

**Proposed Shooting Star Resort and Casino  
Access to Lake/Lake Effects Summary  
Star Lake, Minnesota**

July 31, 2017

## 1. CURRENT CONDITIONS

### a. Size and type of lake

According to the MnDNR website, Star Lake is 4,454 acres with a maximum depth of 94 feet, shoreline length of 38½ miles, and a littoral area of 2,813 acres (a little more than half).

The lake type is identified as mesotrophic (moderately fertile), which is generally the type most suited for walleyes. This lake is along the western edge of the zone identified as ‘Hard Water Walleye Lakes’ by the MnDNR.

Water transparency (depths secchi disk readings) have ranged from 5.8 to 14.0 feet in the past, with the depth at 10.5 feet in the 2015 Lake Survey. It is important to note that the water clarity was lower in the 1970s and has become clearer since that time, indicating an improvement in the water quality (reduced algal blooms) since that time. This coincides with the improvement of land use practices through the 1980s and 1990s.

It is significant to note that on the MnDNR website for Star Lake, the water transparency in the western portion of South Arm and the pond to the west of the project are identified as having lower transparency levels than the rest of Star Lake. This may be from historic nutrient inputs into Star Lake from the farmstead cattle and the row crop farm practices.

### b. Most common uses of lake

Based on the MnDNR Fisheries Lake Survey, the walleye population is at the upper edge of the lake type (10 fish per lift, averaging 1.2 pounds), indicating that there is a good walleye population that is sustained by a fry stocking program in addition to any natural reproduction that might occur in the lake. Therefore, this would be a destination lake for anglers seeking to catch walleyes in the Otter Tail County region.

The northern pike population is significantly over the normal range for the lake type (12.4 per lift), with the average size (1.45 pounds) smaller than the normal range; this means that the lake has a strong population of small northern pikes 15-19 inches long that many walleye and bass anglers consider a nuisance.

The bass population is low, so avid bass anglers are unlikely to fish here. This would reduce the potential for Eurasian Watermilfoil (EWM) infestation as this Aquatic Invasive Species (AIS) is common to largemouth bass fishing lakes such as Lake Minnetonka and Lake Waconia that are currently infested with EWM.

Based on the MN DNR fishery report, this lake also has a strong population of large sunfish. To protect the sunfish population, the MnDNR reduced the bag limit of sunfish down to 10. The intent is to reduce the number of larger sunfish harvested when the sunfish are biting well. This would be a destination lake for anglers in search of large sunfish.

The crappie population and perch population are low enough that they would not be intentionally targeted by anglers for the most part.

There is a Tullibee population in Star Lake that is considered beneficial to the lake as it provides cold water forage to help walleyes and pike grow larger. Tullibeas (also called cisco, *Coregonus artedii*) are a

fish that requires cold water (55 degrees) and higher oxygen levels (3 mg/l) to survive (this is warmer and less oxygen than what trout require). There have been Tullibee die-offs observed in Minnesota lakes in 2006 and 2012, both warmer than normal years. Star Lake is along the western edge of the range where Tullibees are found in Minnesota; the preferred lake habitat is deep, clear, cold, and lacking high amounts of nutrients; the Arrowhead Region is the prime habitat range.

There is a minimal rough fish population (such as carp, suckers, etc.), so there would be minimal rough fish spearing or bowfishing.

In summary of the angling use of Star Lake, walleyes and sunfish would be the primary target species with the smallish northern pike being a third target species.

Walleye anglers commonly fish popular waters that are beginning to have invasive species in them, which can be spread (Leech Lake, Burntside, Mille Lacs, Minnetonka, etc.). With the loss of Lake Mille Lacs as a destination lake for walleye anglers, lakes like Star Lake can receive heavier walleye angler pressure than in the past. By having a “boat and gear cleaning station” in the Star Lake area, AIS could be removed before walleye anglers put their boat into Star Lake whether or not they visited the proposed project building.

This is a significant topic because in 2016 Lake Lida was added to the AIS list as having Zebra Mussel.

Aside from anglers, there are pleasure boaters who visit the area and stay at one of the many resorts or a lake homes around Star Lake. During the summertime, there would also be pleasure boaters towing water skiers and boards/inflatables. In addition, Personal Watercraft (jet-skis) are common to Otter Tail County lakes.

There are swimming docks scattered around the perimeter of the lake, out from some of the docks.

#### **c. Existing residential and other development around the lake**

Using the MnTOPO aerial photography, the tally was 443 docks and 455 boat lifts or visible boats tied to docks.

The resorts include Galaxy Resort, Rocky’s Resort, Ebert’s North Star Resort, Spruce Lodge, and Franks Lodge.

#### **d. Existing lake access (boat ramps and associated parking)**

There are two public boat landings: one on the north side of the lake (approximately 33 parking places) and another on the east side of the lake (approximately 9 parking places).

#### **e. Estimated boat traffic**

As listed above, the tally was 443 docks and 455 boat lifts or visible boats tied to docks on Star Lake. During a busy timeframe (such as the 4<sup>th</sup> of July), if everyone used their watercraft at the same time with the parking lots filled at the boat landings, there would be 497 or approximately 500 watercraft on the water at the same time in the most extreme timeframe (that is unlikely to happen). Since the lake is 4,454 acres, if 500 boats were on the water at the same time it would average one boat every 8.9 acres.

## **f. Current impacts to lake from boating**

### **1. Turbidity and water quality**

Power boating leaves small amounts of residual petroleum in the lake water that biological microbes (Archaea) then break down for use in the food chain. Wetlands also naturally produce small amounts of petroleum from anaerobic breakdown of biological material, which is broken down by archaea.

Wind and wave action would subject the shoreline to a certain amount of scouring, however, strong winds during storms or strong northwest winds after front passages will create scouring within the lake as in-lake currents circulate.

A bigger source of water quality reduction would be from nutrients entering the lake from shoreline sources. The western part of South Arm, including the pond to the west of the proposed project, are identified on the MnDNR Star Lake website as having water that is less transparent than the rest of Star Lake. This suggests that past land practices of row crop farming and concentrated livestock likely contributed a nutrient load into the west end of the South Arm of Star Lake.

### **2. Shoreline erosion**

Naturally-occurring shoreline erosion happens in places where there is a long distance where wind blows across a lake (fetch), especially at locations where regular strong winds occur. Strong northwest winds happen after the passing of a weather front, so the southeast portions of a lake (exposed to northwest wind) are especially susceptible to shoreline erosion. Storms also can have winds from the south or southwest, so the east or northeast ends of lakes would be places where shoreline erosion could occur.

The location of the Star Lake project would not have exposure to either of these strong wind conditions. In addition, the thick band of common cattail along the shoreline will help protect the shoreline from erosion.

Another source of shoreline erosion can be from the wakes of passing boats that occur in narrow channels such as those where boats regularly travel under bridges. Currently, there are no narrows related to bridges over Star Lake.

### **3. Impacts to macrophytes**

In places where there is plant growth near the surface, boat channels were observed through the vegetation. There would have been impacts to macrophytes in those areas.

Since the proposed project does not call for any boat docks, the impacts to macrophytes directly attributable to the proposed project would be minimal. There would be a channel through primarily common cattail to reach the wild rice in the open water beyond the common cattail.

## **g. Known Aquatic Invasive Species (AIS)**

There are no known AIS (Eurasian Water Milfoil, zebra mussel, spiny waterflea, or faucet snails) in Star Lake at this time.

## 2. PROPOSED ACTIONS

- a. There are no plans for installation of docks or any shoreline development.
- b. A 45-vehicle RV campground will be developed that may attract some boaters.

## 3. ANTICIPATED IMPACTS

### a. Direct impacts

1. No docks or mooring facilities for boats, so there would be no direct boat traffic
2. Incremental direct impacts from RV campers who may bring boats and trailer them to launches
  - a. Boaters may be attracted due to the RV campground and the lodging at the location. There are some RV campers who bring boats, however there are more RV campers who don't bring boats than those that do. Kayaks and canoes tend to be the watercraft most used by RV campers based on observations while travelling roadways during the RV season.

### b. Turbidity and water quality

Boat wakes could stir up some shoreline sediment; however, wind action from strong northwest wind and during storms are anticipated to be more significant.

### c. Shoreline erosion

Since wind action from strong winds and storms are anticipated to be the larger contributor of shoreline erosion, incremental impact from boats from the proposed facility are anticipated to be minimal.

In many places within Star Lake there is significant vegetation between the shoreline and the open water where wave action is dissipated.

### d. Impacts to macrophytes

The potential incremental impact to macrophytes would be from travel through shallow bays where the vegetation is located (South Arm and West Arm), while the rest of the lake is deeper or more windswept to prevent vegetation from growing up to the depth of the boat motors.

3. Potential reduced available parking at boat launches

It is likely that there would not be enough parking at the boat landing only during busy weekends as the northern boat landing is observed to rarely have more than a few vehicles during weekdays in the summertime.

#### 4. Incremental increase in boat traffic noise and odors

In theory, the facility could attract boaters who have high-noise boats. Personal Watercraft (jet-skis) are already on the lake, but a resort/RV facility could theoretically attract more.

#### 5. Potential impacts if AIS were introduced

##### a. Eurasian Watermilfoil (EWM)

Shallow waters where there is high nutrient load and adjacent areas tend to be where EWM tends to become established; Lake Minnetonka and Lake Waconia are examples.

If this were to become established, it would thicken the vegetation within the south Arm and the West Arm (no matter if the facility is built or not). EWM is already in area lakes, so there is a possibility that it would invade Star Lake even without people attracted to this proposed facility.

##### b. Zebra Mussel

Zebra mussel is a fingernail-sized clam that is highly invasive meaning that it populates quickly and develops a coral-like coating over underwater structures such as dock posts, water intakes, natural clam beds and so on.

This mussel filter-feeds, which will help clean out nutrients, however, it will take away the plankton that feeds the baitfish such as Tullibee and other pelagic baitfish and young gamefish. Walleye fry are stocked instead of fingerlings; these walleye fry feed on plankton for their growth, so they would be effected by the filter feeding of the zebra mussel.

This AIS has already been found in Big Cormorant, Lida, Rush Lake (as recent as 4 days ago) and other nearby walleye lakes.

##### c. Spiny waterflea

Spiny waterflea is a larger than typical sized zooplankton that feeds on phytoplankton in a lake. This zooplankton has a long spike-like tail with barbs on it that causes small fish (baitfish and fry of gamefish) to cough it out as it doesn't go down the throat of small fish.

The problem arises when small fish target other zooplankton and avoid spiny waterflea, the way that pasture cattle avoid thistles. This allows the population of the spike-tailed critter to explode while the populations of the desirable zooplankton numbers crash.

The hooked spike on the tail of the spiny waterflea catches on fishing lines, downrigger cables, anchors, nets, and boat bilge areas; fishing lines and downrigger cables are the things that catch the most of this zooplankton. The hook catches on lines and cables that drag through the water while trolling; the spiny water flea collects on the end where they meet a swivel or the end of the line.

d. Faucet snail

The Faucet Snail is an AIS that has been linked to the die-offs of waterfowl in Lake Winnibigosh (mostly Scaup (bluebills) and coots). According to MnDNR information, this AIS is an intermediate host to three parasites that can cause death to ducks that eat these snails.

**b. Indirect impacts**

1. Water quality

Because the project is planned to route stormwater from the immediate watershed through stormwater ponds designed to remove most of the nutrients, the water quality of the South Arm is expected to be equal or possibly improve. Row crop farming next to the shoreline of the lake will be stopped and in its place there would be an upland buffer of non-mown vegetation to help remove nutrients before they reach the lake.

2. Temporary gawker boat traffic from boats not associated with the project

While it is possible that people might boat into the back end of South Arm, it is unlikely as the water is shallow and the bay is weedy. With the thick stand of tall cattails, the view from a boat would not allow seeing much of the facility.

**4. PERMITTING**

No project lakeshore permitting is anticipated, as there are no planned shoreline modifications.

**5. MITIGATION MEASURES**

Potential mitigation measures are listed below. Those mitigation measures that are not italicized are commitments from the project proposer. Those footnoted have previously been identified as water quality goals by Otter Tail County and/or the Star Lake.

- a. Proposer will ensure a phosphorus-free fertilizer for lawn maintenance
- b. *A cleaning station established by Otter Tail County, Township and Watershed District using high pressure water at over 120 degrees would be most effective, and the cleaning station should be sited in an area where the AIS would not get into surrounding waters.*
- c. *As a mitigation option, there could be a shuttle service where the boat and trailer could be driven to the facility and the person brought back to the boat at the landing; if the boater is solo, someone could stay to watch the boat at the landing. For pickup, the shuttle vehicle could arrive at the boat landing at a predetermined time or after a telephone call is made.*
- d. *This cleaning station could be open to people outside of Star Lake to prevent AIS from entering the lakes in the area.*
- e. *It could be a mandatory requirement for resort guests to use the cleaning station.*
- f. *Teaming with locals to do boat landing monitoring would be helpful to keep AIS out of the area, and to direct people to the cleaning station before entering area lakes.*

- g.** *Encourage OTC to establish an AIS control program that includes education about Aquatic Invasive species. 2*
- h.** *There could be an educational component at the proposed project facility and the cleaning station.*
- i.** *There could be recommendations that Personal Watercraft avoid being used before a time in the morning and after a specific time.*
- j.** *There could be a recommendation that speeds be kept under 60 miles an hour (or lower) on the lake to minimize wake erosion and noise.*
- k.** *No-wake zones could be established for areas of the lake where shoreline erosion is anticipated.  
1*

1= Mitigation measure contained in Star Lake Management Plan (2011-2012)

2= Mitigation measure contained in Otter Tail County Local Water Management Plan (2009-2019)