

AUKE LAKE MANAGEMENT PLAN

**City & Borough of Juneau
Parks & Recreation Department**

May 1, 2013

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1. Introduction

1.1 Purpose

This lake management plan presents goals and objectives to balance the physical and social demands of those who live or recreate on Auke Lake with the need to maintain public safety and promote a healthy and productive lake ecosystem. The plan seeks to reduce user conflicts, balance environmental and recreational demands, and protect the health, safety and welfare of those who live and recreate on Auke Lake.

1.2 Scope

This management plan provides guidance for how the surface of Auke Lake is used and makes recommendations concerning public access and education of lake users to achieve management objectives. The Juneau Assembly may implement certain aspects of the plan by ordinance, and provide penalties for violation.

1.3 Process

This management plan is the result of a review of existing regulations and lake use conducted in 2012 by City & Borough of Juneau (CBJ) Parks & Recreation staff. This review considered significant developments that have occurred since the original Auke Lake ordinance was introduced in 2007, including completion of the Auke Lake Trail, construction of an improved boat launch, and a planned day use area along the lake shore.

The purpose of this review was to evaluate the effectiveness of existing regulations, and whether the management objectives identified in 2007 are being achieved. These original objectives focused on protecting the lake's water quality, preserving fish and wildlife habitat, and promoting neighborhood harmony. The scope of this review was expanded to include issues of public safety in response to a fatal accident involving a passenger of an inflatable tube being pulled by a personal water craft when the tube struck another personal water craft in June of 2012 and comments received at public meetings during the fall of 2012.

CBJ staff gathered background information about Auke Lake and reviewed how dozens of similar lakes are managed in Alaska and throughout the United States. Thirty-one people commented on existing Auke Lake management at three public meetings held in November, 2012. The issues identified by CBJ staff, lake users, lake residents, and property owners were incorporated into this plan.

The Auke Lake Management Plan was reviewed by the PRAC in January, 2013. The PRAC received 35 oral and written comments and ultimately recommended that this plan be adopted. (The PRAC also expressed a desire that additional funding be provided to manage the lake more intensively, so that high-horsepower vessels could continue to operate subject to more regulations.)

2. Inventory of Existing Conditions

2.1 Location

Auke Lake is located in the Auke Bay neighborhood, about 11 miles north of downtown Juneau. The lake is bordered by municipal park land, Glacier Highway, the University of Alaska Southeast, and residential homes. Public access to the lake is provided by a CBJ boat launch near Auke Creek, as well as two floating boardwalks along the CBJ-managed Auke Lake Trail.

2.2 Physical Characteristics of Auke Lake

Auke Lake is regular in shape, with no bays, islands or peninsulas. It has a surface area of approximately 165 acres and is fed by five tributaries; Auke Creek is the lake's only outlet. The lake is about one mile long and 0.75 miles wide, and has a maximum depth of 101 feet. The elevation of the lake remains relatively constant at 62 feet above sea level. The lake's volume in 2006 was measured at 10,535 acre feet, or 3.43 billion gallons.¹ The shoreline of Auke Lake is bordered by forested terrain, which varies from gentle slopes to steep-sided banks. At least 50% of the lake's shoreline has been urbanized by residential development or road construction.² The lake is utilized by four species of salmon, as well as trout, beaver, waterfowl, otters, deer, bald eagles, and other fauna. Trout habitat is generally limited to areas less than 50 feet deep.³

¹ Connor, et al, *Auke Lake Public Archaeology and Geology*. 2006.

² Lum, et al, 3.

³ Lum, et al, 5.

Table 1: Auke Lake Physical Characteristics

Surface Area	165 acres
Volume	10,535 acre feet
Mean Depth	Unknown
Maximum Depth	101 feet
Shoreline Length	2.4 miles

2.3 Water Quality

Water quality data for Auke Lake and its tributaries is limited. The most extensive data available is water temperature in the lake and some of the tributary streams. Other data include standard water quality parameters such as dissolved oxygen, pH, selected cations (such as iron, magnesium, calcium, etc.), some anions (such as fluorine, chlorine, and sulfate), conductivity, hardness, alkalinity, and nutrients. Less common are data for benzene, toluene, ethyl benzene, and xylene (BTEX). Data for polycyclic aromatic hydrocarbons (PAH) have been collected as part of a study to determine the effect of motorized watercraft on water quality.⁴ Higher concentrations of PAHs have been shown to have a detrimental effect on fish and other species, and petroleum spillage is the primary source of PAHs in aquatic ecosystems.^{5, 7}

Concern about the environmental effects of motorized watercraft on Auke Lake prompted water quality studies to assess PAH concentrations in relation to recreational use of the lake. The National Marine Fisheries Service (NMFS) was particularly concerned because the NMFS hatchery maintains a water intake in Auke Lake at a depth of approximately 9 meters, and because the lake provides rearing habitat for several fish species. Studies conducted by NMFS from 1995-2003 showed that increases in PAH concentrations in surface waters coincided with the seasonal use of motorized watercraft on the lake, especially two-stroke engines. Significant levels of PAHs were detected in surface waters at a depth of one meter, but not at nine meters.⁶

⁴ "Waters in the Spotlight – Auke Lake," Alaska Department of Environmental Conservation, accessed December 21, 2012, http://dec.alaska.gov/water/wnpspc/protection_restoration/aukelake

⁵ Eisler, R. 1987. *Polycyclic aromatic hydrocarbon hazards to fish, wildlife, and invertebrates: a synoptic review*. U.S. Fish & Wildlife Service Biological Report 85(1.11).

⁶ Rice, S.D., L. Holland and A. Moles. 2007. *Seasonal increases in polycyclic aromatic hydrocarbons related to two-stroke engine use in a small Alaskan lake*. Journal of Lake and Reservoir Management Volume 23.

The National Marine Fisheries Service continues to collect water samples from the lake; however NMFS declined to provide data for use in developing this management plan.

While PAH levels and water quality were important factors in developing the existing Auke Lake ordinance in 2007, these concerns did not influence the recommendations contained in Sections Five and Six of this management plan.

2.4 Recreational Use

Non-motorized recreational use of Auke Lake includes swimming, canoeing, kayaking, sailing, and paddle-boarding. At least two companies rent non-motorized vessels that are used on Auke Lake, and the University of Alaska rents kayaks and canoes for use by students and staff. The first “Aukeman Triathlon” was held in 2009, and in 2012 the race drew 89 participants. The event includes a 750-meter “out-and-back” swim course that begins at the boat launch. Many contestants train for the race by swimming in the lake throughout the year.

Motorized recreational use of Auke Lake includes floatplanes and a wide variety of motorized vessels, including personal watercraft (PWCs) ⁷. A gate was installed at the boat launch in 2010 to prevent large vehicles from driving onto the frozen lake during the winter, where they could fall through the ice. The gate is closed by CBJ staff in the fall when regulatory buoys are removed from the lake. A seasonal floatplane dock is located on the southern shore of the lake.

The National Marine Fisheries Service studied motorized use on Auke Lake in 2003 (prior to construction of the boat launch) and found that about 300 motorized vessels used Auke Lake between April and October, with a peak of about 85 vessels in July. Average use was 42 motorized vessels per month.⁸ Federal fisheries researchers provided CBJ staff with anecdotal observations of motorized use in 2012, documenting 12 days between June and September when they observed a total of 36 motorized vessels present on the lake.

⁷ The Personal Watercraft Industry Association (PWIA) defines a “personal watercraft” as a vessel that uses an inboard motor powering a water jet pump as its primary source of power. The vessel is designed to carry from one to three persons and to be operated by a person sitting, standing, or kneeling on the vessel rather than by the conventional manner of sitting or standing inside the vessel. Examples include Jet-Skis and SeaDoo.

⁸ Rice, et al, Figure 3.

Anglers fish for salmon and trout in Auke Lake using motorized and non-motorized vessels, and by fishing from shore. Sport fishing effort for Dolly Varden and cutthroat trout in the Auke Lake drainage averaged 57 anglers per year between 1990 and 2004; these anglers fished an average of 198 person-days each year.⁹

2.5 Land Use & Ownership

The east shore of Auke Lake – including the Auke Lake Trail – is a CBJ Natural Area Park managed by the Parks & Recreation Department. Beyond this greenbelt are hundreds of acres of CBJ land scheduled for disposal as residential development. Most of the south shore is managed by the Alaska Department of Transportation as right-of-way for Glacier Highway. The Auke Lake Wayside is a CBJ Recreation Service Park; an improved day use area is planned for the Wayside in 2014, including bathrooms, parking, and picnic facilities. The University of Alaska Southeast campus comprises the west shore of Auke Lake. Residential homes extend from the UAS campus around the north end of the lake.

The National Oceanic and Atmospheric Administration maintains an easement along Auke Creek, and the Alaska Department of Natural Resources (DNR) holds title to the submerged lands beneath Auke Lake.

2.6 Regulatory Authority

Auke Lake is a navigable lake subject to regulation by both state and local governments. As a home-rule municipality, regulating recreational use of Auke Lake is a valid exercise of the police powers granted to the City & Borough of Juneau by Alaska State Statute (AS 29.35). According to DNR Southeast Region staff, the state typically supports reasonable efforts by municipalities to regulate lakes within their jurisdiction, unless there is an overwhelming state interest to the contrary.

At least two other Alaska municipalities actively manage navigable lakes within their jurisdiction:¹⁰

- The Municipality of Anchorage bans all motorized watercraft on 21 lakes, and imposes horsepower limits and other restrictions on Sand Lake and Lower Fire Lake.

⁹ Lum, et al, 2.

¹⁰ Alaska Department of Natural Resources, Office of Boating Safety. *Motorized Use of Alaska's Waterways*. 2009.

- The Matanuska-Susitna Borough regulates the use of motorized watercraft on at least 43 lakes. Personal watercraft are specifically prohibited on 23 lakes, and motorized vessels are banned entirely on seven others. Motorized vessels on other lakes are generally subject to restrictions on horsepower, wake, areas of operation, or hours of operation.

The State of Alaska also limits horsepower or prohibits personal watercraft on many lakes and marine waters, including Kachemak Bay, the Kenai River, and within many State Parks and State Recreation Areas.¹¹

2.7 Social & Demographic Usage

The present human use of Auke Lake may be characterized as relatively quiet, recreational, and residential. Observations by CBJ staff indicate that motorized use is concentrated during periods of warm weather, when 10 or more motorized vessels can be observed using the lake simultaneously. Most of these vessels are high-horsepower personal watercraft and small boats (modern PWCs can produce up to 250 horsepower or more). Winter use includes skiing, walking, and snowshoeing, with limited snow machine use.

The majority of lake residents who participated in the 2007 process supported the use of motorized vessels, but also expressed a desire to retain the quiet, residential atmosphere of the lake, and to protect water quality and wildlife habitat. These themes were reiterated at public meetings in 2012, with most residents voicing additional concerns regarding the safety of swimmers and other users near motorized craft traveling at high speeds. A minority of lake residents said that using PWCs or other high-horsepower boats on Auke Lake was important to their enjoyment of their property. One lake resident said that the availability of emergency medical services makes it a safer to operate motorized watercraft at Auke Lake than on marine waters.

A majority of lake users who do not own property on Auke Lake expressed a desire to maintain access for motorized watercraft, noting that Auke Lake is the only navigable lake on the Juneau road system. Several individuals said it was easier for parents to monitor children operating high-horsepower vessels at Auke Lake than in marine waters.

¹¹ Ibid.

The Federal Aviation Administration has not designated Auke Lake as a “Seaplane Base;” however, there is a history of seasonal floatplane use.

Observations by CBJ staff and lake users indicate that completion of the Auke Lake Trail significantly changed human use of the area after 2007. Infrared trail counter data shows summer use of the Auke Lake Trail increased from virtually zero in 2007 to as many as 133 people per day in 2009, with an average of 68 people per day. The floating boardwalks are extremely popular with swimmers and are frequently used to transfer passengers from motorized vessels, even though motorized vessels are prohibited from approaching the boardwalks. Anecdotal reports indicate that the new boat launch brought more vessels to Auke Lake, including high-horsepower PWCs and vessels that exceed the lake’s 16-foot length limit. The Parks & Recreation Department receives frequent complaints about large vessels using the boat launch to flush seawater from motors, bilges, and trailers. The Alaska Department of Environmental Conservation (DEC) is concerned that this practice increases hydrocarbon contamination and impairs water quality.

2.8 Motorized Vessel Carrying Capacity

Determining the recreational carrying capacity of any resource is challenging, and lakes are no exception. Nevertheless, assessing a lake’s carrying capacity provides managers with valuable information that can be used to develop a defensible management plan. The U.S. Department of the Interior’s Bureau of Reclamation produced the “Water Recreation Opportunity Spectrum” (WROS) in 2004. This document was revised in 2011 and renamed the “Water and Land Recreation Opportunity Spectrum” (WALROS). The WALROS assesses a variety of physical, social, and managerial attributes to determine how many vessels can reasonably use a lake without creating unacceptable risks or compromising the recreational experience of other users. This is the most widely accepted decision-making tool available. Although no documentation of the use of the WALROS has been found in Alaska other than this plan, it has been tested, used for planning purposes and implemented by the U.S. Department of the Interior, Bureau of Land Management, Corps of Engineers, National Park Service and numerous districts, county, and state agencies within 21 states.

The WALROS Flat-Water Recreational Boating Capacity is expressed as a coefficient, defined by the number of water surface acres adequate for each recreational vessel (acres per vessel). These coefficients are based on collaborative expert opinion, professional experience, published articles and plans, and sound professional

judgment. The coefficient is obtained by assessing a lake on a spectrum that ranges from urban to primitive. Factors used to determine the lake's carrying capacity include: physical and social characteristics, the typical size and speed of vessels, frequency of complaints and accidents, level of boater stewardship, rate of compliance with regulations, and level of enforcement. The carrying capacity for one type of vessel may be very different for another type of vessel (i.e. canoes vs. PWCs). When more than one type of vessel is present, the more restrictive number should be used.

Parks & Recreation staff applied these WALROS guidelines to Auke Lake. The preponderance of answers to the WALROS assessment indicated that Auke Lake can be characterized as a "Rural Developed" lake (*see* Appendix 1). The recommended carrying capacity of a "Rural Developed" lake is 20 to 50 acres per vessel. The presence of high-horsepower vessels, significant user conflicts, and lack of compliance with regulations indicate that management should favor the conservative side of this range. Therefore, the WALROS carrying capacity of Auke Lake is approximately 50 acres per vessel.

The WALROS assessment only considers areas that are available to motorized vessels and suitable for recreation purposes. Ecologically sensitive areas, hazardous areas, and restricted areas are excluded from consideration. While the total surface area of Auke Lake is about 165 acres, only 70 acres are available and suitable for unrestricted motorized recreation (e.g. outside the no wake zone or other prohibited areas). Because the carrying capacity of Auke Lake is 50 acres per vessel and only 70 acres are available for unrestricted use, the carrying capacity of Auke Lake is a maximum of one high-horsepower vessel.

Staff considered how the lake might be managed if it was characterized as being more urban. While the carrying capacity of an urban lake is generally higher, there is actually less capacity for high-horsepower vessels due to increased congestion, user conflicts, and noise.

Table 2: Flat Water Carrying Capacity of Auke Lake ("Rural Developed")

Vessel Type	Acres Required Per Boat	Available Acres	Carrying Capacity
High-Horsepower	50	70	1
Low-Horsepower	20	150	7
Non-Motorized	20	165	8+

2.9 Existing Plans and Monitoring Programs

State of Alaska

The state plan affecting Auke Lake is the Juneau State Land Plan (1993). Auke Lake is included in Unit 3E, and the plan identifies it as a navigable water body. The state will manage Auke Lake “to support the high public values of the lake including research, water quality, habitat restoration, fisheries management, summer and winter recreation, and landings by aircraft.” The state has designated Auke Lake for Dispersed Recreation, Fish & Wildlife Habitat, Fish & Wildlife Harvest, and Shoreline Use. These uses are defined as follows:

Dispersed Recreation (Rd): *Areas that attract recreationists or tourists who range throughout the area. Also, areas that offer high potential for dispersed recreation or tourism because of desirable recreation conditions that are scattered or widespread, rather than localized. Developed facilities are generally not necessary.*

Fish & Wildlife Habitat (Ha): *The most valuable habitat ... defined as: limited, concentrated-use area for fish and wildlife species during a sensitive life-history stage where alteration of the habitat or human disturbance could result in a permanent loss of a population or species’ sustained yield.*

Fish & Wildlife Harvest (Hv): *Localized, traditional harvest areas of limited size where alteration of habitat could permanently limit sustained yield to traditional users; or areas of intense harvest where the level of harvest has or is projected to reach the harvestable surplus for the resource.*

Shoreline Use (Sh): *Areas of state tidelands, submerged lands, and shorelands where water-related or water-dependent facilities for personal use by the owner of an adjacent upland site may be authorized. Facilities may include small docks, boat ramps, mooring buoys, or other facilities for personal, noncommercial use. (This designation applies only to the residential areas along the NE shore of Auke Lake).*

The plan directs that “the area will be managed to avoid or minimize conflicts with the designated uses” (p. 3-8)

City & Borough of Juneau

Management of Auke Lake is affected by the CBJ Comprehensive Plan (2008) and the Parks & Recreation Comprehensive Plan (2006).

- **CBJ Comprehensive Plan**

The CBJ Comprehensive Plan designates the Auke Lake Wayside as a Recreation Service Park (RSP). The Auke Lake Trail and the CBJ-owned shoreline are designated as Natural Area Parks (NAP). It is the policy of the CBJ to protect riparian habitat, including stream corridors and lake shorelines, from adverse effects of development and to provide a higher level of protection for non-urban shorelines in public ownership (CBJ Comprehensive Plan Policy 7.3).

- **Parks & Recreation Comprehensive Plan**

The Parks & Recreation Comprehensive Plan acknowledges that Juneau's rugged terrain results in limited opportunities for motorized recreation, and that there has been conflict between motorized users of Auke Lake and private property owners (P&R Comprehensive Plan p. 5-6). It recommends that a master plan be developed to address recreational use conflicts between motorized and non-motorized users and private landowners (P&R Comprehensive Plan p. 8-7).

Lake Monitoring Programs

Motorized users in 2007 committed to a self-monitoring program that would encourage compliance with new regulations, including creation of a volunteer "lake patrol." However, no effort was made to develop such a program.

A joint program between CBJ and the Juneau Watershed Partnership to monitor recreational use began in 2012, however this study is still in progress and the data is incomplete.

The National Oceanic and Atmospheric Administration collects water samples from Auke Lake to monitor hydrocarbons and other information, however NOAA declined to make this information available for use in developing this management plan.

Federal fisheries researchers provided CBJ staff with anecdotal observations of motorized use in 2012, documenting 12 days between June and September when they observed a total of 36 motorized vessels present on the lake. About 86% of the vessels were observed violating the motorized use regulations.

2.10 Existing Regulations & Enforcement

Federal

Auke Lake hosts significant populations of bald eagles and migratory birds. The Bald Eagle Protection Act and the Migratory Bird Treaty Act, among other things, prohibit the “taking” of eagles and migratory birds. “Taking” includes harassing, chasing, or killing birds, or destroying bird nests and eggs.

State of Alaska

Auke Lake is a navigable water of the State of Alaska. Alaska statutes require that all regulatory markers placed on or near state waters comply with the Uniform State Waterway Marking System (AS 05.25.053 and 11 AAC 07.100).

State law requires access to the surface waters of navigable and public waterways, typically through a “to” easement (AS 38.05.127). Additionally, land adjacent to navigable or public waters may be subject to an “along” easement, which provides a 50-foot public use easement along the waterway adjacent to the ordinary high-water mark. These easements are created when the State or Borough obtains patents to their lands, and stay with the property when the land is disposed of. State and Borough lands transferred prior to the adoption of AS 38.05.127 are not usually subject to these “to” and “along” easements.

City & Borough of Juneau

In 2007 the Juneau Assembly approved Ordinance 2007-31(am), which imposed the following restrictions on the use of Auke Lake by motorized vessels (CBJ Code 67.01.095):

- (a) *Hours of Operation.* Personal watercraft and other motorized vessels may operate on Auke Lake during the following hours:
 - (1) From June 1 through August 31: 9:00 a.m. to 10:00 p.m.
 - (2) From September 1 through May 31: 9:00 a.m. to 9:00 p.m.
- (b) *Prohibited area of operation.* Motorized use is prohibited between the shore of the lake and the buoy line, as depicted on the revised Auke Lake Motorized Use Map, adopted September 8, 2008.
- (c) *Restriction on wake.* No wake in excess of six inches in height shall be allowed between the shore and the buoy line for the area of transition to the Glacier Highway Auke Lake Wayside and residential properties, as depicted on the Auke Lake

Motorized Use Map, which incorporates global positioning system locations of 58°23.318' N, 134°38.257' W; 58°23.287' N, 134°37.616' W; and 58°23.341' N, 134°37.883' W.

- (d) *Refueling prohibited.* Refueling of motorized vessels is prohibited on the lake, in the wayside, and within 50 feet of the lake shoreline.
- (e) *Motorized vessel size.* Lake use is restricted to vessels 16 feet overall or less.

Ordinance 2008-26(c) expanded the no-wake zone and prohibited motorized vessels from approaching the new floating boardwalk along the Auke Lake Trail.

The no-wake zone and the areas where motorized watercraft are prohibited are intended to protect shoreline habitat important to fish and waterfowl. Trout, for example, are generally observed only in water less than 50 feet deep.¹² The ordinance requires the placement of buoys to delineate restricted areas; however existing buoys do not meet state laws requiring all markers placed in or near state waters to comply with the Uniform State Waterway Marking System (11 AAC 07.100).

No citations have ever been issued for violations of the Auke Lake ordinance. The Juneau Police Department does not have a boat or personnel trained to operate on water. The Parks & Recreation Department has not had consistent access to a boat, and none of its employees have been authorized to issue citations. However, Parks & Recreation staff issue numerous verbal warnings to motorized users from shore. The Alaska Division of Wildlife Troopers has offered to patrol the lake a few times each summer; however their authority appears limited to enforcement of state laws, not municipal ordinances. The U.S. Coast Guard has no jurisdiction on state waters, and is also unable to enforce municipal ordinances.

3. Issues and Concerns

The issues and concerns identified by residents and non-residents of Auke Lake during the 2012 review process included:

- Failure of many motorized users to comply with existing regulations.

¹² Lum, et al, 5.

- Lack of enforcement.
- Safety of swimmers and non-motorized users in the vicinity of high-horsepower watercraft.
- Risk of collisions due to multiple high-horsepower watercraft operating in a confined area.
- Risks associated with towed devices being used by high-horsepower watercraft within a confined, congested area.
- Preserving access for motorized watercraft to Juneau's only navigable lake.
- Impacts to waterfowl and other wildlife caused by motorized watercraft.
- Impacts to water quality caused by ocean-going vessels using the lake to flush engines and rinse trailers.

A majority of those attending the public meetings in 2012 said that the quiet, rural residential character of the lake should be protected. A majority also supported some continued historic use of Auke Lake by motorized vessels. Limited use of Auke Lake by floatplanes was also identified as a historical use. Some residents are concerned about winter snow machine use and the associated noise issues, as well as conflicts between snow machines and skiers and skaters.

4. Goals

These goals reflect the future expectations of residents, property owners, and users of Auke Lake: (1) Actively manage Auke Lake to achieve management objectives; (2) address issues of public safety for motorized and non-motorized users; (3) educate users about regulations; (4) enforce regulations; and (5) preserve wildlife habitat and water quality. These goals are not presented in priority order because they are interdependent.

4.1 Active management

Active management can include reasonable regulations that promote management objectives, as well as education and enforcement. State law protects public access to navigable lakes, but municipalities may impose reasonable regulations to manage use. In 2007 and 2012, lake residents and users expressed a clear desire for active management Auke Lake. Due to its popularity, ease of access, and lack of other navigable lakes in Juneau, any effort to manage the lake will require some level of active management.

4.2 Public safety

Public safety was not addressed by the 2007 process, which instead focused on issues of water quality, wildlife habitat, and neighborhood harmony. Safety is now a primary management objective following a

fatal accident in 2012 involving personal watercraft and a towed inflatable device. During public hearings in 2012, the majority of lake residents and several non-motorized users were concerned that existing regulations do not adequately address safety. Current motorized use significantly exceeds the lake's carrying capacity, contributing to increased user conflicts and a higher risk of accidents.

4.3 Education

Comments received during public meetings in 2012 indicate that existing signage and buoys have failed to educate users about the no-wake zones and prohibited areas. Several people suggested that lake users be required to complete a boater education course before operating on Auke Lake. The regulatory buoys now used do not comply with state law.

4.4 Enforcement

There was nearly unanimous agreement among lake residents, motorized users, and non-motorized users in 2012 that enforcement of regulations is critical. Since 2007, there has been no enforcement by the Parks & Recreation Department or the Juneau Police Department due to a lack of resources. Most people agreed that if the CBJ is going to manage and regulate Auke Lake, then adequate resources must be provided to enforce those regulations.

4.5 Preserving wildlife habitat & water quality

The majority of lake residents are concerned that the goals of the 2007 process are not being achieved, including the protection of waterfowl habitat and water quality. Several individuals expressed concern about the increasing number of ocean-going vessels being rinsed and flushed in Auke Lake. The Alaska Department of Environmental Conservation shares this concern because engines produce more hydrocarbons when first started, thus increasing pollution in the lake. Several people felt that water quality should be monitored more actively.

5. **Management Issues, Alternatives, and Recommendations**

5.1 Active Management

Management Issue Active management of Auke Lake began in 2007 with the Auke Lake ordinance; however, the existing regulations have failed to achieve management objectives of preserving water quality and promoting neighborhood quality. This is due to a variety of factors, including a lack of agency resources for enforcement,

inadequate signage and markers, and a general lack of compliance among motorized users. While public safety was not a primary management objective in 2007, many residents and lake users demanded that safety be considered after a fatal collision between personal watercraft and a towed inflatable device in 2012. Based on WALROS guidelines, the number of high-horsepower watercraft using Auke Lake far exceeds its carrying capacity.

Alternatives The following alternatives were evaluated:

- *Make no changes to existing regulations or management.* This cannot be justified because current use far exceeds the lake's carrying capacity, and existing regulations do not address safety concerns.
- *Remove all CBJ regulations and rely on the State of Alaska to manage Auke Lake.* This is not likely to succeed because DNR does not have the resources to actively manage recreational use of Auke Lake. Due to DNR staff workloads, it would be years before a state process could begin. State enforcement resources are extremely limited.
- *Impose reasonable regulations that promote management objectives and provide adequate resources for education and enforcement.* This alternative is preferred because it is most likely to achieve management objectives for water quality, wildlife habitat, neighborhood harmony, and public safety.

Recommendations The City & Borough of Juneau should actively manage Auke Lake to protect water quality and wildlife habitat, preserve neighborhood harmony, promote public safety, and provide recreation opportunities. Public opinion clearly demands active management, and the City & Borough of Juneau is the only entity that has expressed any interest in such management. Existing regulations should be changed to reflect the management objectives contained in this plan, and adequate resources should be provided to educate users and enforce regulations.

5.2 Public Safety

Management Issue Unrestricted motorized use of Auke Lake is limited to 70 acres of the lake's surface. The lake's carrying capacity requires at least 50 acres for each high-horsepower vessel. As a result, the presence of a single high-horsepower vessel prevents use of the lake by any other user without exceeding the area's carrying capacity. The use of towed devices is also a major concern because

riders have no control over their direction of travel, and centrifugal forces can dramatically increase the speed of a towed device while turning. Existing regulations do not address public safety concerns.

Alternatives The following alternatives were evaluated:

- *Allow a limited number of high-horsepower watercraft to use Auke Lake.* This would be difficult because the WALROS carrying capacity of Auke Lake is only one high-horsepower vessel. Even if this number were arbitrarily doubled or tripled, demand could not be accommodated. A fairly complex permit lottery could be developed, however this would require a consistent enforcement presence on the lake.
- *Impose a traffic pattern for tow vessels.* This is unlikely to succeed because a traffic pattern would require a high degree of education and compliance among lake users who have an established record of noncompliance. A workable traffic pattern would also require a significant enforcement presence and constant monitoring. A traffic pattern would not work at all if other vessels were allowed on the lake at the same time, since these other vessels would likely cross paths with the towing vessels. This is especially true for personal watercraft which, due to their maneuverability, often operate unpredictably. Limiting use only to vessels towing skiers or towed devices would also unreasonably restrict public access to the lake.
- *Prohibit towed devices.* Riders of towed devices have virtually no control over their speed or direction of travel. Many state boating safety courses and retail vendors recommend that vessels towing any kind of device maintain at least 3,000 feet of unobstructed waterway in front of the boat.^{13, 14} This is not possible at Auke Lake due to the no-wake zone. Instead, tow vessels are required to make a constant turn to avoid swimming areas, no-wake zones, submerged logs, and the boat launch. The centrifugal force that results from these turns accelerate towed devices to speeds greater than the towing vessel. These forces,

¹³ *Water Skiing, Towed Devices and Wake Sports.* Boating Basics Online.
http://www.boatingbasicsonline.com/content/general/9_1_f.php?new_state=AK. Accessed December 21, 2012.

¹⁴ *How to Buy Water Towables.* Fog Dog Sports.
<http://fogdog.com/info/index.jsp?categoryId=2209293>. Accessed December 21, 2012.

combined with inexperienced operators, make it more likely that riders will be towed into obstacles or oncoming vessels.

- *Prohibit high-horsepower watercraft.* Restricting horsepower would result in lower vessel speeds. A recent study by the Ohio Department of Natural Resources found a definite correlation between higher horsepower and increased accident rates.¹⁵ Enforcing a horsepower limit is far more practical than enforcing vessel length limits, speed limits or wake restrictions, all of which are nearly impossible to prove in the field or in court. At least 30 states use some type of horsepower restriction¹⁶, and similar laws are in place on dozens of lakes in Alaska.¹⁷
- *Prohibit all motorized vessels.* Prohibiting all motorized vessels would promote neighborhood harmony and protect water quality, but is unlikely to make the lake any safer than a reasonable horsepower restriction. A complete ban on all motorized vessels would also significantly restrict use of the lake by many people.

Recommendations Motorized vessels should be limited to a maximum of 10 horsepower. This provides a practical, enforceable way to control vessel speed, thus increasing the number of vessels that can safely use the lake. Similar horsepower restrictions are common on many lakes in Alaska, and throughout the United States.

Towed devices should be prohibited on Auke Lake because the available water surface area is not adequate for this type of activity. Given the number of swimmers, other vessels, and obstacles in the area, towed devices cannot be used safely on Auke Lake.

¹⁵ Ohio Department of Natural Resources. *Boating on Ohio Waterways Plan*. 2004.

¹⁶ Ibid.

¹⁷ Alaska Department of Natural Resources, Office of Boating Safety. *Motorized Use of Alaska's Waterways*. 2009.

5.3 Education

Management Issue For active management to succeed, users must know and understand regulations. Communicating this information to the public is also critical for enforcement. Motorized users also must understand how to operate their watercraft safely. Current education efforts at Auke Lake include a large sign in the wayside parking lot, which includes a map of the lake and the full text of the Auke Lake ordinance. Three buoys (required by the ordinance) are used to delineate the no-wake zone. Additional buoys are used to identify the areas where motorized watercraft are prohibited. These buoys do not comply with state law, and many users complain that the purpose of the buoys is not clear. Several people at the public meetings in 2012 recommended that boaters be required to complete a safety course in order to access Auke Lake.

Alternatives The following alternatives were evaluated:

- *Make regulatory information more accessible through improved signage, online resources, and public outreach.* More effective signage and maps would help lake users understand regulations and restricted areas. This information could also be made available in a simple, user-friendly format on the CBJ website. Finally, public service announcements and other marketing tools could be used to raise awareness of management issues. Improved signage would cost about \$2,000, while the website could be updated by CBJ staff. Public outreach through local media would cost about \$1,000 per year.
- *Use standard regulatory markers.* Regulatory markers that comply with the Uniform State Waterway Marking System are required by state law, and would allow operators to recognize restricted areas while on the water. The current set of mismatched fishing buoys is difficult to identify and easy to tamper with. Purchasing enough buoys to adequately mark Auke Lake would cost about \$15,000. Installing and removing these buoys would require more time by CBJ staff. A suitable boat must be rented several times each summer to safely install, maintain, and remove the buoys.
- *Require lake users to complete a boater education course.* Unlike many states, Alaska does not require a boater education course to operate a vessel on state waters. General boating safety classes are available from the U.S. Coast Guard Auxiliary and the Alaska Office of Boating Safety. Enforcement of such a

requirement would require a significant enforcement presence because many vessels are used by more than one operator.

Recommendations The City & Borough of Juneau should produce and install new signage that effectively communicates regulations and lake management objectives. This information should also be made available on the CBJ website in a user-friendly format. Public service announcements and other marketing tools should be used to maintain public awareness about lake management issues. Users should be encouraged to complete an approved boater safety course.

The City should purchase about 20 standard regulatory markers that comply with the Uniform State Waterway Marking System (including spares). The Parks & Recreation Department should have reliable access to an appropriate vessel to safely install, maintain, and remove the buoys each summer.

5.4 Enforcement

Management Issue Concern about the lack of enforcement at Auke Lake was a common theme during public meetings in 2012. The Juneau Police Department (JPD) is the only agency currently authorized to issue citations for violations of the Auke Lake ordinance; however, JPD does not own a boat and officers are not trained to operate on the water.

Alternatives The following alternatives were evaluated:

- *Encourage motorized users to “self-police” their behavior using a volunteer lake patrol and peer pressure.* When the current Auke Lake ordinance was adopted in 2007, motorized users pledged to form a volunteer lake patrol to educate each other and ensure compliance. This never happened and the concept of self-policing motorized use has failed. At public meetings in 2012, many motorized users said it was the City’s responsibility to enforce its regulations.
- *Create a marine patrol unit within the Juneau Police Department.* According to JPD, the cost to patrol Auke Lake 27 days per summer is about \$71,500, or \$2,650 per patrol day (this figure includes \$40,500 in overtime required to cover marine officers’ regular patrols). Equipment and training expenses would cost an additional \$26,800 in the first year. Additionally, staffing levels at JPD may not allow adequate flexibility to provide an enforcement presence on the lake when users are most active.

- *Create a seasonal park ranger position (Mid April-Mid Oct) with enforcement authority within the Parks & Recreation Department.* This alternative would cost less than police enforcement, provide more coverage, and allow the Parks & Recreation Department to address problems in all CBJ parks (including dog violations, illegal camping, vandalism, etc.). An existing maintenance position that is currently vacant could be converted to a new seasonal ranger position with no impact to current budgets.

Recommendations Enforcement of regulations is necessary in order to actively manage recreational use on Auke Lake; “self-policing” by user groups has failed. Enforcement by either the Juneau Police Department or the Parks & Recreation Department will require either (1) additional resources and funding, or (2) the elimination of existing services.

5.5 Protect wildlife habitat and water quality

Management Issue Concerns about protecting wildlife habitat and water quality shaped the existing Auke Lake ordinance, and these issues remain important to many residents and lake users. There is insufficient data available to determine whether wildlife habitat and water quality are, in fact, being protected.

Alternatives The following alternatives were evaluated:

- *Remove all restrictions on wake and allow unrestricted use of motorized watercraft.* Without adequate resources for enforcement or education, some have suggested that the City abandon any effort to regulate motorized use of Auke Lake. This is not feasible because the Alaska State Land Plan, the Juneau Comprehensive Plan, and the Parks & Recreation Comprehensive Plan all direct that the lake be managed to protect these natural resources. Comments received from most residents and many lake users also indicated a desire to actively manage the lake to achieve these goals.
- *Change the Auke Lake ordinance to remove ineffective portions and address new developments.* With proper education and enforcement, some portions of the existing ordinance provide an effective way to protect wildlife habitat and water quality. These include restrictions on wake and areas of operation, which help protect the

shoreline from erosion. The ban on refueling prevents spills from contaminating the lake. Other regulations, such as the vessel length limit, do nothing to further management objectives. New concerns about large vessels rinsing and flushing motors in the lake have gained increased attention from lake users and state regulators. The vessel length limit could be replaced with a horsepower limit, and rinsing or flushing of vessels could be prohibited.

Recommendations The existing no-wake zone and area of operation should be retained to preserve shoreline habitat. The existing ban on refueling should be maintained. The existing hours of operation for motorized craft should also be maintained. The existing vessel length limit should be replaced with a 10 horsepower limit in order to maintain access while minimizing erosion and disturbance of waterfowl. The rinsing or flushing of vessels should be prohibited to preserve water quality.

6. Implementation

If the Juneau Assembly adopts this management plan, the following recommended actions will be implemented by ordinance in Title 67 of the Municipal Code:

6.1 10 Horsepower Limit

The existing 16-foot length limit for vessels on Auke Lake should be replaced with a 10 horsepower limit for all vessels, regardless of size (this restriction would not apply to aircraft).

Due to the small area available to motorized vessels on Auke Lake, the use of high-horsepower watercraft is not appropriate and exceeds the lake's carrying capacity. A study by the Ohio Department of Natural Resources established a direct correlation between vessel horsepower and accident rates. Speed limits are not enforceable due to a lack of resources, technological limitations, legal challenges, and the physical configuration of the lake. The only feasible way to control the speed of vessels on Auke Lake is to restrict their horsepower. A limit of 10 horsepower is common on many Alaska lakes, and throughout the United States.

6.2 Prohibit Towed Devices

Towed devices should be prohibited on Auke Lake.

Riders on towed devices cannot maintain directional control, and are unable to release themselves from a tow vessel. Due to the "whiplash"

effect that occurs when a tow vessel enters a turn, a towed device can pick up speed dramatically. This increases the risk of the rider colliding with other vessels or obstacles in a confined area like Auke Lake. According to widely accepted boater safety courses, vessels towing rafts or skiers should have at least 3,000 feet of unobstructed waterway in front of the towing vessel. This is impossible to achieve on Auke Lake without violating restricted areas.

6.3 Prohibit Flushing and Rinsing Boats / Trailers
The rinsing and flushing of boats in Auke Lake should be prohibited.

Preserving Auke Lake's water quality is a high priority for the State of Alaska, as well as many lake users and residents. Swimmers are particularly concerned with fuel sheens and other water quality problems near the boat ramp. The Alaska Department of Environmental Conservation (DEC) is concerned that the use of Auke Lake to flush ocean-going vessels and rinse saltwater from trailers will degrade the lake's water quality. Engines produce more exhaust and oil when first started, and flushing engines increases the concentration of these contaminants near the boat launch. This area is used by swimmers and has relatively poor water circulation.

6.4 Prohibit Tampering with Regulatory Markers
Defacing, removing, destroying, or otherwise altering a regulatory marker should be prohibited.

Under Alaska state law, it is illegal to moor a vessel to a regulatory buoy, or to deface, remove, destroy, or otherwise alter a state regulatory marker (11AAC 07.190). Because this state statute does not apply to markers placed by municipalities, an ordinance would be required to prohibit such activity at Auke Lake.

In addition to the ordinance changes outlined above, the following recommended actions may be implemented by the City & Borough of Juneau without changing the Municipal Code:

6.5 Provide Adequate Resources for Enforcement
The CBJ should provide adequate resources to enforce City ordinances on Auke Lake.

If the CBJ is going to actively manage Auke Lake, then it must provide adequate resources for enforcement. Relying on user groups to "self-police" their behavior has not worked. The Juneau Police Department (JPD) is the only agency authorized to issue citations for violations of City ordinances at Auke Lake; however JPD does not have the

resources to enforce laws on Auke Lake. If the Parks & Recreation Department is directed to enforce regulations at Auke Lake without additional resources, then many other programs will be sacrificed, including efforts to control illegal camping, prosecute dumping, maintain trails and replace signage. Volunteer programs (including litter cleanup and memorial bench installations) would be terminated. At this time, the Parks & Recreation Department does not have enough qualified positions to provide complete coverage throughout the summer, and may be unable to respond when needed.

- 6.6 Use Standard Regulatory Buoys as Required by State Law
The CBJ should purchase approximately 20 buoys that comply with the Uniform State Waterway Marking System to delineate regulated areas (no wake zones, motorized vessels prohibited, etc.).

The existing Auke Lake ordinance requires the use of buoys to mark restricted areas on the lake. The fishing buoys currently used are difficult to identify and are easily tampered with. State law requires that regulatory buoys placed in state waters conform to the Uniform State Waterway Marking System. Approximately 20 buoys are needed to mark restricted areas and provide a small reserve.

7. Conclusion

Existing efforts to regulate motorized watercraft on Auke Lake have failed to balance the physical and social demands of those who live or recreate on Auke Lake with the need to maintain public safety and promote a healthy and productive lake ecosystem. Existing levels of motorized use far exceed the lake's carrying capacity, negatively impacting public safety and reducing the recreational experience for all lake users. The fact that Auke Lake is the only navigable lake on Juneau's road system does not change the fact that available water surface acres are not adequate for the type of high-horsepower watercraft and activities now common at the lake.

Vessel speeds should be limited by restricting motorized watercraft to 10 horsepower. Towed devices should be prohibited. The rinsing and flushing of large vessels should be prohibited. Improved signage and standard regulatory buoys should be installed. Finally, adequate resources should be provided for enforcement of regulations.

These recommendations are based on an objective review of existing conditions by CBJ staff, as well as a broad survey of lake management in Alaska and throughout the United States. These conclusions are

based on collaborative expert opinion, professional experience,
published articles and plans, and sound professional judgment.