

Auke Lake Watershed Action Plan
Auke Lake Watershed in Juneau, Alaska



**Prepared by the Juneau Watershed Partnership
December 2009**

The Juneau Watershed Partnership (JWP) is a nonprofit organization whose mission is to promote watershed integrity in the City and Borough of Juneau through education, research, and communication while encouraging sustainable use and development.

Acknowledgements

Production of this document was made possible through a grant from the U.S. Fish and Wildlife Service’s Coastal Conservation program, and could not have been completed without the help of the U.S. Fish and Wildlife Service; Samia Savell, Natural Resources Conservation Service; Lia Mastropolo, Watershed Planning Intern and the Board of Directors of the Juneau Watershed Partnership.

Many thanks go to the members of our technical advisory committee, the Wetlands Review Board and the staff of the City and Borough of Juneau.

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1. INTRODUCTION

1.1 Statement of Need and Purpose for Action Planning

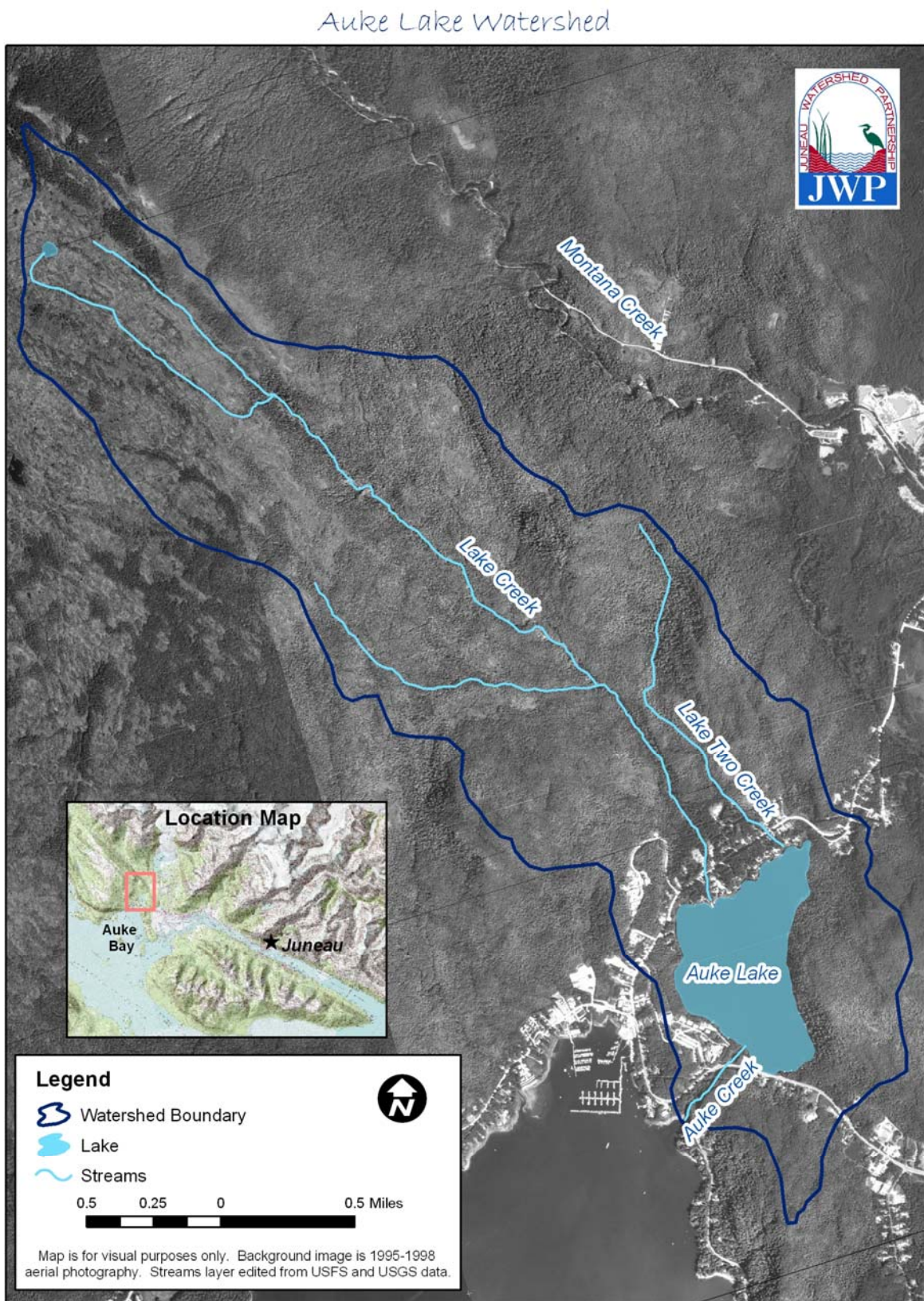
The Auke Lake Watershed Assessment, completed by the Juneau Watershed Partnership (JWP) in 2009, offers an inventory and assessment of general characteristics such as the geology, hydrology, and human and natural history of the watershed. This action plan is a continuation of that work and makes specific recommendations for the continued sustainable management and use of the watershed's natural resources.

The goal of this plan is to protect and preserve the resources of the Auke Lake watershed by identifying actions leading towards long-term, sustainable management of the watershed. To this end, objectives of this plan are to:

- Identify key natural resources in the Auke Lake watershed.
- Outline potential threats to these resources.
- Develop workable actions toward mitigation or prevention of these threats.
- Identify opportunities for partnership among governing agencies at the municipal, state, and federal level, and among community, private, and nonprofit stakeholders.

The intention is that this report will be utilized collaboratively by local, state, and federal agencies involved in conservation and land management decisions within the watershed, the City and Borough of Juneau (CBJ), and Juneau residents.

Figure 1: Auke Lake Watershed Location and Boundary



2. WATERSHED RESOURCES

The Auke Lake watershed is a relatively intact and diverse ecosystem within the boundaries of Alaska's capital city. Valued by residents and visitors for its natural beauty and scenic location, Auke Lake provides several major resources to the Juneau community such as fish and wildlife habitat, developable land and recreational opportunities. Below are general descriptions of these resources summarized from the detailed inventory found in JWP's 2009 Auke Lake Watershed Assessment.

2.1 Fish and Wildlife Habitat

The rich array of vegetation and aquatic habitat types—freshwater streams and wetlands, the lake itself, and a marine estuary—found in the Auke Lake watershed provide a complex environment that supports a variety of fish and wildlife species. The lake and its associated streams support coho, sockeye, pink and chum salmon. Hatchery king salmon are found at the mouth of Auke Creek. Other important fish species in the watershed include cutthroat and rainbow trout, and Dolly Varden char. (Bethers, 1995 and Alaska Department of Environmental Conservation (ADEC), 2008)

Although sport fishing on Auke Lake is limited, as an anadromous fish bearing watershed it provides high quality spawning and rearing habitat for commercial and recreational fisheries in Juneau's marine environment. Nongame fish species such as three-spine stickleback and prickly sculpin provide a food source for the larger fishes, as well as birds. Both resident and migratory birds utilize the area throughout the year, including songbirds, raptors, and waterfowl. Beavers and otters have been sighted in and around Auke Lake as well as Sitka black-tailed deer. Other mammals common to forested habitats in the area and likely to inhabit the watershed include bear, porcupine, marmot, red squirrel, and voles.

2.2 Recreation

For area residents, the open space surrounding Auke Lake provides a desirable setting for a semi-rural Alaskan lifestyle. Auke Lake is a popular recreational area, where both residents and visitors regularly kayak, fish, boat, ski, and swim. Residents are now able to hike around the lake on the recently completed Auke Lake Trail. The University of Alaska Southeast (UAS) is located along lake's shoreline, and university courses in sea kayaking, fly casting and fishing take place on the lake and associated streams. The headwaters of Auke Lake lie within Spaulding Meadows, a popular winter recreation area used by skiers and snowmobilers.

2.3 Research

The University of Alaska's School of Fisheries and Ocean Sciences and the National Marine Fisheries Service (NMFS) Auke Bay Laboratories maintain research facilities within the lower watershed. Scientists and students monitor water quality and fish population dynamics and migrations which contribute to one of the longest running datasets of its kind on the West Coast.

2.4 Development Potential

There are several large parcels of land in the Auke Lake watershed that are under consideration for future development. Several large parcels on the east side of the lake are owned by the CBJ and were identified in the 2008 Comprehensive Plan as potential affordable housing development sites. The UAS also owns significant parcels of land on the lake, some of which are slated for development, conversion into new greenbelt areas, or traded in the future according to the UAS Campus Facilities Master Plan. (Cunningham Group, 2002)

3. RESOURCE THREATS

During the Auke Lake watershed assessment process, local residents and agency representatives participating in the Auke Lake Technical Advisory Committee identified potential threats to the resources found in the watershed (described below). These threats form the basis of our recommendations outlined in section four of this plan.

3.1 Point-Source Pollution

Point-source pollution refers to any pollutant with a known source, such as an industrial dump site or an oil spill. Because these pollutants can often be attributed to a responsible party they are regulated under the Clean Water Act of the Environmental Protection Agency (EPA).

Few point-sources have been documented in the Auke Lake watershed; however concerns about household heating oil spills and illegal oil disposal were voiced by Auke Lake residents during the watershed assessment process.

3.2 Non-Point Source Pollution

Non-point source pollution refers to pollutants from any source that is not singularly defined. Stormwater is the major contributor of non-point source pollution in the watershed. Stormwater is defined here as rainwater and melted snow that transports pollutants and debris from impermeable and semi-permeable surfaces (streets, parking lots, ditch lines, lawns, and construction and industrial sites) to aquatic ecosystems.

Due to its nonspecific nature and a lack of targeted water quality data, little is known about the extent of non-point source pollution in the watershed. Existing development, snow management and storage, and future land development are potential sources of non-point source pollution in the watershed. Known non-point source inputs into the Auke Lake system include stormwater runoff from University Way Rd. into UAJ Creek, stormwater and snow disposal into Auke Creek at Glacier Highway, and runoff from Auke Lake Boat Ramp parking lot.

3.3 Habitat Loss and Degradation

The Auke Lake watershed provides spawning and rearing habitat for four species of Pacific salmon as well as several other resident and anadromous fish species. The watershed's habitat attributes are many and varied, and the loss or degradation of one habitat type can impact fish populations for many years in the future. Of particular importance is the protection and maintenance of near shore spawning and rearing areas in Auke Lake as well as spawning and rearing habitat in the lake's tributaries and outlet stream. Protecting riparian and aquatic plant communities will be essential to maintaining healthy anadromous fish populations as well as populations of invertebrates and small resident fish, both of which serve as important prey for other fishes, birds, and small mammals.

While the Auke Lake watershed remains un-developed in its upper reaches, some wetland areas in the lower watershed have been lost to development. Additional habitat loss or change is likely to occur as development in the watershed continues.

3.4 Erosion and Sedimentation

Erosion and sediment deposition can alter the natural movement of stream channels, encroach on property and diminish flows needed for fish migration, spawning, and rearing. Sediment inputs that exceed natural levels can alter channel shape, bed elevation, sinuosity, and pool and riffle balance. Bank erosion in the watershed could contribute to higher suspended fine sediment and turbidity levels downstream, which can blanket spawning gravels and cloak invertebrate prey.

The construction of Back Loop Road and shoreline development near the mouth of Lake Creek has likely restricted the natural migration of its channels across the historic alluvial fan. Confined, the channel accumulates sediment, surface flow decreases, and fish passage is restricted during low flow conditions. UAJ Creek has been channelized in its lower reaches and receives fine sediment at several stormwater outfalls from the Student Housing road. Bank erosion is occurring on Auke Lake at the boat launch and adjacent parking area.

4. RECOMMENDED ACTIONS

The following are recommendations intended to preserve and protect valuable resources in the Auke Lake watershed. Actions outlined seek to reduce the impacts of the potential threats identified in this action plan. These actions are categorized as research and assessment needs, suggestions for management actions, and finally partnership and stewardship opportunities for watershed preservation and protection.

4.1 Assessment and Further Research

The following section identifies significant knowledge gaps about the watershed, and outlines steps toward acquiring additional information that would better assist resource managers and the public in understanding natural and man-made factors that affect resources in the watershed.

4.1.a Water Quality

A long term water quality monitoring plan for Auke Lake and its tributary and outlets streams is needed to establish baseline data for all relevant water quality indicators, including benthic macroinvertebrates. Both Auke Lake and Auke Creek are currently categorized in Alaska's 2008 Integrated and Water Quality Monitoring Report as "Category 3 Waterbodies", e.g. waters for which there is insufficient data to determine designated use.

In July 2009, JWP nominated Auke Lake for monitoring through the Alaska Clean Water Action (ACWA) program. Further monitoring is needed in order to re-categorize the waterbody in the ACWA program and establish baseline data to better understand what factors influence water quality in the watershed.

Recommended Actions:

1. Identify the appropriate agency or organization to create a water quality monitoring strategy. (e.g. ADEC, JWP, UAS, or others)
2. Partner with the ADEC to align the water quality monitoring strategy with their "Tier 1 Water Quality Monitoring Quality Assurance Project Plan." (ADEC, 2009)
3. Identify sources of funding to support 3-5 years of water quality monitoring.
4. Compare baseline data to ACWA water quality standards.
5. If parameters exceed ACWA water quality standards, nominate Auke Lake for further consideration as an 'impaired' waterbody.

Potential Partners:

JWP, ADEC, UAS, National Oceanic and Atmospheric Association (NOAA), National Marine Fisheries Service (NMFS), Alaska Department of Fish and Game (ADF&G)

4.1.b Stormwater

Stormwater pollution is widely considered to be a major threat to water quality, yet little is known about stormwater origin and transport, input sites, and BMP efficacy in the Auke Lake watershed.

Recommended Actions:

1. Locate and map existing stormwater sources, drainage patterns, and drain outfalls within the watershed.

2. Develop a monitoring program for existing stormwater BMPs in the watershed, to include study objectives, sampling times (storm event criteria), and site locations (targeting both structural stormwater BMPs, and more general BMPs where applicable).

Potential Partners: JWP, CBJ, UAS, ADEC, Alaska Department of Transportation and Public Facilities (ADOTPF)

4.1.c Resource Inventory and Mapping

Continued inventory and mapping of the natural resources within the watershed will be a key piece of informing future planning efforts. Assuming that land development and use will increase in future years, informed land-use designation will be critical to ensuring sustainable development in the watershed.

Recommended Actions:

1. Locate wildlife corridors within and adjacent to the watershed.
2. Conduct full stream and habitat assessments on UAJ, Lake Two Creek and Lake Creeks.
3. Assess and map in-stream, riparian, and upland habitats.
4. Conduct wetland delineations and assessments for CBJ and UAS parcels in the watershed.
5. Compile data into GIS maps and demonstrate relationships between wildlife corridors, drainages, habitat values, wetlands, zoning, and proposed development in the watershed.
6. Distribute maps and files to local land managers and other appropriate partners.

Potential Partners: CBJ, UAS, ADF&G, U.S. Fish and Wildlife Service (USFWS), the Nature Conservancy Alaska (TNC), ADOTPF

4.2 Management Recommendations

This section offers five management actions that will directly address the threats to watershed resources. While varied in approach, these actions represent reasonable starting points leading to development of a full-scale watershed management plan.

4.2.a Stormwater Management

The CBJ manages stormwater permitting in new developments and maintains most of the drains and ditches used for disposal of stormwater runoff. However, currently no minimum on-site containment is required for new developments less than 1 acre in size.

Potential Actions:

1. Utilize methods and recommendations in the CBJ's Manual of Stormwater Best Management Practices for new development in the watershed.
2. Consider downstream impacts of stormwater from new site development during the design and permitting phase to address impacts to water quality and water quantity
3. Advocate and provide incentives for stormwater BMP's in existing developments.
4. Advocate for stormwater BMP's for snow plowing and snow storage in the watershed.

Potential Partners: CBJ, UAS, DEC, ADOTPF

4.2.b Advocacy for Low-Impact Development

Proposed development in the watershed poses the biggest threat to fish habitat and water quality in Auke Lake if not planned for appropriately. Low-Impact Development (LID) is a land-use planning and engineering approach that seeks to use innovation and place-based solutions to maintain the natural hydrology in watersheds.

Potential Actions:

1. Host LID design workshops for developers, engineers and city planners.
2. Host a residential LID workshop for Auke Lake residents.
3. Utilize LID demonstration sites and projects to build support for “smart development” in Juneau; include local landscapers, architects, developers and regulatory entities.

Potential Partners: JWP, CBJ, US Forest Service, Juneau Ranger District (USFS-JNU), local residents and developers

4.2.c Conservation and Protection Opportunities

A low ratio of development to open space is one of the key components of maintaining watershed quality. This plan recommends the protection or conservation of three major parcels of CBJ property within the watershed, shown on the map “Proposed Sites for Conservation in the Auke Lake Watershed”. (Figure 2)

Recommended Actions:

1. Expand Natural Park Area land use designation from the UAS Trail along eastern shore to the top of the hill and watershed boundary, as buffer to potential road and development at hilltop.
2. Establish Conservation Area or Natural Park Area land use designation, currently designated as Urban Low Density Residential, on a small parcel of CBJ property on Lake Two Creek.
3. Establish Conservation Area or Stream Corridor land use designation on the CBJ parcel just south of Auke Creek, currently designated Institutional & Public Use, as buffer to Auke Creek and the NOAA weir.

Potential Partners: JWP, CBJ, Southeast Alaska Land Trust, UAS

4.2.d Habitat Rehabilitation

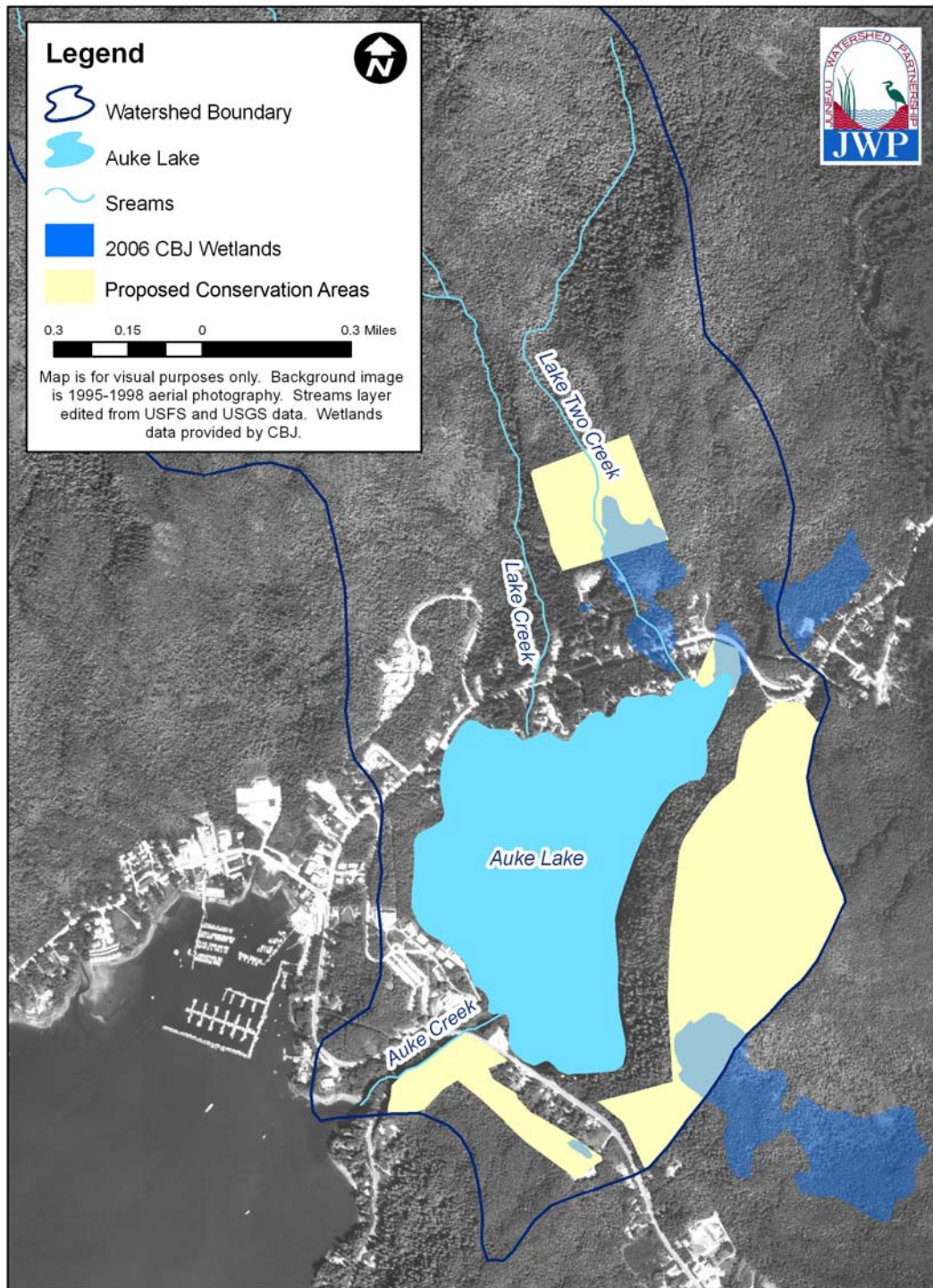
While much of the watershed remains in pristine condition, several sites have been impacted by disturbance and could potentially benefit from rehabilitation. Actions listed in section 4.1.c of this plan (“Resource Inventory and Mapping”) will result in a better understanding of rehabilitation opportunities. At this time, three sites in the watershed merit some rehabilitation activities: the lank bank directly adjacent to Glacier Highway the lower reaches of Lake Creek, and the mainstem UAJ Creek.

Potential Actions:

1. Work with agencies to determine enhancement potential at the three sites listed above.
2. If enhancement is deemed necessary and feasible, prepare work plan and permits, recruit contractors and volunteers for execution of tasks; establish relationship with adjacent homeowners.
3. Using results of resource inventory actions, determine enhancement needs at other sites throughout the watershed.

Potential Partners: JWP, UAS, USFWS, NOAA, ADF&G, Natural Resource Conservation Service (NRCS), Cooperative Extension Service, CBJ

Figure 2: Proposed Sites for Conservation in the Auke Lake Watershed



4.2.e Land Use Planning and Permitting

Because land use decisions in the watershed affect water and habitat quality, regulations and policy continue to play an important role in the ongoing management of the watershed. Inter-jurisdictional cooperation is necessary for the implementation and enforcement of current regulations with regard to recreation and land use. The added involvement of local neighbors and stakeholders in the positioning of any new regulation will help ensure that the best interests of both the resources and the community are protected.

Recommended Actions:

1. Continue to enforce CBJ 50' stream setback ordinance in the watershed.
2. Strongly discourage variances to this ordinance
3. Encourage land owners to maintain larger setbacks along streams and shoreline.
4. Regulate septic tank use and maintenance in homes not connected to sewer line.
5. Maintain current watercraft use regulations.
6. Use GIS mapping to depict conservation/restoration/development in the watershed.
7. If mitigation is required for new developments in the watershed, require mitigation *within* the watershed rather than outside.
8. In long term planning for development, contain impermeable surface area within the watershed to 10%.
9. Combine higher density development with significant open space preservation to minimize habitat impacts while providing for an increase in human use.
10. Require any new developments in the watershed to follow LID principles for stormwater and runoff design..
11. Designate critical habitat and wetland areas (outlined through actions in sections 4.1.c and 4.2.c) for conservation.

Potential Partners: JWP, CBJ, Alaska Department of Natural Resources (DNR), homeowners

4.3 Partnership Opportunities

This section identifies opportunities for partnership among governing agencies at the municipal, state, and federal level, and among community, private, and nonprofit stakeholders. These actions are to promote collaboration, education and stewardship which support the preservation of resources in the watershed.

4.3.a Collaborative Resource Management

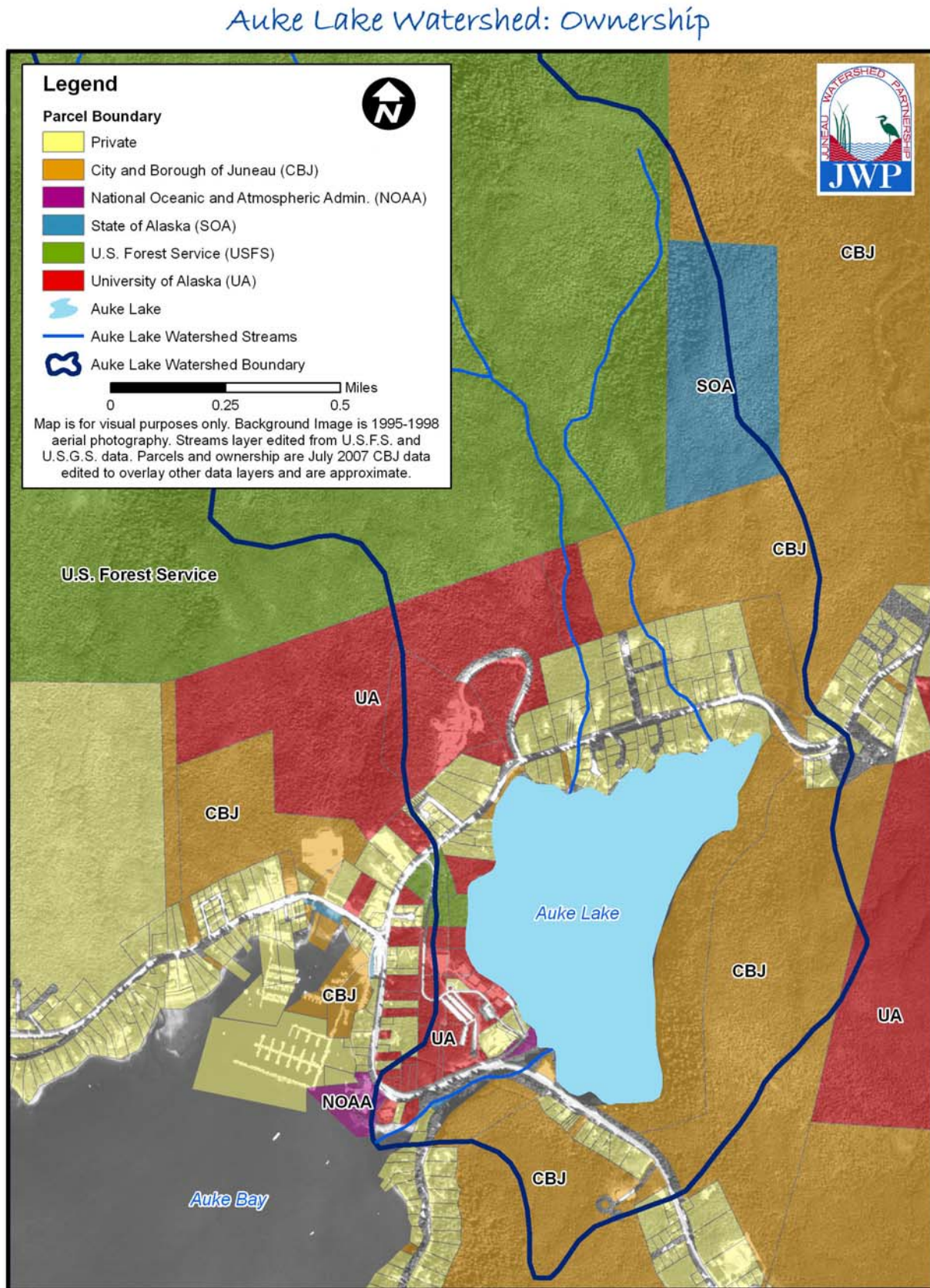
Because jurisdiction and land ownership within the watershed is divided among many entities (Figure 3), clear communication of the roles and responsibilities of local agencies, and agency collaboration, will be of primary importance in the successful management of this watershed.

Recommended Actions:

1. Encourage DNR, ADEC, ADFG, UAS, NOAA/NMFS and the CBJ to work collaboratively to create a multi-agency Memorandum of Understanding (MOU) for the shared oversight of Auke Lake.
2. MOU should outline the many aspects of water quality protection: point and non-point source pollution, land use, data gathering, and monitoring.
3. Encourage the CBJ Assembly to pass a resolution for the development and adoption of a long-term "Auke Lake Management Plan".
4. Support a long term Auke Lake Management Plan that is based on community and agency input.

Potential Partners: JWP, CBJ, DNR, ADEC, ADFG

Figure 3: Land Ownership in the Auke Lake Watershed



4.3.b Community Outreach & Stewardship

Lakeside neighbors and stakeholders play a key role in the management of the watershed. Engaging the community through outreach and education can help produce tangible, productive results for watershed stewardship.

Recommended Actions:

1. Determine the value of a small scale monitoring program such as citizen water quality monitoring, using UAS students, and/or volunteers; establish potential sampling sites, timeline, and plan of work.
2. Fund and plan a "Get to Know Your Watershed" day for local residents.
3. Create opportunities for lakeside residents to volunteer for watershed cleanups and restoration projects.
4. Create educational outreach materials for the community about the resources and threats in the watershed.
5. Provide and maintain pet waste bags and a dumpster in parking areas and near trailheads.

Potential Partners: JWP, CBJ, Discovery Southeast

5. CONCLUSION

Auke Lake supports a wide variety of fish and wildlife, and is highly valued by the Juneau community. Available information indicates that the watershed is in good condition, though increasing development and recreation pressures are beginning to impact water and habitat quality. The resources found in the watershed must be protected, and a first step is the implementation of this plan's recommendations. While there is no designated timeline or prioritization for these first steps, early action will benefit the watershed, and its users and inhabitants, both in the short and long term.

The most important action suggested here is that a comprehensive Land Management Plan for the Auke Lake watershed be developed and adopted by CBJ in order to provide for development while maintaining the existing quality of natural resources. First steps towards the implementation of a comprehensive management plan should include the adoption of an MOU between stakeholders, and designation of a committee to develop the plan. This document provides a substantial outline for the planning process, but collaboration between state and local authorities will be critical for implementation.

6. REFERENCES

Alaska Department of Environmental Conservation (2008) *Alaska's Final 2008 Integrated Water Quality Monitoring and Assessment Report*

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