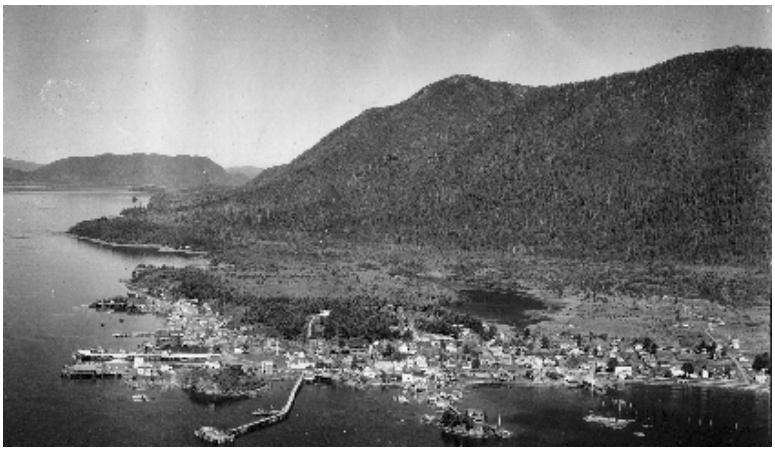
SWAN LAKE WATERSHED RECOVERY STRATEGY

PHASE 1:
DEBRIS AND SOLID WASTE REMOVAL AND CONTROL



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PREFACE

This report is an Action Strategy to improve water quality conditions in the Swan Lake watershed. The present accumulations of debris, waste metals, plastics, abandoned oil tanks and other residues within Swan Lake and feeder streams negatively affect recreational uses in the watershed, create nuisance conditions that may attract undesirable wildlife species and present potential adverse effects on resident fish habitat and populations. The Strategy identifies specific actions to fix these problems. In addition, it addresses legal requirements under the federal Clean Water Act to restore degraded waterbodies. Cleaning up debris and solid wastes - and keeping the watershed free of these wastes - is the first of several issues of importance to Sitkans. Subsequent reports and actions will deal with alternatives for controlling the excessive plant growth in Swan Lake, and will be the basis for grant applications to secure the funding to carry out the preferred remediation option.

The Strategy is designed to address the community's vision for a clean and aesthetically-pleasing watershed that meets the recreational, fish and wildlife, and water quality goals already outlined in the municipality's *Swan Lake Area Meriting Special Attention (AMSA).* In so doing, the Strategy addresses both community goals for a healthy watershed and the regulatory requirements of the Alaska Department of Environmental Conservation (ADEC) and the U.S. Environmental Protection Agency (EPA) under Section 303(d) of the Clean Water Act. The document is organized to fully address the "checklist" of EPA-required items for a "Total Maximum Daily Load" (TMDL) for debris and solid wastes. It is intended to be action-oriented, with the City and Borough of Sitka (CBS) as the responsible custodian and chief implementing entity.

The document includes an expanded overview and background description to provide a broader watershed context and set the stage for the subsequent Eutrophication Report and Action Plan. This is important, as it is this second issue - the future health of Swan Lake due to excessive plant growth - that likely concerns Sitkans the most. Both reports follow a watershed approach, looking beyond just the banks of waterways. Federal, state, municipal and private lands are involved.

The recommended actions and tasks included here are a first step toward restoring the health of the watershed. The Strategy underscores the importance of active community participation in the restoration process and in taking a long-term aquatic habitat/watershed protection approach.

EXECUTIVE SUMMARY

This Watershed Recovery Strategy identifies water quality concerns within the Swan Lake watershed, the existing controls in place to address these problems, and both near-term and long-term tasks and recommendations to solve the problems and keep the watershed clean. A detailed discussion of these issues, along with information on the history and physical setting of the Swan Lake watershed, the regulatory context under Section 303(d) of the Clean Water Act, and the results of previous field inspections, are found in the body of the report and the Appendices.

Water Quality Concerns at a Glance

Water Quality-Limited?	*Yes*
Hydrologic Unit:	*10203-018 (Lat 57 ° 03 ′N; Long. 135 ° 20 ′ W)*
Standard of Concern:	*Debris and residues within feeder streams and lake*
Designated Uses Affected:	*Growth and Propagation of Fish, Shellfish, other Aquatic Life and Wildlife; Recreation*
Environmental Indicator:	*Solid waste debris, including wood, waste metals, abandoned oil tanks and plastics*
Major Source:	*Urban residential development*
Loading Capacity:	*Zero (0); the standard for residues prohibits deposits on or in the streambeds, shorelines and lake*
Load Allocation:	*Zero (0) amounts above natural condition*
Recent Waterbody Investigations:	*October 1996; April 1997; September 1999 Debris/solid waste locations, type and amounts documented; other water quality screening*
Proposed Future Actions:	*Community debris/solid waste cleanups in winter and spring 2000; verify sanitary sewer connections; annual spring cleanups and continued homeowner education on best management practices for heating oil tanks and solid waste controls in the Swan Lake watershed*

Statement of the Problem

Years of residential growth and activity along Swan Lake and its tributaries have resulted in accumulations of debris, solid waste, metals and plastics. The results of three water quality field investigations/assessments completed in the area since the original 1994 survey have confirmed debris and solid waste problems. The investigations point to the need for a thorough cleanup of accumulations and future actions to keep the watershed clean. For Wrinkleneck Creek, the stretch from Baranof Street to Lake Street requires the most attention, as it is this segment that is

listed on the State of Alaska's 1998 impaired waterbody list. The north end of Swan Lake also needs attention. The effects of debris/solid waste residues on uses of Wrinkleneck Creek and Swan Lake are: 1) negative impacts on recreational uses within the watershed; 2) creation of nuisance conditions that may attract undesirable wildlife, and 3) potential adverse effects on resident fish habitat and their populations.

The Watershed Strategy

In August 1999, the Alaska Department of Environmental Conservation awarded a community water quality grant to the City and Borough of Sitka to complete a Swan Lake Watershed Restoration Project. The stated Objective of the project is as follows:

> "Remove the Swan Lake watershed from the Tier I listing as an impaired waterbody and set in place a strategy for reversing eutrophication of Swan Lake and for long-term management of the watershed to prevent future water quality and aquatic habitat degradation."

Phase 1 of the project (this document) is to prepare and implement a "Swan Lake Watershed Recovery Strategy" which will address removal and control of solid waste/debris, ensure community involvement in the project, confirm that sanitary connections are made, and check that home heating oil tanks are in compliance with state and federal regulations or guidelines. Once these steps are verified and subsequent ADEC approval given, the Wrinkleneck Creek-Swan Lake segment will be removed from the ADEC statewide list of "Impaired Waterbodies". The Strategy will guide the community-wide effort to remove logs, discarded building materials, metals, plastics, and other urban debris from the lake and along its two tributaries and to keep these areas clean. Remedies for debris and solid waste removal and control are relatively easy to implement.

The Swan Lake Watershed Strategy constitutes the community's consensus approach for removing and controlling debris and solid wastes within the Swan Lake watershed and maintaining a healthy environment free of other pollutants. It includes near-term and long-term actions. It describes the process and steps to be taken by the City and Borough of Sitka and the community to restore and maintain the watershed in a healthy condition which fully meets Alaska water quality standards. As an "umbrella" approach for solving problems, the Strategy also serves to meet regulatory requirements for residues under Section 303(d) of the Clean Water Act.

The coordinated, community-based cleanup of pallet boards, metals, wood debris, and litter from the watershed is expected to successfully address the immediate problems - and meet water quality standards for these wastes - by June 2000. The Strategy identifies the rationale for needed action and ways to keep the watershed clean of all pollutants into the future. Actions to avoid future problems are identified.

Linkages to Swan Lake Eutrophication (excessive aquatic plant growth): Phase 2

An issue of considerable importance to Sitkans is the progressive growth and encroachment of aquatic plants on recreational uses of Swan Lake as well as impacts on lake limnology and hydrology. A separate Report and Action Plan for addressing lake eutrophication will be prepared in Phase 2 of the project. A draft report will be available in March 2000. The problem facing Swan Lake is well stated in this news release from the City and Borough of Sitka:

> "Swan Lake is filling up with plant growth, organic rich deposits and sediment from the creeks that feed into it, said Buggins. If the process is not reversed, Swan Lake could eventually become a parking lot." (Mark Buggins, Environmental Superintendent, City and Borough of Sitka).

Once completed in June 2000, the Eutrophication Report and Action Plan will then be used by the City and Borough of Sitka to seek funding and guide rehabilitation of the lake. Funding will likely come from a combination of federal, state and local sources coupled with volunteer efforts by community residents. A variety of rehabilitation alternatives and costs, along with the environmental consequences of each, will be examined and shared with Sitkans for their review. A preferred alternative will be selected through this process.

The Swan Lake Watershed: An Area Meriting Special Attention

Swan Lake and its adjacent parks, streams and recreation areas are known as "Sitka's Central Park." The lake and its contiguous wetlands, along with Wrinkleneck and Arrowhead Creeks, were formally designated in 1981 as an Area Meriting Special Attention (AMSA) under the Sitka District Coastal Management (CZM) Program. Proper and improper uses identified for the Swan Lake AMSA are intended to guide future development and environmental protection and have the status of enforceable policies. Stream side and lake setbacks are defined and management objectives within these zones are described.

The Swan Lake Area Meriting Special Attention established the management objectives and "vision" for the watershed that are still relevant today. It recognizes the Swan Lake watershed for its recreational use, its importance as a freshwater ecosystem in Sitka, and the threats posed by development to its habitat and water quality values.

The stated *purpose* of the AMSA is to adopt a process to:

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

These community goals articulate the vision that Sitkans share for a healthy Swan Lake watershed and provide the impetus for both the near-term and long-term recommendations found in this Strategy.

Results and Recommendations from Recent Water Quality Inspections

Three water quality investigations/assessments have been completed in the area since the original 1994 assessment: October 1996; April 1997, and September 1999. Several environmental and fisheries surveys were also completed in the 1970's and 1980's prior to the Alaska Department of Environmental Conservation's water quality investigations. The full results of the most recent investigations are found in the text and Appendices of the report.

Important findings and recommendations were:

- Debris, metals, plastics and wood residues were present at a number of locations within and along Wrinkleneck Creek from Baranof Street to Lake Street, with the majority of debris located outside the creek bed but within a 25-foot setback on each side of the creek. Little debris was present along Arrowhead Creek or in Swan Lake.

- Aboveground home heating oil tanks at residences along Wrinkleneck Creek were not leaking fuel to soils or water and appeared to be properly maintained. Several old abandoned fuel tanks were noted along the creek, none leaking.

- The September 1999 findings and recommendations confirmed those for the April 1997 investigation and included the need for community cleanups of the streams and Swan Lake, distribution of petroleum handling and storage guidelines to watershed residents, and CBS written confirmation that all watershed residents are connected to the municipal sewer system.

- While measured fecal coliform bacteria levels are within acceptable levels in Swan Lake, it is recommended that the municipality consider periodic checks of fecal coliform bacteria levels in Swan Lake, as necessary, to verify the integrity of the wastewater collection system and whether the lake is experiencing any elevated levels.

Existing Controls and Authorities to Get the Job Done

Sufficient authorities and controls exist to successfully meet water quality standards and other environmental goals for the Swan Lake watershed.

The principal means of assuring that actions identified in this Strategy are carried out is through local controls. These include city ordinances and the enforceable policies of the Swan Lake AMSA related to protecting values and uses within the feeder streams, lake and adjacent

setbacks. Effective controls require improved compliance with the municipal refuse/litter

ordinance. Other available tools include subdivision review and approvals, building permits, and planning and zoning decisions. Periodic advisories to homeowners living within the watershed on

responsible practices for home heating fuel storage in aboveground tanks would be helpful. Mailings that alert residents of the existence of prescribed, development-free, setbacks along Wrinkleneck and Arrowhead Creeks and Swan Lake are also an important tool.

The municipality relies heavily on federal and state laws, regulations and permits to implement the coastal management program within the Swan Lake watershed. Collectively, municipal codes and existing federal and state controls provide sufficient authority to remedy and control solid waste and debris problems within the watershed without the need for new controls.

Implementing the Watershed Recovery Strategy

The near-term tasks outlined below address the three required elements for the Phase 1 project: 1) a schedule and process for removal of solid waste/debris and plastics; 2) a public information component to ensure area property owners are aware of the projects goals and objectives, and requesting their involvement in its ultimate success; and 3) confirmation, as required, that sanitary hookups and oil storage tanks are in compliance with state and federal regulations.

Effective implementation of the near-term tasks in the Strategy is expected to show that 1) existing controls and authorities are adequate to achieve water quality standards 2) these actions - community cleanup drives in winter and spring 2000, public education, and verification of a successful cleanup - will result in meeting water quality standards for debris and solid wastes by June 30, 2000 and 3) regular community-based cleanups, coupled with public education, awareness and oversight, will continue to keep the watershed clean. This Strategy lays out the sequence of steps needed, a schedule for each task, and identifies responsible parties. Measures of success for each task are also identified.

A detailed discussion of each task, including responsible parties, schedule for completion, segments of the public to be involved, and measures of success are included in the full text of the Strategy.

Near-Term Strategy for Debris and Solid Waste Cleanup

❶ Winter 2000 stream cleanups (February 1-March 15, 2000)

❷ Ensure community involvement in all phases of the watershed restoration project

❸ Spring 2000 “Swan Lake Cleanup Days” (April 2000)

❹ Verify sanitary sewer connections and home heating oil tank management practices

❺ Verify the success of phase 1 cleanup activities - Cleanup Report (due June 15, 2000)

The Long-Term Control Strategy for a Healthy Watershed: Y2K and Beyond

The following constitute a "pallet"of recommended actions that individually or collectively will help meet the recreational, fish and wildlife, and water quality goals established by the community for the Swan Lake watershed. A detailed discussion of each recommendation is found in the body of the Strategy.

☛***Recommendation 1***: *The City and Borough of Sitka should pursue an ongoing management approach that assesses the "State of the Environment" for the Swan Lake watershed on an annual basis.*

☛***Recommendation 2***: *The City and Borough of Sitka should give a high priority to implementing previously-identified water quality and habitat improvements to the Swan Lake watershed. The Parks and Recreation Committee, or a smaller Moller Park/ Swan Lake Task Force, could help obtain citizen input and involvement and provide some oversight of Swan Lake remediation efforts.*

☛***Recommendation 3***: *The City and Borough of Sitka should continue to host the annual community Spring Cleanup and guarantee the inclusion of Swan Lake and Wrinkleneck Creek among the areas.*

☛***Recommendation 4****: Ensure permits and development approvals within the Swan Lake AMSA boundaries are coordinated through a "team" approach among all the departments within the City and Borough of Sitka with responsibility for these activities.*

☛***Recommendation 5****: Seek ways to improve compliance with local refuse and litter ordinances (Chapter 9) and established stream side setbacks within the Swan lake AMSA. Educational approaches and one-on-one discussions should be used first, followed by enforcement, as needed.*

☛***Recommendation 6***: *Actively support middle school, high school and university projects which provide students"hands-on" environmental education and volunteer monitoring opportunities within the Swan Lake watershed.*

☛***Recommendation 7***: *Complete a vegetation and forest park management approach to guide selective clearing and brushing within the watershed.*

☛***Recommendation 8:*** *The City and Borough of Sitka should actively pursue more frequent communication with state and federal regulatory agencies, readily exchange information, and extend the offer to form watershed "teams" to address specific proposals.*

☛***Recommendation 9***: *Agency staff (DGC, ADEC, ADF&G, federal agencies) working with the municipality on specific water quality projects are encouraged to visit Sitka to meet city representatives, walk the project area, and get an "on -site" appreciation for the issues they regulate. This recommendation is linked to #8.*

☛***Recommendation 10****: Use the Swan Lake Watershed Recovery Strategy as a "springboard" to enlisting community involvement in the planning and remediation of Swan Lake under Phase 2 of the project, titled the "Swan Lake Eutrophication Report and Action Plan."*

☛***Recommendation 11:*** *Work toward developing an improved information base on watershed hydrology, the physical and chemical characteristics of the lake, and wetland functions to better understand the current watershed condition and trends (both natural and man made) in condition over time.*

PHASE I:

Action Strategy for the Removal and Control of

Debris and Solid Waste

from the Swan Lake Watershed in Sitka, Alaska

WATER QUALITY CONCERNS AT A GLANCE:

Water Quality-Limited?	*Yes*
Hydrologic Unit:	*10203-018 (Lat 57 ° 03 ′N; Long. 135 ° 20 ′W)*
Standard of Concern:	*Debris and residues within feeder streams and lake*
Designated Uses Affected:	*Growth and Propagation of Fish, Shellfish, other Aquatic Life and Wildlife; Recreation*
Environmental Indicator:	*Solid waste debris, including wood, waste metals, abandoned oil tanks and plastics*
Major Source:	*Urban residential development*
Loading Capacity:	*Zero (0); the standard for residues prohibits deposits on or in the streambeds, shorelines and lake*
Load Allocation:	*Zero (0) amounts above natural condition*
Recent Waterbody Investigations:	*October 1996; April 1997; and September 1999 Debris/solid waste locations, type and amounts documented; other water quality screening*
Proposed Future Actions:	*Community debris/solid waste cleanups in winter 1999 and spring 2000; verify sanitary sewer connections; annual spring cleanups and continued homeowner education on best management practices for heating oil tanks and solid waste controls in the Swan Lake watershed*

OVERVIEW

Section 303(d)(1)(A) and (B) of the federal Clean Water Act requires states, every two years, to submit a list of waters to the Environmental Protection Agency (EPA) that persistently exceed water quality standards and/or exhibit impairment of uses. Beginning with the 1996 list, the Alaska Department of Environmental Conservation (ADEC) identified the lower segment of Wrinkleneck Creek-Swan Lake as "impaired", or water quality-limited, due to excess solid waste debris within, or bordering, these waterbodies. The Wrinkleneck Creek-Swan Lake segment is among 58 impaired waterbodies statewide on Alaska's federally-approved Section 303(d) list.

Alaska's final 1998 Section 303(d) list was published in June 1999 (ADEC, 1999) and categorized these two local waterbodies as Tier I -- those waters which require further assessments to verify the extent of pollution and whether existing controls in-place are adequate to meet water quality standards by the next listing cycle in 2000. The pollutant source identified is "urban development" within the Swan Lake watershed. Years of residential growth and activity along the watercourses have resulted in the accumulation of debris, solid waste and plastics. These accumulations negatively impact the recreational and fisheries uses and values of the watershed. *Figure 1* summarizes Alaska's Section 303(d) listing process for Tier I, II, III and IV waterbodies. ADEC's web site at ***http://www.state.ak.us/dec/dawq/tmdl/tierscriteria.htm*** has details.

The following narrative explanation is included in ADEC's June 1999 Section 303(d) list:

> *"This waterbody was placed on the 1996 Section 303(d) list for solid waste. There is insufficient information in the file to show an effect to a designated use from habitat modification. A 1994 water quality assessment indicated the waterbody from* ***Baranof Street to Swan Lake*** *(emphasis added) is affected by urban development which has caused several problems in the area by way of urban runoff and solid waste debris, including wood, oil tanks, waste metals, and plastics. An on-site inspection and a coordinated stream clean-up may address the water quality issues; if not, a waterbody assessment is required to confirm pollutants and determine if additional controls are necessary.''*

New information gathered since 1994 warrants updating this narrative. Three water quality field investigations/assessments have been completed in the area since the 1994 assessment: October, 1996; April 1997, and September 1999. The objective of the September 1999 investigation was to update the earlier assessments, including documenting debris in the lake and tributaries, verifying sanitary hookups, and surveying home heating oil tanks along the watercourses. All on-site assessments have been team efforts which included municipal and Fish and Game staff. The full results of these waterbody inspections/assessments are included in the Appendices; they are also summarized here.

These field investigations confirmed the extent of impairment to water quality and/or designated uses, and confirmed pollutant sources and parameters of concern. Debris and solid wastes are the

initial focus of attention. Through water quality monitoring, immediate concern for several other parameters has been reduced. For example, turbidity (cloudiness) and total settleable solids (sediment) levels in tributary creeks are both low and within accepted limits, indicating the value of maintaining the vegetative buffer adjacent to streams for filtration of sediments.

The results of fecal coliform bacteria screening by ADEC in October 1996 and April 1997 from Wrinkleneck Creek, the waterfowl staging area at Swan Lake Spit, and at the outlet to Swan Lake, point to waterfowl - not humans - as the most likely contributing source of measured fecal coliform bacteria. The low levels of bacteria that have been measured in the lake to date suggest that raw sewage is not entering the lake, or certainly not in any significant amount. The municipal sewer system now serves all homes bordering Wrinkleneck Creek, Arrowhead Creek and Swan Lake (O'Jala, personal communication); old septic systems have been closed out and are not a source of bacteria or nutrient loading to the watershed. Localized leakage in the sewer collection system has been alleged by one homeowner and has been investigated by the City and Borough of Sitka. Dye studies to verify the integrity of homeowner connections to the sewer system near the lake and to evaluate whether any chronic sewage leaks are occuring have been completed by the municipality at several locations in the watershed. The municipality reported that dye results were negative and confirmed connection to the wastewater system. The one identified crack found in the line at Moller Park was repaired. Future dye studies and/or periodic fecal coliform monitoring along the lake shore may be considered, as the need arises, to evaluate the integrity of lateral connections to the main sewer line and to further test the conclusions from water quality sampling in 1996 and 1997 that Swan Lake is not experiencing elevated fecal coliform bacteria levels from human sources.

The results of these recent investigations suggest that Wrinkleneck Creek-Swan Lake currently qualifies as a Tier II waterbody, meaning that investigations have determined that existing controls are adequate - once implemented - to meet water quality standards. The most effective methods or controls for water quality restoration have been identified. The remedy must fit the problem. These controls are itemized in the Implementation Strategy. This Watershed Recovery Strategy describes the process and steps to be taken to restore the Swan Lake watershed to a condition that meets water quality standards. Such a waterbody recovery strategy may include, or lead to, a Total Maximum Daily Load - or TMDL - under Section 303(d)(4)(A) of the Clean Water Act to include limitations on certain sources. A TMDL refers to establishing allowable, quantified pollutant inputs from various sources based on the total specific pollutant input or load that a waterbody can accommodate and still meet water quality standards.

In the case of Wrinkleneck Creek-Swan Lake, point source (effluent) discharges are not the source of identified exceedances of water quality standards. Rather, debris and residues from urban residential development is the issue. The Swan Lake watershed debris/solid waste problems are not amenable to the traditional TMDL loading capacity approach, given the nature

of the parameters. Remedies for debris and solid waste removal are easy to implement and do not require highly numerical pollutant allocations as would, for example, sediment runoff,

or discharged sewage or seafood wastes. Mechanisms to ensure compliance with standards include best management practices and monitoring/verification of effective debris cleanup.

In the case of Wrinkleneck Creek-Swan Lake, ADEC and the City and Borough of Sitka (CBS) have agreed to the completion of a Swan Lake Watershed Recovery Strategy (Strategy) that would begin with the coordinated, community-based cleanup of pallet boards, metals, wood debris, and litter from the watershed. This alternative approach is expected to effectively address the immediate water quality and habitat issues that led to listing under Section 303(d).

This document constitutes the Strategy for 1) cleaning up debris and solid wastes within the Swan Lake watershed and 2) carrying out the necessary steps to keep the watershed clean. The Strategy describes the process and steps to be taken to restore the waterbody to a condition which fully meets Alaska water quality standards. Effectively carrying out the tasks and controls identified in the Strategy will ultimately lead to the Wrinkleneck Creek-Swan Lake segment meeting standards and being removed from the ADEC list of impaired waterbodies.

Funding to Solve the Problems

In August 1999, the Alaska Department of Environmental Conservation awarded a community water quality grant to the City and Borough of Sitka to complete a Swan Lake Watershed Restoration Project. The stated Objective of the project is as follows:

> "Remove the Swan Lake watershed from the Tier I listing as an impaired waterbody and set in place a strategy for reversing eutrophication of Swan Lake and for long-term management of the watershed to prevent future water quality and aquatic habitat degradation."

Phase 1 (this document) is to prepare and implement a "Swan Lake Watershed Recovery Strategy" which will address removal and control of solid waste/debris, ensure community involvement in the project, confirm that sanitary connections are made, and check that home heating oil tanks are in compliance with state and federal regulations or guidelines. Once these steps are verified, the Wrinkleneck Creek-Swan Lake segment will be removed from the ADEC statewide list of "Impaired Waterbodies". The Strategy will guide the community-wide effort to remove logs, discarded building materials, metals, plastics, and other urban debris from the lake and along its two tributaries and to keep it clean.

<u>The workplan for Phase 1 includes four tasks</u>**<u>:</u>**

Task 1 calls for producing a *Swan Lake Watershed Recovery Strategy (this document)* by January 15, 2000. A draft will be completed by December 13, 1999 followed by public meetings in Sitka in early January 2000. The Strategy includes 1) a schedule and process for removal of solid

waste/debris and plastics; 2) a public information component to assure that watershed property owners are informed of the project goals and objectives; and 3) confirmation, as required, that sanitary connections and above-ground heating oil storage tanks are in compliance with state and

federal regulations. The recovery strategy will be endorsed by ADEC and the Department of Fish and Game (ADF&G) as being responsive to both water quality and aquatic habitat needs.

Task 2 calls for a continuing process of *public outreach* to develop and carry out the Strategy. The City and Borough of Sitka staff, as lead, and the contractor will work to make the watershed residents aware of what is expected from the Swan Lake watershed protection efforts, including "hands-on" opportunities for participation in the solutions to the problems. Volunteers will be recruited to complete the spring and winter cleanup of waterbodies. Mailings or literature "drops", town meetings, Public Service Announcements (PSAs) and press releases will also be used. Public comment will be sought at a meeting in January 2000 on both the draft Strategy and the development of a related, but separate, report on eutrophication (excessive aquatic plant growth) in Swan Lake.

Task 3 calls for completing a debris/solid waste cleanup of Swan Lake, Wrinkleneck Creek and Arrowhead Creek during winter and spring 2000, with all debris cleanup completed by June 10, 2000. A critical element for success of this plan is "hands-on"community involvement in cleaning up debris in the watershed and in keeping the watercourses and adjoining shorelines free from debris in the future. *The coordinated community watershed cleanup* will remove debris, metals, solid wastes and plastics from the Swan Lake watershed. The upcoming "Swan Lake Cleanup Days" in spring 2000 will be coordinated with the ADF&G to assure that the cleanup operations do not degrade fisheries habitat. The City and Borough of Sitka will serve as the lead for coordinating volunteer crews, distribution of garbage bags, and the pickup and disposal of solid waste. The annual city-wide Spring Cleanup will be the principal tool to achieve solid waste cleanup around the perimeter of Swan Lake.

Task 4 is producing a *Swan Lake Watershed Cleanup Report* documenting the results of debris cleanup and compliance with water quality goals. This will be followed by a written request to ADEC from the City and Borough of Sitka to remove the Swan Lake watershed from Section 303(d) Tier I status as an impaired (water quality-limited) waterbody and reclassifying it to Tier III status (tracking and monitoring) or Tier IV status (requiring no further action). A draft cleanup report will be completed by June 15, 2000 and the final report on June 30, 2000.

Time frame for Attainment of Standards

Attainment of water quality standards for debris/solid wastes is expected by June 30, 2000 following community cleanup drives during winter and spring 2000.

Linkages to Swan Lake Eutrophication (excessive aquatic plant growth) : Phase II

An issue of considerable importance to Sitkans is the progressive growth and encroachment of aquatic plants on recreational uses of Swan Lake. This issue will be addressed in the second phase of the Swan Lake Watershed project. The effects of eutrophication - the condition of high nutrient levels leading to excessive aquatic plant growth - are clearly evident in Swan Lake (*Figures 2 and 3*). This is a natural part of the aging process of the lake. The eutrophication project was discussed generally along with debris cleanup at the public meeting in January 2000 so that Sitkans could comment on and make recommendations about the entire watershed restoration effort.

A Report and Action Plan for addressing lake eutrophication will be prepared in Phase 2 of the project. The problem is well stated in this news release from the City:

> "Swan Lake is filling up with plant growth, organic rich deposits and sediment from the creeks that feed into it, said Buggins. If the process is not reversed, Swan Lake could eventually become a parking lot." (Mark Buggins, Environmental Superintendent, City and Borough of Sitka).

Once completed in June 2000, the Eutrophication Report and Action Plan will then be used by the City and Borough of Sitka to seek funding to rehabilitate the lake. Funding will likely come from a combination of federal, state and local sources as well as volunteer efforts by community residents. A variety of rehabilitation alternatives and
costs, along with the environmental consequences of each, will be examined and shared with Sitkans for their review. A preferred alternative will be selected through this process.

Figures 2,3: Aquatic vegetation, Swan Lake

The Swan Lake Watershed: An Area Meriting Special Attention

Swan Lake and its adjacent parks, streams and recreation areas are known as "Sitka's Central

Park". Boating, picnicking, sport fishing, ice skating, and bird watching and feeding are among the activities that make the lake popular with Sitkans. Residential development around the lake and Wrinkleneck and Arrowhead Creeks poses a threat to water quality, the loss of habitat values and acceleration of the natural lake aging, or eutrophication, process.

In an effort to focus more attention on the protection of this special area, Swan Lake and its contiguous marshlands, along with Wrinkleneck and Arrowhead Creeks, were collectively designated in 1981 as an Area Meriting Special Attention (AMSA) under the Sitka District Coastal Management (CZM) Program (City and Borough of Sitka, 1981, 1989). *Figure 4* shows the AMSA boundaries. This formal designation has since lead to several recreation and fisheries enhancement proposals by the City and Borough of Sitka and Department of Fish and Game. Additionally, local efforts to pick up trash, verify sanitary sewer connections, and initial steps to ensure proper above-ground home heating oil storage within the AMSA have been carried out. The annual community Spring Cleanup is hosted each spring by the City and Borough of Sitka, with the support of numerous volunteers and organizations. Swan Lake and its tributaries are among the areas included in these cleanups.

The stated *purpose* of the AMSA (CBS, 1981) is to adopt a process to:

Figure 4: Swan Lake AMSA (CBS, 1981)

- "✔Insure a clean, aesthetically pleasing fresh water body within the roaded area of Sitka to be enjoyed and utilized by the public;
- ✔Maintain and enhance the resident fish population within the Swan Lake watershed for the recreational enjoyment and use of the public;

. ✔Protect and preserve that habitat attractive to swans and associated waterfowl utilizing Swan Lake; and,

- ✔Provide for recreational activities and development practices consistent with the protection and sound management of the lake's resources and habitats as outlined in this management proposal."

Proper and improper uses identified for the Swan Lake AMSA are included in the Sitka District Coastal Management Program and have the status of enforceable policies. These were adopted by resolution in 1989.

Results and Recommendations from Recent On-Site Water Quality Inspections within the Swan Lake AMSA

Three on-site water quality investigations/assessments have been completed since the original 1994 assessment: October, 1996; April 1997, and September 1999. The findings and conclusions of the most recent inspections are summarized below.

The *recommendations* from the April 1997 ADEC waterbody inspection report were:

The municipality and ADF&G should jointly sponsor debris cleanup in Wrinkleneck Creek and Swan Lake between July 15 and August 15, a fisheries-favorable window to avoid disturbance to resident trout populations; [1]

The City and Borough of Sitka needs to provide confirmation to ADEC that all homes along Wrinkleneck Creek are connected to the municipal sewer system and that old leach fields are properly closed out.

Copies of petroleum handling and storage guidelines should be routinely distributed by the municipality to developers of new fill projects along Wrinkleneck Creek and Swan Lake and also be made available to property owners on request (see *Figure 5*).

While fecal coliform bacteria levels in Swan Lake and Wrinkleneck Creek are within acceptable limits and suggest predominantly waterfowl and dog inputs, it is recommended that the municipality continue periodic checks of fecal coliform levels in Swan Lake .

The April 1997 report by ADEC staff concluded that:

☛ "After summer cleanups are successfully completed per recommendation ❶, and recommendation ❷ is acted upon, ADEC recommends that Swan Lake and Wrinkleneck Creek be moved from Tier I to Tier III in the Waterbody Assessment process. As the original listing parameter was solid waste, these actions effectively address those concerns. Periodic tracking and low-level monitoring of water quality should be done (by the CBS) to confirm effectiveness of debris cleanups to improve fisheries habitat of Wrinkleneck Creek and to evaluate fecal coliform/nutrient levels."

Figure 5: Residential heating oil tank, Wrinkleneck Creek area

To update the April 1997 ADEC investigation, an on-site

[1] Since the 1997 report, the preferred cleanup periods have been revised. They are now February 1 - March 15, 2000 for the creeks and April 2000 for Swan Lake.

Figure 6: Debris types within and along banks of Wrinkleneck Creek, Sept. 1999

assessment of debris and solid waste in the Swan Lake watershed was completed in September 1999 by staff of the Sport Fish and Habitat Divisions of ADF&G, City of Sitka Parks and Recreation staff, and the project consultant.

Principal findings of the September 1999 investigation germane to debris/solid waste were:

❶ Debris was present at a number of locations within and along Wrinkleneck Creek from Baranof Street to Lake Street, with the majority of debris located outside the creek bed but within the 25 foot setback on each side of the creek *(Figure 6)***.** Debris locations were flagged for identifying and directing the future coordinated cleanup during winter 2000. Documented debris included large and medium size metals, plastics, wood pallets and debris, a wooden dam structure, abandoned above-ground fuel tanks, and occasional litter. Homeowner storage of large amounts of materials was documented at several homes abutting and, in some cases, on structures extending over Wrinkleneck Creek.

❷ Little debris was found along Arrowhead Creek. The creek is shorter than Wrinkleneck Creek; the streambed has been channelized/altered above Monastery Street by residential fill encroaching on the bank. Periodic flooding of upstream areas and homes bordering Monastery Street has occurred during heavy fall rains as the water backs up during high flows.[2]

❸ Little debris was present in Swan Lake (*Figure 7*). One metal drum and other large pieces of metal were partially submerged in the shallow northern end of the lake near Moller Park; litter was scattered around the shoreline. Several large pieces of debris, including wooden

Figure 7: Metal drum, north end of Swan Lake

[2] Note: Recommendations for improving water flow through Arrowhead and Wrinkleneck Creek, as well as other hydrologic issues, will be addressed in a separate report on Swan Lake eutrophication that will be completed in draft in March 2000.

timbers and a log, were transported down Wrinkleneck Creek to Swan Lake during the September 22, 1999 storm. Winter windblown material and deposited debris are expected to be additional sources that will be evident after the ice melts in spring. This debris will be cleaned up during Sitka's "Swan Lake Cleanup Days" to be scheduled in April 2000**.**

While stream areas above Baranof Street are not listed as impaired on the ADEC list, an inspection was also conducted on this segment of Wrinkleneck Creek in September 1999. The headwaters of Wrinkleneck Creek were free of significant debris that could cause fisheries habitat concerns. The occasional litter on federal lands, a temporary log crib bridge across the creek, and minor debris found in the culvert at the Sitka High School coho salmon incubator site can be easily and satisfactorily removed and disposed of during either the winter or spring cleanups.

❺ Settleable solids levels observed at the outlet culverts of Wrinkleneck Creek and Arrowhead Creek during a heavy rain event were very low; visual observations of turbidity within both creeks confirmed very low levels, and within standards (less than 5 NTUs). Tannins from muskeg runoff naturally color the stream and lake waters and reduce visibility.

❻ Above-ground home heating oil tanks at residences along Wrinkleneck Creek were not leaking fuel to soils or water and appeared to be properly maintained. No specific fuel containment devices were located under or outside the tanks, a voluntary practice that would reduce the risk of any spills reaching Wrinkleneck Creek. Several old, abandoned fuel tanks were noted along the creek, none leaking.

The recommendations from the September 1999 on-site assessment reaffirmed recommendations from the April 1997 assessment, and supported the conclusion that no new additional controls are necessary to solve the noted problems. Existing controls, once implemented, are adequate to address the ADEC-identified problems of debris and solid waste.

Specific *recommendations from the September 1999* assessment include:

☛ Debris cleanup of Wrinkleneck and Arrowhead Creeks and streamside areas should be scheduled during the period February 1 - March 15 to avoid disturbances to fish habitat *(Figure 8)*. Care should be taken to retain natural fish habitat structures such as logs, rootwads and large woody debris in the creeks. The City and Borough of Sitka, with the technical assistance of the Department of Fish and Game and the project consultant, will lead a coordinated community volunteer effort to document size, type, and amount of debris, and successfully remove and dispose of

Figure 8: Fish and Game biologist flagging debris cleanup sites along Wrinkleneck Creek, September 1999

materials

while protecting fish habitat. Forms including this information will be filled out by cleanup crews.

- Debris cleanup of Swan Lake should be scheduled to coincide with the community's annual Spring Cleanup during April 2000. A focused theme such as "Swan Lake Cleanup Days" is recommended. As with the Wrinkleneck and Arrowhead Creeks cleanup, the CBS will coordinate and lead this volunteer effort, including documenting the type, amount and location of debris, removing it and verifying its disposal.

- Homeowners should be notified in advance of the scheduled cleanups and be encouraged to participate in the cleanups. Instructions should be given to cleanup crews to be sensitive to private property and trespassing issues during the cleanups. Permission should be sought, where necessary. The January 2000 public meeting in Sitka will also be an opportunity to discuss the project with residents.

- Homeowners along Wrinkleneck Creek and Arrowhead Creek should be mailed copies of the ADEC brochure outlining guidelines for heating oil handling and storage, with particular reference to aboveground tanks near the creeks. The Appendices include a copy of this brochure.

- The CBS should confirm, through municipal billing records, that all residents in the Swan Lake watershed are currently connected to the city sewer collection system.

- Homeowner storage of varying amounts of solid waste and drums was documented at several homes abutting and, in some cases, extending over Wrinkleneck Creek. The need for better containment of fluids and selective removal of some solid waste at these homes to prevent wastes from entering the creek is recommended.

- Participation in the spring/winter solid waste cleanups should be viewed by the CBS as a "springboard" to enlisting broad-based, ongoing community involvement in future projects to protect the Swan Lake watershed.

Updating the Listing Status of Wrinkleneck Creek-Swan Lake to Reflect New Information

The Section 303(d) listing process (see *Figure 1*) allows for modifications to the lists before the next formal listing process in 2000 where assessments or other recent actions have been completed. This ensures that the latest and best information is used in determining waterbody status and the appropriate level of remedial action.

The recent on-site assessment results currently support upgrading the Wrinkleneck Creek-Swan Lake segment to Tier II status. Tier II waters are defined by ADEC as:

> "... waterbodies that have undergone comprehensive water quality assessments to determine the most effective methods for water quality restoration through the application of waterbody recovery plans."

Once debris cleanups are completed and confirmed during winter and spring 2000, a Cleanup Report will be prepared and discussions on waterbody delistings will begin with ADEC. Effectively carrying out the controls listed in this Strategy will ultimately lead to the Wrinkleneck Creek-Swan Lake segment meeting standards.

The recovery model applied here is similar to that followed for Hammer Slough in Petersburg. In that case, multiple field assessments and monitoring conducted in close cooperation with the City, followed by implementation of best management practices by several parties, led to compliance with water quality standards and the "delisting" of the waterbody.

The waterbody assessment is the primary tool for determining whether or not waters need additional water quality controls over those presently available. *The results of the field assessments completed since 1996 support and conclude that existing controls, where implemented, are adequate to correct the debris/solid waste problems and meet water quality standards. No additional controls are needed***.**

The Watershed Strategy

This report constitutes a Recovery Strategy for removing and controlling debris and solid wastes within the Swan Lake AMSA. This Strategy describes the steps necessary to bring Swan Lake and its tributaries into full compliance with water quality goals and to keep it clean. As such, this community-based Strategy is expected to fulfill "Total Maximum Daily Load" requirements under Section 303(d) of the Clean Water Act. Effective implementation of the Strategy is expected to demonstrate that 1) existing controls (coordinated debris cleanup, public education and involvement) are adequate to achieve water quality standards by the next listing cycle, 2) these controls have resulted in meeting water quality standards by June 30, 2000 and 3) community-based cleanups will continue to keep the watershed clean. This Strategy lays out the sequence of steps needed, a schedule for each task, and identifies responsible parties for the tasks. Measures of success are also identified for each task.

BACKGROUND: THE PHYSICAL SETTING

Figure 9. Sitka and the Swan Lake watershed, pre-1960 (courtesy of the Sitka Historical Society)

The City of Sitka, within the City and Borough of Sitka, is located 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.

The Swan Lake watershed is located near the downtown area of Sitka. The watershed is relatively small, encompassing less than 5 square miles (*Figures 9 and 11).* The watershed drains to Swan Lake through two major streams, Wrinkleneck Creek and Arrowhead Creek. The study area boundaries range from the headwaters of Wrinkleneck Creek in the Gavin Hill area to the east, to residential areas west of Halibut Point Road, north to encompass Moller Park and Lakeview Subdivision, and south to where the discharge of Swan Lake enters Sitka Sound.

A large portion of the watershed is designated as an Area Meriting Special Attention (AMSA) under the approved Sitka District Coastal Management Program (see Figure 2).

History and Values of the Swan Lake Watershed

Swan Lake, including its tributaries and adjacent shorelands, is an important freshwater ecosystem within the City of Sitka. The watershed has natural, scenic and historical values that trace back to the Russian occupation. Recreational uses include fishing, non-motorized boating/sailing, ice skating, bird watching, picnicking and walking. Its location and small size provide an excellent opportunity for limnological study. It is available assessable to local schools for "hands-on" field trips. The wetlands and shorelands along the lake and tributaries help to moderate flooding, provide fish and wildlife habitat and aquatic education opportunities. It was in recognition of these special values that the Swan Lake Area Meriting Special Attention was established by the City and adopted into its CZM program in 1981.

Swan Lake was on the outer edge of the town of Sitka for some 135 years of the town's existence. Historical references to Swan Lake during the Russian period suggest it was originally a series of ponds. In 1851, the Russian occupants of New Archangel dredged and connected the ponds to form a lake so ice could be harvested for shipment to California (DeArmond, 1999). Harvesting of ice continued until 1913 when Booth Fisheries Company opened up a cold storage. A dam at the outlet of the lake had apparently been built by the

Skaters, 1917 (Photo courtesy of the Sitka Historical Society)

Russians for a dual purpose: to raise the level of the lake to provide more area for cutting ice, and to power the sawmill on Swan Creek. Swan Lake's outlet, Swan Creek, continued to furnish water for industrial power and other uses into the 20th century (DeArmond, 1999). Swan Lake is gradually evolving towards a shallower, organic- rich lake with an ever- increasing density of indigenous aquatic plants growing out from the shoreline to deeper portions of the lake. Over hundreds of years, this aging process - if left unmanaged - will culminate in Swan Lake becoming a muskeg/bog habitat.

Before the culverting of Swan Creek eliminated the fishery, Swan Lake and its tributaries once hosted anadromous fish runs, providing spawning habitat for coho, pink and sockeye salmon and cutthroat trout (ADF&G, 1981).

Climate

Sitka has a maritime climate with frequent and heavy precipitation. Low-lying fog, overcast skies, rain and drizzle dominate weather conditions. Episodic events of extremely heavy rainfall (in excess of 2.5 inches per day) can occur during September and October. Average annual precipitation is about 86 inches, some of which falls as snow. Normal summer air temperatures range from 50 degrees Fahrenheit (F) to 60 degrees F while normal winter air temperatures range from 31 to 39 degrees F (National Weather Service, 1999). Prevailing summer winds are from the south and southeast and from the southeast in fall. Monthly average wind speeds range from 3 to 6 mph.

Physical Setting and Land Use

Swan Lake is a small, shallow lake with a continuous bottom layer of organic peat material ranging from 5 to 17 feet thick (Construction Engineering and Stragier Engineering, 1985). The lake's area is about 22 acres with a maximum depth of about 10 feet (3 meters). Roughly 48 % of the lake is less than 3 feet deep with an average depth of 4.5 feet (ADF&G, 1979 and 1981). Shoreline length is estimated at 6,600 ft. Approximately 60% of the lake shoreline is inhabited. The lake has excessive aquatic plant communities and rapid growth from spring through fall; the lake is gradually evolving towards a shallow wetland bog through the continuous process of plant decay and organic deposition. The lake freezes in winter to an ice thickness of about 12 inches.
The lake level has gradually risen over 35 years.

Figure 11: Swan Lake, circa 1975 (photo courtesy of Kathy Miller)

The outlet of the lake flows into Sitka Sound adjacent to the Library through a 60 inch (5 foot) diameter culvert, 1,200 feet in length.

Swan Lake is bordered on the east by Lake Street and on the west by Halibut Point Road and the Lakeview Subdivision. Moller Park abuts the northwest end of the lake. Upwards of 100 homes now surround Swan Lake and the two tributaries. Land ownership is a mix of private, municipal, state and federal.

Two feeder streams to Swan Lake - Wrinkleneck Creek and Arrowhead Creek - and contiguous marshlands around the lake, are included within the Area Meriting Special Attention (AMSA) adopted as part of the approved Sitka District Coastal Management Program in 1981. Wrinkleneck Creek is the major tributary entering the lake . It originates in a muskeg area approximately 3,000 feet east of Swan Lake and traverses muskeg bogs and spruce/hemlock forest along its upper reaches *(Figure 13).* The lower 1,000 feet winds through a residential area between Baranof Street and Lake Street before discharging to Swan Lake.

Homes and property occupied before 1981 often encroach within the 25 foot AMSA-specified buffer on either side of Wrinkleneck Creek and in some cases, extend over the creek (*Figure 12*).

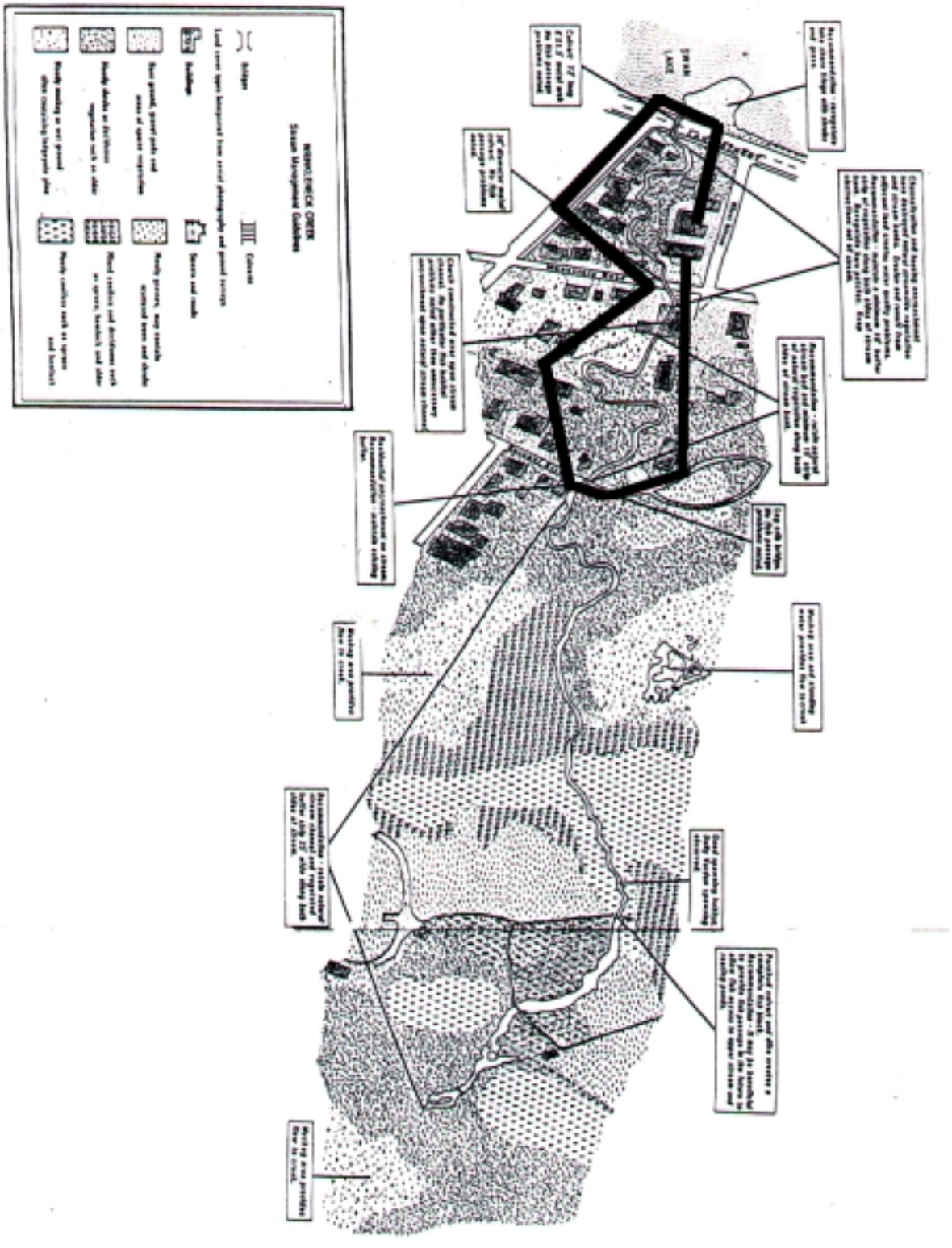
Arrowhead Creek is approximately 700 feet in length, also originating in a muskeg/bog area east of the lake. Arrowhead Creek enters the northeastern end of Swan Lake. It is flanked by residences up to its headwaters.

Wrinkleneck Creek is a low gradient, shallow meandering watercourse fed by surface runoff and groundwater sources in its headwaters. The creek remains unfrozen during winter months, with peak flows of about 20 to 25 cubic feet/second (cfs) estimated during fall (Redburn, this study). The hydrology of both Wrinkleneck and Arrowhead Creeks is principally driven by precipitation and surface water runoff during fall when adjoining wetlands and soils are saturated, with a relatively higher contribution from groundwater expected during winter and any extended summer dry periods (Paustian, personal communication). Given the subsurface geology of the area, it is difficult to quantify the relative contribution of groundwater to Swan Lake's hydrology. It is certainly relevant, particularly discharges to the headwaters.

Figure 12: Wrinkleneck Creek channel under structure on Monastery Street (City and Borough of Sitka photo)

Both Wrinkleneck and Arrowhead Creeks have been altered by stream channelization and obstructions, culverting and filling of adjacent wetlands.

Figure 13. Lower Wrinkleneck Creek, with area requiring concentrated debris/solid waste clean-up noted within black lines (original map from ADF&G, 1981).



THE REGULATORY CONTEXT

I. Applicable Water Quality Standards

Alaska's water quality standards regulations (18 AAC 70) establish protected *designated uses,* numeric or narrative *criteria* or limits to protect designated uses, and antidegradation clauses.

- **Designated Uses**

Designated, or protected, uses for Alaska's fresh waters are found under 18 AAC 70 and include: 1) water supply; 2) water recreation; and 3) growth and propagation of fish, shellfish, other aquatic life, and wildlife. Those designated uses most at risk and impacted by debris accumulation within the Swan Lake watershed are water recreation, and growth and propagation of fish and wildlife.

- **Parameter of Concern**

Alaska's 1998 Section 303(d) list identifies the lower segment of Wrinkleneck Creek - Swan Lake as water quality-limited based on exceedances of the residue standard from the accumulation of wood, plastics, metals and other debris from urban residential development along these waterbodies.

- **Applicable Water Quality Criteria**

The Alaska water quality standards state that residues (debris/solid waste in this case) "May not . . .. . cause a sludge, solid, or emulsion to be deposited beneath of upon the surface of the water, within the water column, on the bottom, or upon adjoining shorelines."

- **Best professional judgment (BPJ) on use impairment**

Included among the guidelines used by ADEC to determine if a waterbody is impaired or water quality-limited is best professional judgment (BPJ). Such documentation from a resource agency professional or other credible source can be applied to determining whether a waterbody has persistent exceedances of water quality standards or that designated uses (e.g. fish habitat) are adversely affected. Direct monitoring data, photographs or videos, or written reports within the last five years are other guidelines used by ADEC in listing decisions.

II. Pollutant Sources

Point Sources

There are no point source discharges to Wrinkleneck Creek and Swan Lake related to, or

contributing to, the debris/solid waste issue germane to the Section 303(d) listing. Therefore,

discharge controls are not relevant to controlling this particular problem. Multiple stormwater discharges to Swan Lake will be addressed in a separate report looking at the progressive eutrophication of the lake and the water quality and other controls needed to reverse this trend.

Nonpoint Sources and Natural Sources

The 1998 Alaska Section 303(d) list identifies the primary source of impairment of Wrinkleneck Creek-Swan Lake as "urban development", and the pollutant as "solid waste", including wood, oil tanks, waste metals, and plastics (ADEC, 1999). These diffuse, nonpoint sources of pollution, and the best management practices Sitkans need to apply to control them, is the focus of this report.

Effects of Debris/solid Waste on Designated Uses

The principal effects of debris/solid waste on uses of Wrinkleneck Creek and Swan Lake are: 1) negative impacts on recreational uses within the AMSA; 2) creation of nuisance conditions that may attract undesirable wildlife species, and 3) potential adverse effects on resident fish habitat and their populations. No smothering of organisms or depressed oxygen conditions have been reported due to debris, litter or metals accumulations. Some level of natural woody debris, such as root wads or smaller trunks, can provide beneficial effects on fisheries habitat and care will be taken to leave such natural woody debris in place during the spring creek cleanup.

The most recent field investigation of the area completed in September 1999 showed that the majority of the documented debris/residues on Wrinkleneck Creek is restricted to areas adjacent to the stream bed, with lesser amounts in the stream. Arrowhead Creek had little debris documented in either the streambed or adjoining streamside buffers.

III. Water quality analysis

As mentioned previously, a Watershed Recovery Strategy may include or lead to, as appropriate, a Total Maximum Daily Load (TMDL) to restore a waterbody to conditions that meet water quality standards. The Alaska Department of Environmental Conservation, after consultation with the EPA, will take the lead on providing the legal documentation for such a process if the agencies determine that this is an appropriate tool to address Wrinkleneck Creek-Swan Lake debris issues. If so, no restoration controls beyond those stated in this Strategy are envisioned.

Load Allocation, Load Capacity and "Margin of Safety"

The nature of the Wrinkeneck Creek-Swan Lake debris issue does not lend itself to the traditional TMDL loading capacity approach such as that taken, for example, in dealing with seafood wastes or mining discharges from pipes. Any TMDL prescribed by ADEC for the listed Wrinkleneck

Creek-Swan Lake segment would include a “zero above background” load allocation and load capacity for non-natural debris and solid waste. This is because the water quality standards

require that no debris be deposited in the stream, lake or on the banks, and that there shall be no continuing sources of residues.

Assimilative capacity is the ability of the receiving waters to accomodate the pollutant, in this case debris and solid waste residues. In Wrinkleneck Creek-Swan Lake and along their banks, the larger metals and debris stay in the system and are not flushed out. While such wastes do not impose a chemical stress on aquatic organisms, they do negatively impact the recreational and habitat values of the watershed and must be removed.

The Clean Water Act Section 303(d) requires that any TMDL prescribed by agencies incorporate a “margin of safety” to address uncertainties about the effects of pollutants on water quality. In the case of Wrinkleneck Creek-Swan Lake, the margin of safety for residues/debris is essentially “no additional residues above natural conditions” or “zero above natural conditions”. This would ensure that fisheries and recreational uses would continue to be protected.

Restoration of the waterbodies and attainment of water quality standards is relatively easy and entails removal of debris and solid waste - as described in the tasks in the Implementation Strategy - that does not serve a fisheries habitat purpose. *Successfully carrying out the Swan Lake Watershed Recovery Strategy is expected to result in meeting agency TMDL requirements.*

Time frame for Attainment of Water Quality Standards

Attainment of water quality standards for debris/solid waste is expected by June 30, 2000 following community cleanup drives during winter and spring 2000.

FINDINGS AND RECOMMENDATIONS FROM HABITAT AND WATER QUALITY INVESTIGATIONS: 1970'S AND 1980'S

Historical Habitat and Water Quality Surveys

Several environmental and fisheries surveys preceded ADEC’s water quality investigations during the 1990's. In 1979, the Sport Fish Division of the Department of Fish and Game completed a time series of biological and physical/chemical investigations of Swan Lake and Wrinkleneck Creek (ADF&G, 1979). Zooplankton, benthos, and fish population data were gathered, along with pH, dissolved oxygen and other basic water quality parameters. Fry traps set up on Wrinkleneck Creek and in Swan Lake confirmed the presence of Dolly Varden and rainbow trout of variable size, and three-spine sticklebacks.

Sundberg and Liepitz (1981) of ADF&G completed habitat surveys of the Swan Lake watershed as part of the resource documentation required for nominating the watershed as an Area Meriting Special Attention under the coastal management program. Their surveys concluded that residential and commercial development around the lake and feeder streams had led to degradation of fish and avian habitat and an acceleration of the natural lake aging process.

Significant aquatic bird use during spring, summer and fall was noted. Management guidelines were proposed for Wrinkleneck Creek and Swan Lake (see *Figure 13*). These included maintaining streamside vegetation within the 25 foot buffer and revegetating portions of the lake shore fringe with grasses and shrubs.

ADEC completed comprehensive trace metal, pesticide and fecal coliform analyses on Swan Lake and Wrinkleneck Creek in 1982, 1989 and 1991. The laboratory results showed pesticide and PCB concentrations in lake sediments to be below the level of detection and sediment trace metals to be generally within acceptable sediment quality guidelines. Fecal coliform levels in the lake were variable, ranging from a maximum of 57 colonies/100 milliliter (ml) down to 0 colonies/100 ml. The state standard is 20 colonies/100 ml.

Staff of the Habitat Division of ADF&G have conducted numerous investigations of the area since the early 1980's as part of the review of dredge and fill (Section 404) permit applications and development proposals. Best professional judgment (BPJ) and recommendations for improved pollution controls and habitat protection practices have been routinely requested as permit stipulations in federal 404 permits and also included in state Title 16 (fish stream) permits.

The Sport Fish Division of ADF&G administers the Swan Lake rainbow trout enhancement program to stock trout and provide for a harvest of up to 200 rainbow trout per year from Swan Lake (ADF&G, 1999). These annual catch statistics help give a qualitative picture of the health of fish stocks within the lake.

City and Borough of Sitka wastewater treatment plant staff collected some basic water quality and fecal coliform samples in Swan Lake and Wrinkleneck Creek in 1983 to determine if sewage was contaminating the lake or creek (Albert, 1983). Staff have periodically screened the lake for fecal coliform levels since that time (Mark O'Jala, personal communication).

EXISTING CONTROLS AND AUTHORITIES

Having sufficient authorities and controls in place to carry out environmental protection and remediation is essential to achieving success. This section describes controls at the local, state and federal levels, with emphasis on controls of the City and Borough of Sitka. The section is relevant to both the Phase 1 debris cleanup activities outlined in this report and future Phase 2 activities for addressing eutrophication of Swan Lake. In those instances where controls have not

been working properly, specific recommendations to make them more effective (e.g. improved compliance/enforcement, periodic monitoring of watershed health, linking up as teams to share resources) are proposed in the Long-Term Implementation Strategy.

Local Authorities and Approvals

The impaired waterbody segments all lie within the municipality's Swan Lake AMSA boundaries. The principal means of assuring that the actions identified in this Strategy are carried out is through local controls. These include the enforceable policies and city ordinances related to managing the Swan Lake AMSA and its setbacks. Additionally, subdivision review approvals, permits, and planning and zoning decisions are tools. Advisories to homeowners living within the watershed on responsible practices for home heating fuel storage in aboveground tanks, litter and solid waste controls, and reminding residents of the AMSA-prescribed, development-free, setbacks along each stream bank are tools that have been historically used by the City.

In February 1989, the Assembly of the City and Borough of Sitka adopted Ordinance 89-859, which adopted and enacted the revised Sitka District Coastal Management Program (CBS, 1989). This ordinance instructed staff to draft appropriate local ordinances to implement and enforce the policies of the Sitka CZM program. Ordinance 89-859 adopted the enforceable policies of the CZM plan, which also include the list of proper and improper uses specified for the Swan Lake AMSA (Marlene Campbell, personal communication).

Local authorities for carrying out the Sitka Coastal Management Program consist of the enforceable policies referenced above as applied to specific land or water uses and activities within the coastal area (CBS, 1989) as well as local planning and zoning authorities granted under Title 29 of State law.

While the enforceable policies of the Sitka CZM plan are largely implemented through state and federal authorities and permits, several local authorities do apply to coastal activities and to environmental/pollution control in general.

Title 29 authorities granted by the State to Sitka (as a Unified Home Rule Municipality) include, but are not limited to, planning and zoning regulations, building and grading permits, conditional land use permits and variances, a litter ordinance, and subdivision ordinance. Enforcement of local permits and approvals is conducted by the responsible issuing Division within the City and Borough of Sitka. For example, homeowner compliance with the local solid waste/litter ordinance is handled by the city building official. No local solid waste permits exist; the city relies on ADEC for issuing state solid waste permits for disposal and management of solid wastes.

The most applicable sections of the Sitka General Code related to Swan Lake/Wrinkleneck Creek debris and sewage issues are Title 9 (Health and Sanitation) and Chapter 15.04 of Title 15 (Sewer

Regulations). The full text of these sections is included in the Appendices.

Chapters 9.08 and 9.12 deal with refuse collection and disposal and litter, respectively. Chapter 9.08.030 (Disposal of refuse) reads "It is unlawful to dump, . . . or otherwise dispose of refuse within the jurisdictional limits of the City and Borough, except at the City and Borough approved refuse disposal site or incinerator." Chapter 9.12.010 makes it unlawful to dispose of litter in other than provided receptacles or sites. Chapter 9.12.020 (Notice to abate-Removal by municipality) authorizes the planning director to require property owners to properly dispose of litter or junked cars or, upon failure to do so, to be liable to the municipality for the costs of litter removal. Litter is broadly defined to include garbage, refuse, and rubbish. The debris and solid waste materials to be removed from the Swan Lake watershed all fall within this definition.

Chapter 15.04.020 (Connection to sewer system mandatory) was used to require Swan Lake, Wrinkleneck Creek and Arrowhead Creek homes to connect to the municipal sewer system and thus end septic leakage into Swan Lake (Marlene Campbell, personal communication). The CBS Public Works Department has verified that all residents in these areas are now connected to the municipal sewer system (O'Jala, 1999).

Sitka's Subdivision ordinance (Title 21) and local Zoning Ordinance (Title 22) have been revised considerably since 1983, principally to add sections to improve their use as a coastal management implementation tool (CBS, 1989). Of particular relevance to Swan Lake, Wrinkleneck Creek and Arrowhead Creek is the dedication for a no-development easement along either side of a creek or stream, with provision for wider easements if the stream is anadromous. This requirement recognizes and addresses the streamside setback guidelines of the Swan Lake AMSA with expanded and improved municipal authorities.

The Comprehensive Plan

Municipal planning can be a powerful tool to address environmental concerns within the Swan Lake Watershed, including debris and solid waste control. The first Comprehensive Plan of the City and Borough of Sitka was adopted in 1976. The most recent draft revision to the Comprehensive Plan was issued in July 1998 with a final plan expected by early 2000. The Comprehensive Plan incorporates the Sitka CZM plan and provides the broad direction for community growth and environmental protection.

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 Swan Lake eutrophication problems, wetlands damage occurring around the lake, and

Wrinkleneck Creek and Arrowhead Creek stream cleanup and erosion.

Swan Lake Area Meriting Special Attention (AMSA) and the Sitka Coastal District Management Program

The Swan Lake AMSA was adopted in 1981 as a "Special Issue" element of the Sitka Coastal District Management Program. It recognized the Swan Lake watershed for its recreational use, its importance as a freshwater ecosystem in Sitka, and the threats posed by development to its habitat and water quality values. Both *proper and improper uses* within the AMSA are itemized in the original and revised CZM Plan (CBS, 1981 and 1989) and are adopted as enforceable policies. Improper uses relevant to the Section 303(d) issues of debris and solid waste cleanup and control are:

- development of permanent structures or land clearing within the 50 foot special management zone without acquiring local, state and federal approvals and a review for a determination of impact against the AMSA policies.

- cutting or eradication of natural vegetation occurring within the special management zone (25 ft buffer on each side of Wrinkleneck and Arrowhead Creeks to Baranof Street; 50 ft on each side above Baranof Street; 50 ft around Swan Lake) which would cause losses of streamside and lakeside cover or erosion of soils to these waters.

- unauthorized dredge and fill operations, and

- obstructions of natural water flows leading to flooding of wetlands within the AMSA boundaries or creating unfavorable changes to aquatic, wetland or shoreline vegetation which would decrease use by fish or waterfowl.

In summary, the existing municipal code provides sufficient authority to remedy and control solid waste and debris problems within the watershed without the need for new controls.

State and Federal Controls

The City and Borough of Sitka relies heavily on federal and state laws, regulations and permits to implement the CZM program. Army Corps of Engineers dredge and fill permits for wetlands under Section 404, Forest Service and BLM Land Use permits, ADF&G Fish Habitat Permits on Anadromous Streams (Title 16), ADNR state tidelands leases and permits, DGC coastal consistency determinations and water quality certifications issued by ADEC are examples of authorizations used to manage uses/activities within the Swan Lake AMSA.

Solid waste advisories, grants, agency field staff visits, Section 303(d) listings, and enforcement of state and federal permits are examples of other state and federal tools to address pollution

control.

THE IMPLEMENTATION STRATEGY

The Implementation Strategy outlined below addresses the three elements for the Phase 1 project: 1) a schedule and process for removal of solid waste/debris and plastics, 2) a public information component to ensure area property owners are aware of the projects goals and objectives, and requesting their involvement in its ultimate success, 3) confirmation, as required, that sanitary hook-ups and oil storage tanks are in compliance with state and federal regulations. Future controls on solid waste generation within the watershed, along with citizen involvement, are an important part of the project.

Both a near-term and long-term strategy are proposed.

I. THE NEAR-TERM STRATEGY FOR DEBRIS AND SOLID WASTE CLEANUP

- Winter 2000 stream cleanup

The City and Borough of Sitka, with assistance from the Department of Fish and Game, have agreed to coordinate the solid waste cleanup of Wrinkleneck Creek and Arrowhead Creek during the period February 1 - March 15, 2000. This window was selected to avoid potential adverse impacts on resident populations of dolly varden, cutthroat and rainbow trout and their wintering habitats. *Objectives* for the effort are: remove all debris in a manner that doesn't harm fish or their habitat, seek cooperation from neighbors living along the creeks, involve members of the community in the cleanup effort, stabilize any bank areas affected by the removal of large solid waste, and use the field sessions to increase public awareness of the concerns and reasons for cleanup.

Figure 14: Debris storage adjacent to Arrowhead Creek, September 1999.

Debris sites were flagged in September 1999 to identify locations needing cleanup. City of Sitka and Fish and Game Habitat and Sport Fish staff will closely oversee the removal and disposal of debris. The municipality's Public Works Department will donate trucks and time for picking up and disposing of the debris.

Task: *Wrinkleneck and Arrowhead Creek (and adjacent streamside areas) debris cleanup*
Responsible party(s)*: City and Borough of Sitka, with ADF&G and consultant assistance*

Schedule: *1 to 2 days from February 1 - March 15, 2000. Snow conditions will dictate date.*
Segments of public involved*: Scout troops, municipality, and ADF&G staff, interested citizens*
Measures of success*: amount and type of debris removed; estimated weight disposed of; improved fish habitat*

- Public involvement in the Swan Lake watershed project

Task(s)*: PSAs, newspaper article, phone calls, home mailings, coordination of volunteer cleanup effort; public meeting. Coordinate volunteers for creek and Swan Lake cleanups*
Responsible party(s)*: City and Borough of Sitka, Parks and Recreation and Public Works*
Schedule*: October 15, 1999 through May 31, 2000; public meeting scheduled for January 2000*
Segments of public involved*: interested citizens of Sitka*
Measures of success*: number of citizen volunteers helping with cleanup; diversity of volunteers; future watershed groups formed as a result of process; confirmation of mailings and media announcements*

- Spring 2000 Swan Lake debris cleanup

The City and Borough of Sitka will host a spring "Swan Lake Cleanup Days" event during April 2000. The event will coincide with the annual community-wide spring litter cleanup, with focused attention on Swan Lake and its shorelines.

Task: *Coordinate and carry out "Swan Lake Cleanup Days"*
Responsible party(s): *City and Borough of Sitka, Parks and Recreation*
Schedule: *Spring (April) 2000*
Segments of public involved: *Scouts, Rotary Club, students, interested citizens and businesses*
Measures of success: *Amount and type of debris removal; estimated weight of materials disposed; number and diversity of volunteers involved; public interest in forming a future watershed stewardship group*

- Verifying sanitary sewer connections and home heating oil tank management practices

One task of the approved workplan for this project includes verifying that all residents along Wrinkleneck and Arrowhead Creeks and those bordering Swan Lake are connected to the municipal sewer system. A second element is to assess residential above-ground heating oil tanks along Wrinkleneck Creek to ensure proper maintenance and to check for any leakage. While neither ADEC or EPA regulate residential heating oil tanks, education on best management practices to reduce leakage problems is an appropriate task.

Task 1: *Verify sanitary connections from available records and information*
Responsible party(s): *City of Sitka, Public Works Dept.*

Schedule: *by December 13, 1999*
Segments of public involved: *City staff and consultant*
Measures of success: *City memorandum verifying 100% hookup; names and addresses of watershed residences; map of residences*

Note on Status: Confirmation that all homeowners are hooked up to the municipal sewer collection system was completed on September 28, 1999 (see memo in Appendices). Possible

localized leakage in the sewer collection system along Lake Street and Moller Park has been alleged and previously investigated by the City and Borough of Sitka. Dye studies to verify the integrity of homeowner connections to the sewer system and to evaluate whether any chronic sewage leaks are occuring have been completed by the municipality at several homes in the watershed. The municipality reported that results were negative and confirmed connection to the wastewater system. To address this issue, future dye studies and/or periodic fecal coliform monitoring along the lake shore may be considered, as the need arises. This would allow for continued evaluation of the integrity of the wastewater system and whether Swan Lake is experiencing higher fecal coliform bacteria levels than those previously measured.

Task 2: *Mail copies of ADEC's brochure "For Homeowners with Heating Oil Tanks" to each home address along Wrinkleneck Creek, Arrowhead Creek and Swan Lake; periodic walk-throughs to assess streamside areas and lake fronts for any fuel leakage.*[3]
Responsible party(s)*: City and Borough of Sitka*
Schedule*: mailings by June 30, 2000; walk-throughs after June 30, 2000*
Segments of public involved*: Homeowners living along Wrinkleneck and Arrowhead Creeks and Swan Lake*
Measures of success*: Mailings confirmed; periodic walk-throughs and short follow-up notes by CBS staff*

Verifying the success of phase 1 cleanup activities

Monitoring progress towards meeting the objectives of Phase 1 activities is essential. The following approaches will be used.

- Swan Lake Watershed Cleanup Report (due June 15, 2000)

A Swan Lake Watershed Cleanup Report documenting the results of debris cleanup and compliance with water quality goals is due to ADEC by June 15, 2000. This report will evaluate

[3] The September 1999 field inspection noted no apparent leaking or poorly maintained home heating oil tanks along Wrinkleneck Creek. One home at the intersection of Baranof Street and Wrinkleneck Creek had appropriately moved the fuel tank to the side of the house away from the creek.

each cleanup task against the relevant “measures of success” listed above.

A final accounting of debris location and type, numbers for each type, and estimated weight of disposed materials will be provided in a field inspection report, along with post-cleanup photographs for comparison with debris site photos taken in September 1999. Municipal, ADEC and ADF&G staff will collectively walk the watershed and verify that cleanup is complete.

The results of the watershed “walk-through” in September 1999 assessed compliance of home heating oil tanks with federal and state guidelines and regulations. No apparent leaks or improperly maintained tanks were observed. The locational issue of many tanks being near the stream is, in some cases, difficult to remedy. The brochure mailing on maintenance practices for fuel tank owners will address spill containment and control issues. The results of future “walk throughs”will be reported in a field inspection report.

Periodic monitoring of fecal coliform in Swan Lake and Wrinkleneck Creek by the CBS, Public Works Department, is recommended for screening against any leakage in the sewer collection system. While the levels of fecal coliform bacteria monitored to date suggest the source of bacteria in the lake appears primarily from non-human sources, the potential health effects of waterfowl-derived fecal coliform bacteria on swimming and other water contact uses, as well as he need to verify the future integrity of the sewer connection system along Lake Street, warrant consideration of periodic sampling.

II. LONG-TERM CONTROL STRATEGY FOR DEBRIS, REFUSE AND RELATED ISSUES: Y2K AND BEYOND

The near-term strategy for removal of debris and solid wastes from the Swan Lake watershed, once completed, will address the immediate regulatory issue facing the municipality. These efforts should be viewed as an opportunity and “springboard” for introducing the larger issue of maintaining watershed health and controlling future problems. This is an ongoing task.

The following are a “pallet”of recommended actions that can be individually or collectively used for achieving a continuing community effort towards meeting the recreational and water quality goals for the Swan Lake watershed. They are voluntary actions, but will help ensure a watershed clean of debris and other wastes. Many are being successfully used in other watershed protection efforts in Alaska. Several of the actions are closely linked to future efforts by the City and Borough of Sitka to control eutrophication in Swan Lake. A more exhaustive list of actions will be included in that future report as they relate to sediment and erosion controls, hydrology, nutrient loading, wetland encroachment, vegetative buffers, and forest park enhancement north of Swan Lake in the Moller Park area.

Recommendation 1: *The City and Borough of Sitka should pursue an ongoing management approach that assesses the "State of the Environment" for the Swan Lake watershed on an annual basis.*

Active, ongoing management of activities within the Swan Lake AMSA watershed by the City and Borough of Sitka will help ensure that the watershed is maintained in a healthy state and avoids the potential for relisting on the state's Impaired Waterbody list in year 2000 and beyond.

An annual "internal" assessment of watershed controls and activities against proper and improper uses within the AMSA need not be rigorous, but would strengthen the management of the watershed and provide a factual basis for enforcement for non-complying activities. As an example, periodic walk-throughs are encouraged to monitor the effectiveness of debris controls throughout the year and to clean up debris before it becomes a problem again.

Recommendation 2: *The City and Borough of Sitka should give a high priority to implementing previously-identified water quality and habitat improvements to the Swan Lake watershed. The Parks and Recreation Committee, or a smaller Moller Park/ Swan Lake Task Force, could help obtain citizen input and involvement and provide some oversight of Swan Lake remediation efforts.*

There is broad public support and interest by Sitkans in maintaining a healthy Swan Lake watershed. The Parks and Recreation Committee has a lead role in developing short and long-term recreational goals for the Swan Lake watershed. The Moller Park/Swan Lake Ten Year Community Use Plan was proposed in 1991 by a Task Force of the Committee. Several of the Task Force recommendations remain to be implemented. The Parks and Recreation Committee should support the CBS in continuing to encourage citizen involvement in issues of Swan Lake water quality protection. The Committee could play an important role in advocating the City and Borough of Sitka's implementation of the Swan Lake Eutrophication Action Plan.

Recommendation 3: *The City and Borough of Sitka should continue to host the annual community Spring Cleanup and guarantee the inclusion of Swan Lake and Wrinkleneck Creek among the areas.*

Such events stress the positive outcomes of community involvement and lead to more pride in a clean environment.

Recommendation 4*: Ensure permits and development approvals within the Swan Lake AMSA boundaries are coordinated through a "team" approach among all the departments within the City and Borough of Sitka with responsibility for these activities.*

The Parks and Recreation, Public Works, and Planning Departments all have important interests and responsibilities for certain activities in the Swan Lake watershed. Recognizing time and

staffing shortages, a "team approach" may offer efficiencies. The "Planning Review Station" approach recently proposed by the CBS/Public Works Department is a good example of an effort to improve the coordination of reviews involving building permits, fills, utility and engineering issues.

Recommendation 5*: Seek ways to improve compliance with local refuse and litter ordinances (Chapter 9) and established streamside setbacks within the Swan lake AMSA. Educational approaches and one-on-one discussions should be used first, followed by enforcement, as needed*.

Educational flyers to homeowners would be a good tool to emphasize the values of the Swan Lake watershed and keep them apprised of planned activities and proper uses in the AMSA. One-on-one discussions with those individual homeowners along Wrinkleneck Creek who currently have debris stored within the streamside setbacks is recommended. Summary sheets listing specific proper and improper uses would be a useful tool for both citizens and local planning and permit staff as a guide to responsible development within the AMSA.

Recommendation 6: *Actively support middle school, high school and university projects which provide students"hands-on" environmental education and volunteer monitoring opportunities within the Swan Lake watershed.*

School involvement links science with management. It's a strong lesson and also helps bring adults "to the table" to look at solutions. Schools are an important part of the community team.

Recommendation 7: *Complete a vegetation and forest park management approach to guide selective clearing and brushing within the watershed.*

Selective removal of vegetative cover is acceptable in some areas, but generally not a good idea immediately adjacent to streams. An evaluation of the vegetation management policies in the Swan Lake AMSA against what is actually happening in the watershed should be completed and adjustments made, as necessary.

Recommendation 8: *The City and Borough of Sitka should actively pursue more frequent communication with state and federal regulatory agencies, readily exchange information, and extend the offer to form "teams" to address specific proposals.*

"Teaming" with resource agencies helps build trust and is less adversarial than enforcement approaches. ADEC has begun to utilized a team approach with varied interests in a variety of

small-scale watershed protection projects throughout Southeast Alaska, including Granite Creek in Sitka, Hammer Slough in Petersburg and Lemon Creek in Juneau. This approach may be a useful model for the Swan Lake watershed.

Recommendation 9: *Agency staff (DGC, ADEC, ADF&G, federal agencies) working with the municipality on specific water quality projects are encouraged to visit Sitka to meet city representatives, walk the project area, and get an "on -site" appreciation for the issues they regulate. This recommendation is linked to #8.*

It goes without saying that better agency decisions are made with first- hand interaction with the activities they regulate. This recommendation addresses a stated concern from CBS staff that agency staff living outside the city - but issuing permits and approvals that affect the city - infrequently visit Sitka to "ground" themselves in the issues.

Recommendation 10*: Use the Swan Lake Watershed Recovery Strategy as a "springboard" to enlisting community involvement in the planning and remediation of Swan Lake under Phase 2 of the project, titled the "Swan Lake Eutrophication Report and Action Plan".*

Recommendation 11: *Work towards developing an improved information base on watershed hydrology, physical and chemical characteristics of the lake, and wetland functions to better understand the current watershed condition and trends (both natural and man-made) in condition over time.*

This is a long-term task. It is also true that management actions often have to be taken without having complete scientific information. However, as for many watersheds, lack of basic information on the Swan Lake watershed does constrain scientists' ability to explain the reasons for changes in watershed condition. Reliance on anecdotal evidence and untested hypotheses often is the result. A more statistically-rigorous database will allow for improved cause-and-effect analysis of watershed changes and rehabilitation options. Stream flow measurements, surveys of lake level, physical parameters, nutrient chemistry, vegetation mapping and aerial photography would all be important elements. Agencies could provide quality assurance/technical support, while data collection could be done by students or other volunteers.

The process of improving our information base could also address other issues. Sewer collection system leaks have been alleged. Only a fragmented water quality database exists to address this issue. Future dye studies and/or periodic fecal coliform monitoring along the lake shore may be considered appropriate, as the need arises, to continue the municipality's ongoing evaluation of the integrity of sewerage systems and whether Swan Lake is experiencing elevated fecal coliform bacteria levels.

PUBLIC REVIEW AND COMMENT

The draft Swan Lake Watershed Recovery Strategy was made available for public review and comment by the City and Borough of Sitka in late December 1999. A public workshop was held in Sitka on January 4, 2000 to discuss the draft Strategy and to introduce ongoing work on the companion Swan Lake Eutrophication Report. Every resident living along the creeks and lake was individually telephoned and invited to the workshop. A public notice and press release were also published in the Daily Sitka Sentinel; radio coverage was provided. Over 20 residents attended the workshop, with over half of those signing up to help with the upcoming creek and lake debris cleanups.

Regarding Phase 2 of the project, a separate draft Swan Lake Eutrophication Report and Action Plan will be available for public review on March 15, 2000. It will detail the current environmental conditions within the watershed and analyze a variety of alternatives for controlling the progressive aquatic plant growth in Swan Lake. Hydrology and stormwater issues will also be discussed. The costs and environmental effects of each treatment will be addressed. A preferred alternative will be selected by the City and Borough of Sitka after public meetings and substantive discussions with Sitkans on how they wish their watershed managed.

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APPENDICES

I. Excerpts from Alaska's 1998 Section 303(d) list of Water Quality-Limited Waterbodies (Tier I, page 5)

II. City of Sitka news release on Swan Lake project (June 22, 1999)

III. City of Sitka memorandum confirming sanitary sewer connections (September 28,1999)

IV. ADEC brochure "For Homeowners with Heating Oil Tanks"

V. Local ordinances for refuse collection and disposal and sewer regulations

VI. Alaska Department of Environmental Conservation Waterbody Inspection and Assessment Reports: Swan Lake/Wrinkleneck Creek. April 23, 1997.

Effective and strong partnerships are the key for both restoring impaired watersheds and sustaining healthy ones.