

# GLENSHIRE POND

By Adrian Juncosa

First of all, is it a pond or a lake? It's both. In some regulatory or mapping realms, anything over 10 acres is labeled a lake (ours is 11+ acres). But a more common approach in the science of lakes and ponds is the biological one: if sufficient light penetrates to the bottom to support plants and algae, it's a pond. Since much of this article discusses biology and ecology, we're going to call it a pond here.

## History

The pond is at a low spot in the valley, which older aerial photographs show was previously a mixed wetland complex. A lot of wetland remains in the open space surrounding the pond at present. The historic name "Union Mills"

suggests there was some previous sort of impoundment to support logging, but the present dam was built as part of the development of the subdivision. The impoundment consists of the dam itself, with a screw-operated gate valve near the bottom, and a low concrete weir over which an inch or two of water spills during winter and spring.

## Regulatory Context

A long battle over water rights was recently resolved by the Truckee River Operating Agreement (TROA). Since any dam implies a possible consumptive use of water (evaporation), the permitting for our dam was put on hold for decades while TROA was being negotiated. Now that it is finally in effect, we need to complete our permit, or else open the valve and let all the water it impounds drain out. This is similar to what happened with Lake Van Norden (except that it's in the Yuba River watershed, so TROA wasn't the issue). The Board decided it was in the

best interest of GDRA and our residents to maintain the pond, so we need to act quickly to complete the complicated permitting process.

In addition to TROA, all waters of the State of California within the Lahontan Region (most of eastern California) are subject to state jurisdiction via the Lahontan Regional Water Quality Control Board. One important reason this matters is the requirement of maintaining water quality standards, specifically (but not only) minimizing sediment that gets into tributaries to the pond and the River.

## Physical Ecology

The pond lies in a watershed of approximately 2,300 acres, within which the surface soils are derived from volcanic rock and old lakebed sediments which include volcanic ash and diatom skeletons. Volcanic rocks often weather directly into soils with high clay content (compared with granitic rocks which, in

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## AQUATIC INVASIVE SPECIES Eyes on the Lake – League to Save Lake Tahoe

Since 1957, the League to Save Lake Tahoe - known by our mantra "Keep Tahoe Blue" - have worked to protect and preserve the water quality and clarity in our Jewel of the Sierra. Aquatic invasive species, especially weeds and shellfish, are the greatest ecological threat to the Lake, which makes them a League priority. Our work centers on tackling invasives at ground zero for their infestation in Tahoe, the Tahoe Keys on the South Shore, as well as around the Lake's shoreline, and in our wider Sierra Nevada neighborhood.

The Truckee-Tahoe region's lakes, ponds, rivers and streams are interconnected. Beyond hydraulic and ecological linkages, people connect the waterbodies as boaters, paddlers, swimmers and anglers. Unknowingly, when recreators move from lake to reservoir, or river to pond, they can transfer aquatic invasive species that stowaway on watercraft or gear. Birds can sometimes do the same.

Beginning in the fall of 2020, the League's Eyes on the Lake volunteer program launched an initiative to conduct citizen scientist surveys of waterbodies in the Truckee-Tahoe region. The objective is to identify and map populations of aquatic invasive species, so they can be eradicated or managed and prevented from spreading to other waterbodies.

Glenshire Pond was surveyed in July 2021 from the shore and watercraft. The team was pleased to not discover any aquatic invasive species. They did find a healthy assemblage of native aquatic species, including northern mifoil, common waterweed, and Richardson's pondweed. Given the GDRA policies that discourage watercraft, swimming, and fishing on Glenshire Pond, the risk that invasive species will be introduced is low.

Eyes on the Lake waterbody surveys will continue in 2022. Volunteer citizen scientists are always needed. If you'd like to help protect the local environment from aquatic invasive species, please visit [keeptahoeblue.org/eyes](http://keeptahoeblue.org/eyes) to get involved.

– Chris Joseph, League to Save Lake Tahoe



*The clay particles in this puddle in the Glenshire pond watershed still have not settled out, a week after the last rainfall. It is important to make sure that all runoff water infiltrates into the soil profile. - Photo by Adrian Juncosa.*

our area, weather mostly into coarser textured soils). One important feature of a watershed with clay-rich soils is that when there's erosion, the tiny clay particles tend to stay suspended in the water; they don't settle out as easily as silt or sand. Also, many important plant and algal mineral nutrients stick to clay particles, so when there's a lot of clay in the water, there are also more nutrients that are easily plant-available and can support a lot of submersed and floating aquatic vegetation and even (in a worst case) harmful algal or bacterial blooms. This is one reason it's essential to control erosion and keep any loose sediment where it was generated (within parcels and roadsides), so as to ensure that surface water infiltrates into the soil and does not flow down into the pond.

Many lakes are "stratified" meaning there is a layer of warm water that stays on top, with cooler water below, separated by a zone called the thermocline. When the seasons change, the thermocline can dissipate and the upper and lower layers of water mix. If there is particularly nutrient rich water in the lower part of the water column and it mixes with the surface layer, this can result in algal blooms, oxygen depletion, fish kills - a variety of undesirable things. We don't yet know whether the Glenshire pond is seasonally stratified or not, but it's not very deep, and shallow water

bodies usually aren't stratified because wind mixes the water. And we certainly have wind! In any case, although there is nutrient-rich soft sediment on the lakebed, we don't have definite evidence of a harmful seasonal algal bloom ever having resulted from this getting mixed into the upper water column.

### Water Quality

Truckee River Watershed Council coordinates an annual water sampling event throughout the Middle Truckee River watershed. Compared with other sampling sites in the region, relatively high nitrogen and phosphorus levels are consistently found in one of the tributaries to the Glenshire pond. However, crucially, the TRWC sampling site downstream of the pond has much lower nutrient levels, in line with several other water bodies such as Prosser Lake and Martis Lake. Our own sampling showed the same pattern. This means that the Glenshire pond is actually functioning in an ecologically normal and beneficial way: it's removing nutrients from the inflows to the Truckee River, not adding them. It is also an indicator that the GDRA and resident user efforts to remove dog waste from the ecosystem are working. (Thanks to everyone who does this!) If those efforts weren't effective, we would see nutrients increase right at the pond, not decrease. Nevertheless, the relatively high nutrient content of the one main tributary inflow is







Like Glenshire pond, Lake Ella is a shallow pond in a volcanic soil watershed. It has almost no surrounding development, but still supports extensive native aquatic vegetation. - Photo by Adrian Juncosa.

a concern, and we want to ensure that it doesn't result in any harmful degradation of water quality within the pond itself. This requires limited, carefully planned, cost-efficient study, which is underway.

Resident waterfowl are not a net source of these nutrients, because, as for birds generally, anything they excrete was something they just ate only a short time previous. In other words, those nutrients were already here, mostly in plant parts that die and decompose, releasing nutrients, at the end of the growing season. Some birds are net exporters of nutrients, such as ospreys that nest elsewhere but come to Glenshire to catch fish and take those back to the nest.

We will expand on these and other aspects of water quality in a future Shire article.

GDRA worked with a pond management company to identify available treatments, in the event we decide to address any aspect of water quality in the pond. This company identified several possible actions and provided partial cost estimates, not including the construction and regulatory permitting costs that would be necessary for some of them. However, they provided no analysis of how effective they would be in affecting those water quality parameters, or how often those costs would need to be incurred. Given that none of these measures were directed at the nutrient levels flowing in, it is likely that their effects would be very short lived, perhaps only a few months, and then the same costs and disruptions would need to be repeated. Source control is a well-known principle in the realm of water

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Pied-billed grebe nesting on floating aquatic vegetation, which provides food for the whole pond ecosystem and, for some species, essential nesting or breeding habitat. - Photo by Martin Meyers (sierrabirdbum.com).

## GLENSHIRE POND BIRDS

Glenshire pond is a mecca for birds and people. To find an equal abundance of birds, you'd need to travel north to Sierra Valley or far south to the wetlands of the Upper Truckee (though Will Richardson of Tahoe Institute for Natural Science (TINS) says that Lake Forest Beach on Tahoe is a 4-season standout). But no other place in Truckee-North Tahoe comes close when our waterfowl arrive in numbers. I've seen 21 species of ducks, geese, and swans, including several rarities; four kinds of heron (great blues, great egrets, the smaller snowy egret, and the black-crowned night heron); three grebe species, white pelicans, two shorebirds, and one 'hider,' the sora rail. Add to that the wide variety of small land birds (three species of nesting swallows, the always-active warblers, and once, a rusty blackbird which is a real rarity) and our hawks, including nesting season osprey on patrol, the occasional bald eagle, and several owls, and our 11-acre lake qualifies as a neighborhood paradise. Why is the pond such a hub of life? For waterfowl, it's food: the mix of thriving native aquatic vegetation and invertebrates for geese and dabbling ducks; the feast of pan fish for the divers; larger (non-native) catfish for ospreys; various vertebrates for wading birds. There are reports of a beaver and (probably) a mink as well, though not verified by a good quality photograph. Even better, it's in the heart of our human community. Bring a field guide and a pair of binoculars on your morning walk to glory in its beauty and exuberant life.

– Bill Noble, with assistance from Martin Meyers (www.sierrabirdbum.com) and Will Richardson (TINS).



## Your questions deserve unscripted conversations.

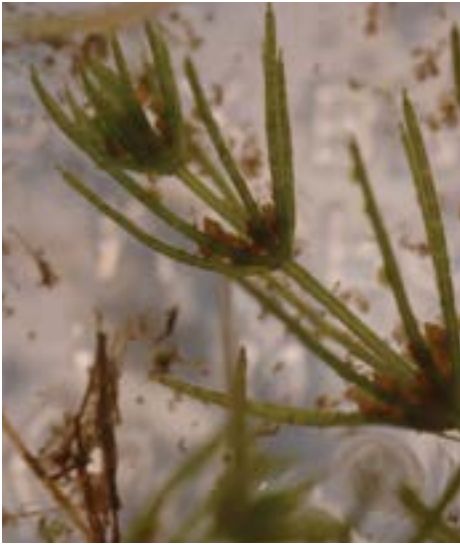
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Muskweed (*Chara* sp.), a green alga found in the pond, which is generally indicative of relatively good water quality.  
- Photo by Adrian Juncosa.

quality management, so the Association determined that it was more important first to improve our understanding of where the nutrient inflows are coming

from, then figure out which remedies, if any, to apply to that incoming water, and after that, consider whether any treatments of the pond water itself are beneficial and cost-effective.

### Biological Ecology

The water of the Glenshire pond freezes on the surface in the winter, but not all the way to the very bottom, so its population of fish survives. Most of the aquatic plants die back to the rhizomes in the lakebed sediments. The water gradually warms up throughout most or all of its shallow depth during the summer. Warm water and adequate nutrient levels are a prescription for aquatic plants to grow, so, in the context of our watershed, the aquatic vegetation we see in the pond during the summer and fall is completely ecologically normal. Lake Ella, for example, which is also a shallow water body but lies in a nearly undeveloped watershed, has abundant aquatic

vegetation at the end of the growing season too.

And what is that aquatic vegetation? We had the benefit of a free one-time survey of aquatic plants done by volunteers working with League to Save Lake Tahoe, targeted at answering the question of whether we have any aquatic invasive species. (We don't: see sidebar on page 16.) All of the plants they found are native, including one alga that is associated with good water quality.

Is there more aquatic vegetation than in the past? In principle, this could be determined using remote sensing image analysis of data from the last few decades, but due to wide climatic variations year to year and the different dates of freely available satellite imagery, it's not as straightforward to determine this for underwater vegetation as it is for terrestrial vegetation. All we know for sure from subjective inspection of satellite



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images from several different years is that the aquatic vegetation cover is greater later in the year (until the water cools off), and it varies from year to year. Currently, there is no evidence that there is more aquatic vegetation now than in the past.

Submersed (underwater) aquatic plants of the kinds that grow in our pond get their mineral nutrients both from the water column (absorbing them directly into the leaves) and through their roots in the lakebed sediment. The root-absorbed fraction is considerable, probably roughly half the nutrient uptake. This varies from species to species and likely also based on availability: if nutrients are scarce in the water, they'll take up more of them through their roots, and vice versa. During the growing season, the nutrients are part of the living plants; then when the days get short and the water cold, and the floating annual part of the plant dies back to the roots/rhizomes in the lakebed, some of those nutrients are released back

into the water and others of them settle back to the lakebed in small dead organic particles or adsorbed onto clay particles that settle very slowly through the water. It's important to recognize this seasonal cycle when interpreting laboratory analysis of water quality samples.

Regardless of one's aesthetic opinion about our aquatic vegetation, it is certainly the case that this vegetation is the foundation of an extremely rich food chain that supports many waterfowl and other birds. (See sidebar on page 17.) Some of these species consume primarily the plants themselves, others also consume the many invertebrates that are supported by them, and still others (mergansers, pelicans, and visiting ospreys) consume primarily the fish that in turn are eating the plants and invertebrates. Frogs, snakes, and small mammals also contribute to the overall bird diet. Consequently, the Glenshire

pond is probably the most outstanding site for abundance and diversity of waterfowl anywhere in the region, especially considering its small area. It really is a jewel of the regional bird fauna (see sidebar).

The pond is also surrounded by a variety of different vegetation communities, including areas dominated by three different species of sagebrush and multiple different kinds of marshes and meadows, from long-seasonal inundated wetlands (beaked sedge) to mostly dry (grasses and sagebrushes). Almost all of this vegetation is dominated overwhelmingly by native species. Scattered willows and other woody plants are present, providing nesting and perching resources for many species. Secretive species live and nest in the dense meadow vegetation, including birds, reptiles, amphibians, and no doubt rarely observed species like shrews.

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Ospreys do not nest at the pond, but come here to fish from miles away. This one takes home a sizeable non-native catfish (probably) for the family lunch. Pelicans and mergansers are other fish-eating species that use the pond. - Photo by Martin Meyers (sierrabirdbum.com).

## Looking Forward

As mentioned above, time is of the essence to complete the dam permitting. To ensure success, we have engaged the assistance of a hydrology firm for water monitoring and consumptive use analysis, and a water rights consultant to complete the complicated submittals to acquire our permit. We also expect to do some additional upgrades of the trail, especially on the south side of the pond. The Board and staff are working to identify additional sources of funding for this important work from outside our annual operating budget. We are continuing to

study the water quality issue, which could result in designing some inconspicuous passive water treatment features, but we are not currently planning any large scale actions to reduce or alter the existing aquatic vegetation. Anything of this kind would require a much more thorough understanding of the entire costs, benefits, and possible adverse effects. Finally, we could consider whether planting some limited additional native vegetation or creating other habitat diversity based on natural reference sites would enhance the aesthetics and wildlife

values of the pond and surrounding common area.

We know how much all Glenshire residents use and love the pond and hope that this whirlwind summary of a lot of different aspects of it helps increase the community's understanding of its ecological functions and values. We are always eager for input and ideas, so if you are interested in getting involved with planning and putting future improvements into effect, please contact the Association at [info@glenshiredevonshire.com](mailto:info@glenshiredevonshire.com).



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