to rely on the pond owner for the most information other than what can be seen with one's eyes. Ask for all stocking/harvest records or what species were recently stocked. In addition, ask what species have been caught and released, as well as how many of each species have been harvested.

The pond owner may not have records, and it might be necessary to ask them to describe in as much detail as possible what they have caught in the past from the pond and what species are known to be present. However, relying on the pond owner's ability to correctly identify fish species present and how much they have stocked and harvested can be problematic. When possible, ask the pond owner for photos and, if the land owner can provide them , visually identify fish. For example, green sunfish are commonly confused with bluegill and other sunfish, while bullheads are often confused with channel catfish. When records do not exist, immediately request the landowner to start collecting records to determine more about the fish

population present. Request the pond owner seine, cast net, and/or utilize fish tracks to collect information on the fishery, if possible. Again, this is not always feasible for the pond owner. What is normally feasible and often greeted with enthusiasm when suggested, is fishing. The fishing should be conducted in a quasi-scientific manner, though.

The objective of fishing scientifically is to catch fish that represent the range of different species and fish sizes present in the pond. To do this, an angler should fish numerous times under varied weather conditions 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, the data collected can be used 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 erratic 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 to observe numbers; species present; obvious signs of disease, such as growths and ulcers; and distressed fish with erratic swimming patterns.

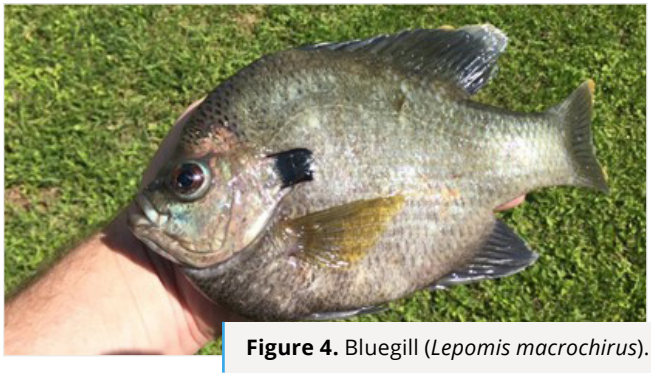

Figure 4. Bluegill (*Lepomis macrochirus*).

Figure 5. Bass being measured.

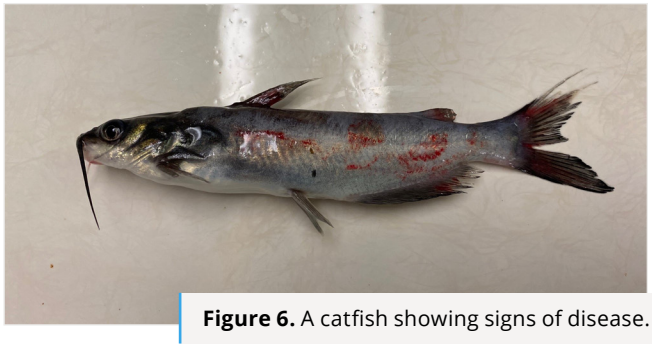

Figure 6. A catfish showing signs of disease.

☐ Determine water quality.

Water quality can be determined through previous water quality reports acquired by the landowner using a field testing kit or submitting a water sample to one of the Texas A&M 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 seen, but note any visual cues (e.g., the appearance of spilled paint or oil sheen) or apparent odors. These could be indicators of cyanobacteria (blue-green algae) blooms that could produce toxins or other water chemistry issues. Any dead aquatic life, such as fish, ducks, turtles, and frogs, should be noted. Water chemistry is often one of the most overlooked aspects of pond management, but it is critical to supporting a quality fishery, limiting nuisance aquatic vegetation growth, and supporting the health of livestock and wildlife that consume it.

☐ Identify potential issues with water quality.

Water chemistry levels may determine what chemical treatments will be effective, what fish species to stock, liming rates, and fertilization rates. Determine the water temperature and consider the time of the year.

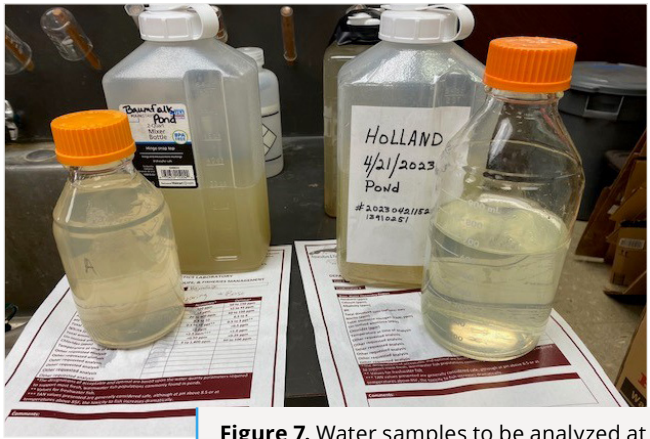

Figure 7. Water samples to be analyzed at the Texas A&M Aquatic Diagnostics Lab.

What is the current water temperature? When water temperatures are below 65 degrees F, most aquatic vegetation in Texas will be dormant or not actively growing, so management options, like chemical control, may not be effective. When water temperatures reach above 85 degrees F, it is not safe to haul, stock, or handle fish, or treat aquatic vegetation in ponds containing fish due to dissolved oxygen concerns.

Figure 8. Spraying cattails.

☐ **Identify all possible management solutions using different types of control or management.**

Will an integrated pest management strategy offer longer-term control? What types of preventative measures could be put into place after management? Determine herbicide use restrictions based on pond usage. Determine feasibility or legal issues with control. 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 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 used for 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 all the fish are killed off to start over.

Figure 9. Triploid grass carp exclusion device.

Is the landowner unable to reach aquatic vegetation from the bank? Alternative application equipment and methods may need to be suggested.

☐ **Determine all other quantifiable information available for the pond.**

How much background information does the owner have regarding the pond? As previously stated, some pond owners can provide information about the last 30 years, while some new landowners can only describe the last 30 days. Determine if the owner knows the age of the pond; watershed size and area; what the water source is; when it was stocked with fish; what fish it was stocked with; what numbers of each fish were stocked; fish species the landowner knows are present (stocked or otherwise); catch records or other data; water quality data; past management practices, such as harvests, supplemental stockings, liming or water treatments, and herbicides applications; past and current water quality data; history of fish kills; and any other item of note or concern, including recent weather events, such as freezes, drought, or heavy rains. Any one of these pieces of information may prove valuable in determining the cause of an issue or implementing a management practice. For example, a pond cannot be limed to correct water chemistry issues without knowing the mean depth, surface area, if fish are present, the water source, and the current water chemistry. These are all factors that affect this single management practice.

☐ **Contact a specialist for further help if needed.**

After conducting a site visit and gathering initial information, it may be necessary to reach out to a specialist to assist with management recommendations. Information gathered from the guiding questions above should be summarized and given to the respective specialist, but more

information may be needed. Here are some common examples:

– **Sending photos for identification of aquatic vegetation.**

Photos should be taken to highlight key characteristics like flowers, leaf arrangements, and nodes (stem area from which a leaf or leaves branch 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 with size comparison. See below for examples.

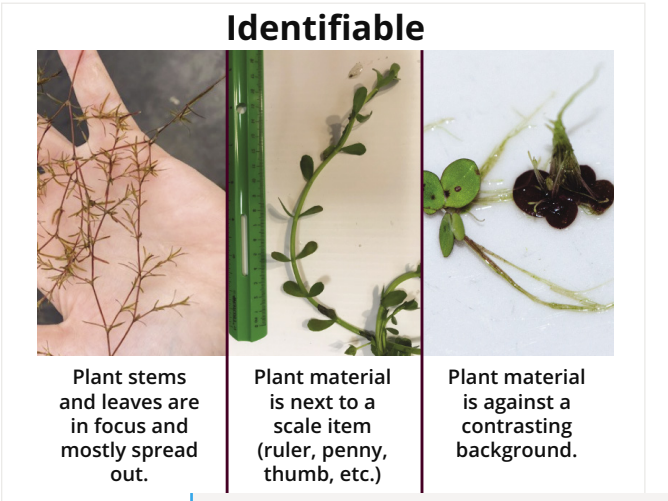

Figure 10. Examples of aquatic vegetation photos to submit for identification.

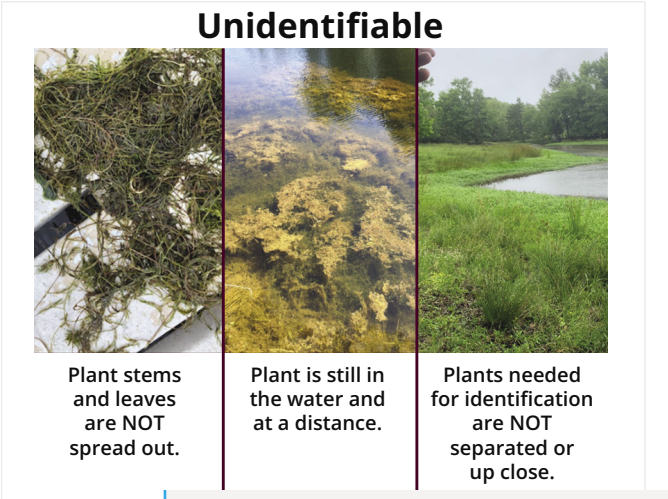

Figure 11. Examples of aquatic vegetation photos that are inadequate for identification.

– **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.

Figure 12. Example of fish photo for identification.

– **Directing someone to submit 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 Diagnostics 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 the bottle is rinsed 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 a format of last name, date, and source (e.g., "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 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.

For water analyses that are geared to 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 on completing the aquatic site visit checklist! Once this process is completed, remember to collect the landowner's feedback on management recommendations and whether they determine them to be feasible. If they decide that they are not capable of carrying out recommendations, reconsider other management options or direct them to hire a professional.

- 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

- ☐ Before leaving or on the way to the site, note the region of the state, location, and surrounding landscape.
- ☐ After arriving, speak with the landowner before any assumptions are made.
- ☐ Accurately determine the size of the pond.
- ☐ Identify the water sources for the pond.
- ☐ Determine the landowner's budget and management intensity.
- ☐ Identify all aquatic plants present, including non-targets surrounding the water.
- ☐ Assess fish population and species present.
- ☐ Determine water quality.
- ☐ Identify all possible management solutions using different types of control or management.
- ☐ Determine all other quantifiable information available for the pond.
- ☐ Contact a specialist for further help if needed.

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