CITY & BOROUGH OF SITKA

Brief History: Sitka has a rich and exciting history of human habitation that is still much in evidence in the community today. Tlingit Indians still live in the same area where their 18th century village stood, and St. Michael's Russian Orthodox cathedral, destroyed by fire in 1966, has been rebuilt exactly as it was in 1848. Archeological research has indicated that humans inhabited Baranof Island and southeast Alaska from approximately 10,000 years ago. The very coastal resources that attracted the Russians to establish their original trading post at Old Sitka have sustained the Sitka Kwaan of the Tlingits for centuries, and the bloody confrontations that followed the coming of the Russian traders continued until the superior Russian force was able to prevail. Alexander Baranov, manager of the powerful Russian-American Company, went on to make Sitka the headquarters of the vast Alaskan fur trading business.

Photo by: Sarai Timothy

Pronunciation:	(SIT-kuh)
Population (2007):	8,615
Shoreline:	1,627 miles
Coastal Area:	4,185 square miles
Annual Precipitation:	57"
Annual Snowfall:	39"
Hours of Daylight Summer:	18 hours, 5 min
Hours of Daylight Winter:	6 hours, 45 min
Regional Native Corporation:	Sealaska Corporation
Legislative District:	2 A

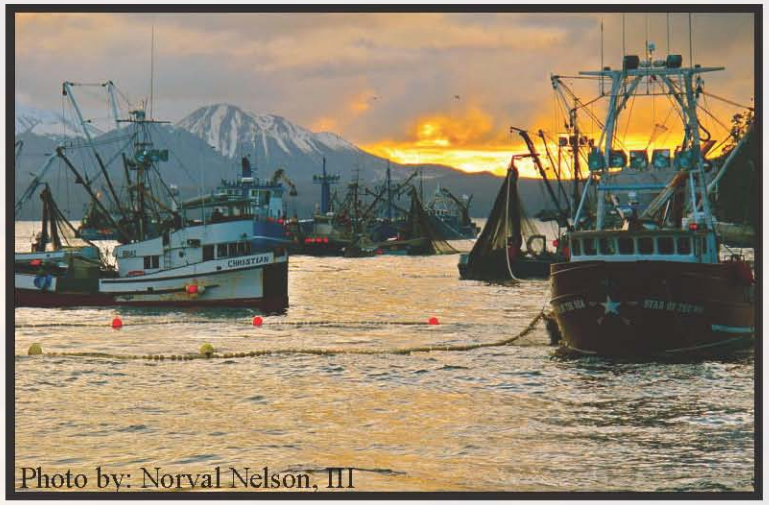


Photo by: Norval Nelson, III


Photo by: Norval Nelson, III

STATE OF ALASKA
COASTAL IMPACT ASSISTANCE PROGRAM
City and Borough of Sitka, Alaska

PROJECT TITLE: **Sitka Swan Lake Restoration Project – Tier I**

PROJECT CONTACT

Application/Oversight Contact Name: Marlene Campbell, Coastal Management Coordinator
City and Borough of Sitka
Address: 100 Lincoln Street, Sitka, AK 99835
Telephone Number: (907) 747-1855
Fax Number: (907) 747-7403
Email Address: campbell@cityofsitka.com

Capital Project Manager Name: Mark Buggins, Environmental Superintendent
City and Borough of Sitka
Telephone Number: (907) 966-2256
Email Address: markb@cityofsitka.com

PROJECT LOCATION

Swan Lake is located in downtown Sitka and drains into Crescent Bay in Sitka Sound at approximately 57° 3'22.47"N Latitude/135°20'12.71"W Longitude. A map showing Swan Lake and its location in relation to the coastal zone is attached to this project description.

PROJECT DURATION

The City and Borough expects this project to take two and one-half years to complete

ESTIMATED COST:

Spending Estimate ($)				
TOTAL	**Year 1**	**Year 2**	**Year 3**	**Year 4**
$771,236	$450,000	$321,236	0	0

Funding per Allocation Year of CIAP ($)				
TOTAL	**FY 07**	**FY 08**	**FY 09**	**FY 10**
$771,236				$771,236

PROJECT DESCRIPTION

Summary: The Sitka Swan Lake Restoration Project will directly and permanently conserve, protect, and restore the highest priority coastal area located in the Swan Lake Area Meriting Special Attention (AMSA) which discharges directly to salt water in Crescent Bay of Sitka Sound. It will virtually stop the eutrophication of the critical water channel and circulation areas. Dredging of these expanded areas will enable water entering the Lake to circulate and exit the

Lake without dropping its sediment load and re-creating sediment "islands" which virtually blocked water flows until dredged several years ago.

Background: Sitka, Alaska's Swan Lake, also known as "Sitka's Central Park", is a eutrophic, dying lake. It has a unique place in Alaskan history. It was created in 1851 when the Russian occupants of New Archangel (now Sitka) connected and deepened a series of ponds by dredging, rerouting a creek, and building a log dam at the outlet to permit harvest of ice for shipment to California. Swan Lake is a 23 acre shallow lake located centrally in Sitka which empties into salt water in Sitka Sound. It is a sunken bog with bottom peat deposits ranging from 5 to 17 feet thick. It suffers from overabundant aquatic plants, rich organic deposits, and periodic depression in dissolved oxygen levels. The natural succession of the Swan Lake plant community toward a higher density is enhanced by eutrophication – an increase in nutrient content of the water and sediments from both human and natural activities. Left unchecked, the lake will eventually fill in with organic matter, turning the lake into a swamp and, ultimately, into terrestrial habitat.

In 1981, the Swan Lake Area Meriting Special Attention (AMSA) was created as part of the Sitka Coastal Management Program in recognition of its special values to the community and concerns about its deterioration. In June, 2000, City and Borough of Sitka completed the Swan Lake Watershed Recovery Strategy: Eutrophication Report and Action Plan to guide long-term restoration tasks. Dredging shallow areas that restrict water flow and selectively removing lily pads and other aquatic plants in inlet and outlet streams are priority tasks in the Strategy.

Of long-standing concern to Sitka is the progressive growth and encroachment of aquatic plants on the Swan Lake environment. Actively managing the distribution and density of aquatic vegetation around Swan Lake has been the subject of much lake restoration attention since 2000. Fish and wildlife habitats are constrained due to a dense assemblage of yellow lilies, pondweed and emergent vegetation. Prior to dredging the Lake's outlet in 2001, the shallow outlet channel did not allow the Lake to be self-flushing during periods of high water input. The Lake is filling up with organic materials, much of which are not being oxidized or broken down in deeper bottom sediments. Sediments are introduced from storm drains and road erosion. Concerns are increasing about water quality, including depressed levels of dissolved oxygen under winter ice, particularly at the bottom, and effects on the resident fish population. The few access points to the Lake for shorebirds and other wildlife are overgrown.

Methodology: The Sitka Swan Lake Restoration Project continues restoration efforts started in July 2000 as prescribed in the Swan Lake Watershed Recovery Strategy. Since 2005, lily pad growth in Swan Lake has continued unabated. Shoreline areas around the lake are progressively filling in. Culverts discharging to the Lake are choked with vegetation at their outlets. A priority is to initiate further dredging by barge in areas of the Lake not accessible by shore-based equipment. A large-scale dredging project is needed to reduce the eutrophication of the Lake. Swan Lake is now deteriorating so rapidly that it will become a marsh in the foreseeable future if the two entrance channels to the Lake, Wrinkleneck Creek, Priority 1 and Arrowhead Creek, Priority 2 (see attached drawing), are not opened up to permit water to enter and flow through the Lake unimpeded.

This Community Coastal Impact Assistance Program Named Recipients Grant for $771,236 is the only source of funding for Swan Lake Restoration at this time.

This Swan Lake Restoration project has the following components:

- Hire consultant to complete permitting, environmental, design, and request for proposals,
- Select contractor,
- Develop access ramp, pad, barge for water-based excavation and a dewatering, transport and disposal strategy,
- Construct de-watering and disposal sites,
- Stake and excavate two thirds of Priority 1 area, 31,000 square feet,
- Remove and dispose of excavated material,
- Restore bank area and demobilize,
- Continue to monitor and provide public education and annual maintenance.

Finished water depth is 7-15 feet below ordinary high water (OHW) level. Silt fences will be installed and truck count will be basis of determining all dredge spoils transported and disposed of at the disposal site. It is estimated that 8,600 cubic yards of vegetation, sediment and debris will be removed through this $771,236 portion of the project. Bank damage will be repaired and re-vegetated. The project will be completed during either one or if necessary two summer in-water work seasons depending on scope (in year one or year two).

Mobilization and demobilization costs of dredging are very high, consuming up to 35 percent of previous small-scale project budgets. Larger projects are much more cost effective because the mobilization costs are nearly fixed and not proportional to the volume of material dredged. By combining resources, the highest priority dredging should stabilize Swan Lake for the long term. To complete all five priorities for dredging and completely restore the Lake would cost more than $8 million, which is cost prohibitive. The Swan Lake Recovery Strategy will continue to use aquatic plant removal and other methods in the lower priority areas.

Twofold Project Environmental Benefits: The purpose of the Swan Lake AMSA, restoring the Lake's hydrology and circulation, water quality, and fish and wildlife habitats to a healthy condition that fully supports resident fish and wildlife and migratory birds will be achieved and water quality of the outflow into salt water will be improved. The Swan Lake Restoration Project will reduce nutrient and sediment loading, improve stormwater collection and treatment, open up and improve habitat currently restricted due to plant growth for resident trout and wildlife (including overwintering habitat at the mouth of Wrinkleneck Creek which remains ice free and is heavily used by resident fish), thin aquatic plant biomass, and lessen nutrient loads which increases dissolved oxygen through reduced demand from lily pads and marestail, reduce restrictions on water flow into and out of the Lake, and improve circulation and hydrology.

Reduced (anoxic) sediments create a source of phosphorus in solution, effectively injecting it back into the water column leading to increased algal growth and increased eutrophication. Removing a portion of these sediments, plants, and areas for plants to grow, will reduce the recycling of nutrients within the water body and ultimately reduce nutrient levels in the water column which reduces the nutrients discharged to salt water.

Institutionalized pollution control BMPs and annual solid waste cleanups in the watershed will educate the Municipality and public on the problems and their hands-on role in helping to solve them. Documenting water quality improvements (dissolved oxygen, sediments, nutrients) over time will provide a running report card on successes and adjustments.

The second primary benefit of this project will be to improve the water quality of the tidewater, since Swan Lake empties directly into Sitka Sound in a high-value habitat area regularly used by herring for spawning. Reducing nutrient and sediment loading and deepening the Lake and flow channels will increase water flow and reduce sediment concentrations exiting the Lake and entering the intertidal area. This will reduce Total Suspended Solids and turbidity in the stream entering salt water, improve dissolved oxygen, and decrease deposition of decaying plant matter in unproductive shallow areas in the intertidal zone.

MEASUREABLE GOALS AND OBJECTIVES

This project is expected to result in the removal of vegetation, sediment and debris over a 31,000 square foot area of Swan Lake, an estimated 8,600 cubic yards of material. This will remove nuisance plant growth and sediment causing eutrophication and deepen to sustainable level of at least 7 feet, increase water flows into and out of Lake, increase lake circulation, reduce flooding events, and improve water quality and fish and wildlife habitats of Swan Lake and its coastal outflow environments.

PROJECT CONSISTENCY WITH CIAP AUTHORIZED USE:

The Sitka Swan Lake Restoration Project is consistent with several CIAP Authorized Uses, with the strongest connection to Authorized Use Number 4. "*Implementation of a federally approved marine, coastal, or comprehensive conservation management plan*".

Chapter IV of the Sitka Coastal Management Plan, Final Plan Amendment December 2006, Effective: April 8, 2007, is entitled "Area Meriting Special Attention". Within Chapter IV, Swan Lake is designated as an AMSA and Recreational Use Area under the Coastal Management Plan. The objectives of the AMSA (Chapter IV, Section D, page 98) are:

- Ensure a clean, aesthetically pleasing fresh water body within the roaded area of Sitka to b enjoyed and used by the public;
- Maintain and enhance the resident fish populations and habitats within the Swan lake watershed for the recreational enjoyment and use of the public;
- Protect and preserve habitat attractive to swans and associated waterfowl utilizing Swan Lake; and,
- Provide for recreational activities and development practices consistent with the protection, restoration, and sound management of the lakes' resources and habitats as outlined in this management proposal and its companion Swan Lake Watershed Recovery Strategy.

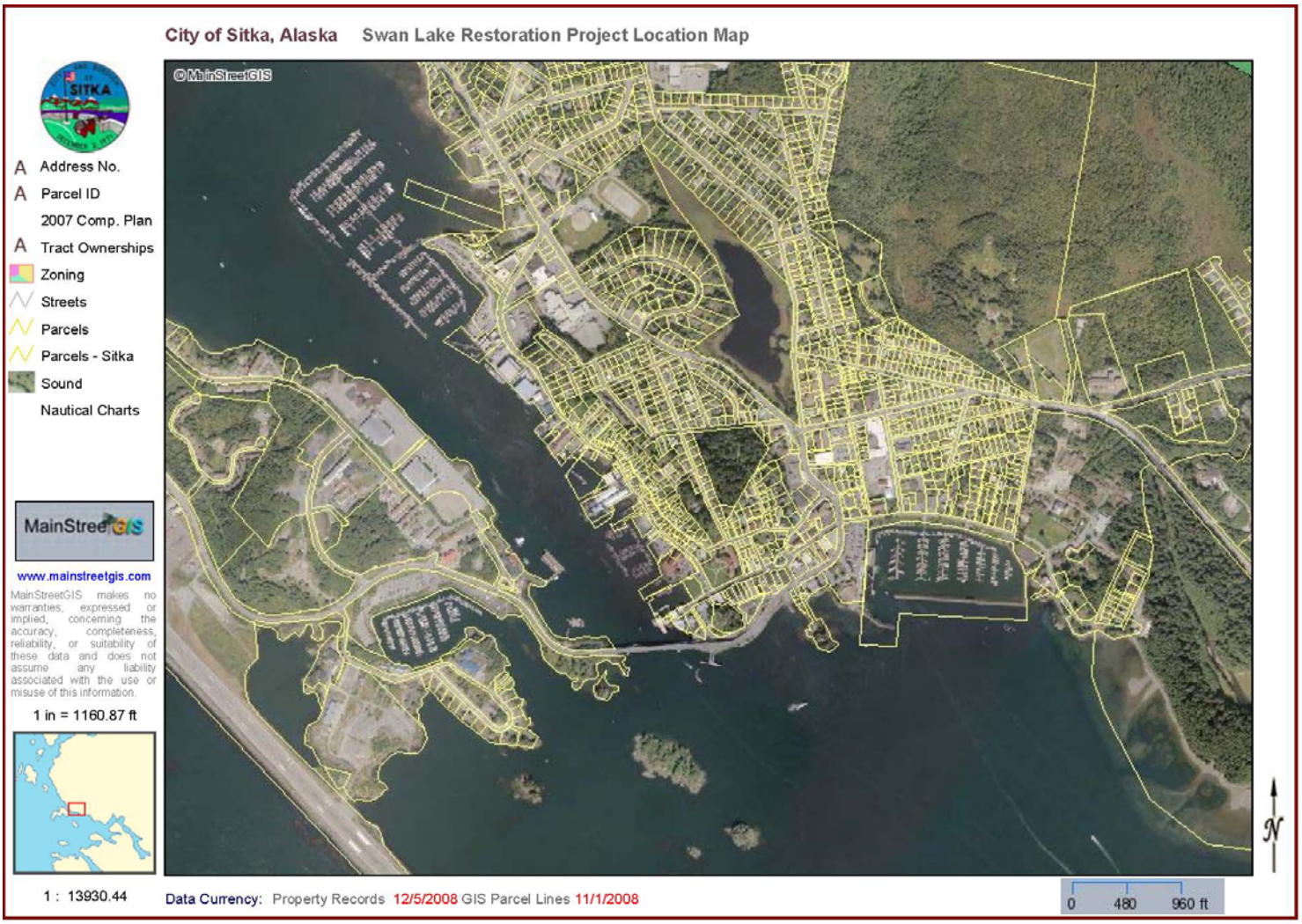
This project will directly and permanently conserve, protect, and restore the highest priority coastal area located in the Swan Lake Area Meriting Special Attention (AMSA) which discharges to salt water in Crescent Bay of Sitka Sound. It will greatly reduce the eutrophication of the critical water channel and circulation areas. Dredging of these expanded areas will enable

water entering the Lake to circulate and exit the Lake without dropping its sediment load and re-creating sediment "islands" which virtually blocked water flows until dredged several years ago. Formerly dredged areas have all remained open and were not re-colonized by vegetation, but a greatly expanded footprint is still needed.

This project has widespread community support. It will restore more of Swan Lake to its former depth to function more effectively as a lake, increase the area of water unobstructed by aquatic vegetation which will enable wildlife to have easier access to the Lake, and create better habitat for the resident fish population. These improvements will be very visible and energize the community to put more effort into protecting Swan Lake and its resources. Last, the quality of the fresh water flowing through the Lake and outflow culvert of Swan Lake to salt water will have improved water quality and be more compatible with the ocean environment.

COORDINATION WITH FEDERAL RESOURCES OR PROGRAMS:
No direct coordination is required except for Corps of Engineers Permit process. Previous coordination has included EPA funded DEC 319 grants and a prior CIAP project on Swan Lake. Please see EPA "Swan Lake Success Story" attached.

COST SHARING OR MATCHING OF FUNDS: No CIAP funds will be used for cost sharing or matching purposes.



http://www.mainstreetmaps.com/cgi-bin/gis.exe 4/23/2010

City of Sitka, Alaska Swan Lake Restoration Project Location Map

City and Borough of Sitka
DEPARTMENT OF PUBLIC WORKS
100 LINCOLN STREET • SITKA, ALASKA 99835
TEL (907) 747-1804 FAX (907) 747-3158

Swan Lake Dredging Area Map

DRAWN: TAD	SCALE: 1"=200'
CHECKED: MBuggins	DATE: June 2009
DRAWING NAME: SwanDredge04-09	
SHEET NO.	1 / 1

KOMATSU
PC200LC


DUMP NO WASTE
DRAINS TO LAKE
CURB SIDE

SITKA SENTINEL

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Sitka, Alaska | Monday, April 19, 2010 | 8 Pages

Spring Cleaning

Volunteers Marcel and Connie LaPerriere pick up trash along Swan Lake Saturday during the annual Swan Lake clean-up. Sitkans were busy picking up litter around town and around their properties during the first weekend of the city's Spring Clean-Up 2010. All residential property owners may dispose of refuse at the Jarvis Street Transfer Station free of charge through Sunday, April 25. (Sentinel Photo)

Mark Buggins, Environmental Superintendent
City and Borough of Sitka
100 Lincoln Street
Sitka, AK 99835

Regarding: CIAP Application

Dear Mr. Buggins,

This letter is in support of the Cities request for funds to dredge Sitka's Swan Lake. As you know we live near the inlet of Arrowhead Creek into Swan Lake. In the 4 years that we have owned the property we have been watching the lake continue to shrink. It has amazed us how quickly the lake has been filling in, and it seems to us that as the lake gets shallower the rate the lake is filling has increased. In four short years we have watched the lake grass in front of our home double in size and our neighbors on both sides of use report the same the thing.

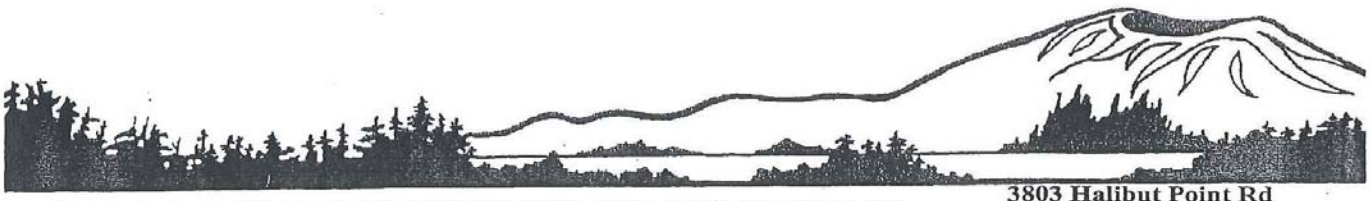
As an advocate for dredging of Swan Lake I am often asked why it should be dredged when it is a normal process for all lakes to slowly fill in. I think it could be safely argued that Sitka's Swan Lake is possibly the most historic lake within Alaska, and for that reason alone it should be preserved. But, more important to me is the fact that Swan Lake in many ways defines Sitka. When the lake is frozen in the winter nothing brings all generations of Sitkan's together more than the lake. We have watched young children learn to skate on the lake and have watched the joy the lake brings to all ages of people. Of course the yearly children's fishing derby is also a big community event. And, what a great place for kids to safely row a boat. In fact in the summer there is never a day go by that we do not see kids out having fun on the lake.

As a grandparent of 3 young children I'd like to think that Swan Lake will be here for many more generations to enjoy. As you more than likely know last year we built the first Army Corp permitted dock on the lake in front of our home. Frankly, I seldom use the dock, but many of the youth of Sitka do, and that is why we built it. The neighbor's boys keep a row boat on the dock, and my grandkids keep a canoe on the dock during the summer. When the lake is frozen we have noted how the dock has become a magnet as a gathering spot for all ages of kids to socialize while resting. The lake has been filling in so quickly that without dredging soon I will have to add to the 45 foot long dock or the dock will not reach the waters edge in the next year or two.

Thank you and others in the city for your continued efforts to protect one of Sitka's community treasures.

Sincerely,

Marcel LaPerriere
705 Lake Street,
Sitka, AK 99835



SITKA STATE PARKS CITIZEN'S ADVISORY BOARD
3803 Halibut Point Rd
Sitka, AK 99835 907.747.6249

March 9, 2010

Sally Cox
Department of Commerce, Community, and Economic Development
Division of Community and Regional Affairs
Community Coastal Impact Assistance Program
550 West 7th Avenue, Suite 1770
Anchorage, AK 99501-3510

Dear Ms. Cox:

The Sitka State Parks Citizens Advisory Board is pleased to provide this letter of support for the City and Borough of Sitka's Swan Lake Recovery Project. While Swan Lake is not a Sitka State Park facility, it is widely believed that Swan Lake is in fact Sitka's "Central Park". It has great historical, recreational, environmental, and aesthetic importance to both the citizens of Sitka and Sitka's substantial visitor population and has been an Area Meriting Special Attention in the Sitka Coastal Program since 1981.

The City and Borough of Sitka, owner of Swan Lake, has worked very hard for decades to improve Swan Lake. Swan Lake is small and is becoming even more shallow due to eutrophication. The Sitka community has supported both small dredging and clean-up efforts on Swan Lake for many years, and the Lake has now been removed from the Impaired Waterbody DEC list. However, it continues to eutrophy, and water plants continue to spread, causing further eutrophication and difficulty for fish and other resources to survive. There has been widespread agreement based on studies and demonstration projects that a major (and costly) strategic dredging project is needed to rehabilitate Swan Lake. The more funding that can be utilized to expand the Swan Lake dredging project the Municipality is planning, the more cost effective and permanent the solution to the deterioration of Swan Lake will be.

The members of Sitka State Parks Citizens Advisory Board support the recovery of Swan Lake to continue to serve as Sitka's downtown "Central Park" and directly improve the Sitka coastal area. Any funding which can be committed to this important upgrade will be well spent.

Sincerely,

Marlys E. Tedin

Marlys Tedin, Chair

Mark Buggins, Environmental Superintendent
City and Borough of Sitka
100 Lake Street
Sitka, Alaska 99835

March 9, 2010

Dear Mr. Buggins,

As a homeowner on Swan Lake for the past 19 years, I would like to add my voice to those in support of dredging the lake. The change that we have seen since we moved here is radical. When our children were young we kept a boat on the shore which we all enjoyed a great deal. Now, in the summer, there is an impenetrable border of lily pads some 60 to 80 feet from the shore outward. The entire western tip of the lake is covered. This lovely lake at the center of our town will be, in a fairly short time, be the Swan Muskeg unless the lake is dredged.

I understand that lakes turning to muskegs turning to meadows can be a natural process but I suspect that Swan Lake's infilling is due substantially to the human-altered water flows in and out of the lake and the 'enrichment' of the water by human pollution. It seems to me that we would be responsible citizens in helping to maintain the lake in its original and natural state.

A lake at the center of a town is a lovely thing. Swan Lake adds beauty and year-round recreational opportunities for everyone. I would love to see Coastal Assistance Impact Program funding be used to maintain the natural state of Swan Lake.

Sincerely,

Randy Hughey
220 Lakeview Drive
Sitka, AK 99835
747-5923

CITY AND BOROUGH OF SITKA

RESOLUTION NO. 2010-09

A RESOLUTION OF THE ASSEMBLY OF THE CITY AND BOROUGH OF SITKA SUPPORTING A GRANT APPLICATION TO THE COASTAL IMPACT ASSISTANCE GRANTS PROGRAM FOR REHABILITATION OF SWAN LAKE

WHEREAS, the Alaska Department of Commerce, Community, and Economic Development, Division of Community and Regional Affairs is soliciting proposals for competitive Community Coastal Impact Assistance Program (CIAP) grants; and

WHEREAS, projects proposed under this solicitation must benefit the natural coastal environment of Alaska's coastal area and meet at least one of the following uses authorized by the Coastal Impact Assistance Program (CIAP), and the Swan Lake Rehabilitation Project meets #1--"Projects and activities for the conservation, protection, or restoration of coastal areas, including wetland" and #2—"Mitigation of damage to fish, wildlife, or natural resources" and received a prior CIAP grant in 2002; and

WHEREAS, the City and Borough of Sitka and Sitka community have partnered for more than two decades to restore and rehabilitate Swan Lake, known as Sitka's "Central Park", a formerly State-designated Impaired Waterbody which is a severely eutrophic "dying" lake, including completing major Swan Lake assessments and implementation plans for the long-term rehabilitation of the lake; and

WHEREAS, the separate State-designated Coastal Impact Assistance Program for named recipients including City and Borough of Sitka will help fund the strategic dredging and rehabilitation project to restore Swan Lake, but mobilization costs are very high, and larger projects are much more cost effective, so CBS is seeking funding for a larger project of up to $4 million to complete the maximum long-term restoration of Swan Lake that can be accomplished; and

WHEREAS, once this upgrade is completed, Swan Lake will be restored to provide its historical, environmental, and recreational richness for the future;

NOW, THEREFORE, BE IT RESOLVED, that the Assembly of the City and Borough of Sitka, Alaska, supports the City and Borough of Sitka's applying for $1,575,100 to complete the Swan Lake Rehabilitation Implementation Plan; and further authorizes the Municipal Administrator to negotiate, execute, and administer any and all documents and contracts required for the application, acceptance, and management of these CIAP funds on behalf of City and Borough of Sitka.

PASSED, APPROVED, AND ADOPTED by the Assembly of the City and Borough of Sitka, Alaska, this 9th day of March, 2010.

Scott McAdams, Mayor

ATTEST:

Colleen Ingman, MMC, Municipal Clerk

Section 319 Nonpoint Source Success Stories

Alaska: Swan Lake & Wrinkleneck Creek

ction 319 Success

Community Watershed Cleanups, Stormwater Controls, and Lake Dredging Improve Water Quality and Recreation Uses

Waterbody | Problem | Project Highlights | Results | Partners & Funding

ıg,
ıproved water
olid waste in

Waterbody Improved

Swan Lake is Sitka, Alaska's "Central Park," widely used for recreational uses, providing habitat for waterfowl, ice skating in winter and historical uses going back to its Russian ownership. Years of residential growth and activity along Swan Lake and its main tributary, Wrinkleneck Creek, have resulted in the accumulation of debris, solid waste, metals and plastics. Wrinkleneck Creek and the north end of Swan Lake were impaired from those pollutants and listed together on Alaska's 1994, 1996 and 1998 impaired waterbody lists. Alaska's Department of Environmental Conservation (ADEC) used Clean Water Act section 319 grants over five years to fund community trash cleanups, manual harvest of noxious aquatic plants, lake dredging, water quality monitoring, educational efforts, stormwater mapping, and operations and maintenance schedules. These collaborative efforts improved water quality and resulted in Alaska removing from its 303(d) list both Wrinkleneck Creek and Swan Lake for debris and solid waste in 2004.

Contact:

Mark Buggins
(markb@cityofsitka.com)
Environmental Superintendent City & Borough of Sitka 907-966-2256

Laura Eldred
(laura.eldred@alaska.gov)

http://www.epa.gov/owowwtr1/NPS/Success319/state/ak_swan.htm

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You are here: EPA Home Water Wetlands, Oceans & Watersheds Polluted Runoff (Nonpoint Source Pollution) Section 319 Success Stories Alaska: Swan Lake & Wrinkleneck Creek

Environmental Program
Specialist Alaska DEC Division of Water 907-376-1855

Figure 1. Ducks enjoy the cleaner water as a result of removal of trash and debris.

Figure 2. The CBS team shows off a load of trash collected during a Swan Lake cleanup.

Problem

The Swan Lake watershed is near the downtown area of Sitka, which is on the west coast of Baranof Island fronting Sitka Sound. Baranof Island is an outer-coast island in the northwest area of southeast Alaska's Alexander Archipelago bordering the Gulf of Alaska and Pacific Ocean. The watershed is relatively small, encompassing less than five square miles. The watershed drains to the shallow, 23-acre Swan Lake through two small streams, Wrinkleneck Creek and Arrowhead Creek.

ADEC and the City and Borough of Sitka (CBS) conducted three assessments in order to eliminate other anecdotal water quality concerns and confirm that solid waste/debris was a major source of impairment. ADEC first placed these waterbodies on the 1994 section 303(d) list for solid waste. The pollutants were more fully described in the 1996 list as "wood, oil tanks, waste metals and plastics." The state standard for residue and debris prohibits any deposits on streambeds, shorelines or lakes that negatively impact designated uses. Water quality field investigations pointed to the need for a thorough cleanup of debris accumulations and future actions to keep the watershed clean. The effects of debris/solid waste residues on uses of Wrinkleneck Creek and Swan Lake are the following:

1. Negative impacts on recreational uses within the watershed
2. Creating nuisance conditions that could attract undesirable wildlife
3. Potential adverse effects on resident fish habitat and their populations

Project Highlights

CBS, its contractor, and ADEC developed an EPA-approved Swan Lake Watershed Recovery Strategy and Total Maximum Daily Load (TMDL) during 2000.

Restoration activities in the watershed include annual community trash cleanups (Figure 2), manual harvesting of lily pads in high-use recreational areas, dredging the lake outlet channel and the Wrinkleneck Creek delta, monitoring by citizens and professionals, improving hydraulic efficiency of culverts in the Arrowhead Creek/Monastery Street intersection, and completing a stormwater control strategy and a "state of the lake report" for public education. Some activities were one-time tasks; other tasks are continuing.

The Swan Lake watershed restoration project continues to apply a broad number of best management practices for water quality protection. Particular emphasis is placed on stormwater collection and treatment, ranging from storm drain stenciling to greater use of vegetative swales to treat road runoff. Several tons of trash and debris have been removed from the creek and lake over the years. During the first cleanup in 2000, volunteers collected more than 6,600 pounds of trash and debris. In 2001 volunteers collected another 1,000 pounds, including 12 metal gas cans and two large storage tanks. Each year the amount collected has decreased from the previous year.

Results

Citizen involvement continues for the ninth consecutive Swan Lake Trash Cleanup scheduled for April 2008. This cleanup will continue to be an annual event in coordination with a citywide spring cleanup.

CBS believes the actions to date support moving the Swan Lake watershed to Category 2 in the 303(d) assessment report, which represents a waterbody that meets some designated uses but for which data is still needed to determine whether it meets all designated uses. The Swan Lake watershed team has an implemented waterbody recovery plan and an approved TMDL, which includes the annual cleanups and monitoring.

CBS has provided the documentation confirming that the TMDL continues to be implemented and that water quality standards are being met. As a result, Alaska removed Wrinkleneck Creek and Swan Lake from its 2004 303(d) list of impaired waters. The success of these efforts reflects the community’s commitment and the implementation of the Swan Lake Watershed Recovery Strategy.

Partners and Funding

CBS has received a total of $181,830 in section 319 funds from ADEC for Swan Lake and Wrinkleneck Creek recovery actions. CBS has provided approximately $121,220 in matching funds for these projects.

milfoil has not been effective at controlling it, therefore, the City and Borough of Juneau would not likely be inclined to share in the "regional" costs of purchasing or renting a harvester.

4. Lake Dredging

Dredging to remove aquatic plants is usually considered practical only when used in conjunction with other channel deepening projects. Backhoes or floating dredges are typically employed. Hydraulic, backhoe or clam shell dredges remove a large amount of sediment along with the vegetation and therefore a suitable disposal site must be identified. Hydraulic dredging is probably not suitable for Swan Lake because the dredged organic material will be over 80% water, creating a disposal/dewatering challenge. Backhoes mounted on shallow-draft barges, "marsh buggies", or a crane-drag line setup, would likely be most feasible for dredging shallow channels. Drag-line equipment is available locally in Sitka, but floating marsh excavators would have to be rented or purchased by CBS (Brian Bergman, personal communication). CBS backhoes operating from the shore would not have sufficient reach to dredge anything other than very shallow areas.

Disturbance of the bottom by dredging will create suspended sediments, reduced viability and habitat impacts on the lake. The organic sediments of Swan Lake would also have to be dewatered on site in a settling pond. Retention of sedge grasses (*Carex* sp) along the perimeter of the lake is recommended; some grasses would need to be removed if dredging at the lake outlet channel is implemented. These native grasses provide a beneficial function to the lake by filtering out sediments introduced to the lake from the storm drains and providing food and habitat for fish and wildlife.

Swan Lake is a naturally shallow lake and development has not appreciably decreased lake depth from sediment, with the exception of filling in the shoreline fringe. Indeed, lake levels have risen over the last 30 years based on evidence from historical aerial photographs, stormwater culvert submergence and measurements against surveys of Lake Street. Deeper water deposits are principally organic, ranging from five to seventeen feet thick (Construction Engineering Services and Stragier Engineering Services, 1985).

Small-scale dredging of organic bottom sediments and lilies (approx. 300 square foot area) was done on the north side of the Swan Lake spit in the late 1960's (Schmidt, 1980). Back-hoed material was used as compost. The area is adjacent to the waterfowl staging area. Open water is maintained at this site. Finding an economic use for dredged material on a larger scale could help defray the high costs of dredging.

Several Mud Cat [1] dredges are available as rentals for different applications. For Swan Lake, a floating excavator that can work in shallow waters and dredge to depths of 10 feet (the maximum depth of the lake) is preferred. Cedar Island Lake in Michigan is a case study that employed a

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[1] Mud Cat is the protected trademark name for the Ellicott International dredges

Mud Cat dredge to restore one embayment of the lake. A 16,000 lb. Mud Cat machine was selected to remove accumulated sedimentation, weeds, and hydro-soil to a depth of 10-12 feet below the water surface. The dredge is a flotation barge 30 feet long and 8 feet wide and can operate in waters as shallow as 27 inches (Ellicott International, 2000). The machine is operated by two persons, one on the craft and another on shore. Up to 18 inches of material can be removed on a single pass. Waste material is conveyed through a discharge pipe (up to 2500 feet long) into trucks or other receptacles for disposal.

Marsh excavators (Marsh Buggies Inc.) are used extensively in Florida wetlands ***(Figure).*** Backhoes can be mounted on them and they are portable, breaking down into three components for transport.

The *Appendices* contain an application form that many companies use to request information and provide cost estimates for clients. The application requests information on size or lake, type of soils and plant, depth of the lake, and physical constraints that may affect dredging. Telephone contacts and literature on available dredge machines are also provided as a resource to the CBS. Marsh Excavators and Mud Cats are trade names for the equipment of major companies specializing in dredging. .

Dredging as a technique for aquatic plant control is more palatable when it supports the objectives of several different, and often disparate, organizations and addresses several problems at the same time. Such a linkage appears to exist in examining historical ADF&G proposals for improvements in overwintering fisheries habitat in Swan Lake and CBS efforts to make hydrologic improvements at the lake outlet. In 1981, the Department of Fish and Game proposed a Swan Lake Enhancement Alternative as part of the AMSA proposal that included dredging and deepening a two acre area at the south end of Swan Lake (***Figure***). This project was recommended to provide for increased public recreational use and reduce the potential for winter fish kills (ADF&G, 1981). Dredging under this proposal would remove 21,200 cubic yards of dredge spoil to a maximum depth of 16 feet below the water surface. The study proposed that the material be dried and sold as topsoil or composting material. In 1977, the CBS and local Parks and Recreation Committee had also envisioned dredging portions of the lake (Schmidt, CBS, 1986).

Following the adoption of the Swan Lake AMSA and the ADF&G enhancement study, a geotechnical assessment of the feasibility of recreational improvements to Swan Lake was completed in 1985 (Construction Engineering Services and Stragier Engineering Services, 1985). The analysis included lake dredging costs, technical feasibility and impacts at the written request of the CBS Engineering Department to address ADF&G concerns about eutrophication and dissolved oxygen levels in the lake (Harmon, 1985). A haul route section was also added to address traffic and road integrity impacts, since disposal of dredged material on-site was not acceptable. The dredge location area was the same 2 acre area identified in the 1981 ADF&G fisheries enhancement alternative ***(see Figure).***

Portable backhoe (BB) dredge.

Portable dredge with grab attachment.

The study proposed using a Mud Cat dredge that could be moved with a truck and lowboy without special permits. It can excavate to water depths up to 25 feet. Dewatering the dredged material was an issue addressed, with the proposal to dewater on-site (Stragier, 1985). Presumably, silt screens would be utilized to contain the spread of suspended sediments during dredging. Dewatering dredge spoil would require a large area, ideally taking place on fill material, if available. Hauling to the dumpsite using waterproof truck bed liners was proposed to avoid splattering over the haul route. The impacts of increased load on Lake Street and traffic congestion were also addressed. The haul route from the south portion of Lake Street to Halibut Pt. Road was recommended because it is the shortest route, does not cross a residential area, allows full capacity truck loads, and would require the repair of 800 feet of Lake Street that was expected to need repair anyway (Stragier Engineering Services, 1985). Replacement of sewer lines and repaving were envisioned. There is currently a 10 ton load limit for trucks using Lake Street. The Granite Creek waste disposal area is likely the only site that would accept dredged material.

The analysis concluded that costs would run a minimum of $10 per cubic yard of material, with an upper end of $12.50/cyd of removed material. Dewatering and hauling costs were estimated at an additional $7.50/cyd. The costs of removal and treatment of 20,000 cyds of lake sediments was estimated at $400,000. Inflation-adjusted costs of $15.00/cyd in today's dollars seem warranted. To bracket costs, dredging of 1,000 cyds would cost an estimated $15,000; 5,000 cyds an estimated $75,000. Using an example of possible smaller scale dredging at the Swan Lake outlet, dredging an area 10 feet by 100 feet to depths of 2 feet would represent 2000 cubic feet or 74 cyds of material. Rental and transport fees to bring equipment to the site would be additional costs.

Dredging of smaller areas (e.g. around the spit area or mouth of Wrinkleneck Creek) would be proportionally smaller. Mobilization costs are high up front, suggesting that (economically) several small projects at different locations are best completed at the same time.

The advantages of using a dredge to remove vegetation are:

- immediate results in providing open water
- increased flushing of nutrients out of the lake
- the roots are removed, along with nutrient sources in the sediments that promote macrophyte growth
- the treatment is effective for longer periods of time than surface harvesting
- deepening outlet channels or other parts of the lake can be accomplished in conjunction with aquatic plant removal
- increased overwintering habitat for resident fish is provided
- dredging can target selective areas, while leaving critical habitats protected

The disadvantages of using dredges are:

- increase in suspended sediments, temporary reduction in water clarity
- destruction of bottom dwelling invertebrates along with the plants.
- costs are higher per unit area compared with manual removal or other methods
- dewatering of sediments (80% water content) is necessary with control of discharges; settling ponds or other containment is typically needed near the lake to separate solids from water
- a disposal site or market for large amounts of dredged organic material must be found
- permitting of dredging operations is complex and can take a long time for approval
- compensatory mitigation (on-site or off-site) may be required by the Corps of Engineers for resources lost or impacted from dredging
- increase in noise and traffic
- negative impacts from truck hauling on Lake Street road integrity (sinking and wear and tear).
- may need to reconstruct 800 ft. of Lake Street due to heavy truck damage

5. Rotovation

Rotovation is the process of uprooting aquatic plants with a rototiller-type device. Rototilling extends seven to nine inches deep into lake sediments and dislodges the plant roots, where most of the growth occurs. Plants and roots are collected manually or by using a rake attachment to the rototiller head (DOE, 1999). This technique is most effective during spring when plants are died back or not growing quickly. If the technique is used on lily pads or pondweed during summer or fall, cutting the plants first may be necessary as long stems wrap around the head and slow the tilling process. The equipment used is rather large and costs relatively high; hence, rototillers are most suitable on larger lakes that have fast growing plant species.

Typically, given the plant densities present in Swan Lake, it is estimated two to three acres per day could be rotovated. The case histories available indicate rotovation is very effective for Eurasian milfoil control but less effective at controlling other aquatic plants.

Special permits are required in the State of Washington for rotovation projects, largely due to the environmental effects on water quality and sediment (resuspension of sediments, release of bottom nutrients to water column, potential toxic releases from churning up the bottom). Alaska's permit requirements were discussed above under Regulatory Controls.

The advantages (pros) of using this method are:

- removes the entire plant rather than a portion of the plant
- plant densities are decreased by repeated treatments
- one treatment usually last two years
- can be used during all seasons except ice-covered winter periods

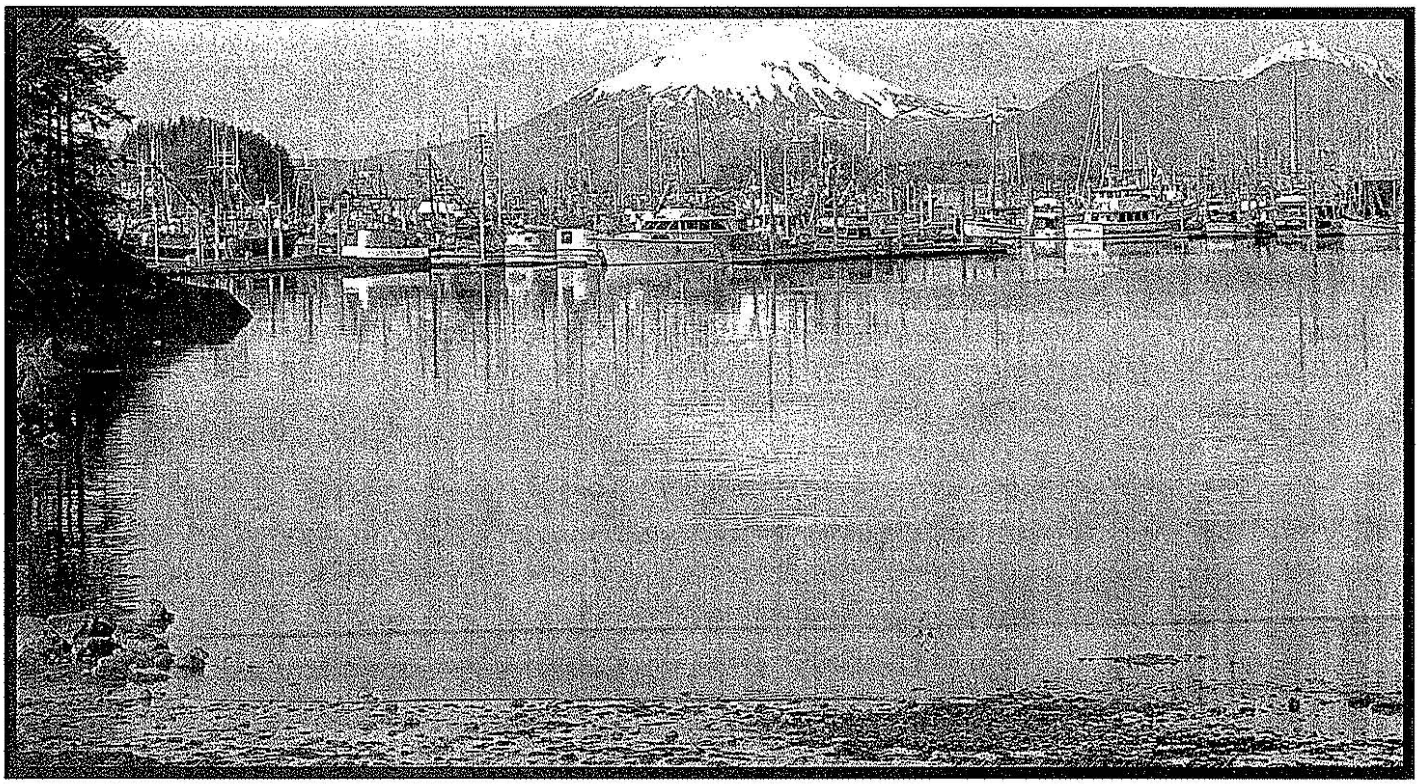

Photo by Gabrielle LaRoche

City and Borough of Sitka Coastal Management Plan

Final Plan Amendment, December 2006
Effective April 8, 2007

Prepared By:

LaRoche+**Associates**

IV. AREA MERITING SPECIAL ATTENTION

A. Introduction and Designation of Swan Lake as an AMSA and Recreational Use Area

The Alaska Coastal Management Act and the Guidelines and Standards that implement a local program permit the establishment of "area which merits special attention" (AMSA). AMSAs may be used in local coastal management plans as a management tool to recognize and protect "areas of unique, scarce, fragile or vulnerable natural habitat, cultural value, historical significance or scenic importance" and "substantial recreational value or opportunity." Accordingly, the Swan Lake AMSA was established in 1981.

The Swan Lake AMSA boundaries are depicted on Figure 7 and legally described as follows. All of that tract of land that lies less than 30.00' above mean lower low water as depicted on the survey by M.V. Schmidt titled "Swan Lake" dated Dec 16 1977. This land is within or contiguous to the portion of USS 1763 defined as:

> Beginning at Meander Corner 3 of USS 1474, said corner also being the southwesterly corner of USS 226 and corner 1 and the true point of beginning of this description, thence following record meanders of USS 1474 in a clockwise direction S 36° 29' E 140.41' to corner 2; thence S 08° 15' E 42.41' to corner 3; thence S 17° 54'W 81.57' to corner 4; thence S 06° 52' W 229.68' to corner 5; thence S 12° 10' E 84.18' to corner 6; thence S 63° 02' W 54.18' to corner 7; thence N 57° 29' W 314.31' to corner 8; thence N 41° 45' W 60.00' to corner 9; thence N 48° 40' W 324.96' to corner 10; thence N 75° 29' W 209.06' to corner 11; thence N 47° 21' W 132.20' to Meander Corner 4 of USS 1474 said corner also being Corner 9 of USS 6-1/2 and corner 12 or this description; thence following meander 8 of said USS 6-1/2 N 39 ° 00'E 495' to Corner 8 of said USS 6-1/2 and corner 13 of this description; thence following meander 7 of said USS 6-1/2 N 25° 30'W 462' to Corner 7 of said USS 6-1/2 and corner 14 of this description; thence following meander 6 of said USS 6-1/2 N 38° 30'W 739.86' to Corner 6 of said USS 6-1/2, this corner also being Corner 8 of USS 225 and corner 15 of this description; thence N 10 ° 30' W 433.62' along the boundary of said USS 225 to Corner 7 of said USS 225 this corner also being Corner 1 of USS 226 and corner 16 of this description; thence along the boundary of said USS 226 S 46° 45' E approximately 1575' to the mouth of Arrowhead Creek; thence continuing S 46° 45' E approximately 191.82' to Corner 6 of said USS 226 and corner 17 of this description; thence S 02° 00' W approximately 543' to the mouth of Wrinkleneck Creek; thence, continuing S 02° 00' W approximately 38.46' to Corner 5 of said USS 226, this corner also being the True Point of Beginning of this description

In addition, the entire Swan Lake AMSA is designated a recreational use area because the area receives significant use by persons engaging in recreation. Note that although there is land under federal ownership within the study area, those lands are excluded from the coastal zone and thus the designation as depicted on Figure 7.

While the lands and waters of the Sitka District are rich in coastal resources and many areas in the District might technically qualify for AMSA designation, an adequate level of protection for their environmental and economic values is already provided through existing governmental regulation and the implementation of the coastal district plan.

Swan Lake, however, is truly unique and contains fragile and vulnerable habitat of sufficient cultural value and historical significance to be credibly identified as an AMSA and to warrant detailed planning studies as the Coastal Program is implemented. It also contains unique recreational attributes and is often referred to as Sitka's "Central Park."

B. Resource Inventory and Resource Analysis

The Resource Inventory and Resource Analysis for the Swan Lake AMSA are located in Appendix A-7. The references are listed in that appendix and in Appendix A-8 References.

C. Swan Lake AMSA Issues and Historic Management Actions

Swan Lake is located in the virtual center of the Sitka roaded area and is a prime recreational area for local residents. The watershed has historical values that trace back to the Russian occupation. Boating, picnicking, sport fishing, ice skating and bird watching are among the activities which make the lake popular with Sitkans.

Swan Lake, including its tributaries and the adjacent shorelands, comprises an important freshwater ecosystem in Sitka. Development around the lake and its feeder streams poses a threat to water quality, which could lead to loss of habitat and recreational values and acceleration of the natural lake aging process. Special management practices are warranted to ensure that this valuable lake will continue to support healthy fish and wildlife populations, as well as to provide aesthetic and recreational enjoyment for the people of Sitka. Slowing the natural lake aging process is key to fully restoring and enhancing these recreational and habitat values.

The AMSA Study of Swan Lake was developed by the Alaska Department of Fish and Game in a report titled "Swan Lake Recreational Area," completed in January, 1981. It provided a biological analysis of the area and explained why AMSA classification was requested. It was adopted by the District and approved as part of Sitka's Coastal Management Program in 1981.

When the original 1981 coastal document was completed, Swan Lake possessed the second highest priority in Alaska for federal funding under the "Clean Lakes" program. This program was specifically designed to assist in the cleanup of lakes suffering from major eutrophication (lake nutrient enrichment and aging). Swan Lake is slowly filling up and being extensively choked by lily pad growth. As a part of the detailed habitat evaluation program, the Alaska Department of Fish and Game recommended additional limnology studies be accomplished to further review the lake and its biological potential. A combined limited dredging and recreational fill project was suggested. However, prior to completion of the application for "Clean Lakes" funding, the new federal administration deleted money for that program. No alternative funds were available.

In 1984, seven different combined habitat improvement and recreation proposals for the lake were examined by the municipal Parks and Recreation Committee. Following a series of public hearings, the proposal, as submitted in the 1981 AMSA, was recommended. The estimated cost was in the

neighborhood of $1,400,000, which included the development of 60,000 square feet of recreation space, 30,000 square feet of parking area, and the reconstruction of a portion of Lake Street needed after repeated heavy hauling to and from the project site. This cost also included dredging of approximately 180,000 square feet or 4.15 acres of the lake to a maximum depth of sixteen feet below the water surface. The above figures and volumes were arrived at through a "Geotechnical Assessment and Construction Analysis" study, accomplished by Stragier Engineering and Construction Engineering Services in September, 1985.

The Moller Park/Swan Lake Ten Year Community Use Plan, proposed by the Task Force of the Sitka Parks and Recreation Committee in 1991, addresses desired recreation and transportation facilities and upgrades on public lands. The Plan also addresses environmental issues, including vegetation and forest park enhancement adjacent to Swan Lake, and reducing erosion and sediment entering Swan Lake from the ditch and hillsides near the Moller track. Lastly, the Plan acknowledges the need for it to be linked to the special needs of the Swan Lake AMSA, such as lake eutrophication problems, wetlands damage occurring around the lake, and Wrinkleneck Creek and Arrowhead Creek stream cleanup and erosion.

Since the 1990s, the Sport Fish Division of the Alaska Department of Fish and Game has administered the Swan Lake Rainbow Trout Enhancement program as part of the Southeast Alaska regional five-year stocking plan. The purpose of the program is to increase the availability of rainbow trout in Swan Lake to improve angler success. Swan Lake is the site of the annual Junior Trout Derby for young anglers and receives a considerable amount of fishing pressure during the open water season. Major objectives are to generate 200 angler-days of fishing effort per year for young anglers and provide for a harvest of up to 150 rainbow trout per year from Swan Lake. Annual stocking of approximately 300 rainbow trout taken from Sukoi Lake supplements the existing rainbow trout population. The annual catch statistics help give an adequate picture of the health of fish stocks in the lake.

1. Swan Lake Watershed Recovery and Restoration

The lake restoration effort received renewed attention beginning in the mid-1990s. In 1994, the Alaska Department of Environmental Conservation (ADEC)---as part of a statewide effort to identify waters not meeting water quality standards---completed an assessment of Swan Lake and its feeder creeks to document habitat and water quality concerns. Follow-up assessments confirmed Swan Lake and Lower Wrinkleneck Creek as impaired waterbodies due to urban runoff and excess solid waste and debris in the watershed. Moreover, the excessive growth of lily pads and other aquatic plants in the lake impedes recreational and fisheries uses during open water periods. After these investigations, ADEC awarded a community water quality grant to Sitka in 1999 to complete a Swan Lake Watershed Recovery Strategy to guide restoration work throughout the watershed. Federal funding came from a nonpoint source pollution control grant under Section 319 of the Clean Water Act.

The Swan Lake Watershed Recovery Strategy. Phase 1: Debris and Solid Waste Removal and Control (January 2000) outlines a publicly endorsed action strategy to improve water quality and habitat conditions in the watershed. The purpose of the Strategy mirrors the purpose of the Swan Lake AMSA: simply, to protect and enhance the recreational, aesthetic, and fish and wildlife values of Swan Lake for the enjoyment and use of the public. The multi-year process in the Strategy addresses this purpose by taking specific actions to slow down and reverse the natural aging of Swan Lake. It also includes a Total Maximum Daily Load (TMDL) for cleaning up debris in the watershed in keeping with federal requirements. Under the Phase 1 plan, annual community trash cleanups of the

lake and creeks keep the watershed relatively free of debris and litter. Improvements in home heating oil tank management also reduce oil spillage adjacent to Wrinkleneck Creek.

The Phase 1 Strategy triggered multiple follow-up actions. To identify the actions needed to slow down and reverse the eutrophication process, the City and Borough of Sitka completed the *Swan Lake Watershed Recovery Strategy. Phase 2: Eutrophication Report and Action Plan (June 2000).* Also funded by a federal Clean Water Act grant, the Phase 2 Strategy outlined an Action Plan of over 20 tasks to help restore Swan Lake and its tributaries. A range of alternatives to address the problems was proposed and a preferred alternative was selected after public discussion. This Strategy remains the key document in guiding lake restoration priorities.

Closely following the publication of the eutrophication report and recovery strategy in 2000, *A Guide to Volunteer and Agency Water Quality Monitoring in the Swan Lake Watershed and a Quality Assurance Project Plan (June 2001)* lays out the procedures and objectives for student and agency water quality monitoring in support of lake rehabilitation. Sitka High School students and municipal staff have joined with professional monitors in collecting lake and creek water quality information. A small brochure, *A Citizen's Guide to Protecting Water Quality in the Swan Lake Watershed (June 2001),* recognizes and emphasizes the importance that Sitkans play in protecting their AMSA. It includes a list of "Dos" and "Don'ts" that focus on simple things citizens can do to improve lake habitat and water quality. *The State of the Lake Report (July 2002)* summarizes lake restoration actions taken since 2000, presents a progress report and "report card" on the relative success of each action, and outlines restoration work that remains to be done. The *Stormwater Control Strategy and Action Plan for the Swan Lake Watershed (June 2002)* recognizes the importance of stormwater management in protecting the lake's recreational and habitat uses, identifies sources and pathways of stormwater in the Swan Lake watershed, summarizes current controls, and calls for over 20 new actions to improve stormwater management. This Strategy was soon followed by *A Contractor and Citizen Guide to Reducing Stormwater Pollution – "When it rains, it drains" (June 2004).* This brochure outlines stormwater problems, how runoff is regulated, permit requirements, and local practices that are effective in reducing stormwater pollution.

Lastly, the City and Borough of Sitka completed *Vegetation Management Guidelines for the Swan Lake AMSA* in March 2004. The guidelines will educate and guide city and borough staff and citizens in practices for protecting habitat and water quality in the AMSA. The stated purpose is to "help keep Swan Lake aesthetically pleasing, clean and accessible for public use and enjoyment" as well as to "maintain and enhance the resident fish, waterfowl and wildlife populations with the Swan Lake watershed." Both proper and improper uses that are compatible or detrimental, respectively, to the purpose of the Swan Lake AMSA are identified.

Considerable restoration progress has been made through the combination of the above-mentioned efforts. A summary of notable lake and watershed restoration actions taken since 2000 includes the following:

- Dredged over 1,500 cubic yards of vegetation and sediments collectively from the lake outlet channel and from the Wrinkleneck Creek delta, removing restrictions and improving water flow out of and into Swan Lake.
- Established an active student and professional water quality monitoring program for the lake and creeks, involving over 370 hours of student volunteer effort through April 2002.

- Routinely documented seasonal dissolved oxygen levels, pH, lake water levels, sediment loading, and turbidity at multiple stations and culverts throughout the watershed.
- Held municipally sponsored annual community watershed litter cleanups that have collected over three tons of debris, trash and metals from the lake and creeks to date.
- Mailed educational flyers and brochures to each watershed resident on best management practices to keep their lake and creeks clean and pollution-free.
- Reduced sedimentation of the lake through improved municipal maintenance practices and stormwater controls.
- Initiated culvert upgrades and other drainage improvements at problematic streets and drafted a ditch maintenance plan for improving the quality of stormwater runoff.
- Actively involved watershed residents and other volunteers in rehabilitation work.

2. Future Efforts

More work remains to be done. Remaining tasks will require further funding. Perhaps the single most visible and successful restoration task has been dredge removal of lake sediments and vegetation in critical recreational and resident fish habitat areas. Funded under a combination of federal grants (Section 319, the Alaska Clean Water Act, and Coastal Impact Assistance Program grants) and local funds, dredging has occurred in three separate phases through 2004. For efficiency, further dredging would ideally be supported by a large grant (greater than $250,000) that would provide sufficient funding to effectively deploy equipment for several weeks and dredge several acres of sediment and vegetation.

Additional priorities are to upgrade culverts and drainage within the watershed, and continue student and professional water quality monitoring to better evaluate water quality trends over time. An ongoing task is to evaluate resident compliance with Swan Lake AMSA streamside buffer protections and the city and borough's vegetation and forest park management guidelines for streamside revegetation, reseeding and tree/brush clearing in the AMSA. Starting a dialogue with other Southeast communities on common lake problems and possible sharing of resources and equipment might bring more resources and improve management of the Swan Lake AMSA. Lastly, continuing to actively involve watershed residents in rehabilitation work is essential to fully meeting the purposes of the AMSA and Recovery Strategy.

D. Swan Lake AMSA Physical Description, Goals and Objectives

The area included in the AMSA includes Swan Lake, the contiguous marshlands, and the two feeder streams, Wrinkleneck Creek and Arrowhead Creek. Wrinkleneck Creek is the major tributary entering the lake. It originates in a muskeg area approximately 3,000 feet distance east of the lake and traverses muskeg bogs and spruce/hemlock forests along its upper reaches. The lower 1,000 feet winds through a residential area where houses and property encroach upon the stream channel. Arrowhead Creek also originates in a muskeg/bog area located approximately 700 feet distance from its mouth at the northeastern end of Swan Lake.

Swan Lake encompasses 22.25 acres and contains about 101 acre-feet of fresh water. Depth averages about 4-1/2 feet, with a maximum depth of almost 10 feet. A layer of organic peat material at the lake bottom ranges from 5 to 17 feet thick. The lake is characterized by excessive native aquatic plant

community growth, and is naturally evolving towards a shallow wetland bog. The two feeder streams drain muskeg bog areas that dot the alluvial fan found at the base of Gavan Hill. Both Wrinkleneck and Arrowhead Creeks have been extensively altered by stream channelization, culverting and filling of adjacent wetlands for development. The outlet of the lake has also been altered from its original open channel configuration, and presently flows into Sitka Sound through a 60-inch culvert, 1,200 feet in length.

Ownership of lands within the AMSA consists of a mixture of private and municipal lands. Approximately 60 percent of the lake shoreline is inhabited. Any substantive recreation plan for the lake has been limited based on the checkerboard ownership pattern preventing a single program being developed around the entire lake.

Present management and development is subject to the Sitka Subdivision Regulations, Zoning Ordinance, and other public health and safety ordinances of the City/Borough. Development actions within the lake or its wetlands require a U.S. Army Corps of Engineers "404" permit for the placement of dredged or fill materials and a State Department of Environmental Conservation "401" water quality certification. Recreational fishing within the lake and its tributaries is governed by State of Alaska sport fish regulations. Conflict is inevitable when the pressures of urban development begin to have a noticeable affect on a formerly wild and natural waterbody.

Goal

While it is physically, biologically and politically impossible to recapture the pristine character of a freshwater ecosystem located in the heart of a populated area, it is possible to salvage from this conflict, an attractive "urban" lake that will provide pleasant visual and recreational experiences for many generations of Sitkans. It is the goal of the AMSA to preserve, protect, enhance or restore the physical, biological, and cultural features upon which the recreation values depend.

The objectives of this AMSA, therefore, are to adopt a management process that will:

- Ensure a clean, aesthetically pleasing fresh water body within the roaded area of Sitka to be enjoyed and used by the public;
- Maintain and enhance the resident fish populations and habitats within the Swan Lake watershed for the recreational enjoyment and use of the public;
- Protect and preserve habitat attractive to swans and associated waterfowl utilizing Swan Lake; and,
- Provide for recreational activities and development practices consistent with the protection, restoration and sound management of the lake's resources and habitats as outlined in this management proposal and its companion Swan Lake Watershed Recovery Strategy.

E. Subject Uses

In general terms, all land and water uses and activities occurring within the Swan Lake AMSA, are subject to the district coastal management program. Subject uses for the AMSA are the same as for the rest of the plan and are described more specifically in Section A.2 of the Implementation Chapter of this plan.

F. Proper and Improper Uses

Proper uses within the AMSA are those uses that are compatible with the management goals, and that are permitted uses within the Sitka District Plan. Activities considered proper include, but are not limited to:

- Construction of property improvements that do not infringe on wetlands areas nor result in runoff of polluted water into the aquatic system;
- Development of small finger floats or piers for private landowners along the periphery of Swan Lake;
- Scientific research and instruction where compatible with fisheries and waterfowl management goals;
- Habitat enhancement and restoration projects for the purpose of improving fish and wildlife populations within the AMSA and surrounding areas;
- Recreational use of Swan Lake by the general public for non-motorized boating, fishing, swimming, ice skating, and other compatible recreational activities;
- Other uses of the aquatic system that do not conflict with primary management goals stated in this program.

There are no outright or absolute prohibitions within the Swan Lake AMSA. Rather there are enforceable policies "that will be used to determine whether a specific land or water use or activity will be allowed." (11 AAC 114.270(g)).

G. Enforceable Policies

The enforceable policies of the Swan Lake AMSA supplement the enforceable policies contained in Chapter III and will be implemented in accordance with procedures described in Chapter VI. The enforceable policies are necessary to preserve, protect, enhance or restore the physical, biological, and cultural features upon which the recreation values depend. The enforceable policies will be used to determine whether the following activities will be allowed within the Swan Lake AMSA.

Applicability of policies: In addition to the policies contained in Chapter III, which apply throughout the Sitka coastal district and to designated recreational use areas, the following policies apply within the Swan Lake AMSA as depicted on Figure 7.

AMSA 13.1 **Policy:** Within the Swan Lake AMSA as shown in Figure 7, development of permanent structures or land clearing within the 25-feet of the stream banks measured from Ordinary High Water (OHW) of Arrowhead and Wrinkleneck Creeks and within 50-feet of the lakeshore measured from OHW shall avoid, minimize, or mitigate adverse impacts to the recreational uses of Swan Lake. The recreational uses of Swan Lake can be found in Appendix A-7.

AMSA 13.2 **Policy:** Within the Swan Lake AMSA as shown in Figure 7, cutting or eradication of natural vegetation is not allowed if the activity would detract from recreational uses of the area. The recreational uses of Swan Lake can be found in Appendix A-7.

AMSA 13.3 **Policy:** Within the Swan Lake AMSA as shown on Figure 7, in order to protect the recreational uses of the area, gravel or soils extraction and dredge and fill operations

are not allowed unless consistent with Swan Lake Watershed Recovery and Restoration Plan. The recreational uses of Swan Lake can be found on p. A-85 of Appendix A-7. For information about Swan Lake Watershed Recovery and Restoration, see Appendix A-7.

AMSA 13.4 **Policy:** To protect the recreational uses in within the Swan Lake AMSA as shown in Figure 7, operation of motorized watercraft or aircraft (not including radio-controlled model craft) on Swan Lake is not allowed except for purposes of authorized fish restocking.

H. Matter of Local Concern

Under State statutes, the enforceable policies of the district coastal management plan must not address a matter regulated or authorized by state or federal law unless the enforceable policies relate specifically to a matter of local concern. A matter of local concern is a specific coastal use or resource within a defined portion of the district's coastal zone that is

(1) demonstrated as sensitive to development;
(2) not adequately addressed by state or federal law; and
(3) of unique concern to the coastal resource district as demonstrated by local usage or scientific evidence.

For a designated recreation area, the "matter of local concern" test does not apply unless a proposed enforceable policy addresses a matter regulated or authorized by some other state or federal law not enumerated in the statewide standards. In this case, there are state and federal laws that may regulate or authorize the activities identified above. However, enforceable policies for an AMSA in effect on July 1, 2004 satisfy the requirements of (1) and (3) above (11 AAC 114.270(i)). Therefore, only (2) above must be satisfied here.

In terms of adequacy, the applicable laws are broad in scope and general in their application. State laws that address recreation are not applicable due to land ownership patterns. Federal management is limited to federal lands. State regulations are inadequate to protect the resident fish habitat upon which, in part, the recreational uses depend. More specificity is needed to determine whether a specific land or water use or activity will be allowed within the AMSA/designated area and to provide the management measures necessary to address the physical, biological, and cultural features of the area and to preserve, protect, enhance and restore the recreational values (as permitted by 11 AAC 114.270(g) and required by 11 AAC 114.420(d)).

Fig. 7: Swan Lake Area Meriting Special Attention and Designated Recreational Use Area

Sitka Coastal Management Plan, June 2006

— Description —

The special management zone is 50 feet from the lakeshore and 25 feet either side of the center of the two creeks. Description is offical boundary. Refer to DNR's AMSA digital file for digital representation of boundary.

Applicable enforceable policies: 3.1, 3.2, 3.3, 13.1, 13.2, 13.3, 13.4.

Source: City & Borough of Sitka Planning Department
Federal lands are excluded.