APPENDIX A-1
SITKA COASTAL MANAGEMENT PLAN ENFORCEABLE POLICIES AND DEFINITIONS

ENFORCEABLE POLICY CROSS REFERENCE TABLE		SITKA COASTAL MANAGEMENT PLAN	
Policy # and Page # (Ch. IV)	**Issues, Goals and Objectives**	**Resource Inv. and Analysis***	**Maps**
1.1, p. 25	p. 19 issues, p. 24 goals /obj	Ch. III p. 20, App. A-6	None needed
1.2, p. 26	p. 19 issues, p. 24 goals /obj	Ch. III p. 20, App. A-6	None needed
1.3, p. 26	p. 19 issues, p. 24 goals /obj	Ch. III p. 20, App. A-6	Ch. III Figures 2, 4-5; all figures in Ch. 5
1.4, p. 26	p. 19 issues, p. 24 goals /obj	Ch. III p. 20, App. A-6	Ch. III Figs. 3-3d
1.5, p. 27	p. 19 issues, p. 24 goals /obj	Ch. III p. 20, App. A-6	None needed
1.6, p. 34	p. 29 issues, p. 363 goals / obj	Ch. III p. 30, App. A-6	None needed
1.7, p. 35	p. 29 issues, p. 363 goals / obj	Ch. III p. 30, App. A-6	Ch. III Figures 4-5
1.8, p. 36	p. 38 issues, p. 39 goals / obj	Ch. III p. 38, App. A-6	None needed
3.1, p. 46	p. 44 issues, p. 48 goals / obj	Ch. III p. 45	None needed
3.2, p. 46	p. 44 issues, p. 48 goals / obj	Ch. III p. 45	None needed
3.3, p. 46	p. 44 issues, p. 48 goals / obj	Ch. III p. 45	Ch. III Figure 4
3.4, p. 46	p. 44 issues, p. 48 goals / obj	Ch. III p. 45	Ch. III Figure 4b, Figure 5; also various maps in Ch. 5
3.5, p. 46	p. 44 issues, p. 48 goals / obj	Ch. III p. 45	Ch. III, Figure 5
4.1, p. 59	p. 57 issues, p. 62 goals / obj	Ch. III p. 58	None needed
8.1, p. 75	p. 76 issues, p. 78 goals / obj	Ch. III p. 77	None needed
**** Resource Inventory and Analysis for previous policies are found in chapter IV and App. A-6.***			
AMSA 13.1, p.99	issues p. 97-102; goals/objectives p. 102	Appendix A-7	Ch. IV Figure 7
AMSA 3.2, p.99	issues p. 97-102; goals/objectives p. 102	Appendix A-7	Ch. IV Figure 7
MSA 13.3, p. 100	issues p. 97-102; goals/objectives p. 102	Appendix A-7	Ch. IV Figure 7
MSA 13.4, p. 100	issues p. 97-102; goals/objectives p. 102	Appendix A-7	Ch. IV Figure 7
*****Resource Inventory and Analysis for previous policies are found in Appendix A-7.***			
SMA 14.1, p. 129	issues p. 108; goals p. 109	Ch. IV p. 20, App. A-6	Ch. V, maps
SMA 14.2, p. 129	issues p. 108; goals p. 109	Ch. IV p. 45, Ch. V, App-6	Ch. V, maps for SMAs with sockeye streams
SMA 14.3, p. 129	issues p. 108; goals p. 109	Ch. IV p. 45, Ch. V, App-6	Ch. V, maps for SMAs with public cabins, shelters/trails
SMA 14.4, p. 130	issues p. 108; goals p. 109	Ch. IV p. 20, Ch. V, App-6	Ch. V, all maps
SMA 14.5, p. 130	issues p. 108; goals p. 109	Ch. IV p. 45, Ch. V, App-6	Ch. V, maps for SMAs with trails
SMA 14.6, p. 130	issues p. 108; goals p. 109	Ch. IV p. 45, Ch. V, App-6	Ch. V, all maps
**** Resource Inventory and Analysis for previous policies are found in chapter IV and App. A-6.***			
Designation, page #, # of policies		**Resource Inv. & Analysis**	**Maps**
recreational areas, p. 41, 5 policies		Chapter IV p. 45	Ch. III, Figures 4-5, figures in Ch. V
suitable for major energy facilities, p. 53, 1 policy		Chapter IV p. 58	Ch. III Figure 6
designated recreational use areas, chapter V, 9 policies		Chapter V	Chapter V

A. SITKA COASTAL MANAGEMENT PLAN ENFORCEABLE POLICIES

Applicability of policies: The following policies apply within the Sitka CMP boundary, as described in Chapter III of the Sitka CMP. Relevant maps references are included with each policy. Table 3 below provides a handy cross-reference where a map is needed to determine the portion of the district's coastal zone to which an enforceable policy will be applied.

TABLE 3: ENFORCEABLE POLICY APPLICABILITY

MAP FIGURES		ENFORCEABLE POLICIES								
		1.3	1.4	1.7	3.1	3.2	3.3	3.4	3.5	4.1
	2	✓								
	3		✓							
	4	✓		✓	✓	✓	✓	✓		
	5	✓		✓	✓	✓	✓	✓	✓	
	6									✓
	7				✓	✓				
	Ch.5	✓			✓	✓		✓		

DEFINITION: For purposes of this section, a "floating facility" is defined as a boat, houseboat, barge, or any structure located on a raft that is moored or anchored in one location for a period of 14 days or more, during which time it is not primarily used for transportation. Floating facilities may be powered or not. Floating facilities located in harbors and marinas are excluded from this definition. Floating facilities can generally be separated into the following use categories, including, but not limited to:

- Fishing related: processors, buying scows;
- Mariculture/aquaculture related: operations facilities and bunkhouses, research or educational stations, net pens;
- Transportation and/or Tourism related: seaplane, tour boat or other water-based operations;
- Timber related: floating logging camps, reconnaissance or other short-term projects, thinning contract camps;
- Mining related: floating mining camps, dredges, support claim development;
- Wild Resource Use: trapping camps, sport fishing lodges, bird watching stands, base camps for recreational activities;
- Floathouses: primarily designed, intended, or fitted out as a residence or place of habitation and not an integral component of another use category.

DEFINITION: For purposes of this section, "public benefit" is defined as:

The broad-based socioeconomic gains accruing to the public from a use or activity which creates jobs, maintains the Sitka District's renewable resources, stabilizes or enhances resource development and economic base, or in other ways serves the public good to a greater extent than the use or activity adversely impacts the general public and/or environment.

1.1 **Policy:** In determining whether to allow or prohibit any floating facility at a specific site, the following priorities shall be considered:

1) Highest priority shall be given to those uses and activities that are water-dependent or water-related. Examples of such uses and activities include fish processors, fish buying scows, water-based transportation facilities, aquaculture or mariculture facilities.

2) Higher priority consideration shall be given to those uses and activities that are neither water-dependent nor water-related, for which there are no practicable upland alternatives. Examples of such uses and activities include camps supporting logging, thinning contracts, reconnaissance or other short-term projects, mining, or other related activities; research stations; floating log transfer or storage facilities; dredges.

3) Lower priority consideration shall be given to those uses and activities that benefit only an individual or limited group, are neither water-dependent nor water-related, and for which there are no upland alternatives. The intent of this policy is to severely restrict placement of those facilities seeking to locate on publicly owned waters that do not generate a public benefit.

   Examples of uses and activities under this category include sport-fishing or other floating lodges, trapping camps, base camps for recreational activities.

4) Lowest priority consideration shall be given to those uses and activities that benefit only an individual or limited group, are neither water-dependent nor water-related, and for which there are upland alternatives. The intent of this policy is to severely restrict placement of those facilities seeking to locate on publicly owned waters that do not generate a public benefit.

   Examples of uses and activities in this category include residential float houses, sport fishing or other floating lodges, trapping camps, or base camps for recreational activities.

1.2 **Policy:** The following important physical and economic criteria shall be considered in determining whether or not to permit a floating facility at a specific site:

1) The size and configuration of the site and surrounding area.

2) The public benefits or adverse impacts the facility will have on the area itself, as well as on other users of the area considering the number of persons impacted physically and economically both positively and negatively by the facility (from a few individuals to the entire community) and the degree of those impacts on both upland owners and users.

3) The length of time the facility will be in place at the site, with seasonal or short-term uses given higher priority consideration than long-term use.

4) The complexity of the facility, with greater scrutiny being directed toward a facility taking up a large area and/or having broader or more impacts than a small facility would generate.

5) The appropriateness of the site to accommodate a floating facility in terms of its physical characteristics, including anchorage, hazards to navigation, proximity to other floating facilities or upland users, site specificity (the need for the facility to be located at a specific site)."

1.3 **Policy:** Floating facilities shall be prohibited in the following areas, unless a significant public benefit results from the proposed use, and there is no practicable upland alternative for the proposed use:

1) Designated Recreational Use Areas as shown on map Figures 4- 5 and all Special Management Area Figures in Chapter V.

2) State Tidelands adjacent to Wilderness Areas as shown on Figure 2, unless the facility is considered a high-priority use under Policy 1.1, and a public benefit results from the proposed use. Both short-term and long-term benefits will be evaluated.

1.4 **Policy:** Within the Sitka Sound area, as shown on Figure 3, private floathouses for residential use that are not an integral component of another use category may be permitted on public tidelands only within the following areas:

1) Within Jamestown Bay, as shown on Figure 3a, in the area by Guertin and Dove Island currently occupied by floathouses;

2) Within Camp Coogan Bay, as shown on Figure 3b, including the immediately adjacent bight currently occupied by floathouses;

3) Within the northern bight of Eastern Bay, as shown on Figure 3c;

4) Within Picnic Cove, as shown on Figure 3d, so long as boat anchorage use is not obstructed.

1.5 **Policy:** The following requirements shall apply to all floating facilities permitted within the District:

1) Grounding: Floating facilities shall be sited to avoid shallow areas where they could settle on or abrade the substrate during low tides. To the extent practicable, floating facilities shall be moored in a minimum of 12 feet of water present during mean lower low water or 0.0 tide stage.

2) Proper Anchoring: Floating facilities shall use anchoring methods similar to a marine vessel and shall not use shore ties or other means which restrict passage around their location unless specifically approved by the appropriate agency or agencies as

meeting regulatory requirements. Anchors shall be of sufficient weight and holding capability to keep the facility in its permitted location without being washed up or damaged on the beach.

3) Removal: An owner or operator shall be responsible for promptly removing and disposing of floats, docks, rafts, boats, and floathouses or other related materials when the lease or permit fees lapse. Abandonment, casting loose, or disposal on a beach are prohibited as disposal methods.

4) Exception to Above Requirements: The above requirements apply to floating facilities on publicly-owned tidelands rather than those tied with the permission of the dock owner to a private dock on privately owned tidelands.

1.6 **Policy**: Priority for coastal development adjacent to the Sitka road system shall be given in the following order:

1) Highest priority is given to water-dependent uses and activities. Examples of water-dependent uses and activities include fish hatcheries, aquaculture or mariculture activities, fish processing plants; boat harbors; freight, fuel, or other docks; seaplane, tour boat staging, or other water-based transportation facilities; marine ways (haul out areas).

2) Second-highest priority shall be given to water-related uses and activities. Examples of water-related uses and activities include marine gear stores, waterborne commerce activities, water-based recreational sites.

3) A low priority shall be given to non-water-dependent or non-water-related uses and activities for which there are no practicable upland alternatives. Theses shall be evaluated on a case-by-case basis to ensure that a future significant potential water-dependent or water-related use for that site is not preempted.

4) A lower priority shall be given to non-water-dependent or non-water-related uses and activities for which there are upland alternatives, but which would derive benefit from being on or near the waterfront. Examples of uses and activities under this category include hotels, restaurants, shops and activities for visitors, and residences.

   These shall be evaluated on a case-by-case basis to ensure that a future significant potential water-dependent or water-related use for that site is not preempted. The evaluation shall consider the suitability of the site for water-dependent or water-related use due to size and depth of water frontage, topography, or other physical factors, and the feasibility of upland alternatives. Greater weight shall be given to a business that derives a major economic benefit from being on or near the waterfront.

5) The lowest priority shall be given to large land uses and activities that are neither water-dependent nor water-related and for which there are practicable upland alternatives. Examples of uses and activities under this category include office buildings, public schools or similar uses.

1.7 **Policy:** Dredging or filling on tidelands within the designated recreational use areas listed below is allowable only as required for protection of the resource from storm or other damage, or for enhancement of recreational, historic or other cultural values *Note: See Appendix A-6 for information on specific sites, and figures 4 and 5 for locations:*

1) Starrigavan Bay, Estuary and Creek;
2) "Old Sitka" Historic Site;
3) Granite Creek at Halibut Point Recreation Area and Tidelands;
4) Indian River Estuarine Flats;
5) Lower Indian River Corridor.

1.8 **Policy:** Waterfront residential uses have the lowest priority and are allowable adjacent to coastal waters where water-dependent or water-related activities are not suitable.

There are no policies for Section 2, Natural Hazards.

3.1 **Policy**: A project within designated recreational use areas as shown on Figures 4-5 and 7 and the Special Management Area Figures in Chapter V must avoid, minimize, or mitigate adverse impacts to the physical features upon which the recreation depends. Physical features include ocean view, water access, bird foraging, forested uplands, trees and vegetation, and fish and shellfish.

3.2 **Policy**: Within designated recreational use areas as shown on Figures 4-5 and 7 and the Special Management Area Figures in Chapter V, water access to, from and along lakeshores, streams, shorelines, tidelands, estuaries and saltwater wetlands for recreational use shall be enforced to the maximum extent practicable, through easements, dedications, or other means, except where human health or safety would be at risk.

3.3 **Policy:** Recreation shall be considered the primary use of the following designated recreational use areas as shown on Figures 4- 5. These areas shall be protected and developed for the enhancement of recreational uses (such as picnicking, family play, recreational sports, swimming, walking, hiking, clam digging, beachcombing, photography, and observations of animals and birds in the natural world). For specific recreational uses for each designated area, see the 1991 Sitka Parks and Recreation Plan in Appendix-8.

1) Indian River Estuarine Flats adjacent to the Sitka National Historical Park (State);
2) Pioneer Park (Municipal);
3) Moller Park (Municipal);
4) Crescent Park (Municipal);
5) Totem Square (State);
6) Halibut Point Recreation Area and Tidelands (State);
7) Sandy Beach Tidelands (State);
8) Starrigavan Bay, Estuary and Creek (State);
9) "Old Sitka" Historic Site (State);
10) Swan Lake AMSA (Municipal);
11) John Brown's Beach (State); and
12) Whale Park (Municipal).

3.4 **Policy**: Recreation shall be a high priority use of the following designated recreational use areas as shown on Figures 4, 5 and in Chapter V. To the extent practicable, these areas shall be protected and maintained for recreational uses. For specific recreational uses for each designated area, see Chapter V and the 1991 Sitka Parks and Recreation Plan in Appendix-8.

1) Goddard Hot Springs (Municipal)
2) Non-federal publicly-owned portion of Baranof Warm Springs north of the river (State)
3) Lower Indian River Corridor (State/Municipal/private); and
4) Mahknati Island (Japonski) Causeway (State).

3.5 **Policy:** Within Indian River Corridor Designated Recreational Use Area, new construction, alteration of natural vegetation, excavation, placement of fill, or land clearing are not allowed within 25 feet along either side of the 100-year floodplain. Uses and activities necessary for the maintenance and enhancement of recreation are allowed.

Note: For dredging and filling in designated recreational use areas, see also policy 1.7. Additional recreational use designations and enforceable policies applicable to those designations are found in Chapter IV: Swan Lake AMSA and Chapter V: Special Management Areas.

4.1 **Policy**: Hydroelectric power shall be the highest priority use for the Takatz Lake watershed as shown on Figure 6. Conflicting uses of the Takatz Lake watershed shall be prohibited. Interim, short-term non-conflicting uses for Takatz Lake may be permitted on a case-by-case basis.

There are no enforceable policies for section 5, Transportation and Utilities Routes and Facilities.

There are no enforceable policies for section 6, Commercial Fishing and Seafood Processing Facilities.

There are no enforceable policies for section 7, Timber Harvest and Processing.

8.1 **Policy**: The incidental removal of coastal sand and gravel that is integral to an allowable project shall minimize adverse changes to littoral processes of sediment erosion, deposition and transport.

There are no enforceable policies for section 9, Subsistence Use Areas.

There are no enforceable policies for section 10, Habitats.

There are no enforceable policies for section 11, Air, Land and Water Quality.

There are no enforceable policies for section 12, Historic, Prehistoric, and Archaeological Resources.

B. SWAN LAKE AMSA ENFORCEABLE POLICIES

Applicability of policies: In addition to the policies of the Sitka CMP, which generally apply throughout the Sitka coastal district, the following policies apply within the Swan Lake AMSA as shown on Figure 7. See Figure Appendix-7 for maps and resource inventory and analysis.

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

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

AMSA 13.3 **Policy:** Within the Swan Lake AMSA as shown on Figure 7, in order to protect the recreational uses of the area, gravel or soils extraction and dredge and fill operations are not allowed unless consistent with Swan Lake Watershed Recovery and Restoration Plan. The recreational uses of Swan Lake can be found on p. A-85 of Appendix A-7. For information about Swan Lake Watershed Recovery and Restoration, see Appendix A-7.

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

C. SITKA SPECIAL MANAGEMENT AREAS ENFORCEABLE POLICIES

Applicability of policies: In addition to the policies of the Sitka CMP, which generally apply throughout the Sitka coastal district, policies 14.1–6 apply to the appropriate Special Management Areas as indicated within each policy. These areas are described and shown on Figures (maps) in Chapter V: Special Management Areas.

None of the Special Management Areas include federal land or waters and all of the Special Management Area policies described in this plan refer only to activities occurring on State/District land within the Special Management Area; none of the SMA policies apply to federal lands or waters except through the federal Coastal Zone Management Act federal consistency provision. The applicability of all policies is subject to the exclusion of federal lands and waters from the coastal zone as described in section F.1. of Chapter V.

SMA 14.1 **Policy:** Tideland uses with in the designated Special Management Areas as shown in the figures in Chapter V shall be compatible with the recreation nature of the surrounding area. The recreational nature of the surrounding area is discussed in Chapter V in the narrative for each designated area.

SMA 14.2 **Policy:** Within Special Management Areas as shown in the figures in Chapter V containing lakes or streams that support sockeye salmon, a "no development" area shall be maintained on each sockeye stream to ordinary high water as well as along the entire lake to ordinary high water in order to protect recreational fishing. Activities directly related to the enhancement of the sockeye resource are exempt from this policy. Note: Special Management Areas supporting sockeye salmon are specifically named in the title of the designated area in Chapter V.

SMA 14.3 **Policy:** Special Management Areas shown in figures K5-7, NB2-4, and SB2 in Chapter V and designated recreation areas in figures 4a-4c containing non-federal uplands, shall be managed for recreation. Conflicting uses are not permitted within a Special Management Area boundary of 200 feet around the cabin, shelter or trail. Where located on a lake, this boundary shall include the entire lake and a 200 foot buffer strip around the lakeshore.

SMA 14.4 **Policy**: Where practicable, all land- and water-based uses that conflict with the recreational use of the Special Management Areas are not allowed within the boundaries of all Special Management Areas as shown in the figures in Chapter V, except for the maintenance or enhancement of the recreation and/or subsistence resources. The recreational uses and resources of the SMAs are discussed in Chapter V in the narrative for each designated area.

This policy does not preclude the development of fish enhancement projects, including remote fish release sites, when a need is shown and proper evaluation, including a formal public process, has been completed.

Exceptions to this policy may be made only after a consistency review or other public process determines that there is greater public benefit by permitting a use (e.g. temporary moorage of a fish-buying scow or herring pound) in a Special Management Area than the public benefit accrued by protecting that Special Management Area exclusively for recreational uses.

Existing leases and special use permits within the Special Management Areas are exempted from this policy. However, if the lease or permit is renewed or the project is modified, it would then become subject to the policies in this Plan.

SMA 14.5 **Policy:** Where practicable, a "buffer strip" of 100 feet shall be maintained on each side of all trails within Special Management Areas shown in figures K5, K7, NB2, NB3, and SB2 in Chapter V and designated recreation areas in figures 4a-4c containing non-federal uplands, for the protection of the trail and the recreational experience. Significant adverse impacts to these trails shall be mitigated by relocating the affected trail to a location where the buffer can be maintained. Where practicable, all viewpoints, scenic areas, and other unique physical features of the trail upon which the recreation depends shall be protected.

SMA 14.6 **Policy:** The tidelands and waters from Mean High Tide to 200 feet below the Mean Lower Low Tide within the major designated recreational use areas listed below and as shown on Figures 4 and 5 in Chapter 3 and map NB14 in Chapter V shall be closed to all uses incompatible with the primary use of public recreation.

a. Whale Park
b. State Tidelands adjacent to Sitka National Historic Park
c. Pioneer Park
d. Sandy Beach Tidelands
e. Halibut Point Recreation Area and Tidelands
f. Starrigavan Bay Cooperative Project

Note: Shore boundaries for "f" above are from the northern boundary of the municipal lease tidelands on the south end to the point beyond Mosquito Cove on the north.

Incompatible uses include: floating facilities of all types; private mooring facilities; mariculture/aquaculture facilities of all types; water-borne storage of all types; and all moorage of other than a purely short-term, transitory nature. Exceptions to this policy will be made only after a consistency review process determines that there is greater public benefit by permitting a use in a Special

Management Area adjacent to the listed public recreational site than the public benefit accrued by protecting the area exclusively for recreational use.

ENFORCEABLE POLICY CROSS REFERENCE TABLE

SITKA PUBLIC USE MANAGEMENT PROGRAM

Note that the policies in the Sitka Coastal Management Plan do not have titles.

Policy #	Chapter II, Page # (see note 1)	Definitions, p. B-19	Issues, Goals and Objectives (see note 2)	Resource Inventory and Analysis (see notes 3-4)	Maps	Appendices
1	B-28					
2	B-28	practicable				
3	B-28					
4	B-28	floating facilit(ies); public benefit				
5	B-28	practicable	Goal language in policy			
6	B-28	floating facilit(ies); practicable; mariculture				
7	B-29	practicable				
8	B-29	floating facilit(ies); public benefit; mariculture	Issue language in policy		Part III "Special Management Areas" parts 1-5	There are no appendices for the policies.
9	B-30					

Note 1: page numbers refer to Public Hearing Draft, March 2005

Note 2: Issues, Goals and Objectives in the Sitka CMP for recreation (p. 41 ff) and subsistence (p. 76 ff) support these policies.

Issues and Goals applicable to all policies are also found in Sitka PUMP ch. 1.

Additional issue or goal statements specific to individual policies shown in table above.

Note 3: The Resource Inventory consists of the maps and descriptions of each Special Management Area in Chapter III.

Note 4: Approved by DGC in 1993, the Sitka PUMP relied on PUMP ch. 1 and CMP Ch. IV to fulfill resource analysis requirements.

When OPMP required districts to analyze their plans in the summer of 2004, the question OPMP authorized for the resource analysis only asked about a demonstration of resource sensitivity. And per AS 46.40.070(a)(2)(C)(i), SAMPs in effect in July 2004 did not have to meet the sensitivity te Therefore, no new resource analysis information was required.

D. DEFINITIONS

A number of the terms used in coastal management have specific regulatory or procedural meaning. To clarify the intent of the coastal management polices, the following definitions apply to language used in the plan policies.

ACMP is the Alaska Coastal Management Program.

Adjacent has the same meaning as in State law:

11 AAC 112.990 (a) (2) "adjacent" *means near but not necessarily touching; (Eff. 7/1/2004, Register 170; am 10/29/2004, Register 172)*

AMSA has the same meaning as in State law:

AS 46.40.210 (1) "area which merits special attention" *means a delineated geographic area within the coastal area which is sensitive to change or alteration and which, because of plans or commitments or because a claim on the resources within the area delineated would preclude subsequent use of the resources to a conflicting or incompatible use, warrants special management attention, or which, because of its value to the general public, should be identified for current or future planning, protection, or acquisition; these areas, subject to council definition of criteria for their identification, include:*
(A) areas of unique, scarce, fragile or vulnerable natural habitat, cultural value, historical significance, or scenic importance;
(B) areas of high natural productivity or essential habitat for living resources;
(C) areas of substantial recreational value or opportunity;
(D) areas where development of facilities is dependent upon the utilization of, or access to, coastal water;
(E) areas of unique geologic or topographic significance which are susceptible to industrial or commercial development;
(F) areas of significant hazard due to storms, slides, floods, erosion, or settlement; and
(G) areas needed to protect, maintain, or replenish coastal land or resources, including coastal flood plains, aquifer recharge areas, beaches, and offshore sand deposits;

Aquatic Farming means the growing, farming, or cultivating of aquatic plants, fish, or shellfish in captivity or under positive control to be sold or offered for sale.

Avoid has the same meaning as in State law for Avoid, Minimize and Mitigate:

11 AAC 112.900. Sequencing process to avoid, minimize, or mitigate. *(a) As used in this chapter and for purposes of district enforceable policies developed under 11 AAC 114, "avoid, minimize, or mitigate" means a sequencing process of*
(1) avoiding adverse impacts to the maximum extent practicable; (2) where avoidance is not practicable, minimizing adverse impacts to the maximum extent practicable; or (3) if neither avoidance nor minimization is practicable, conducting mitigation to the extent appropriate and practicable; for purposes of this paragraph, "mitigation" means
(A) on-site rehabilitation of project impacts to affected coastal resources during or at the end of the life of the project; or

(B) to the extent on-site rehabilitation of project impacts is not practicable, substituting, if practicable, rehabilitation of or an improvement to affected coastal resources within the district, either on-site or off-site, for a coastal resource that is unavoidably impacted.
(b) For a project that requires a federal authorization identified under 11 AAC 110.400, the coordinating agency shall consult with the authorizing federal agency during that federal agency's authorization review process to determine whether the mitigation requirements proposed by the federal agency for that federal authorization would satisfy the mitigation requirements of (a)(3) of this section. If the coordinating agency determines that the mitigation requirements proposed by the federal agency would not satisfy the mitigation requirements of (a)(3) of this section, the coordinating agency shall require appropriate mitigation in accordance with (a)(3) of this section.
(c) For purposes of (a)(3) of this section, a determination of practicability includes the consideration of the following factors, as applicable: (1) the magnitude of the functional values lost by the impacted coastal resources;
(2) the likelihood that the mitigation measure or improvement will succeed in actually rehabilitating the impacted coastal resources; and
(3) the correlation between the functional values lost by the coastal resources impacted and the proposed mitigation measure or improvement.
(d) To the extent feasible and not otherwise addressed by state or federal law, any requirements imposed under (a)(3) of this section for mitigation through on-site or off-site rehabilitation of project impacts shall be established by the coordinating agency at the time of the project's consistency review under 11 AAC 110.
(e) In applying the mitigation process described in (a)(3) of this section, unless required by a federal agency issuing an authorization identified under 11 AAC 110.400 for the project, the coordinating agency may not require
(1) that no net loss of impacted coastal resources occur; or
(2) monetary compensation. (Eff. 7/1/2004, Register 170; am 10/29/2004, Register 172)

Coastal Water has the same meaning as in state law:

11 AAC 112.990. Definitions. (6) "coastal water" *means those waters, adjacent to the shorelines, that contain a measurable quantity or percentage of sea water, including sounds, bays, lagoons, ponds, estuaries, and tidally influenced waters; (Eff. 7/1/2004, Register 170; am 10/29/2004, Register 172)*

Consistency means compliance with the standards of the ACMP, including the enforceable policies of this approved coastal plan.

Consistent to the Maximum Extent Practicable means that federal government activities or uses, including development projects affecting the coastal zone of Alaska, are fully consistent with the standards of the ACMP unless compliance would violate another federal law (15 CFR 930.32.(a)).

Cumulative Impacts has the same meaning as in State law:

11 AAC 110.990. Definitions. (a) (19) "cumulative impacts" *means reasonably foreseeable effects on a coastal use or resource that result from the incremental impact of an individual project when viewed together with the impacts of past and currently authorized projects; (Eff. 7/1/2004, Register 170)*

DEC is the Alaska Department of Environmental Conservation.

DF&G is the Alaska Department of Fish and Game.

Direct and Significant Impact has the same meaning as in State law:

> ***11 AAC 114.990. Definitions. (13) "direct and significant impact****" means an effect of a use, or an activity associated with the use, that will proximately contribute to a material change or alteration of the coastal waters, and in which*
> *(A) the use, or activity associated with the use, would have a net adverse effect on the quality of the resources;*
> *(B) the use, or activity associated with the use, would limit the range of alternative uses of the resources; or*
> *(C) the use would, of itself, constitute a tolerable change or alteration of the resources but which, cumulatively, would have an adverse effect; (Eff. 7/1/2004, Register 170; am 10/29/2004, Register 172)*

Development means any man-made change to improved or unimproved lands and coastal waters, including but not limited to, buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling.

DNR is the Alaska Department of Natural Resources.

Due Deference has the same meaning as in State law.

> ***11 AAC 110.990. Definitions****. (a) (25) "due deference" means that deference that is appropriate in the context of*
> *(A) the commentor's expertise or area of responsibility; and*
> *(B) all the evidence available to support any factual assertions of the commentor; (Eff. 7/1/2004, Register 170)*

Estuary has the same meaning as in State law:

> ***11 AAC 11.990 Definitions. (11) "estuary"*** *means a semiclosed coastal body of water that has a free connection with the sea and within which seawater is measurably diluted with freshwater derived from land drainage; (Eff. 7/1/2004, Register 170; am 10/29/2004, Register 172)*

Facilities Related to Commercial Fishing and Seafood Processing has the same meaning as in State law:

> ***11 AAC 114.990. Definitions****. (17) "facilities related to commercial fishing and seafood processing"* *includes hatcheries and related facilities, seafood processing plants and support facilities, marine industrial and commercial facilities, and aquaculture facilities;*
> *(Eff. 7/1/2004, Register 170; am 10/29/2004, Register 172)*

Feasible and Prudent means consistent with sound engineering practice and not causing environmental, social, or economic problems that outweigh the public benefit to be derived from compliance with the standard which is modified by the term "feasible and prudent."

Geophysical Hazard is a condition created by a geological process, topography, water drainage, or unique weather condition that presents a significant hazard to life and property.

Important Habitats has the same meaning as in State law:

> ***11 AAC 112.300. Habitats.*** *(c) For purposes of this section,*
> *(1)* ***"important habitat"*** *means habitats listed in (a)(1) – (8) of this section and other habitats in the coastal area that are*
> *(A) designated under 11 AAC 114.250(h);*
> *(B) identified by the department as a habitat*
> *(i) the use of which has a direct and significant impact on coastal water; and*
> *(ii) that is shown by written scientific evidence to be significantly more productive than adjacent habitat; or*
> *(C) identified as state game refuges, state game sanctuaries, state range areas, or fish and game critical habitat areas under AS 16.20; (Eff. 7/1/2004, Register 170; am 10/29/2004, Register 172)*

Maintain means to provide for continuation of current conditions and functions.

Mariculture is the captive cultivation of plants and animals in marine and estuarine waters for human consumption.

Mean High Water has the same meaning as in State law:

> ***11 AAC 53.900 (14) "mean high water"*** *means the tidal datum plane of the average of all the high tides, as would be established by the National Geodetic Survey, at any place subject to tidal influence; (Eff. 3/27/80, Register 73; am 7/5/2001, Register 159)*

Mean Higher High Water is the average of all the daily higher high water recorded over a 19-year period or a computed equivalent period. It is usually associated with a tide exhibiting mixed characteristics.

Mean Low Water has the same meaning as in State law:

> ***11 AAC 53.900 (16) "mean low water"*** *means the tidal datum plane of the average of all the low tides, as would be established by the National Geodetic Survey, at any place subject to tidal influence; (Eff. 3/27/80, Register 73; am 7/5/2001, Register 159)*

Mean Lower Low Water has the same meaning as in State law:

> ***11 AAC 53.900 (17) "mean lower low water"*** *means the tidal datum plane of the average of the lower of the two low waters of each day , as would be established by the National Geodetic Survey, at any place subject to tidal influence; (Eff. 3/27/80, Register 73; am 7/5/2001, Register 159)*

Minimize has the same meaning as in State law (see Avoid).

Mitigate has the same meaning as in State law (see Avoid).

Natural Hazards has the same meaning as in State law:

> ***11 AAC 112.990. Definitions. (15) "natural hazards"*** *(A) means the following natural processes or adverse conditions that present a threat to life or property in the coastal area: flooding, earthquakes, active faults, tsunamis, landslides, volcanoes, storm surges, ice formations, snow avalanches, erosion, and beach processes;*
> *(B) includes other natural processes or adverse conditions designated by the department or by a district in a district plan; (Eff. 7/1/2004, Register 170; am 10/29/2004, Register 172)*

One Hundred Year Flood is a flood of a magnitude, which can be expected to occur on an average of once every 100 years. It is possible for this size flood to occur during any year, and possible in successive years. It would have a one percent chance of being equaled or exceeded in any year. Statistical analysis of available stream flow or storm records, or analysis of rainfall or runoff characteristics of the watershed, or topography and storm characteristics are used to determine the extent and depth of the 100-year flood.

OPMP is the Office of Project Management and Permitting with the Department of Natural Resources.

Ordinary High Water has the same meaning as in State law:

> ***11 AAC 53.900 (23) "Ordinary high water"*** *means the mark along the bank or shore up to which the presence and action of non-tidal water are so common and usual, and so long continued in all ordinary years, as to leave a natural line impressed on the bank or shore and indicated by erosion, shelving, changes in soil characteristics, destruction of terrestrial vegetation, or other distinctive physical characteristics. (Eff. 3/27/80, Register 73; am 7/5/2001, Register 159)*

Practicable has the same meaning as in State law:

> ***11 AAC 112.990. Definitions. (18) "practicable"*** *means feasible in light of overall project purposes after considering cost, existing technology, and logistics of compliance with the standard; (Eff. 7/1/2004, Register 170; am 10/29/2004, Register 172)*

Proper and Improper Uses are the can-do and can't-do uses for the area.

Public Need has the same meaning as in State law except that "documented" includes those needs expressed in locally adopted plans, studies, policies and standards.

> ***11 AAC 114.990 (35) "public need"*** *means a documented need of the general public and not that of a private person; (Eff. 7/1/2004, Register 170; am 10/29/2004, Register 172)*

Resource Agency has the same meaning as in State law:

> ***Sec. 46.39.010. (2) "resource agency"*** *means*
> *(A) the Department of Environmental Conservation;*

(B) the Department of Fish and Game; or
(C) the Department of Natural Resources.

Shall means mandatory; it requires a course of action or set of conditions to be achieved.

Should states intent for a course of action or set of conditions to be achieved. This implies that case-specific discretion may be applied for achieving the intent of the action.

Significant Adverse Impact means an impact as indicated in state law by "direct and significant impact."

11 AAC 110.990. Definitions. *(b) For purposes of AS 46.40.096(q)(1) and this chapter, "**direct and significant impact**" means an impact that contributes to a material change in or alteration of natural, social, cultural, or economic characteristics of a coastal use or resource.*

Subject Uses is a description of the land and water uses and activities subject to the district plan.

Subsidence is a lowering in elevation of ground surface due to underground geologic or hydrologic change. It can be a common occurrence in areas susceptible to seismic activity and where excessive water table depletion occurs.

Subsistence Use Areas are coastal habitat areas, used traditionally or occasionally in response to seasonal or cyclic resource abundance, where subsistence harvests of fish, wildlife, and other biological resources are conducted.

Subsistence Uses has the same meaning as in State law:

AS 16.05.940 (33) "subsistence uses" *means the noncommercial, customary and traditional uses of wild, renewable resources by a resident domiciled in a rural area of the state for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation, for the making and selling of handicraft articles out of nonedible by-products of fish and wildlife resources taken for personal or family consumption, and for the customary trade, barter, or sharing for personal or family consumption; in this paragraph, "family" means persons related by blood, marriage, or adoption, and a person living in the household on a permanent basis;*

Surface Waters include streams, rivers, ponds, lakes, and contiguous open water wetlands.

Water-dependent has the same meaning as in State law:

11 AAC 112.990. Definitions. (31) "water-dependent" *means a use or activity that can be carried out only on, in, or adjacent to a water body because the use requires access to the water body;*

Waterfront means area along the coastline between mean higher high water and mean high sea level.

Water-related has the same meaning in State law:

11 AAC 112.990. Definitions. (32) "water-related" *means a use or activity that is not directly dependent upon access to a water body, but which provides goods or services that are directly associated with water-dependence and which, if not located adjacent to a water body, would result in a public loss of quality in the goods or services offered; (Eff. 7/1/2004, Register 170; am 10/29/2004, Register 172)*

Wetlands has the same meaning as in State law:

11 AAC 112.990. Definitions. (33) "wetlands" *means saltwater wetlands and those freshwater wetlands that have a direct drainage to coastal waters; (Eff. 7/1/2004, Register 170; am 10/29/2004, Register 172)*

APPENDIX A-2
SITKA COASTAL MANAGEMENT PLAN GUIDANCE POLICIES

I. SITKA COASTAL MANAGEMENT PLAN GUIDANCE POLICIES

Guidance Policies are the City and Borough of Sitka's statements of direction, intention, and recommendation. These policies are commitments the City and Borough is making to itself and the public at large, and are directions or actions that are appropriate at the municipal level. They also provide an alternate means to achieve the district's goals and objectives.

Under AS 46.40.210(7), a district coastal management plan is a plan that sets out policies and standards "to guide public and private uses of land and water within that district ...". Guidance policies are policies that may not meet one or more tests of enforceability contained in state statute but that can help guide coastal uses within the district. Guidance policies are not enforceable and cannot be used to require conditions or stipulations on projects during the project consistency review process.

Note that the section and subsection numbering is out of sequence in this appendix because the text has been excerpted from Chapter III and the numbering has been retained from Chapter III for ease of reference and correlation.

a. COASTAL DEVELOPMENT

b. FLOATING FACILITIES

a) To encourage floating facility owners to take responsibility for promptly removing and disposing of a facility in the public domain, the City and Borough of Sitka recognizes the need for the development of a performance bond program to be administered by the appropriate state agency or agencies, to assure compliance or a substantial financial penalty for noncompliance.

c. WATERFRONT AND TIDELANDS DEVELOPMENT

b) In considering whether or not to permit development of a coastal area adjacent to the Sitka road system, a higher priority will be given to waterfront development which seeks to protect and expand the local economy, provides employment, and strengthens the economic diversity with minimum effects upon environmental quality, than for a development which does not meet these guidelines.

3. RECREATION, TOURISM AND COASTAL ACCESS

a) Public access to coastal waters will be maintained or increased through the construction of boat launching facilities, waterfront recreation sites, or other appropriate means.

b) Recreational development will be based on the Sitka Parks and Recreation Plan for the Sitka roaded area, and the Borough-wide Recreation Management Plan, and the Sitka Trails Plan, 2003.

c) Land holdings of the City and Borough of Sitka located in and around Goddard Hot Springs will be classified and zoned as Public Recreation, as required by the Public Recreation restriction on the deed to these lands.

d) The City and Borough of Sitka supports the State Marine Parks Program to protect and provide marine-related recreational opportunities to its citizens.

e) A full spectrum of recreational opportunities, with respect to recreational activities, experiences, and settings from primitive to urban, will be maintained for the benefit of all citizens.

f) In areas of the City and Borough with sensitive habitat, with a high level of recreational or subsistence use, or where major aesthetic concerns are raised, the appropriate regulatory agencies are encouraged to develop policies to insure that off-road motorized vehicles will not significantly adversely affect these habitats and uses. For purposes of this policy, an off-road motorized vehicle is a vehicle designed for off-road use weighing less than 1,000 pounds.

g) The City and Borough of Sitka strongly recommends that the Mental Health Trust state-owned islands in the Sitka Sound area currently classified as "Public Recreation" be retained in public ownership under a "Public Recreation" classification to protect the public use.

h) The "airplane turnaround" is recognized as having great public value. No development should take place on this property without a complete public hearing process.

i) When amended to the District Plan, the Sitka Recreation Management element will be used when making consistency recommendations on proposed activities where recreational uses could be impacted.

4. ENERGY FACILITIES

a) If possible, the municipality will continue to seek funding to provide for the Takatz Lake hydroelectric facility and transmission line, independent of the Alaska Power Authority.

b) Takatz Lake is considered as the best, "number one" hydroelectric prospective site within the City and Borough of Sitka. The City and Borough of Sitka will continue to work with the State of Alaska, Department of Natural Resources to complete the selection process from the Tongass National Forest to assure municipal selection for that site.

c) The municipality should begin the steps to formulate preliminary engineering and prepare the Federal Energy Regulatory Commission licensing requirements for Takatz.

d) Tank farms, fueling piers and other energy facilities will be sited, designed, constructed and operated to minimize impact on coastal resources.

5. TRANSPORTATION AND UTILITIES ROUTES AND FACILITIES

a) Priority will be given to transportation system improvements that serve multiple developments rather than on a lot-by-lot basis.

b) The municipality encourages the rapid completion of engineering and construction for the new Sitka Airport access road.

c) The municipality strongly supports the maintenance of Alaska Marine Highway ferry service at least at the current levels.

d) The municipality strongly supports the development and maintenance of harbors and launching ramps to meet community needs, and considers this a high-priority use of the Sitka waterfront area.

e) The transportation priorities for improvements are airport access road, improved airport landing navigation system, and boat harbor enlargement for vessels from 40 to 80 feet in length.

f) The City and Borough of Sitka opposes any reduction in mainline ferry service.

g) The municipality will continue to attempt to provide utilities services to all sections of the roaded municipality, contingent on availability of the necessary funding.

h) Following construction of transportation and utility projects, intertidal or beach areas will be cleaned and restored to address vegetative cover, coastal access, slope stability and shoreline processes.

6. COMMERCIAL FISHING AND SEAFOOD PROCESSING FACILITIES

a. FISHING AND SEAFOOD PROCESSING INDUSTRY

a) The fishing industry is considered to be a major economic factor in the City and Borough of Sitka, and therefore, the development of water-dependent facilities for the expansion of this industry will be a priority use of waterfront and other coastal areas.

b) The municipality encourages the private development of support facilities such as bunkhouses or parking areas needed to provide for seasonal employment opportunities in the seafood industry.

c) The municipality encourages strong enforcement of requirements for waste discharges from seafood processing plants.

b. MARICULTURE AND AQUACULTURE

d) In recognition of the contribution made by public and private not-for-profit fish hatcheries and other aquaculture activities to the enhancement of fisheries resources, where feasible and prudent, the City and Borough supports such public and private not-for-profit aquaculture efforts as a priority use of coastal areas, provided District Plan requirements for permitting and siting are met.

e) Not-for-profit mariculture and aquaculture projects designed to increase the fish and seafood harvesting potentials for the common property, available to the general public, are considered priority uses of the coastal area, within the parameters of District Plan requirements for permitting and siting.

f) The City and Borough of Sitka is opposed to the issuance of commercial for-profit finfish mariculture permits within the City and Borough until such time as sufficient research and public support favor this development.

g) The City and Borough of Sitka requests the appropriate regulatory agencies to provide for local input in the planning process for the development of the mariculture/aquaculture industry. The City and Borough of Sitka strongly supports state efforts to develop a coordinated permit process that includes the local community in a public hearing process prior to approving new mariculture and/or aquaculture operations within the City and Borough. Equal weight should be given to socioeconomic concerns, as well as biological considerations, when reviewing mariculture permit requests. The intent of this policy is to insure that since mariculture activities could potentially preempt any other use in a particular location within the public domain, the citizens of the affected community should be included in a formal approval process.

h) To protect the environment, including habitats, natural runs, and existing uses, the City and Borough of Sitka will exercise due caution in recommending permitting of mariculture or aquaculture uses and activities.

7. TIMBER HARVEST & PROCESSING

a) Commercial log salvage operations should not be permitted within fifteen (15) miles of the Sitka road system due to the widespread need for beach salvage by the entire community, unless such a commercial activity will not adversely impact (i.e., compete with) collection of beach logs for local personal use.

b) Clear-cutting of zoned parcels of private property within the roaded community should be prohibited unless specifically identified as a part of a development proposal that receives the approval of the City and Borough of Sitka.

c) To minimize impacts of timber development on other coastal resources, such development should use existing environmentally sound log-transport facilities and extend use over several sale periods, unless the adverse impacts generated by use of an interconnected or extensive road system exceeds the advantages of non-connected log transfer and road systems.

8. SAND AND GRAVEL EXTRACTION

a) The municipality is encouraged to review ordinance revisions to incorporate reclamation and development guidelines on natural resource extraction on private property within the Sitka road system.

9. SUBSISTENCE USE AREAS

a) Land and water uses and activities within the District should minimize and/or mitigate significant adverse impacts, including cumulative impacts, on subsistence resources and their use. If a substantial concentration of the resource could be significantly adversely impacted by a proposed use or activity, protection of the resource should be a priority consideration. Important subsistence resources include: razor clams, black and other seaweeds, salmon (especially sockeye), halibut, deer, herring eggs, smelt, rockfish, abalone, crab, clams, shrimp, mussels, gumboots, goat, bear, ducks and other waterfowl, berries, fur bearers, sea otters, and seals.

b) Persons engaged in subsistence activities should have access to subsistence resources on public lands and waters to the full extent provided under relevant law.

c) Razor clams on Kamenoi Beach and black seaweed are unique because of their scarcity and the potential for the total loss of the resource, and should be protected from the significant adverse impacts to the resource.

10. HABITATS

a) The municipality favors the continued cooperative efforts by appropriate agencies and organizations to carry out stream or fish passage improvements designed to enhance and expand fish habitat throughout the Borough, including within "wilderness" areas.

b) Impacts from necessary instream work such as culverting, bridge construction, streamside road construction, channelization, bank stabilization, damming, gravel extraction, and stream diversion should be mitigated or minimized. Trained resource specialists are available in the private sector or in government agencies including the Alaska Department of Fish and Game, U.S. Fish and Wildlife Service, and U.S. Forest Service, and can identify ways to mitigate adverse impacts of these activities.

c) The Alaska Department of Fish and Game is requested to assist in specific anadromous stream studies within the roaded area that will expand on the knowledge gained in the Sitka Coastal Habitat Evaluation with respect to the need for (and recommended widths of) green belts along the margins of the individual streams.

d) Existing fish passage problems, including perched culverts, man-made stream obstructions, and velocity barriers should be corrected whenever routine maintenance is scheduled.

e) Future industrial and commercial waterfront expansion into Starrigavan Bay is not recommended.

f) To maintain anadromous and resident fish populations and associated wildlife, land and water uses potentially affecting anadromous fish streams should be designed to conserve or improve existing habitat or mitigate adverse impacts. To prevent unnecessary encroachment upon these stream channels, their banks, and associated floodplains, new construction and land clearing should be buffered by a natural vegetation zone within a minimum of 25 feet along either side of the 100-year floodplain. A wider buffer is encouraged where appropriate to provide greater protection.

g) Land and water uses having the potential to significantly adversely impact habitat seasonally supporting substantial concentrations of herring eggs, should be designed to conserve existing habitat or mitigate significant adverse impacts.

SPECIAL TOPIC: BALD EAGLE MANAGEMENT

a) It is the policy of the City and Borough of Sitka that the following Management Guidelines be considered when development along the road system is proposed adjacent to eagle nests:

1. When an eagle nest tree is located within a parcel of private property to be developed, the owner of the property will be requested to participate in a discussion with representatives of the City and Borough of Sitka and USFWS to determine how the proposed development can best accommodate bald eagle habitat.

2. Roads and driveways should be located to minimize proximity to known eagle nests, preferably sited landward from nest trees.

3. Accidental electrocution of eagles is a problem in Sitka. When powerlines and poles are placed in areas where eagles tend to perch on them, measures to minimize accidental electrocution of bald eagles include the following:

a. When undertaking major powerline development, the City and Borough of Sitka Electrical Department or private developer should consult with USFWS concerning measures to minimize the danger of electrocution of eagles.

b. Poles should extend two (2) feet above energized wires to provide a safer perch.

c. Powerline corridors that parallel shorelines should be located landward of nesting and perch habitat if feasible. A 100-yard distance from shore is recommended.

d. Where anadromous streams exist necessitating powerline crossings, it is recommended they cross landward of major spawning areas where eagle flights would increase the potential for accidental electrocution.

b) The Subdivision Regulations of the City and Borough of Sitka should be amended to include the following:

To assure adequate protection around eagle nest trees, the U.S. Fish and Wildlife Service should provide to the municipal Planning Department a map of eagle nest trees in the Sitka roaded area. Prospective developers and owners of land in the vicinity of an eagle nest tree shall participate in discussions with the USFWS and the City/Borough concerning mitigative measures to ensure

protection of the nest tree. Mitigative measures may include leaving an undisturbed buffer of trees to maintain windfirmness of the nest tree and timing of construction activities to avoid disturbance during the nesting season. Any mitigation measures agreed to should be placed on the face of the subdivision document as a plat restriction.

c) To maintain valued eagle habitat along the Sitka road system, owners of property containing perch trees regularly used by eagles are strongly encouraged to retain such perch trees and to participate in mitigation discussion with the City and Borough Planning Department and U.S. Fish and Wildlife Service prior to commencing any development which could result in the loss of this habitat.

11. AIR, LAND, & WATER QUALITY

a) The municipality recognizes the authority of state and federal agencies to regulate air, land, and water quality and will comply with these regulations.

b) The City and Borough of Sitka will develop a visual resources management plan to inventory and identify scenic views of particular significance to the public which should be maintained, enhanced, or rehabilitated, both from the Sitka road system, and from Sitka Sound toward town.

c) The municipality should continue to assist the Department of Environmental Conservation in the air sampling program.

d) Greenbelts are encouraged adjacent to streams, wetlands, and other areas of aesthetic value.

12. HISTORIC, PREHISTORIC, & ARCHAEOLOGICAL RESOURCES

a) The municipality encourages the renovation of historic sites and buildings.

b) The municipality encourages the restoration of Native clan houses or other structures that have cultural as well as historic value.

c) The municipality encourages appropriate state agencies to continue identifying areas of the coast which are important to the study, understanding, or illustration of national, state or local history or prehistory.

d) Project proponents should refer to National Register of Historic Places, Alaska Heritage Resource Survey and Sitka Parks and Recreation for information on known or potential historic, prehistoric, and archeological resources during project planning.

IV. AREA MERITING SPECIAL ATTENTION

Within the Swan Lake AMSA, channelization or obstructions of natural water flows are not allowed when such action would:

- lead to dewatering or the inundation of wetland areas within the AMSA;
- lead to unfavorable changes to aquatic, wetland or shoreland vegetation; or
- decrease use of the AMSA by desirable fish species or swans and other birds, thereby reducing the quality of recreational fishing or bird watching.

V. SPECIAL MANAGEMENT AREAS

SMA 14.a Any structure sited adjacent to a Special Management Area should not inhibit access to anchorage to, from and within the Special Management Area.

4. MANAGEMENT GUIDANCE

A. New Forest Service cabins and trails for public use would automatically meet the criteria for selection as Special Management Areas under "2. Area is a developed or designated recreational facility…". Newly approved Wild and Scenic Rivers would also automatically meet the Criteria for Selection under "3. Area has rare or uncommon physical, geological, geothermal, or cultural resources…". Likewise, cabins, trails, or Wild and Scenic Rivers removed from the System would no longer meet the criteria for selection. Cabins, trails, or Wild and Scenic Rivers which are added to or removed from the Systems will subsequently be added to or deleted from the Special Management Areas through a Coastal Program amendment process.

B. Existing Forest Service road systems should be reviewed through the Forest Service road management planning process. Where practical, and consistent with the goals and objectives of the applicable road management plan, roads should be maintained for long-term continued use for diverse recreation (e.g., hiking, ATV use, biking). Roads left open should not cause water quality or fish habitat problems.

C. Lakes included in the Special Management Areas in the Public Use Management Plan should be reviewed by Alaska Department of Fish and Game for fishing opportunities, and if practical and desirable, stocked to expand the recreational potential at these sites.

D. No ATV use should be permitted in Special Management Areas, including trails, except where an actual need is demonstrated. Exceptions to this policy will include those areas such as the Kruzof Island road system traditionally used by ATVs, where use is common and resource damage is not occurring.

E. It is strongly recommended that the Forest Service develop a management plan for the Special Management Area of Iris Meadows that closes Iris Meadows and Shelikof Beach to ATV use and protects the Meadows and Shelikof beach ecosystems. ATVs should be permitted only on the existing road system and designated trails, and in designated areas where resource damage will not occur or is acceptable. Stream crossings should be permitted only in designated locations.

APPENDIX A-3
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APPENDIX A-4
PUBLIC PROCESS AND AGENCY CONSULTATION

A. PUBLIC PROCESS

Changes in state requirements for district coastal management plans, and a requirement that district plans be revised to meet new requirements within one year, prompted the City and Borough to undertake the plan revision process that produced this plan (see letter from the Office of Project Management and Permitting, Alaska Department of Natural Resources to the Honorable Fred Reeder, October 2004, at the end of this appendix). Despite the short time frame for plan revision, the City and Borough of Sitka has committed to and maintained an active public participation process throughout the revision.

In October 2004, the City and Borough of Sitka convened a Sitka Coastal Management Plan Task Force to work with the municipality and its planning consultant, LaRoche + Associates on this state-mandated "transition" amendment to the District Program. The Task Force was made up of a broad cross section of representatives of various groups:

- Sitka Tribe
- Sitka Chamber of Commerce
- Sitka Conservation Society
- Sitka Sportsman's Association
- City and Borough of Sitka Administrator
- City and Borough of Sitka Government Relations Director
- City and Borough of Sitka Planning Director
- City and Borough of Sitka Parks and Recreation Director
- City and Borough of Sitka Parks and Recreation Committee
- City and Borough of Sitka Long-Range Planning Committee
- Alaska Department of Fish and Game
- Alaska Department of Natural Resources
- Alaska Department of Commerce, Community and Economic Development
- U.S. Forest Service

The Task Force met on October 7, 2004; December 5, 2004; and February 24, 2005 to review early drafts of the revised plan.

Because the plan was undergoing a transition amendment, a 21-day review period was required. The public hearing draft of the revised plan and all background documents were made available to the public and to federal, state and local agencies and entities for review from March 14 to April 8, 2005. Availability of the plan for review was announced in the media, by posting in public areas, and by direct notice to adjacent districts and to all persons known to the district to have a significant interest in coastal resources or to conduct uses or activities that are potentially affected by coastal management.

The plan was posted on the project Web site http://www.larocheandassociates.com/Projects/sitka and was distributed electronically to the list of state and federal agencies provided by OPMP. In addition, printed copies of the Public Hearing Draft were distributed to the Sitka CMP Taskforce, the Planning Commission and Assembly and were available on request at the Municipal offices.

Written public comments were accepted throughout the review period. Though a public hearing was not required by the state for a transition amendment, a widely publicized public meeting was held on April 6, 2005 to accept oral testimony. The public meeting was held in a public building open to the public. All records from this meeting are available from the Government Relations Director.

Written comments were received from the following entities:

Alaska Department of Commerce, Community and Economic Development
Alaska Department of Environmental Conservation
Alaska Department of Fish &Game
Alaska Department of Natural Resources, Division of Geological & Geophysical Surveys
Alaska Department of Natural Resources, Division of Mining, Land and Water
Alaska Department of Natural Resources, Office of Habitat Management and Permitting
Alaska Department of Natural Resources, Office of Project Management and Permitting (OPMP)
National Park Service, Sitka National Historical Park
Sitka Conservation Society

Eight state and federal agencies, one organizations, and no individuals submitted written comments. Both written and oral comments received during the review period were accepted and considered.

The Sitka Assembly reviewed the draft plan at a public meeting on May 10, 2005 and approved Resolution #2005-16 supporting its submission to the State of Alaska for review. The minutes of this public meeting can be obtained from the Sitka Municipal Clerk, 100 Lincoln Street, Sitka, Alaska 99835. The Final Draft Plan Amendment was submitted to OPMP, Alaska Department of Natural Resources, for review and approval on March 1, 2006. The Final Draft Plan Amendment was also posted on the project Web site http://www.larocheandassociates.com/Projects/sitka.

The Office of Project Management and Permitting, Alaska Department of Natural Resources, prepared Preliminary Finding and Recommendations to the Commissioner June 1, 2006. Those findings were made available to the public on the project Web site http://www.larocheandassociates.com/Projects/sitka on the OPMP Web site www.alaskacoast.state.ak.us. OPMP invited comment on the plan and it's findings until July 3, 2006. Agency consultation was again conducted, the plan was revised and Final Plan Amendment was submitted August 24, 2006.

The Sitka Assembly adopted Ordinance No. 2007-02 to enact the Sitka District Plan Amendment on February 13, 2007. The plan was approved by OCRM on March 1, 2007. It was filed with the Alaska Lieutenant Governor's Office March 9, 2007 and became effective on April 8, 2007.

A record file containing all material submitted by the District under 11 AAC 114, the Alaska Department of Natural Resources' recommendations under this chapter, and all material on which the recommendation was based, will be maintained at the District office by the City and Borough of Sitka Government Relations Director, 100 Lincoln Street, Sitka, Alaska 99835.

In addition to the above process specific to the transition plan amendment, other public documents used during this amendment were also developed using a public process. These include, but are not limited to, initial district plan development documents, U.S. Forest Service Tongass Land Management Plan (TLMP) documents, planning documents developed by the City and Borough and Sitka and its consultants, and others.

B. AGENCY CONSULTATION

This plan revision was accomplished in consultation with state agencies in accordance with regulatory requirements. The district and its planning consultant, LaRoche + Associates, consulted with state agencies at a coastal management planning workshop in Anchorage on October 20-22, 2004, and a Resource Fair on October 23, 2004. They further consulted with agencies by attending 11 teleconferences on district planning hosted by the Office of Project Management and Permitting between June 9, 2004 and January 26, 2005. A special meeting with the state and federal agencies was held April 13, 2005 to discuss the Public Hearing Draft. The district further consulted with the agencies at the Anchorage Workshop, November 2-4, 2005.

As the public hearing draft was prepared, LaRoche + Associates consulted with various state agencies on matters concerning their areas of expertise. These communications were both in person and via agency Web sites. Specific personal communications and Web sites are included in the References Appendix. In addition, LaRoche + Associates conducted legal research on the existing body of state and federal law as it applies to coastal uses, resources and activities to determine adequacy of legal coverage.

State agencies with expertise were members of the Task Force, which met three times to review early drafts of the revised plan. The public hearing draft of the plan was also sent to state agency staff for comment during the public review period, and comments received were incorporated into the revised public hearing draft as appropriate.

Consultation with Randy Coleman, Office of Policy Analysis and Economics, Alaska Region USFS, concerning special management areas was extensive from March 2006 through April 2006. In April – May 2006, consultation concerning the special management areas expanded to include David Kaiser, Senior Policy Analyst, OCRM, NOAA. These discussions resulted in extensive revisions to the text and maps in Chapter 5.

STATE OF ALASKA

FRANK H. MURKOWSKI, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
OFFICE OF PROJECT MANAGEMENT/PERMITTING
ALASKA COASTAL MANAGEMENT PROGRAM

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October 4, 2004

The Honorable Fred Reeder
City and Borough of Sitka
100 Lincoln Street
Sitka, AK 99835

Dear Mayor Reeder:

This October, the Department of Natural Resources (DNR), Office of Project Management and Permitting (OPMP) and the Department of Commerce, Community and Economic Development (DCCED) are rolling up our sleeves at a coastal district workshop, along with coastal communities throughout Alaska, to learn how to renovate all of the Alaska Coastal Management Program (ACMP) district coastal management plans.

This letter provides a brief overview of why your district plan has to be revised now, and how OPMP and DCCED staff can support your community though the process to amend your local district coastal management plan by July 1, 2005.

Background

The Alaska State Legislature passed House Bill 191 (chapter 14 SLA 2003) in May 2003 finding that "there is a need to update and reform the district coastal management plans under the ACMP so that the local enforceable policies within those plans

- are clear and concise,
- provide greater uniformity in coastal management throughout the state,
- relate to matters of local concern, and
- do not duplicate state and federal legislation".

The legislation requires the coastal districts to complete the plan revision and submit the amended plan to DNR for approval by July 1, 2005. During 2005-2006, DNR will be coordinating the state and federal review and approval of all of the revised district plans. District plans that are not revised, approved and in effect by July 1, 2006, sunset on that date.

While the district coastal management plans must be revised to comply with HB 191, AS 46.40 and the implementing regulations, **it is important to realize that a full comprehensive update is not required.** We acknowledge that there is limited time and funding available and that a comprehensive plan update may not be feasible. If you find that you are unable to do a comprehensive revision, we encourage you to limit the scope of your update. Consider developing a limited number of enforceable policies to address your priority areas or subjects only. Another option would be to delete those policies that do not meet the regulations, but retain those that do.

"Develop, Conserve, and Enhance Natural Resources for Present and Future Alaskans.

Even if this option leaves you with just one policy, it will still allow you to participate in coastal management. Appropriate revisions to the resource inventory and analysis and any necessary maps or narrative descriptions to support the enforceable policies (see 11 AAC 114.250-270) must still be included. Additional policies could be added in subsequent years through additional plan amendments. It is up to each coastal district to decide how extensive a revision to do, dependant on the resources (time and money) each chooses to commit. A coastal district may amend its plan in the future when more resources are available either from the ACMP or other local, state or federal sources.

DNR and DCCED have provided $900,000 in grants to the 26 coastal districts that applied for ACMP funds for the plan amendments. Recognizing the real constraints of time and money, we developed a two step process for communities to evaluate their plans, and for the coastal coordinator to work with their assembly or board to decide the extent of the plan amendment you want to take on. We provided information on this preliminary plan evaluation step at the February 2003 ACMP Conference, developed materials with step by step instructions, and hosted several teleconferences to discuss the plan evaluation and grant application requirements.

To further assist the coastal districts and planning consultants with the plan amendments, OPMP and DCCED staff have prepared guidance materials and templates, are developing model enforceable policies, model implementation chapters, have hosted several teleconferences to explain the plan amendment requirements and created a website that hosts several of these tools. The website is on the Alaska Coastal Management Program website at: http://www.alaskacoast.state.ak.us/Plans/intro.htm.

October Workshop

DNR and DCCED are hosting the October 20-22 ACMP workshop in Anchorage to work closely with the coastal districts and consultants on the plan amendments. State and federal agencies will also participate specifically to provide information about their laws that govern the management of coastal resources and where to locate resource inventory information, an essential ingredient of the district plans.

Please let us know if there is anything else we can do to assist your communities. Funds are available for ACMP staff to travel to each coastal district at a critical juncture in the plan amendment process. You can contact me at 907 269-8431 or Randy Bates at (907) 465-3562 if you have questions. I look forward to hearing from you, and to meeting your coastal coordinator at the October workshop.

Sincerely,

Bill Jeffress
Director

Cc: Marlene Campbell
Mike Black, DCCED
Kevin Ritchie, AML
Randy Bates, OPMP

2

Sponsor: Administrator

CITY AND BOROUGH OF SITKA

ORDINANCE NO. 2007-02

AN ORDINANCE OF THE CITY AND BOROUGH OF SITKA, ADOPTING THE FINAL PLAN AMENDMENT OF THE SITKA COASTAL MANAGEMENT PLAN

1. **CLASSIFICATION.** This ordinance is of a permanent nature and is not intended to become a part of the Sitka General Code.

2. **SEVERABILITY.** If any provision of this ordinance or any application to any person or circumstance is held invalid, the remainder of this ordinance and application to any person or circumstances shall not be affected thereby.

3. **PURPOSE.** This ordinance adopts the 2006 Final Plan Amendment to the Sitka Coastal Management Plan as required by the State of Alaska, Department of Natural Resources, Office of Project Management and Permitting, Alaska Coastal Management Program (ACMP) to incorporate changes required by Alaska House Bill 191 and associated executive orders, statutes and regulations. The Alaska Department of Natural Resources adopted Final Findings and Conclusions amending the Final Plan Amendment of the Sitka Coastal Management Plan and approved the plan on November 24, 2006. The plan is being submitted to the federal Office of Ocean and Coastal Resource Management for its review and approval. This final plan completely replaces the current version of the Sitka Coastal Management Plan amended in 1989 with further amendments in 1993 and 1997.

4. **ENACTMENT.** NOW, THEREFORE, BE IT ENACTED by the Assembly of the City and Borough of Sitka that the 2006 Final Plan Amendment of the Sitka Coastal Management Plan be adopted.

5. **EFFECTIVE DATE.** This ordinance shall become effective immediately upon approval of the Final Plan Amendment of the Sitka Coastal Management Plan by the National Oceanic and Atmospheric Administration, Office of Coastal Resource Management.

PASSED, APPROVED, AND ADOPTED by the Assembly of the City and Borough of Sitka, Alaska this 13th day of February, 2007.

John Holst, Vice Deputy Mayor

ATTEST:

Colleen Pellett, MMC
Municipal Clerk

Introduction: January 23, 2007
Public Hearing: February 13, 2007

APPENDIX A-5
MINING IN THE SITKA AREA

MINING IN THE SITKA AREA

Note: this appendix copies the mining discussion from the approved 1989 Sitka Coastal Management Program, reprinted here for the information of readers.

In the past, the Sitka area was the site of substantial mining activity. Extensive exploration and mine development occurred throughout Southeast Alaska from the 1880s through the 1920s. Other locations in the Lower 48, prices of the minerals, additional development costs in Alaska, and distances from major markets all played a part in the decline of the mining industry.

At the present time, there is a renewed interest in potential gold mining on Chichagof Island, on Klag Bay, along Doolth Mountain, and in and around the original Chichagof Mine, Hirst Chichagof Mine, and Kimsham Townsite. The depletion of other reserves and higher value of the gold on the world market have created a renewed interest in the economic activity.

Minerals
Mr. Tom Buntzen, Economic Geologist in the Alaska Department of Natural Resources, Division of Geological and Geophysical Surveys, provided the following information on Mineral Potential of the Sitka Borough, reproduced in its entirety:

"Within the Greater Sitka Borough, over 100 mineral deposits and occurrences containing gold, silver, nickel, copper, lead, zinc, tungsten, chromium, industrial minerals, and rare earth elements occur in a variety of geologic environments (see Table 4). An estimated 789 mineral claims were active within Borough boundaries during 1986. The following is a brief summary of these mineral resources broken down into several commodity groups.

TABLE 4
SELECTED MINERAL DEPOSITS OF THE SITKA BOROUGH

AREA	RESOURCE
Bohemia Basin	nickel, cobalt
Mirror Harbor	cobalt, nickel and platinum group metals
Chichagof Mining District	gold, silver
Iyookeen Cove	gypsum
Sitka Mining District	gold, silver
Goddard Hot Springs	rare earth elements, tungsten
Snipe Bay	nickel, copper, cobalt
Red Bluff Bay	chromium

Source: Alaska Division of Geological and Geophysical Surveys

"These are few recent summaries of the area, and the following information was compiled using old geologic reports from this agency and various federal groups.

"Gold/silver
In 1871, just four years after the purchase of Alaska from Imperial Russia, the first attempt at lode gold mining in Alaska was made near Sitka at the 'Blue Lake Prospect.' The next year, a mill was constructed to exploit several gold veins at Silver Bay, about 10 miles southeast of Sitka. The total

production through the turn of the century from the Sitka area was somewhat modest—amounting to a few thousand ounces of gold-silver bullion.

"Gold mining of considerable significance became concentrated at Klag Bay and Kims ham Cove, eventually the center of the Chichagof Mining District. Almost a million ounces of gold and several hundred thousand ounces of silver were recovered from lodes in the District, mostly from the Chichagof and Hirst-Chichagof mines. These mines were second in importance only to the mines near Juneau to total Alaskan hardrock gold production.

"From 1918-41, the Chichagof Mine produced 660,000 ounces of gold and 200,000 ounces of silver from 596,487 short tons of ore. From 1918 to 1943 the nearby Hirst Chichagof Mine produced 131,000 ounces of gold from 140,000 tons of ore. Both mines contained high angle quartz-gold-sulfide deposits that were intruded along faults in Sitka graywacke (sandstone) over a large vertical range. The deposits at the Chichagof Mine were worked to a total vertical range of 4,100 feet—the deepest workings being 2,800 feet below sea level.

"Other nearby hardrock gold properties at Cobol, Apex-El Nido, and Alaska Chichagof collectively produced about 30,000 ounces of gold during the same time period. Nearly 500 miners worked the Chichagof District mines for 25 continuous years prior to World War II.

"Since 1981, the main Chichagof and Hirst Chichagof properties have been under exploration and development by the Exvenco Company, an American-Canadian joint venture partnership based originally in Spokane, Washington. In 1987, the company became Golden Sitka Resources, Ltd., and was listed on the Vancouver (British Columbia) Stock Exchange. This company has proposed to: 1) reprocess mill tailings at the old Chichagof mine; 2) develop and produce ore from the Big Croppings, Aurum, and Sitka deposits (new and extensions of old ore bodies) at the same mine; and 3) reopen the Hirst-Chichagof mine—the latter believed to have the largest remaining reserve of unmined ore. Underground workings have been rehabilitated at both mines, and drilling programs have been initiated at a cost of several million dollars in the last 5 years. If results are positive, this company would probably mine and process ores utilizing infrastructure mounted on a barge, so that both properties could be accessed and onshore disturbances minimized. Anticipated employment levels are unknown, but at proposed output rates of 200 to 500 tons per day, an estimated 100-300 employees would be needed. These properties constitute the most promising mineral developments in the Sitka Borough area at this time.

"Copper-Nickel-Cobalt-Platinum Metals
The west coasts of Chichagof and Baranof islands contain several copper-nickel-cobalt-platinum element deposits hosted in intrusive plutonic rocks known as 'norites.' The most promising properties are found on Yakobi Island outside the Sitka Borough, but similar deposits occur at Mirror Harbor on Chichagof Island and Snipe Bay on Baranof Island. The former deposit contains indicated reserves of 3 million tons of nickel-cobalt mineralization, while the latter contains 430,000 tons of 0.3% nickel and 0.3% copper. Glactic Resources Ltd. conducted a sampling and drilling program at Mirror Harbor in 1987. Present mineral industry interest in these areas is limited to exploration (land status, i.e. mineral closures, is a factor at both properties) but future development could occur with favorable commodity price levels and new mineral technologies, in the author's opinion. Nickel-cobalt deposits with similar size and tenor are currently being mined in Scandinavia.

"Chromium

The east coast of Baranof Island hosts several small deposits of chromite, the principal ore mineral of the strategic metal chromium. Tabular chromite bodies at Red Bluff Bay are estimated to contain 29,000 tons of 35% Cr_20_3(based on drilling conducted there during World War II. Chromium and nickel were also investigated at Takanis Bay near the townsite of Baranof, although reserves there are considered modest. Neither properties have been commercially exploited, and their current economic viability is questionable. However, given tidewater access that both properties have, along with the instability of nations in southern Africa that supply American industry with chromium, these deposits could be developed or further explored during times of critical need.

"Tungsten — Rare Earth Elements
Plutonic rocks near Goddard Hot Springs contain veins and disseminations of rare earth minerals allanite and monazite along with scheelite (calcium tungstate), and base totals. Rare earth elements are part of the high technology 'growth' industries, and future demand may substantially increase worldwide. However, the commercial viability of the mineral deposits is considered unknown or low. Limited exploration and investigation has been conducted near Goddard Hot Springs in the 1980s. Similar hot springs-related deposits occur in other locations on Baranof Island.

"Industrial Minerals
Uses of industrial minerals within the Sitka Borough have been limited to road construction, rip/rap armor applications along shorelines, bridges, or harbor reinforcement. Prior to 1930, high grade deposits of gypsum were mined and shipped to Pacific Northwest markets from deposits at Iyoukeen Cove just north of the Borough boundary on eastern Chichagof Island. The same geologic units hosting the gypsum extend into the northeastern area of the Borough. Host of the anticipated sand and gravel and quarry stone production will probably be confined to public works construction or support activities of existing private industry. The locations of these deposits vary widely, and exploitable reserves are generally delineated with on-site inspection, sampling, and subsequent laboratory investigations. We do not have a good database concerning the distribution of industrial minerals in the Borough although Department of Transportation and Public Facilities and the U.S. Forest Service have developed some information to meet their own specific requirements.

"Mineral Exploration
Mineral exploration by private firms is on the increase in Southeast Alaska—jumping from $2.8 million in 1986 to nearly $6.0 million in 1987. Besides geologically favorable environments and past mineral production, the extremely favorable transportation situation with respect to harbor and docking facilities makes the Sitka Borough a good place to explore for minerals. To date about 70% of these expenditures have been in gold exploration with the remainder in base metals and industrial commodities. Exploration activity in itself provides job opportunities and business to air logistical firms, boat rentals, and other supply outlets in local communities of the planning region."

APPENDIX A-6
SITKA COASTAL HABITAT EVALUATION
FINAL PROJECT SUMMARY WITH MANAGEMENT RECOMMENDATIONS

Submitted by: Kimbal A. Sundberg
Habitat Biologist
Alaska Department of Fish and Game
Habitat Protection Section
Marine/Coastal Habitat Management Project
333 Raspberry Road
Anchorage, Alaska 99502

The preparation of this report was financed in part by funds from the Alaska Coastal Management Program and the Office of Coastal Zone Management, National Oceanic and Atmospheric Administration. U.S. Department of Commerce, administered by the Division of Community and Regional Affairs.

[Note: This appendix is reprinted in its entirety from the 1989 Sitka CMP. The figure and table numbers are unique to this appendix and are unrelated to the numbering system in the rest of the Sitka CMP. Though much of the scientific biological information here remains unchanged from the date of the study, many of the management recommendations are outdated, generally because they have already been implemented. This appendix, and the more complete habitat study it summarizes, remain the approved Resource Inventory and Resource Analysis for the Sitka CMP. Given that sweeping changes to Alaska Coastal Management Program have necessitated the revision of the Sitka CMP within a very short time, on very limited resources, it would not be possible to perform additional habitat studies necessary to bring this chapter up to date.]

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INTRODUCTION

The City and Borough of Sitka embarked upon the development of a District Coastal Management Program in 1979. In February 1979, the Alaska Department of Fish and Game entered into a contract with Sitka to furnish an inventory and analysis of known fish and wildlife resource and habitat Information for the Borough area as well as a summary of coastal management Issues concerning fish and wildlife resources and their habitats. Sitka retained the consulting firm of R.W. Pavitt and Associates to provide the remainder of the inventory and analysis of coastal resources, issues, goals, and objectives. These combined efforts culminated in the publishing of the "Sitka Coastal Management Program Phase I Report" by the City and Borough of Sitka in October 1979.

Phase II of Sitka's Coastal Management Program began immediately following the completion of Phase 1. As a result of the success of Phase I, the City and Borough of Sitka and the Alaska Department of Fish and Game signed a joint Memorandum of Understanding (MOU) in November 1979 to undertake additional research on coastal habitats with special emphasis on Sitka Sound and the urban area of Sitka. Funding for the Phase II effort was provided by the Office of the Governor, Division of Policy Development and Planning, Office of Coastal Management.

Specifically the MOU called upon the Department of Fish and Game to:

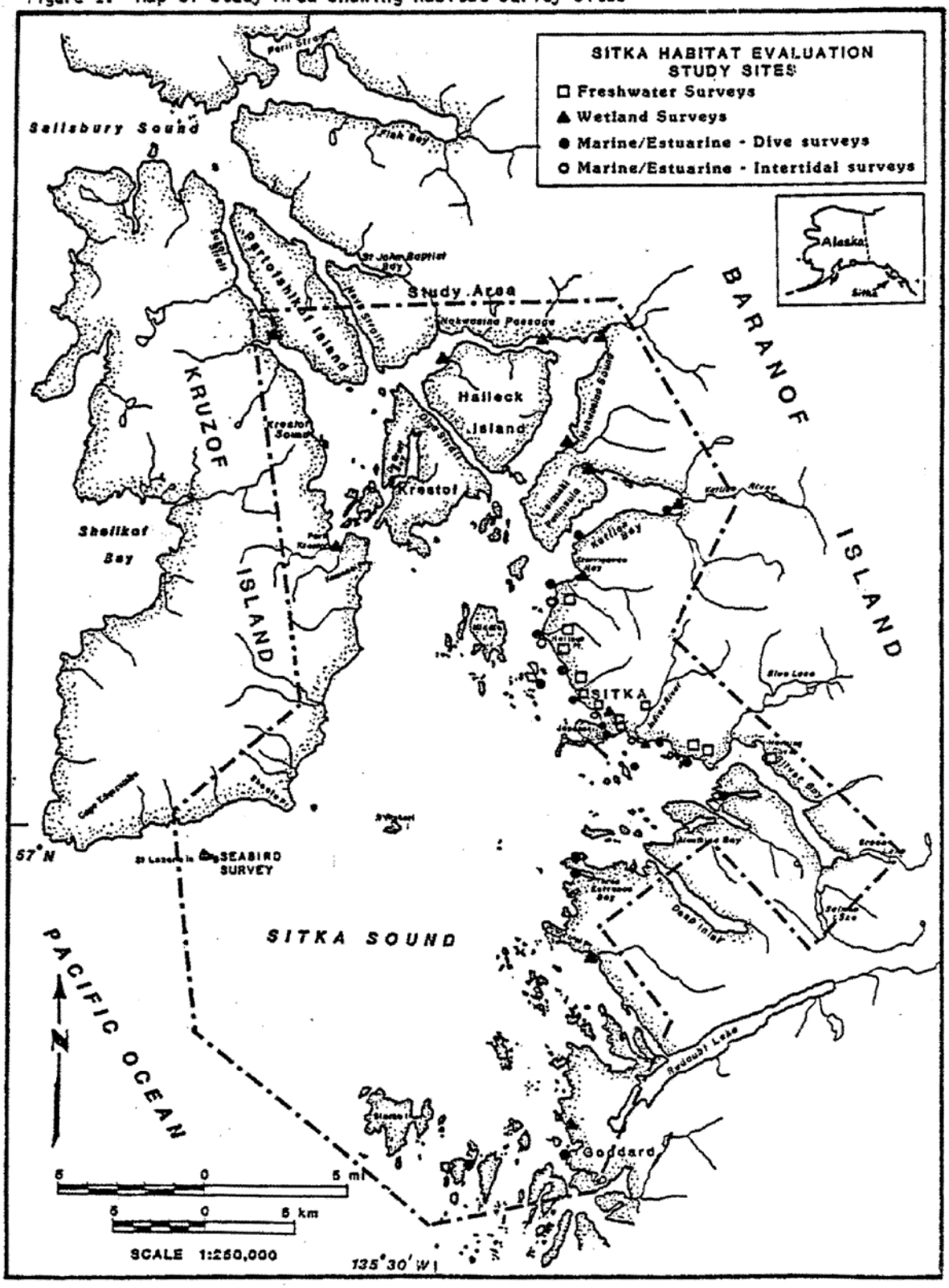
1. Evaluate and map individual streams and lakes along the 15 mile Sitka road system to delineate fish species, spawning areas, and other sensitive habitat areas; identify adjacent land and water use practices that affect fish and wildlife habitat; and make recommendations for maintaining or enhancing specific stream and lake habitats within the Sitka "urban" area.
2. Evaluate and map coastal wetlands and tidal flats to delineate important habitat use areas for birds and other wildlife. Document past and present Impacts to wetland habitats and make recommendations for the conservation of important wetland habitats.
3. Identify and characterize waterfront marine habitats including estuaries, tidal flats, rocky shores, and man-made structures. Describe and document the biological and physical components of these habitats and develop a management system for these areas based upon their relative sensitivities to various types of waterfront development.

This report is a summary of the results of the Phase II study with general and specific recommendations for habitat management. A series of detailed technical reports covering the subjects of: 1) freshwater habitats, 2) wetland habitats, and 3) marine/estuarine habitats and marine circulation, are available to provide backup Information for the habitat management recommendations contained in this report. Examples of the technical report products are found in Figures 2 through 16.

STUDY AREA

The study area (Figure 1) includes the Sitka Sound region bounded on the north by Nakwasina Passage, on the south by Goddard Hot Springs, on the west by Kruzof Island, and on the east by Silver Bay. Specific study sites were selected within this area because of their known fish and wildlife value, their sensitivity to coastal development, and their representation of habitat type and geographic area. The period of study extended from 1979 to 1980 and spanned the four seasons: fall, winter, spring, and summer.

Figure 1. Map of Study Area Showing Habitat Survey Sites



METHODS

Standard methods were used to survey fish and wildlife habitats within the study area. A brief description of the methods follows:

1. Freshwater Habitats.

A determination of fish species present in 12 streams along the road system was accomplished by consulting the available Information, both published and unpublished, and by sampling with standard minnow traps baited with salmon eggs. Stream drainages were walked their entire length from tidewater to the upper limit of known fish habitat to note potential spawning areas, rearing areas, obstructions to fish passage, condition of stream channel and banks, and adjacent land use practices and impacts. Mapping techniques included the use of low altitude 35 millimeter color infrared (CIR) photography enlarged to a scale of one inch = 140 feet. This was supplemented with U.S. Forest Service one inch = 1,320 feet color photographs and NASA/Ames one inch = one mile high altitude CIR photographs. Photographic interpretations were verified by ground surveys at selected locations.

2. Wetlands Habitats.

Wetland habitats were initially identified and mapped by synthesizing the available knowledge of the area, by consulting aerial photography, and by conducting limited surveys by car, boat, aircraft, and on foot. Thirteen areas were selected for additional surveys and of these, seven were selected for more intensive floristic and surface soil characterization. One meter wide belt transects were established across representative plant zones at each of the seven wetlands. The transects were sampled at one meter intervals to determine plant species, elevation, percent cover, and surface soil type. CIR photos were used to map major plant zones and wetland features. Bird surveys were conducted at all major coastal marshes and their adjacent waters within the study area during the fall, winter, spring, and summer. Opportunistic sightings of Sitka black-tailed deer, brown bear, and small mammal use in wetlands were also made during the 1979-80 field season. Surveys were conducted on foot, in a 13 foot open skiff, in a 29 foot power boat, by car along the road system, and by aircraft. Survey data recorded included: species present, relative numbers, and observed habitat use.

3. Marine/Estuarine Habitats.

Marine and estuarine habitats were evaluated through intertidal surveys, subtidal surveys, and a drift bottle study.

Intertidal surveys were conducted by walking a linear transect through the intertidal zone from the higher high water line to the lower low water line to record and sample epifauna, epiflora, infauna, substrate, and elevation within major life zones. Infauna was sampled by shovel and washed through a one millimeter mesh sieve. All intertidal surveys were conducted during minus tides in May.

Underwater surveys were conducted by making scuba dives along a 100 meter transect tape anchored at mean higher high water and run perpendicular to the shoreline out to 100 meters length or 24 meters (80 feet) depth, whichever occurred first. Data on surface substrate, depth, epiflora, and epifauna were recorded every five meters along the tape. Limited infaunal sampling was done by hand digging. Underwater 35 millimeter photos were taken along the transect to supplement observations.

A drift bottle study was initiated by releasing 3,500 plastic bottles at 35 locations within Sitka Sound. Each bottle contained a highly visible, sequentially numbered card Instructing the finder to record the time, place, and date the bottle was found. Data obtained from returned cards was used to interpret the net surface circulation within Sitka Sound during the study period.

RESULTS

The results of the Phase II field studies include the following:

1. Freshwater Habitats.

Sitka area streams are typically short, steep drainages with highly variable flows and unstable beds. All of the surveyed streams provide habitat for pink salmon, coho salmon, and Dolly Varden char. Pink salmon were the most numerically abundant species in all streams. Chum salmon, cutthroat trout, and steel head/rainbow trout are also present 1n several systems. Sockeye salmon occur in suitable lake/stream systems, most notably Salmon Lake. Productivity of anadromous streams varies from year to year depending upon stream flows, temperature, and the fluctuating numbers of spawning salmon. Table 1 summarizes the peak salmon escapements from the past twenty years in seven Sitka area streams. Pink salmon escapements in the surveyed streams ranged from less than 100 in small creeks, to over 150,000 in the larger drainages. Peak pink salmon spawning generally occurs during odd numbered years with lower numbers during even years. Low flows combined with extended periods of sub-freezing weather can severely limit salmon production in Sitka area streams. High flows, particularly fall freshets that can dislodge eggs from the gravels, will also adversely affect salmon production.

Sitka area streams and lakes provide important recreational and subsistence opportunities for Sitka residents, as well as providing the resource base for the local commercial salmon fishery. During the surveys, several freshwater systems were found where spawning and rearing habitat and water quality have been adversely affected by land and water use practices. The most significant impacts have occurred in Granite Creek, Indian River, Sawmill Creek, Swan Lake, and Turnaround Creek. However, these systems still provide important resource values to the community and will continue to support fish and wildlife resources with careful land and water management.

2. Wetlands Habitats.

Wetlands comprise less than ten percent of the shorelands of Sitka Sound, yet many were found to be important coastal habitats. The term “wetland” as evaluated in this study, includes four broad categories:

A. Coastal Wetlands

Coastal wetlands are low gradient shorelands that often occur at the heads of bays and on the alluvial deposits at stream mouths. This type of wetland tends to be relatively small and isolated when compared to the majority of the shoreline of Sitka Sound, which is characteristically steep and rocky. Sizes range from 4 acres at the mouth of Indian River (Figure 2) to 160 acres in Katlian Bay (Figure 3). Coastal wetlands and their adjacent marine/estuarine waters were found to be high value feeding and resting areas for approximately 70 species of waterfowl and shorebirds. Peak bird usage is during the spring migration (Table 2). The use of coastal wetlands for nesting was found to be minimal. Typically, five plant communities (listed in order from the high intertidal zone landward to the forest)

occur in coastal wetlands. They are: alkali grass (Puccinellia nutkaensis), bluejoint grass (Calamagrostis canadensis), sedge (Carex lyngbyaei), beach rye-grass (Elymus arenarius), and reed bent grass (Calamagrostis nutkaensis). Figure 4 shows a typical vegetation profile for Katlian coastal wetland. The upper limit of a coastal wetland is usually sharply delineated by the forest fringe or shrub zone. In Sitka, the upland extent of coastal wetlands was found to be the upper extent of occasional saltwater influence.

B. Estuarine Tidal Flats

Estuarine tidal flats are comprised of deposits of silt, sand, and gravel and often occur in conjunction with coastal marshes. They are generally vegetated with scattered patches of algae. Some areas such as the Old Seaplane Turnaround Flats have extensive low intertidal and shallow subtidal eelgrass meadows. Invertebrate life is rich on tidal flats and in estuaries making them important feeding areas for birds, fish, and wildlife. For example, eelgrass beds are utilized as spawning areas for Pacific herring and as rearing and feeding areas for juvenile salmon crabs and shrimps. Eel grass beds are also an important source of primary productivity and export nutrient energy to adjacent estuarine and marine systems.

C. Freshwater Wetlands

Freshwater wetlands occur in conjunction with lakes, potholes, and low gradient stream reaches. Swan Lake has an example of a freshwater wetland at its northern shore (Figure 5). Vegetation in freshwater wetlands includes submergent plants such as pond lily (Nuphar polysepalum) and pondweed (Potamogeton gramineus), as well as emergent plants such as marestail (Hippurus vulgaris), horsetail (Equisetum fluviatile), two species of grasses (Deschampsia beringensis and Calamagrostis canadensis), and one species of sedge (Carex sitchensis). Figure 6 shows a typical vegetation profile for Swan Lake freshwater wetland. Freshwater wetlands provide food and cover for waterfowl and fish. They also export nutrient energy to adjacent rivers, lakes, and streams.

D. Muskegs

Muskegs are localized patches of poorly drained soils found throughout coastal forests and the alpine zone. Typical muskeg plant communities consist of sphagnum mosses (Sphagnum spp.) and sedges (Carex spp. interspersed with lodgepole pine (Pinus contorta), Alaskan yellow cedar (Chamaecyparis nootkatensis), crowberry (Empetrum nigrum), labrador tea (Ledum palustre), skunk cabbage (Lysichiton americanum), and bracken fern (Pteridium aquilinum). Muskegs comprise the largest wetland type within the Sitka area. Bear, deer, and several bird species utilize muskeg areas on a seasonal basis. Muskegs may function as either hydrologic reserves or hydrologic sinks. The peat deposits found in muskeg bogs can serve as large sponges capable of soaking up peak rainfall to be released into adjacent streams during periods of low flow. Other muskegs can effectively trap water and contribute little flow to adjacent watersheds. Further research on the hydrology of muskegs is warranted.

Of the four wetland types, the coastal wetlands and estuarine tidal flats were found to provide the most Important wetland habitat. They provide feeding and resting areas for a large proportion of the migrant and resident waterfowl and shorebirds of Sitka Sound. The marine Invertebrates and plants associated with estuarine tidal flats are an important food source for waterfowl, fish, and shellfish. The plant species present in coastal wetlands provide high protein food for Sitka black-tailed deer, brown bear, ducks, and geese. Brown bear and bald eagles feed on spawning salmon in streams and

Table 1. Peak Salmon Escapement Estimates for Major Sitka Area Streams

	Katlian River 113-44-003			South Fork Katlian 113-44-005		Starrigavan Creek 113-41-015			Granite Creek 113-41-017	Indian River 113-41-019		Sawmill Creek 113-41-021	Salmon Lake Creek 113-41-032			
Year	Pink	Chum	Coho	Pink	Chum	Pink	Chum	Coho	Pink	Pink	Coho	Pink	Pink	Chum	Coho	Sockeye
60	400	4,000	NS	200	18,000	2,500	NS	NS	NS	NS	NS	NS	2,400	NS	NS	NS
61	1,200	NS	NS	11,000	NS	2,000	NS	NS	NS	NS	NS	NS	4,500	NS	NS	NS
62	1,500	NS	NS	20,000	NS	500	NS	NS	NS	500	30	NS	NS	NS	NS	NS
63	4,500	NS	NS	35,000	NS	7,000	NS	NS	NS	300	NS	NS	6,000	NS	NS	500
64	400	NS	600	5,000	NS	500	NS	NS	NS	300	NS	NS	4,000	NS	NS	NS
65	11,000	NS	NS	11,300	NS	5,000	NS	NS	NS	500	NS	NS	6,700	200	1,000	NS
66	2,000	NS	NS	2,250	2,250	500	NS	NS	NS	300	NS	NS	500	NS	NS	NS
67	6,000	NS	NS	30,000	NS	500	NS	NS	NS	150	NS	NS	5,500	NS	NS	NS
68	2,000	NS	NS	4,000	NS	100	NS	NS	NS	NS	NS	NS	1,500	NS	NS	300
69	5,500	NS	NS	50,000	NS	1,000	NS	NS	NS	500	NS	NS	25,000	NS	NS	1,000
70	1,000	2,000	NS	1,500	1,000	300	200	NS	NS	NS	NS	NS	2,500	2,500	NS	2,000
71	5,200	NS	NS	21,000	NS	10,000	NS	NS	NS	300	NS	NS	NS	NS	NS	NS
72	300	NS	NS	1,200	NS	400	100	NS	NS	200	NS	NS	NS	NS	NS	NS
73	34,000	500	NS	55,000	200	5,300	NS	200	NS	500	NS	NS	5,000	2,000	NS	NS
74	1,000	300	NS	5,000	NS	6,150	NS	NS	NS	NS	NS	NS	700	NS	NS	NS
75	40,000	NS	NS	50,000	2,700	17,500	NS	NS	NS	NS	NS	NS	3,000	NS	NS	NS
76	500	1,000	NS	3,000	3,950	25,000	NS	NS	NS	NS	NS	NS	100	NS	NS	NS
77	120,000	NS	NS	125,000	NS	70,000	NS	NS	NS	17,500	NS	NS	70,000	100	NS	50
78	6,000	2,500	NS	8,000	3,000	48,800	NS	NS	1,000	2,000	NS	NS	5,500	300	NS	NS
79	100,000	NS	NS	155,000	NS	55,000	NS	300	*1,000	+13,000	96	1,000	16,500	NS	20	2,000
80	400	NS	NS	4,000	4,000	15,000	NS	2,000	200	2,900	110	NS	5,000	NS	NS	5

Sources: All data furnished by ADF&G, Commercial Fisheries Division unless otherwise noted.
*Bill Hughes, U.S. Fish and Wildlife Service.
+Dennis Lund, Sheldon Jackson College
NS - No survey data available

Figure 2. Indian River, Coastal Wetland

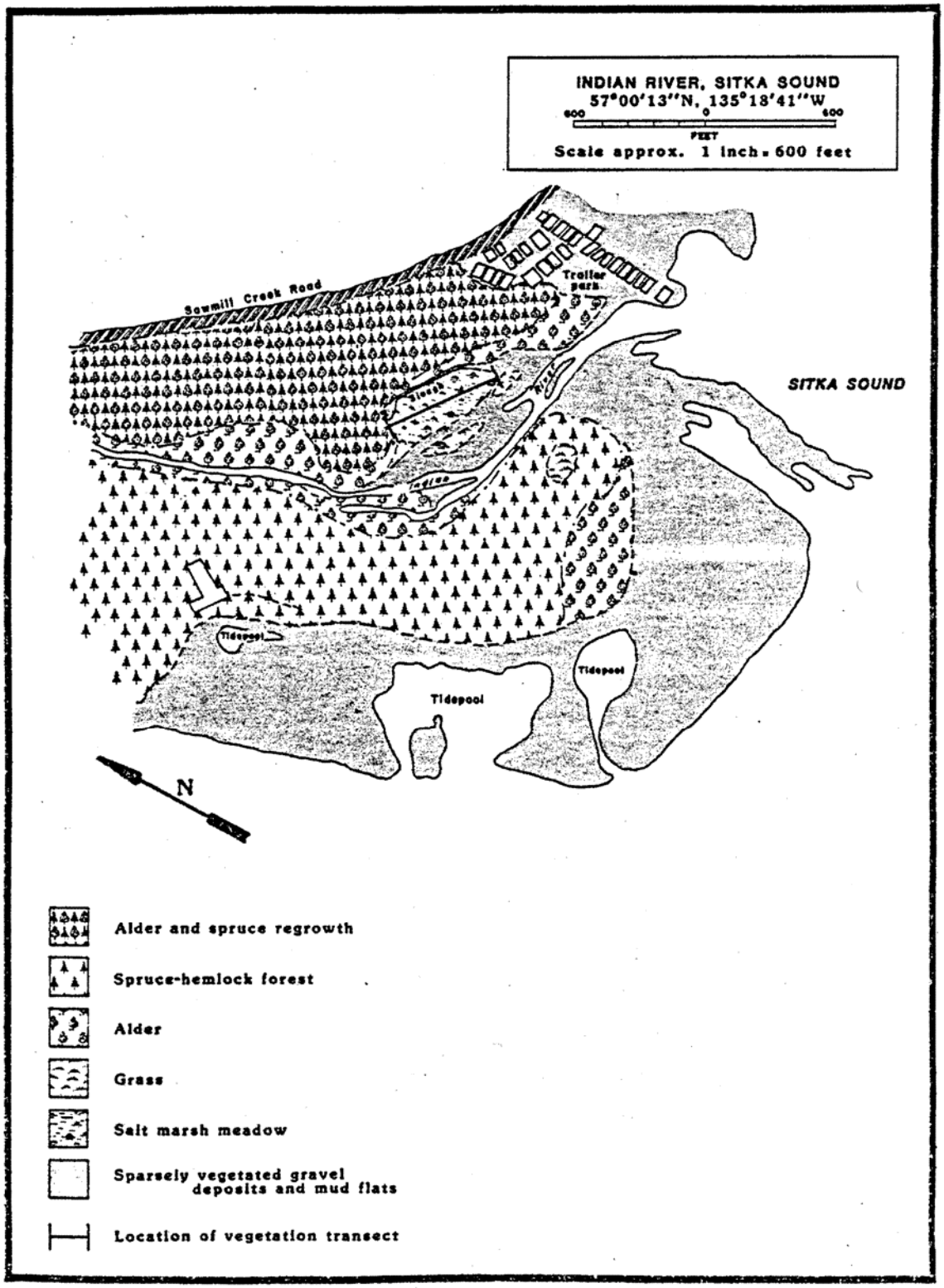
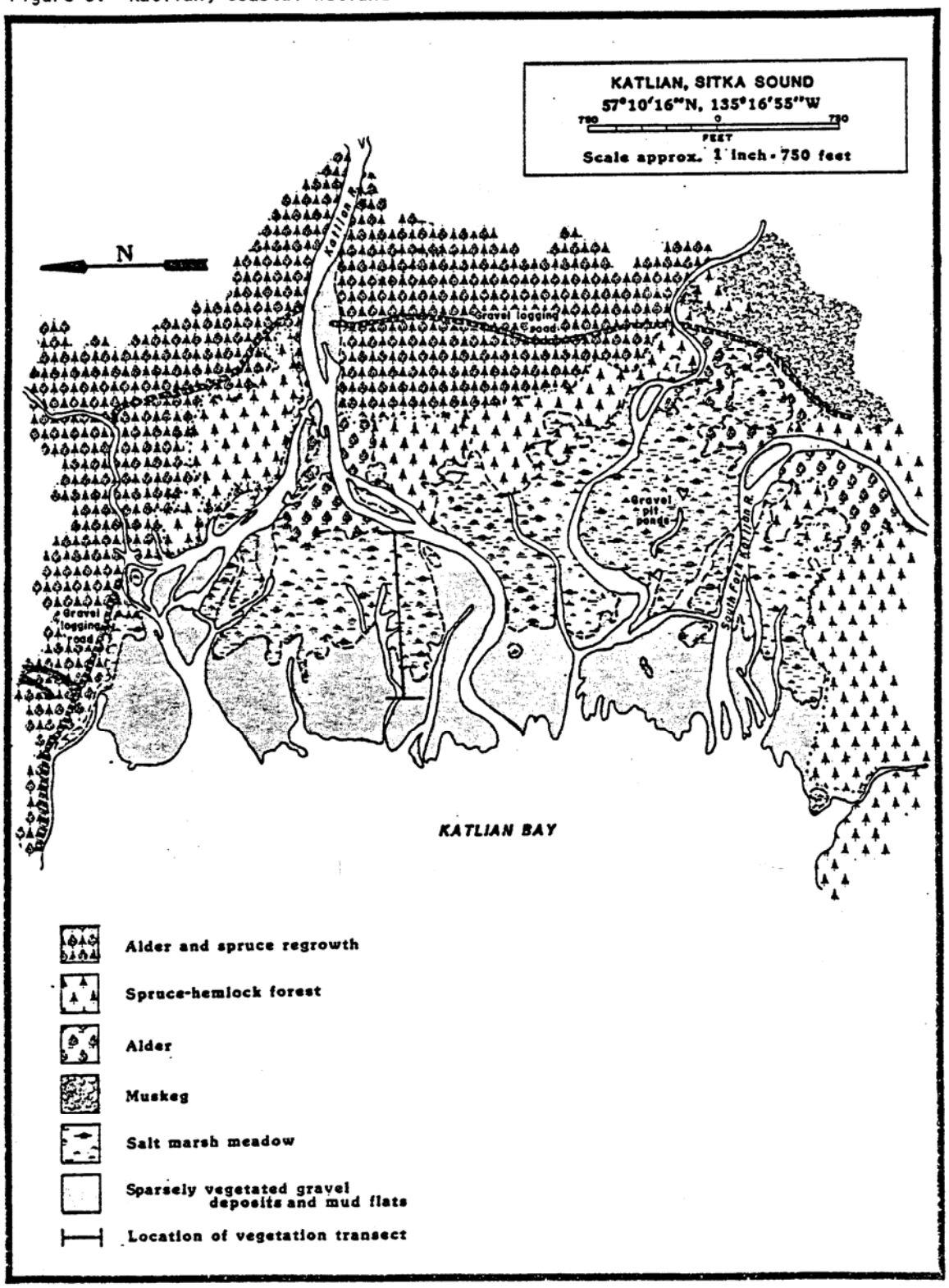


Figure 3. Katlian, Coastal Wetland



	SPRING 1980				SUMMER 1980	FALL 1979					WINTER 1979
	APR 1-15	APR 16-30	MAY 1-15	MAY 16-31	JUNE 1-26	AUG 27-31	SEPT 1-15	SEPT 16-30	OCT 1-15	OCT 16-31	FEB 18-29
LOONS and GREBES	4	9	9	2	6	—	—	4	8	14	45
SWANS	10	—	—	—	—	—	—	—	—	—	—
GEESE	157	57	148	2	8	80	1	—	36	95	70
DABBLERS	833	657	404	47	67	107	42	35	290	448	625
DIVERS and SEA DUCKS	2371	5535	1336	209	393	11	85	518	1961	1501	1493
SHOREBIRDS	582	4756	1621	45	28	32	275	93	142	50	15
SEA BIRDS	2	4	39	4	2	4	6	—	—	1	1

Table 2. Seasonal Populations of Selected Bird Species Groups Observed on Wetland Habitats. Data are from Surveys of the Roaded and North Areas.

Figure 4. Katlian, Coastal Wetland Vegetation Profile

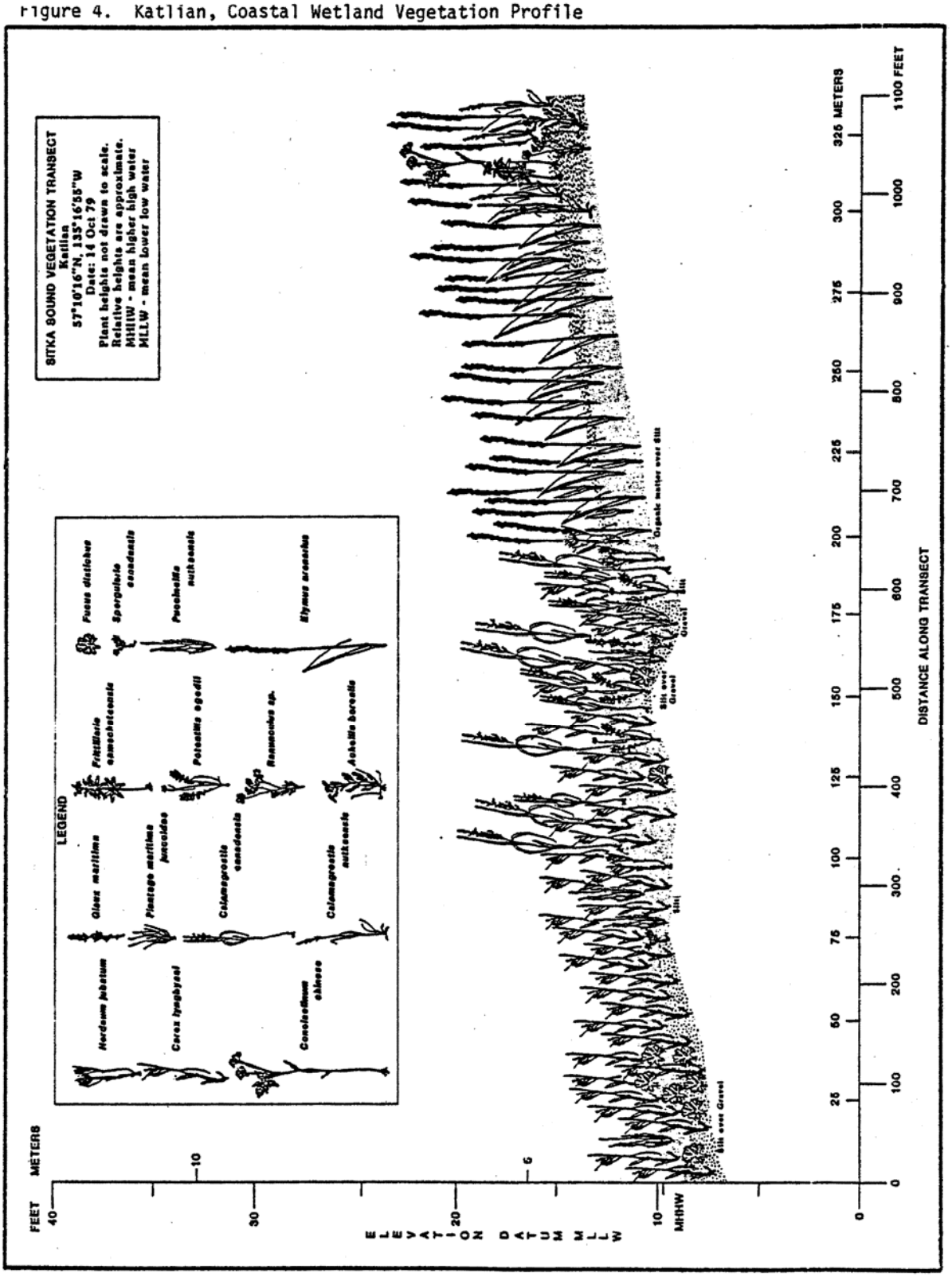


Figure 5. Swan Lake, Freshwater Wetland

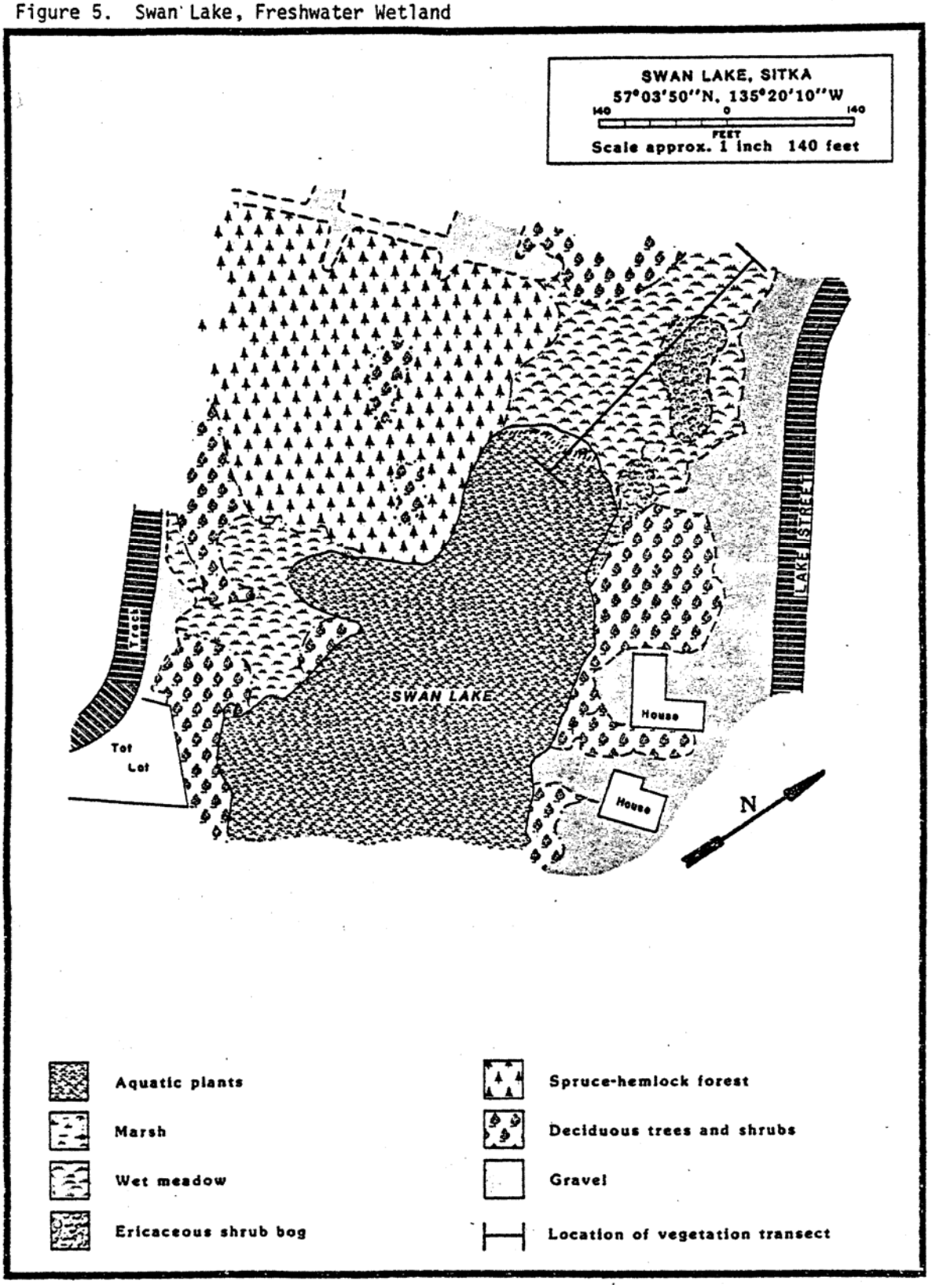
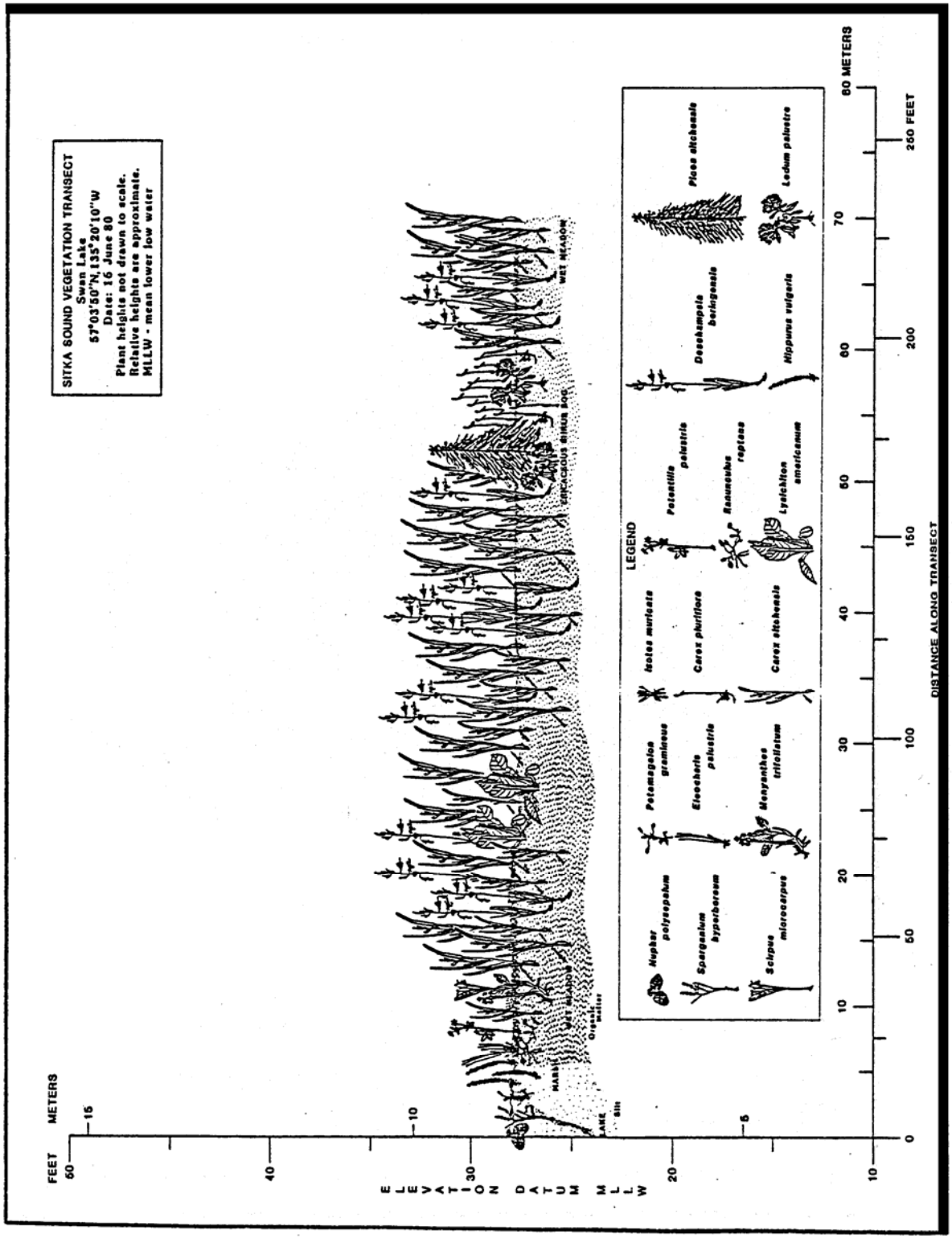


Figure 6. Swan Lake Freshwater Wetland Vegetation Profile



estuaries contiguous to wetlands. Eelgrass beds provide spawning substrate for herring and rearing habitat for juvenile salmon and shellfish.

3. Marine/Estuarine Habitats.

A variety of marine habitats within Sitka Sound ranging from quiet embayments to exposed rocky shores were sampled through subtidal and intertidal surveys. The rich variety and abundance of marine life in Sitka Sound is due in large measure to the diversity of the nearshore habitats found in the region. Two habitat types, steep rocky shores and estuarine tidal flats, are characteristic of many of the marine habitats surveyed.

A. Steep Rocky Shorelines

Steep rocky shorelines. including Halibut Point (Figure 7), provide substrate for the attachment of large marine algae, such as kelp and seaweed. Marine algae are an important source of primary productivity in Sitka Sound. The algal communities and their associated rocky substrates provide habitat for rockfish, herring, and forage fishes. Diverse and rich invertebrate fauna, including abalone, shrimps, and scallops are also found in rocky shoreline areas.

B. Estuarine Tidal Flats

The intertidal and shallow subtidal habitats are limited in Sitka Sound owing to the steep bathymetry of the area. Estuarine tidal flats are generally restricted to the heads of bays, mouths of creeks, or in small coves where sediments collect. Estuarine tidal flats, such as Totem Park, were found to be a generally productive and limited resource in Sitka Sound where steep rocky shorelines are a far more abundant habitat. Dense clam, worm, and eel grass beds were characteristic of Sitka estuarine tidal flats. These areas were found to provide essential rearing areas for juvenile salmonids, herring shrimp, and crabs. Birds, adult fish, and crabs are attracted to estuarine tidal flats to feed on clams and worms. Eelgrass beds are utilized as spawning areas by herring.

C. Man-made Habitats

Man-made marine habitats include piling supported docks such as the Old Navy Dock (Figure 8). This dock structure was found to have a rich and diverse assemblage of marine life Including numerous invertebrate species, herring, rockfish, scallops, octopus, and juvenile forage fishes.

4. Sitka Sound Circulation

Productivity in the offshore marine area is closely related to circulation. The upwelling of nutrient rich waters along the coast and subsequent mixing with freshened inshore waters has a determinant effect upon primary productivity and the basis of marine food webs. The seasonality and retention time of fish and shellfish larvae in gyre systems influences the location and productivity of fishing grounds. Circulation also affects the pathways, assimilation and concentration of pollutants in the marine environment.

Figure 7. Halibut Point Shore Zone Profile

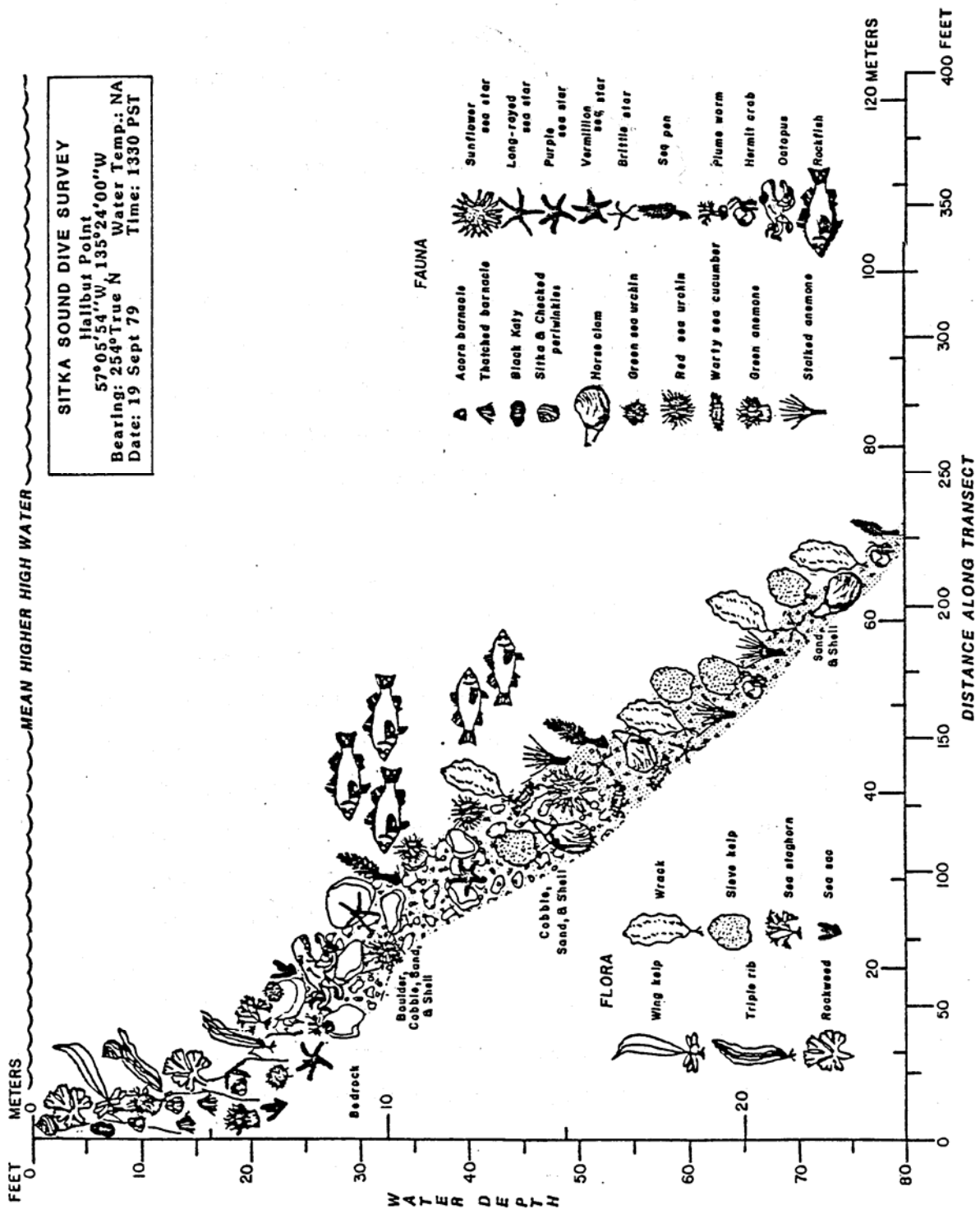
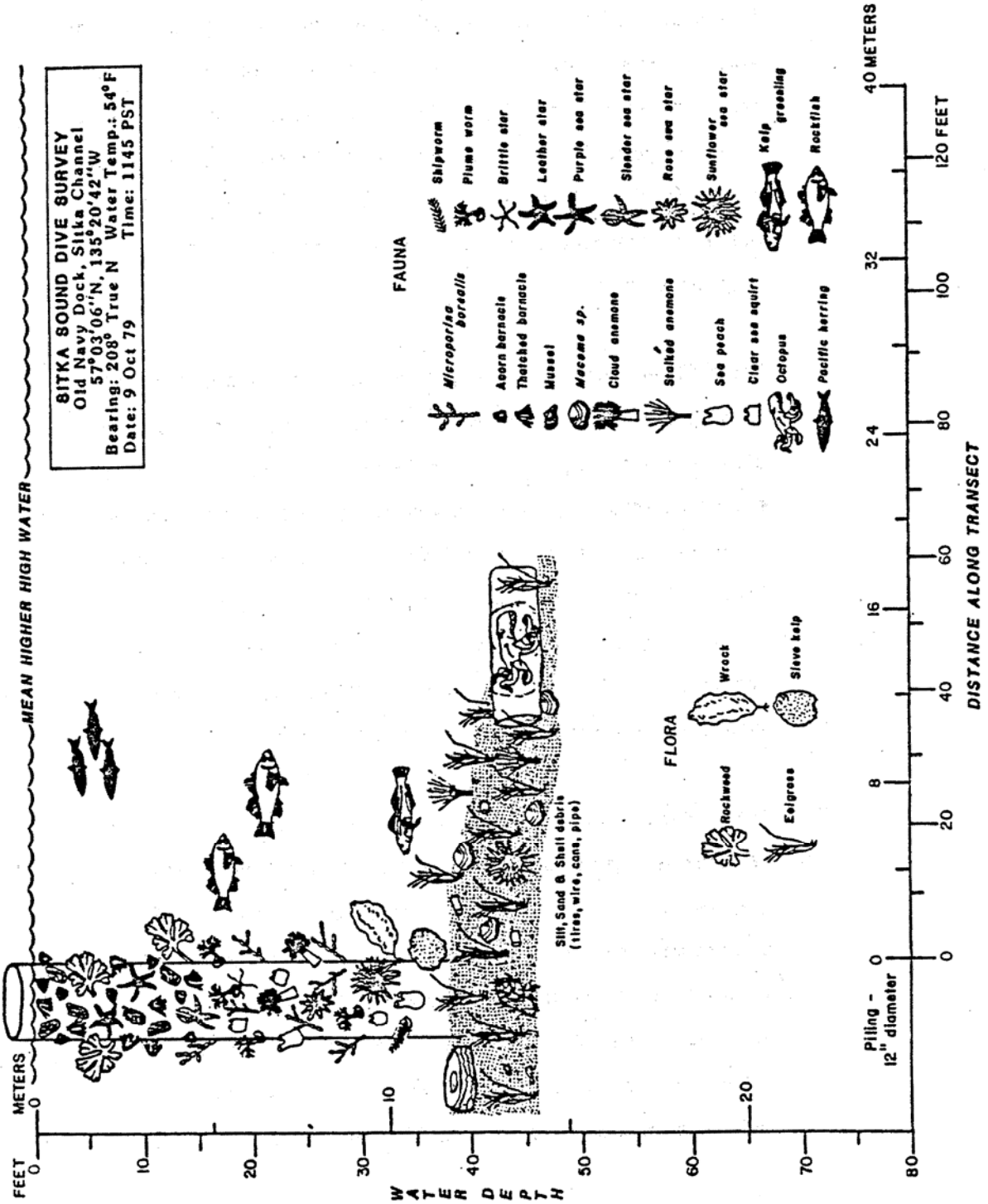


Figure 8. Old Navy Dock Profile



A. Regional Net Circulation

The regional net circulation within Sitka Sound is integrally related to the offshore circulation in the Gulf of Alaska. Coastal waters of the northward flowing Alaska Current enter Sitka Sound from the south and exit to the north around Cape Edgecumbe. A cyclonic (counterclockwise rotating) gyre in the outer portion of Sitka Sound is suggested by the results of the drift bottle study (Figure 9). Southwestward transport along the Inside coast of Kruzof Island was also demonstrated.

The influence of oscillatory tidal currents is most evident along the eastern and northern shores of the Sound and in the straits and passages to the north of the Sound. Small local eddies generated by tidal currents, particularly in the nearshore region are common in this area. There appears to be little if any net northward flow into Nakwasina Sound, and only limited net northward flow into Olga Strait and Hayward Strait. Surface flow from Silver Bay and Katlian Bay is strongly towards the direction of Sitka Sound.

B. Local Circulation

The local net circulation in the vicinity of Sitka was shown to be northwestward, parallel to the coast (Figure 10). Nearshore data indicate that Japonski Island diverts most of the flow to the west around Makhnati Island and that little surface water passing the east entrance to the Sitka Waterfront Channel actually enters the channel. Circulation Into Mt. Edgecumbe Lagoon (Sealing Cove) indicates that this embayment receives a high flushing rate.

MANAGEMENT RECOMMENDATIONS

Tables 3 and 4 summarize the relative habitat values and sensitivities for the Sitka “urban” area. Two types of habitat management recommendations, general and site-specific, are proposed for Sitka’s Coastal Management Plan.

Figure 9. Sitka Sound Net Circulation

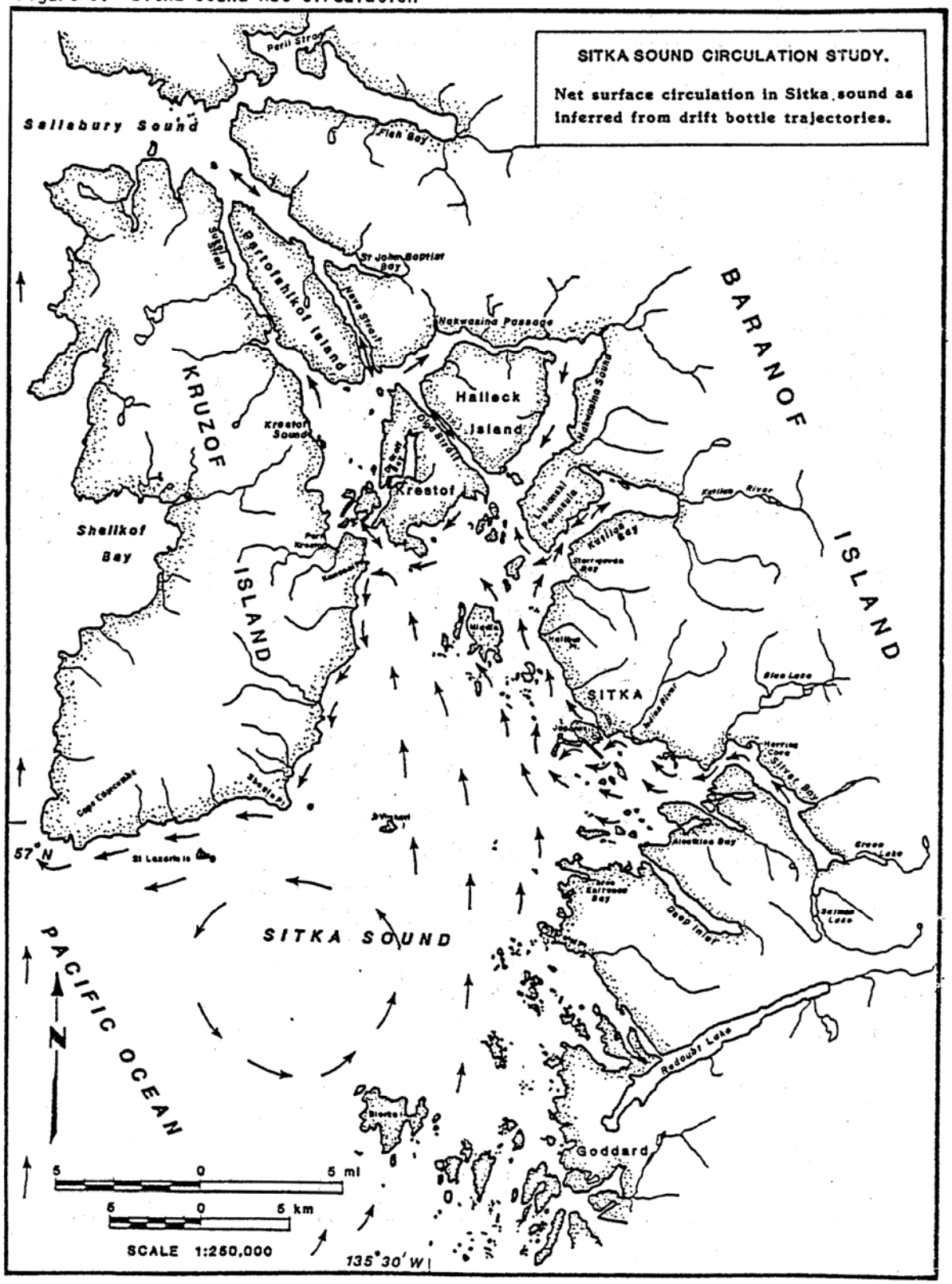


Figure 10. Sitka Waterfront Net Circulation

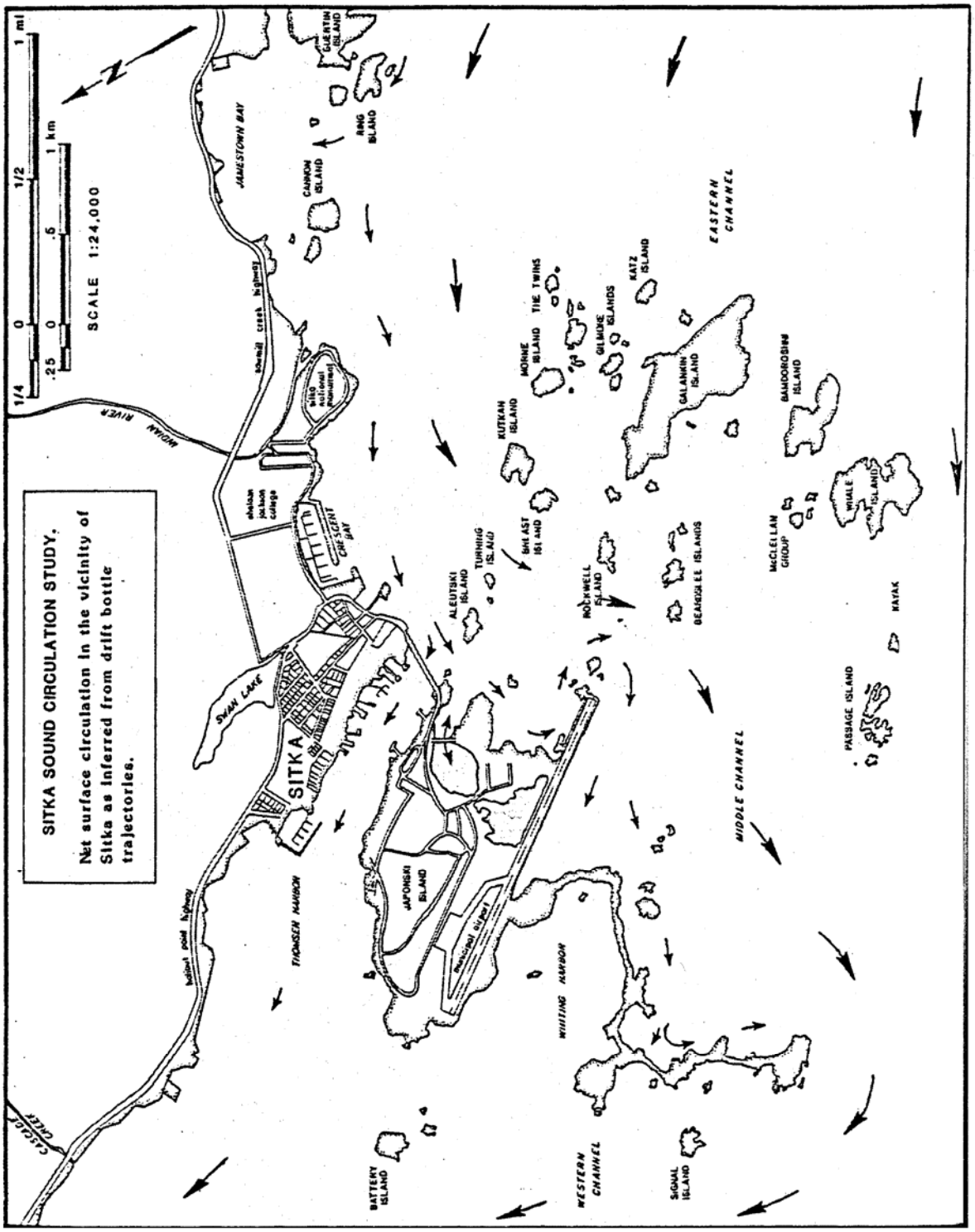


Table 3. Relative Fish and Wildlife Resource and Habitat Values Within the Sitka Urban Area

H=High, M=Medium, L=Low, NA=Not Applicable

	Herring Spawning	Herring Feeding	Salmon Spawning	Salmon Rearing	Bottom Fish	Shellfish	Clams	Productive Wetlands*	Kelp Beds+	Bald Eagles	Waterbirds	Deer	Bear	Small Mammals	Marine Mammals
Katlian	H	H	H	H	M	H	H	H	L	H	H	H	H	H	H
Starrigavan	H	H	H	H	M	H	H	H	M	M	H	M	M	H	H
Harbor Pt.-Halibut Pt.	H	M	M	H	H	M	H	H	H	M	M	M	M	M	H
Mile 1.7-3.5, Halibut Pt. Rd.	H	M	L	M	M	M	M	M	M	H	L	L	M	M	H
Seaplane Turnaround Cove	H	M	L	H	M	M	H	H	L	M	H	L	L	L	M
Sitka Channel	L	M	L	M	M	M	L	M	L	M	M	L	L	L	M
Swan Lake	NA	NA	NA	NA	NA	NA	NA	M	NA	M	H	L	L	L	NA
Islands N. of Japonski I.	H	M	L	M	H	H	H	M	H	H	H	M	M	H	H
Japonski I. and Causeway	H	M	L	M	H	M	M	M	H	H	H	M	L	M	H
Islands S. of Japonski I.	M	M	L	M	M	M	M	M	L	H	M	M	L	M	H
Castle Hill-Crescent Harbor	L	M	L	M	H	M	M	M	M	M	M	L	L	L	M
Totem Park	L	M	H	H	H	M	H	H	M	H	H	M	L	M	M
Jamestown Bay	L	M	L	M	M	M	M	M	L	M	L	M	L	M	M
Thimbleberry Bay	L	M	M	M	M	M	M	M	M	M	M	M	L	M	M
Silver Bay	L	M	H	H	M	H	M	M	L	M	M	H	H	H	H

*includes intertidal zones and sea grass beds
+includes both attached, floating, and submerged algal beds

Table 4. Relative Sensitivities of Habitats Within the Sitka Urban Area to Development Impacts

H=High, M=Medium, L=Low, NA=Not Applicable

	Fills* (high intertidal)	Fills* (low intertidal)	Fills* (wetlands**)	Oil Spills	Liquid Waste# Disposal (organic)	Liquid Waste# Disposal (inorganic)	Dredging & Gravel Extraction	Noise and Disturbance	Stream and Watershed Damage	Increased Access
Katlian	H+	H	H	H	L+	M+	M+	M+	H	M+
Starrigavan	M+	H	H	H	M	M+	M+	M	M	M
Harbor Pt.-Halibut Pt.	M+	H	M	M	L+	M+	L+	M	M	M
Mile 1.7-3.5, Halibut Pt. Rd.	L	M	L	M	L	M+	L+	L	M	L
Seaplane Turnaround Cove	M	H	L	H	M	M+	H	M	M	M
Sitka Channel	L	M	L	M	L	M	L+	L	L	L
Swan Lake	NA	NA	H	H	H	H	H	M	H	M
Islands N. of Japonski I.	M+	H	M	M	L+	M	M+	M+	M	M+
Japonski I. and Causeway	M	M+	L	M	L+	M	L+	L+	L	M
Islands S. of Japonski I.	M	M+	M	M	L+	M	L+	L+	L	M
Castle Hill-Crescent Harbor	M	M	L	M	M	M+	L+	L	L	L
Totem Park	H	H	H	H	M	M+	M+	M	M+	M
Jamestown Bay	L	M	L	M	M	M	L+	L	M	L
Thimbleberry Bay	M	M	L	H	M	M+	M+	L+	M	M
Silver Bay	M	M	H	M	L+	M+	L+	M+	M+	M+

*assumes only clean shot rock or like material is used
**includes freshwater wetlands and coastal marshes
#assumes discharge is treated to meet State water quality standards
+specific locations may have higher sensitivity

General Recommendations

1. Freshwater Habitats.

All freshwater systems surveyed, with the exception of Swan Lake and its tributaries, support anadromous fish populations. To maintain anadromous and resident fish populations and associated wildlife, land and water uses involving anadromous streams should be designed to conserve existing habitat. The most important stream habitats found within the Sitka "urban" area include: Katlian River, South Fork Katlian, Starrigavan Creek, No Name Creek, Granite Creek, Indian River, Sawmill Creek, Medvejie Creek, and Salmon Creek. Other streams found to support anadromous fish include: Coxe River, the four unnamed streams along the south shore of Katlian Bay, Channel Club Creek, Turnaround Creek, Blueberry Lane Creek, Cascade Creek, Thimbleberry Creek, Herring Cove Creek, and three unnamed creeks along the east shore of Silver Bay.

The following guidelines are suggested for the habitat management of anadromous streams:

A. To prevent unnecessary encroachment upon the stream channel its banks and associated floodplain, new construction and land clearing should be buffered by a riparian zone of a minimum of 25 feet of vegetation along either side of the 50 year floodplain of the following small streams: Coxe River, the four unnamed streams along the south shore of Katlian Bay, Channel Club Creek, Turnaround Creek, Blueberry Lane Creek, Cascade Creek, Thimbleberry Creek, Herring Cove Creek, and the three unnamed creeks along the east shore of Silver Bay. Because of their special Importance and sensitivity, the following streams should be buffered by a minimum of 50 feet of riparian vegetation along either side of the 50 year floodplain. They are: Katlian River, South Fork Katlian, Starrigavan Creek, No Name Creek, Granite Creek, Indian River, Sawmill Creek, Medvejie Creek, and Salmon Lake/Creek.

These streamside development recommendations are intended to be general guidelines and do not substitute for site-specific project evaluation by trained resource specialists. On-site evaluations may indicate either wider or narrower buffer zones or alternative protection measures as each case merits.

B. Impacts from necessary instream work such as culverting, bridge construction, streamside road construction, channelization, bank stabilization, damming, gravel extraction, and stream diversion can be mitigated or minimized by submitting plans and specifications for review by trained resource specialists. These specialists can be found in the private sector or in government agencies including the Alaska Department of Fish and Game. U.S. Fish and Wildlife Service, and U.S. Forest Service. The law requires submitting plans and specifications to the Alaska Department of Fish and Game, Habitat Protection Section, 230 South Franklin Street, Juneau 99801 for work affecting streams cataloged under the provisions of the Anadromous Fish Act (A.S. 16.05.870). Nearly all streams in the Sitka area are affected by this law.

C. Existing fish passage problems, including perched culverts, man-made stream obstructions, and velocity barriers should be corrected whenever routine maintenance is scheduled. Fish passage problems were noted on Channel Club Creek, Turnaround Creek, Blueberry Lane Creek, and Herring Cove Creek.

2. Wetlands Habitats.

Our general management recommendations for wetlands place a high value on protecting coastal wetlands and estuarine tidal flats from destruction, pollution, excessive noise, and disturbance.

A. Coastal wetlands and estuarine tidal flats should be avoided when siting industrial operations, log transfer and storage, roads, landfills, and permanent structures.

B. Traditional wetland activities, including recreational and subsistence hunting, fishing, clamming, beach walking, etc. should be protected when making land use decisions regarding wetlands.

C. Offroad motorized vehicle use in coastal wetlands and tidal flats should be discouraged because of its disruptive effect upon bird life, plants, infauna, and the substrate.

D. Under certain circumstances, selective gravel removal, particularly in marsh areas above tidal influence, may be allowed when performed under the supervision of fisheries and wildlife biologists. Observations made during the study showed that ponds created by gravel removal in the Nakwasina (Figure 11) and Starrigavan (Figure 12) wetlands, which have few natural ponds, enhanced waterfowl usage of those areas.

E. To minimize encroachment on coastal wetland habitat from adjacent land uses, a buffer zone consisting of a minimum of 50 feet of natural vegetation should be retained landward of the upper fringe of beach rye grass (Elymus arenarius). Exceptions to this general guideline may be made on a case-by-case basis if the buffering effect is sufficient through other methods. This should be determined through site-specific evaluation by trained resource specialists.

F. Projects that must be sited on coastal wetlands and estuarine tidal flats should continue to be individually reviewed through the U.S. Amy Corps of Engineers 10/404 permit process. Freshwater wetlands, such as those occurring in conjunction with Swan Lake and Salmon Lake, should also be managed on an individual permit basis. The proposed Swan Lake Area Meriting Special Attention offers detailed management guidelines for the remaining freshwater wetlands adjacent to Swan Lake. The Swan Lake AMSA proposal is available as a separate document.

G. We suggest that development of muskeg areas along the Sitka road system can be handled under general permit guidelines, to be developed jointly by the Corps of Engineers, the City and Borough of Sitka, and the appropriate resource agencies. The hydrological values of muskegs may deserve further study, particularly their contribution to anadromous streams during low flow periods.

3. Marine/Estuarine Habitats.

Due to the generally steep topography of the shoreline in the City and Borough of Sitka, intertidal and shallow subtidal habitats should be considered a limited and valuable resource. These habitats were found to: 1) support the bulk of herring spawning, 2) provide important rearing and feeding areas for juvenile salmonids and crustacean larvae, 3) export plant nutrient energy to Sitka Sound, 4) support local bird populations, and 5) provide the basis for many marine food webs. As a general rule of thumb, projects that increase the wetted surface area will enhance habitat, those that decrease the wetted surface area will decrease habitat. The following general guidelines are suggested:

A. A City policy should be adopted that encourages alternatives to filling out from the shoreline into tidelands to create waterfront lands. Waterfront developments that utilize piling supported or floating structures in their design should be encouraged over those that utilize solid tideland fills. Where solid

fills are in the public interest, measures to minimize or mitigate adverse impacts on habitat should be sought by working with resource specialists prior to submitting 404/10 permit applications to the U.S. Army Corps of Engineers.

B. Judicious use of fill, such as in breakwater construction, can diversify habitat resulting in the attraction of certain desirable fish species. In many cases additional surface area is being created. Working with resource specialists during the siting and designing of harbor facilities and breakwaters will help to protect habitat values and facilitate Corps permit reviews.

C. Observations made during intertidal and current studies suggest that the decision of the City to consolidate sewage collection and treatment in one deep water outfall south of the runway is a good one. Our observations also suggest that with the anticipated low volumes and nature of Sitka's domestic sewage effluent, a primary treatment facility discharging into well mixed waters is probably adequate to protect habitat values in Sitka Sound. Secondary treatment may be required as the City grows and develops.

D. The results of underwater surveys between Japonski Island and Eastern Channel including Ball Islets (Figure 13) indicate that subtidal macrophyte (kelp) communities may be limited at depths normal for macrophyte growth elsewhere in Sitka Sound. Whether this is due to shading from the sulphite waste liquor plume from the ALP mill or other factors could not be determined from our study. It is known that very little herring spawning occurs in this area (Figure 14). Further study on the effect of the mill effluent upon marine algae and herring spawning, particularly in the area between the Japonski Island causeway and Silver Bay is recommended.

Figure 11. Nakwasina Coastal Wetland

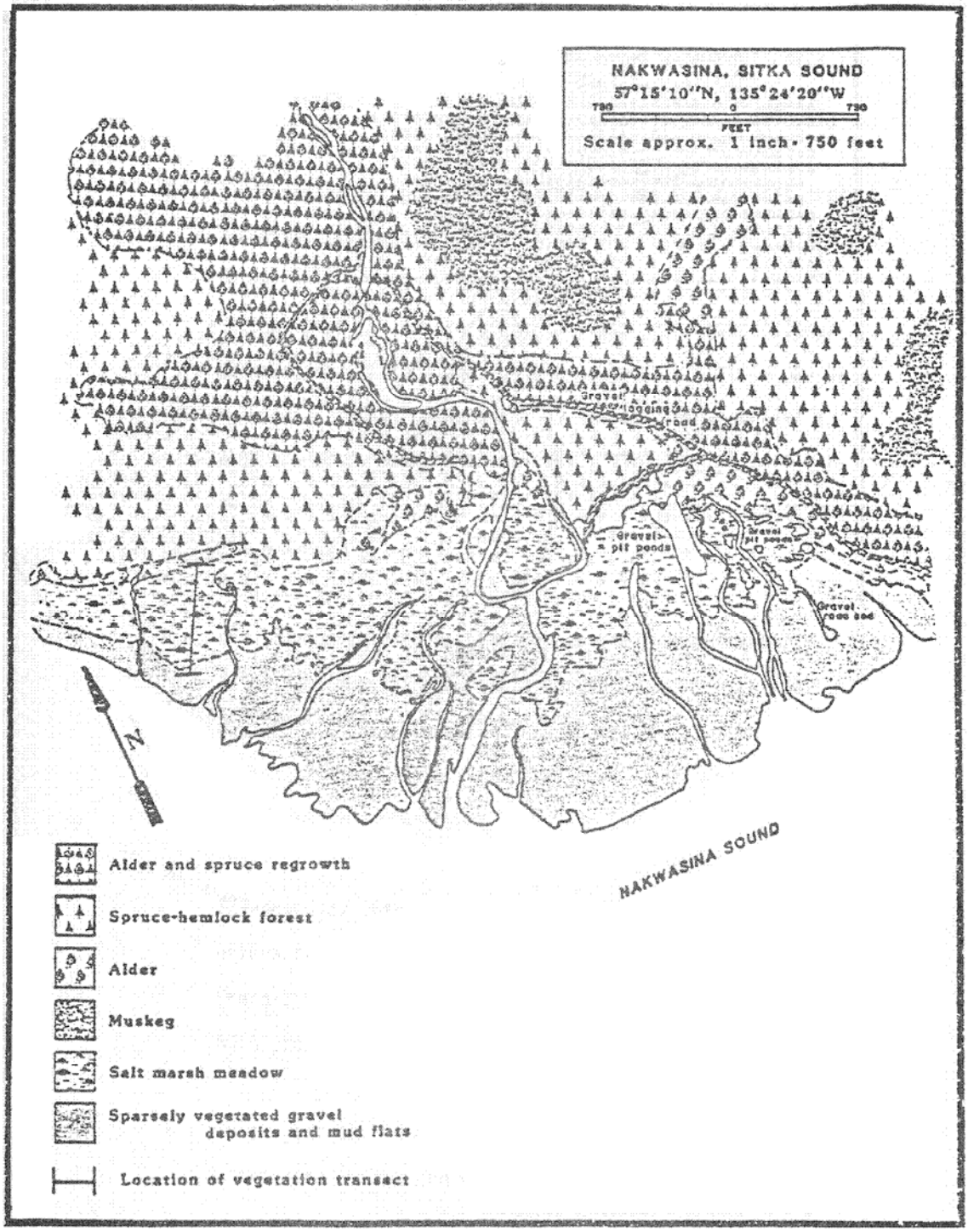


Figure 12. Starrigavan Coastal Wetland

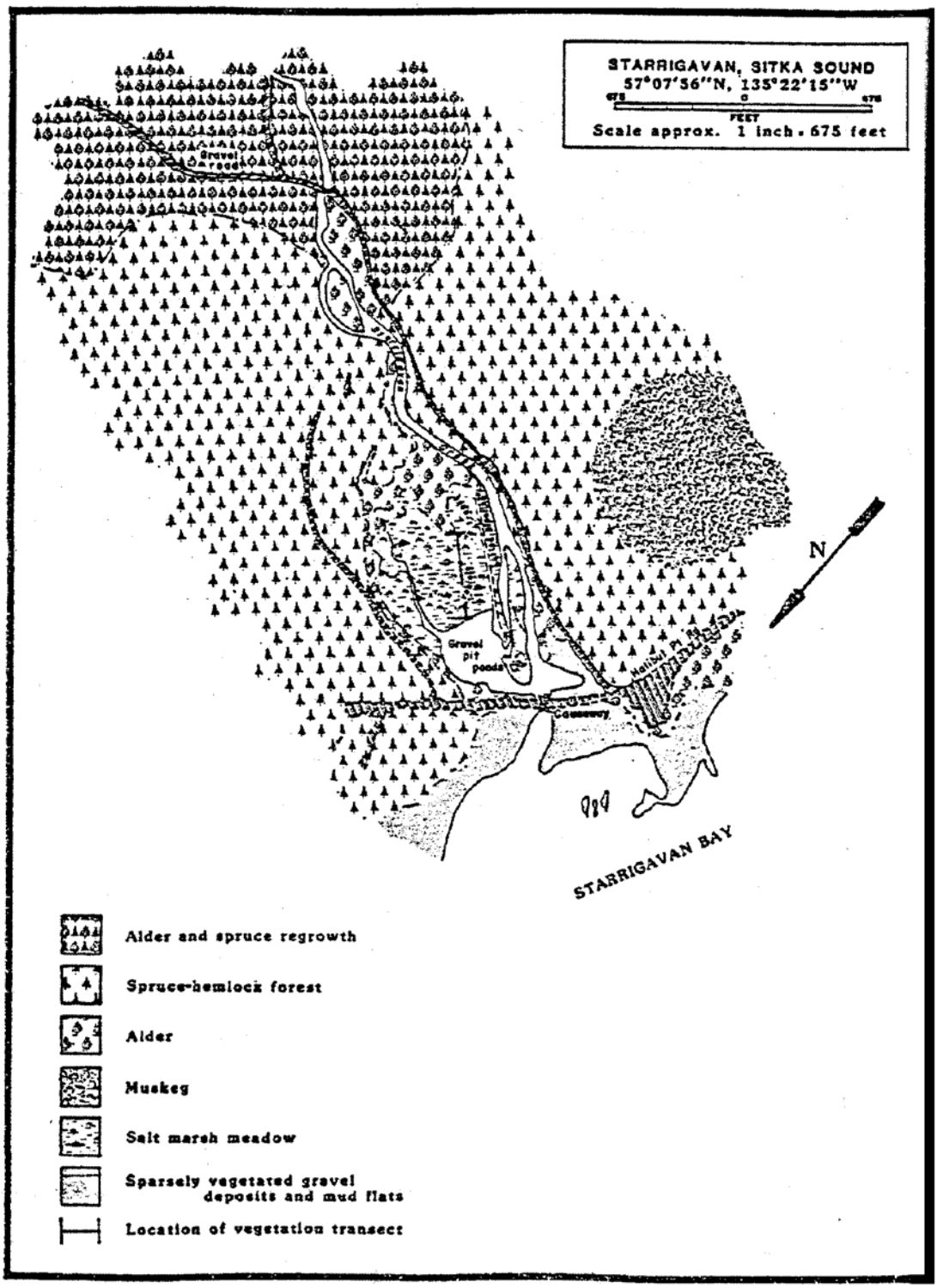


Figure 13. Ball Islets Shore Zone Profile

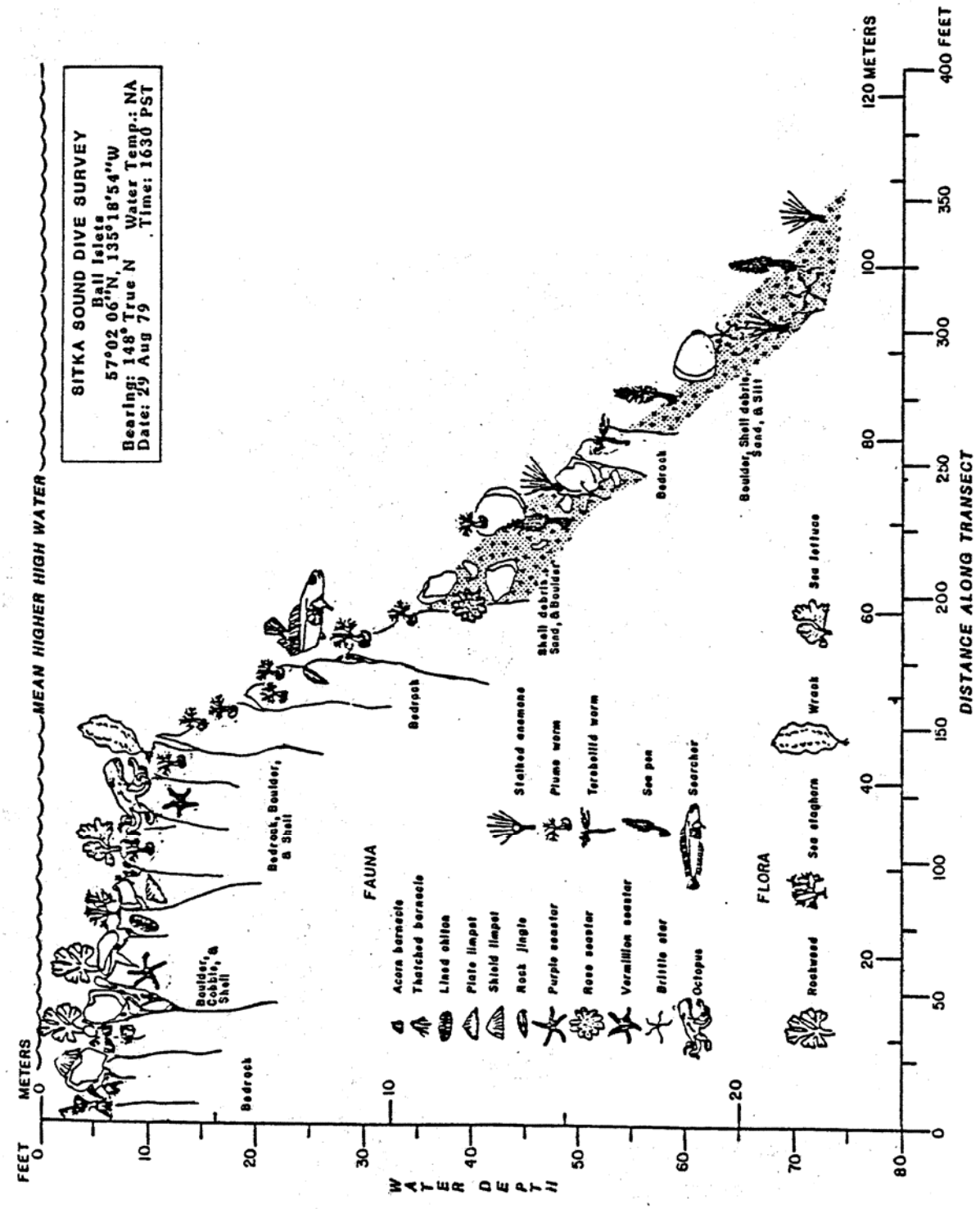
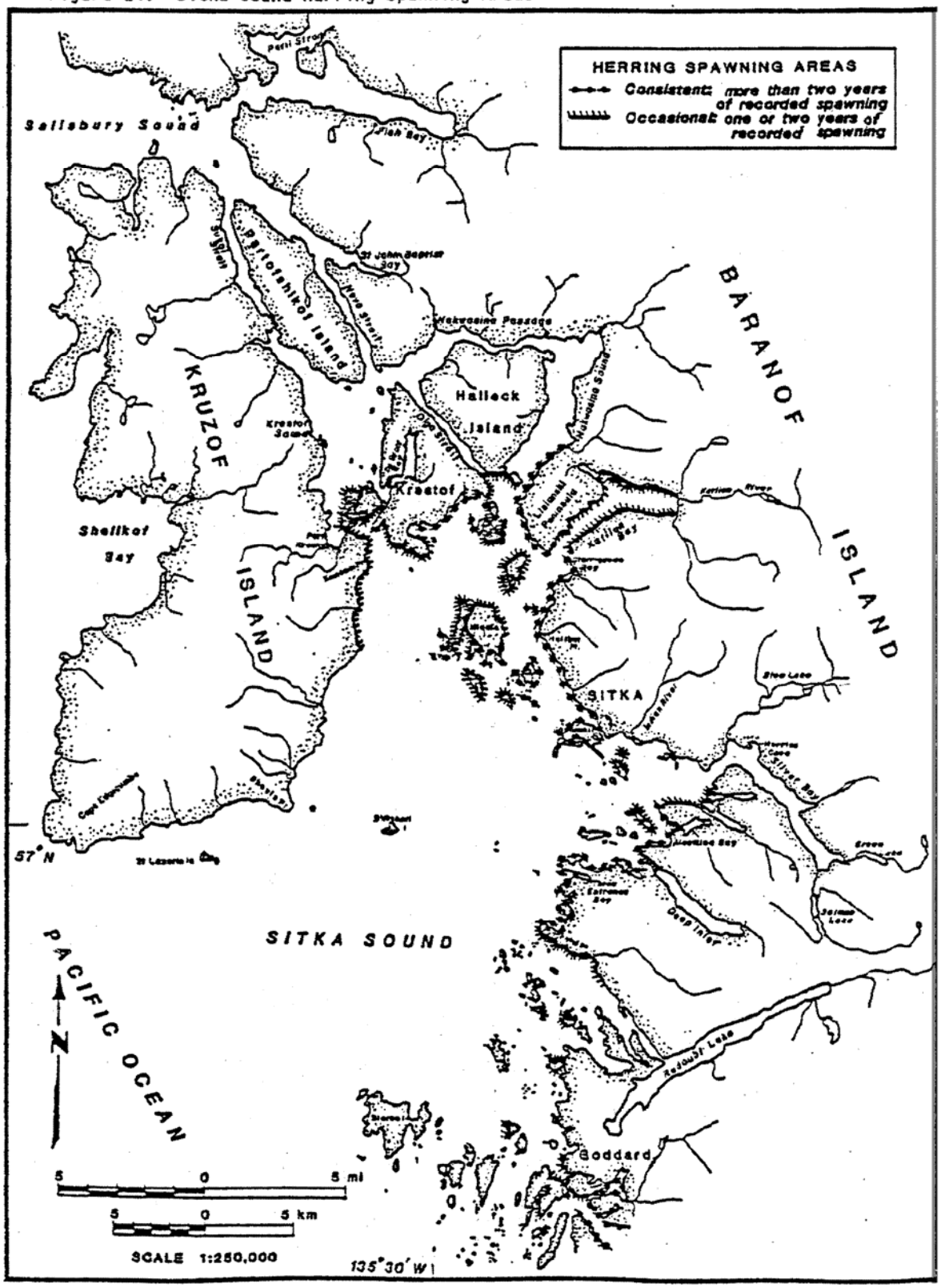


Figure 14. Sitka Sound Herring Spawning Areas



Specific Recommendations

1. Granite Creek.

Problems associated with heavy siltation caused by gravel pit operations in the upper reaches of Granite Creek are being controlled by the current operator through the use of settling ponds. As the City expands its gravel pit operations we recommend that the maintenance of water quality and spawning habitat be given a high priority for future planning and expansion of the pit. We recommend that the City develop a gravel pit mining plan with the assistance of the Alaska Department of Environmental Conservation, Alaska Department of Fish and Game, and U.S. Fish and Wildlife Service. The plan would address water quality and habitat protection as well as pit reclamation and restoration.

2. Turnaround Creek.

The City landfill operation has degraded water quality In Turnaround Creek through high turbidity and leachates, and has created a chronic water pollution problem that may last for many years after this site is abandoned. Recent analysis of Juvenile coho salmon and Dolly Varden char taken from Turnaround Creek suggests abnormally high amounts of zinc, arsenic, and polychlorinated biphenyls (PCB) in fish tissue samples. We recommend that a rigorous program of water quality monitoring be undertaken by the Alaska Department of Environmental Conservation above and below the landfill, and that steps be taken to determine if State water quality and public health standards are being met. If not, the landfill and drainage situation should be corrected and measures taken to insure that the operation meets accepted environmental standards.

3. Swan Lake.

Swan Lake and its two tributaries, Arrowhead Creek and Wrinkleneck Creek, provide recreation, aesthetic, and habitat values to the community. Our surveys indicate that the current trend toward filling and associated development along the lakeshore and in the wetlands at the north end of the lake threatens certain habitat values, particularly the continued use of the lake by migrating waterfowl including trumpeter swans. There is also a need to protect the stream flow and fish habitat within the two tributary streams that support the lake ecosystem (Figure 15). Protection of the lake ecosystem and its associated values can be best served by a comprehensive lake, stream, and shoreline management plan that accommodates both the legitimate rights of property owners and the public resource values of Swan Lake. We recommend that Swan Lake, its associated tributaries, marshes, and immediate shorelands be designated as an Area Meriting Special Attention (AMSA). An AMSA proposal prepared by the Department of Fish and Game, Habitat Protection Section is available as a separate report and contains detailed management recommendations for Swan Lake.

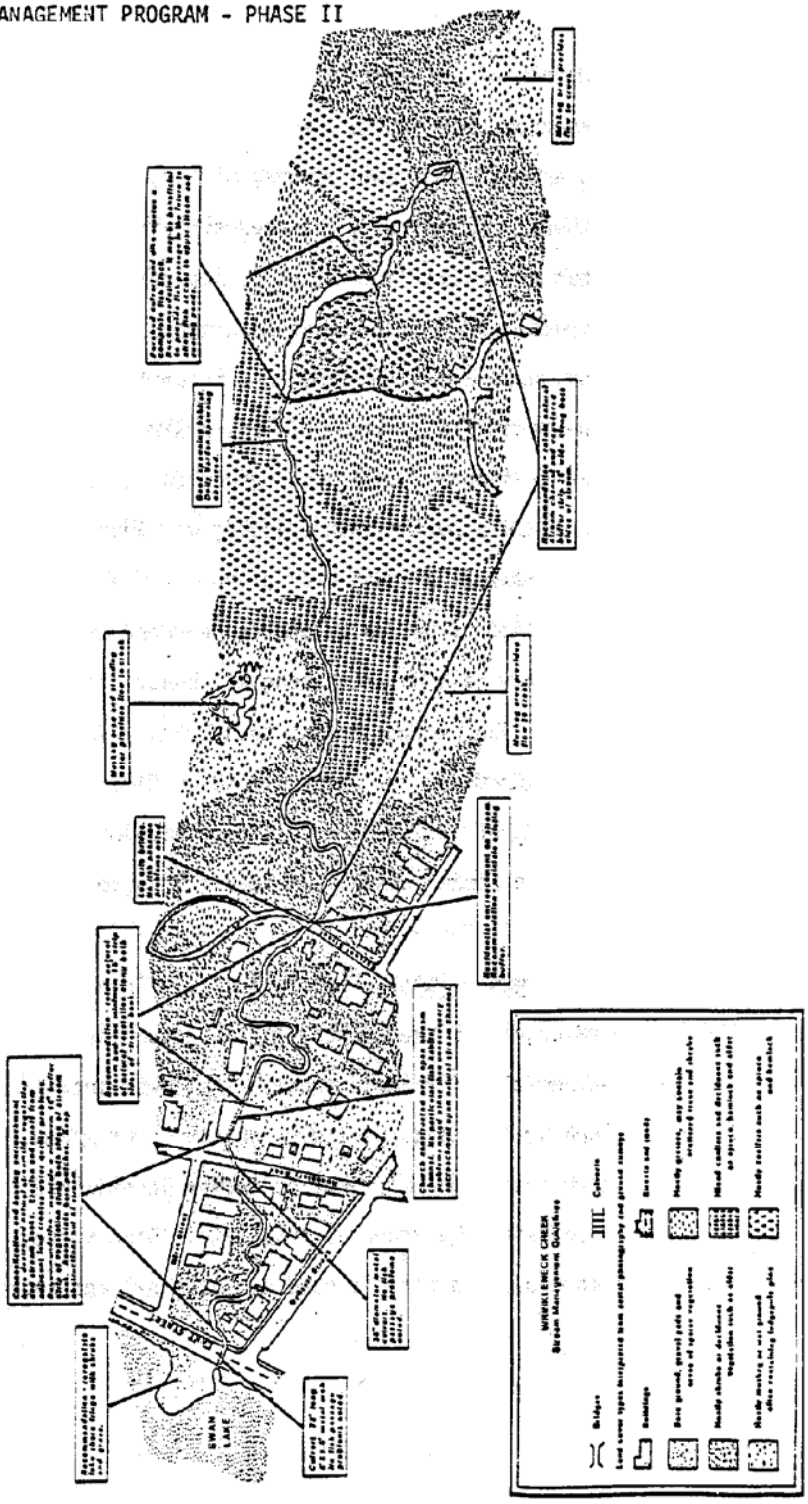


Figure 15. Winkinleeheck Creek Stream Management Map

4. Indian River.

Indian River represents a classic example of competing demands for limited water resources. The City presently withdraws its primary source of domestic water from Indian River; Sheldon Jackson College diverts water for hydroelectric generation and a hatchery facility; the State and Federal governments manage the watershed and must insure adequate flows for the fish and wildlife habitat; and the National Park Service considers the preservation of flow in the lower stream to be essential for protection of the natural and historical setting of the Sitka National Historical Park. Fortunately, Indian River is presently meeting all of the demands placed upon it. However, as demands for this finite resource increase in the future, decisions will be required to determine which user groups, if any, will have priority over others. Recognizing the need to maintain the healthy balance that now exists, the City, in cooperation with the U.S. Geological Survey and Alaska Department of Natural Resources, has initiated a data collection program to quantify the seasonal in-stream flow regimes of Indian River. If additional funding can be secured, they have agreed to participate in studies that would define both existing and future project stream flow requirements of each user group. The ultimate objective should be to devise a long range water management plan that will maintain balance among all beneficial users of Indian River. We recommend that this study move forward and that Sitka consider including an Indian River water management plan as part of its implementation of habitat management policies for the Sitka Coastal Management Program.

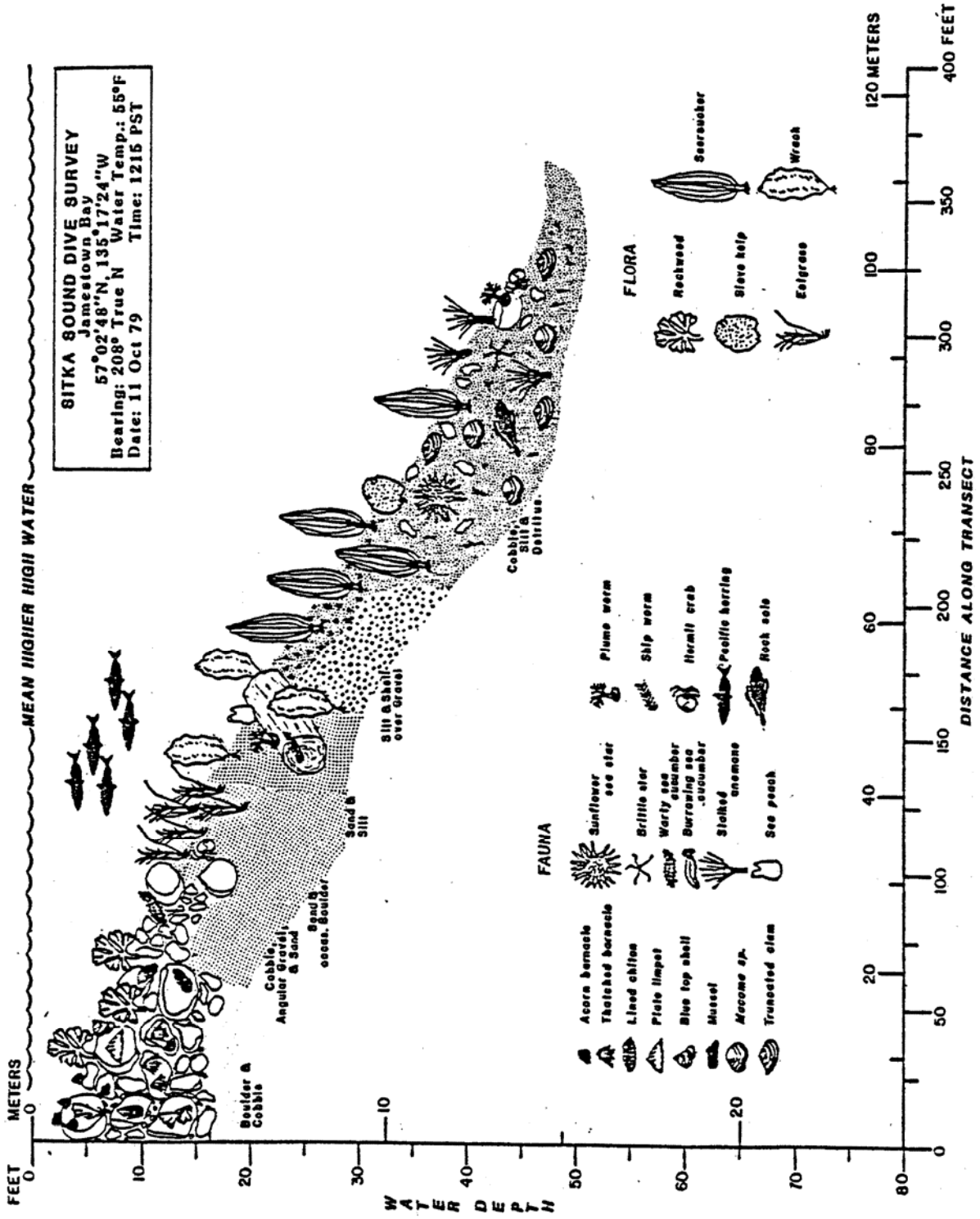
5. Turnaround Flats.

The Old Seaplane Turnaround Flats was found to be one of the richest marine/estuarine habitats surveyed along the Sitka waterfront. The lower intertidal and shallow sub tidal zone support high densities of clams, worms, eelgrass, and associated soft bottom marine invertebrates. Herring traditionally spawn at this site. Bird surveys indicate that this area is heavily used by waterfowl and shorebirds for feeding and resting. While this area is currently influenced by an intertidal sewage outfall, our studies suggest that the productivity of this site will remain high after the sewage discharge is eliminated. To protect the rich mud flats and eelgrass bed habitat of Old Seaplane Turnaround Flats, no solid filling or tideland destruction should be allowed below the 5.0 foot tide line (MLLW). Any proposed design for tideland fill or alteration at this site should be reviewed on a case-by-case basis by resource agencies. The proposed burial of a sewage trunk line should have only a temporary and localized Impact upon the habitat as long as activities are confined to the immediate vicinity of the line installation.

6. Jamestown Bay.

Underwater surveys confirm that Jamestown Bay and in particular, the northwest shore show evidence of habitat degradation due to tideland development and siltation. Our studies did not find any critical habitat values in Jamestown Bay, although this area was once utilized for herring spawning. We did find juvenile herring during one of our surveys (Figure 16). The shoreline is already partially committed to industrial and commercial purposes. From a habitat standpoint, Jamestown Bay is less sensitive to shoreline alteration than other embayments such as Thimbleberry Bay and Starrigavan Bay.

Figure 16. Jamestown Bay Shore Zone Profile



7. Future Commercial and Industrial Development.

Areas already industrialized, such as Sitka Channel and Sawmill Bay, should be given the highest priority for siting future water-dependent commercial and industrial development while reserving other more sensitive shorelines for residential use, public recreation, and habitat. Future industrial and commercial waterfront expansion into Starrigavan Bay is not recommended at this time because of the availability of less sensitive areas, notably the Sitka Channel, Sawmill Bay, and Jamestown Bay.

In all waterfront development we encourage the use of pile-supported structures to avoid the unnecessary filling of tideland habitat. Besides their effect upon removing productive tidelands, solid fills can force juvenile salmonids out of relatively protected shallow feeding areas into deeper water where they become prey to a host of offshore species including rockfish and sculpins. Where fills and causeways are necessary, a breach in the low intertidal area may be necessary to protect juvenile salmonid migration.

SUMMARY

In summary, the rich variety and abundance of natural resources and the high quality of life found in Sitka is due in large measure to the diverse and productive fish and wildlife habitats present in the coastal zone. Local fish and wildlife resources have been shown to be of considerable socio-economic value to the community and will continue to provide both tangible and intangible benefits with wise use and management. Our studies have identified many of the important habitat areas present within the urban area of Sitka. We have made recommendations based upon our best professional judgment and experience as to how these habitats can be protected, acknowledging that Sitka will continue to grow and develop and the certain losses of habitat quality and diversity are probably unavoidable. It is now up to the City and Borough of Sitka and the local citizens to consider these recommendations and assume the bulk of responsibility for conservation and management of their shared habitat resources on a day-to-day basis. It is hoped that Sitka's Coastal Management Program will produce future cooperative efforts between resource managers, government regulators, developers, and the public in all sectors and levels of authority.

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APPENDIX A-7: UPDATED RESOURCE INVENTORY AND ANALYSIS FOR THE SWAN LAKE WATERSHED AND AMSA

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A. INTRODUCTION AND PURPOSE

The Swan Lake Area Meriting Special Attention (AMSA) background document is 23 years old. An update of resource information and analysis, uses and activities and summaries of recent lake and watershed restoration work is essential to bring the AMSA plan up to current regulatory requirements for AMSA plans. Though the area continues to qualify as an AMSA, adding current scientific information is necessary to support the enforceable policies with respect to local concerns, resource sensitivity and uniqueness of the AMSA. Emphasis is on the recreational use designation.

This inventory and analysis supplements the information found in *Chapter IV. Area Meriting Special Attention.* The reader is referred to the References Appendix for detailed background information, including monitoring data and maps.

The most recent comprehensive resource inventory and analysis for the Swan Lake AMSA was completed in 1981. The principal documents --*Sitka Coastal Habitat Evaluation Final Project Summary with Management Recommendations (Sundberg, 1980)* and *Swan Lake Recreational Area: a proposal for an Area Meriting Special Attention (AMSA) classification under the authorities of AS 46.40.210(1) and 6 AAC 80.160(b) of the Alaska Coastal Management Program (Liepitz and Sundberg, 1981)* -- were integral to the support rationale and original adoption of the Swan Lake AMSA in 1981. Both documents focused on the biological and habitat values of the borough and Swan Lake watershed. They remain part of the Sitka CZM program, the first found in Appendix A-6 and the latter incorporated by reference.

Since 1981, considerable new scientific information has been gathered and numerous actions taken to restore the recreational and habitat uses of Swan Lake, Wrinkleneck Creek and Arrowhead Creek. These areas have degraded over time due to urban growth and lake eutrophication. These actions continue to support and justify the current AMSA designation.

This updated resource inventory and analysis summarizes new information in documenting this unique area of concern, and fully supports the enforceable policies that guide allowable uses and activities within the AMSA. Linking the scientific studies and restoration activities completed over the last five years to proper and improper uses and enforceable policies is a key objective of this section.

Importantly, the purpose of the recent watershed recovery work was guided by and mirrors that of the original AMSA. They are inextricably linked. Both are intended to protect and retain those unique recreational, historical and cultural values of Swan Lake that led to creating the original AMSA in 1981.

Most of the background resource information (physical characteristics, habitat and biological characteristics, existing ownership and management status) contained in the 1981 resource documents is still valid and is not repeated here. The reader is referred to these documents for a detailed discussion.

This section updates uses and activities and resource information for the Swan Lake AMSA through 2004 and strengthens the linkage between the scientific work and continued protection of recreational and other protected uses of the AMSA. It examines current uses and activities in the watershed and current and anticipated conflicts among those recreational uses and activities. A number of changes in uses and activities over the last twenty years have impacted Swan Lake. It also examines future rehabilitation and enhancement alternatives that would continue restoration work accomplished since 2000.

It includes the necessary background documentation for policies required under recent CZM program revisions for the AMSA with respect to demonstration of local concern, resource sensitivity and uniqueness of the Swan Lake watershed – Sitka's Central Park.

Proper and Improper Uses of the AMSA, and enforceable policies to address uses, are found in Chapter IV.

B. AREA DESCRIPTION

This section addresses the history and values of the Swan Lake watershed, its physical setting, and current challenges to supporting recreational uses of the AMSA.

1. 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, walking and classroom education. The wetlands and shorelands along the lake and tributaries help to moderate flooding, support diverse fish and wildlife populations 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 coastal district 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 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 salmon fishery, Swan Lake and its tributaries hosted anadromous fish runs, providing spawning habitat for coho, pink and sockeye salmon. Today, resident rainbow trout continue to provide recreational fishing opportunities for Sitkans.

2. THE PHYSICAL SETTING

Swan Lake is a small (23 acre), shallow lake located within the City and Borough of Sitka (CBS) (*Figure 10*). It is a sunken bog, with bottom peat deposits ranging from five to seventeen feet thick. The lake has a maximum depth of about 11.5 feet. Roughly 48% of the lake is less than 3 feet deep with an average depth of 4.5 feet. Shoreline length is estimated at 6,600 ft. Approximately 60% of the lake shoreline is inhabited. The lake freezes in winter to an ice thickness of up to 12 inches. The entire Swan Lake watershed is small, approximately 2 square miles in size, and drains to the lake principally through two major streams, Wrinkleneck Creek and Arrowhead Creek.

The lake is a popular recreation area for Sitkans and is the centerpiece of the Swan Lake Area Meriting Special Attention (AMSA) established in 1981. Like many older, shallow lakes in glaciated areas, it suffers from such symptoms as overabundant aquatic plants, rich organic deposits, periodic depression in dissolved oxygen levels and restricted access for recreational boating and fishing. The natural succession of the Swan Lake plant community toward a higher density is enhanced by eutrophication -- an increase in nutrient content of the water and sediments. Left unchecked, the lake will eventually fill up with organic material, turning the lake into a swamp and, ultimately, into terrestrial habitat.

Swan Lake has naturally occurring low water clarity. The muskeg soils drained from the upper reaches of the watershed add tannins that naturally color the water and reduce visibility.

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 surround Swan Lake and the two tributaries**.** Land ownership in the watershed is a mix of private, municipal, state and federal. Development around Swan Lake was accelerated by urban renewal projects during the 1960s, which included installing a sanitary sewer collection system, city water, paving of streets, a 1200-ft. outlet culvert and a stormwater drainage system.

Two feeder streams to Swan Lake -- Wrinkleneck Creek and Arrowhead Creek -- and contiguous wetlands around the lake, are included within the Area Meriting Special Attention (AMSA) adopted in 1981. Wrinkleneck Creek is the major tributary entering the lake and receives considerable residential runoff. 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. The lower 1,000 feet winds through a residential area between Baranof Street and Lake Street before discharging to Swan Lake.

Arrowhead Creek is approximately 700 feet long, 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. It receives drainage from the high school and residences in higher elevations on the north and east side of Swan Lake. The Arrowhead Creek/Monastery Street intersection serves as a major collection point for stormwater runoff.

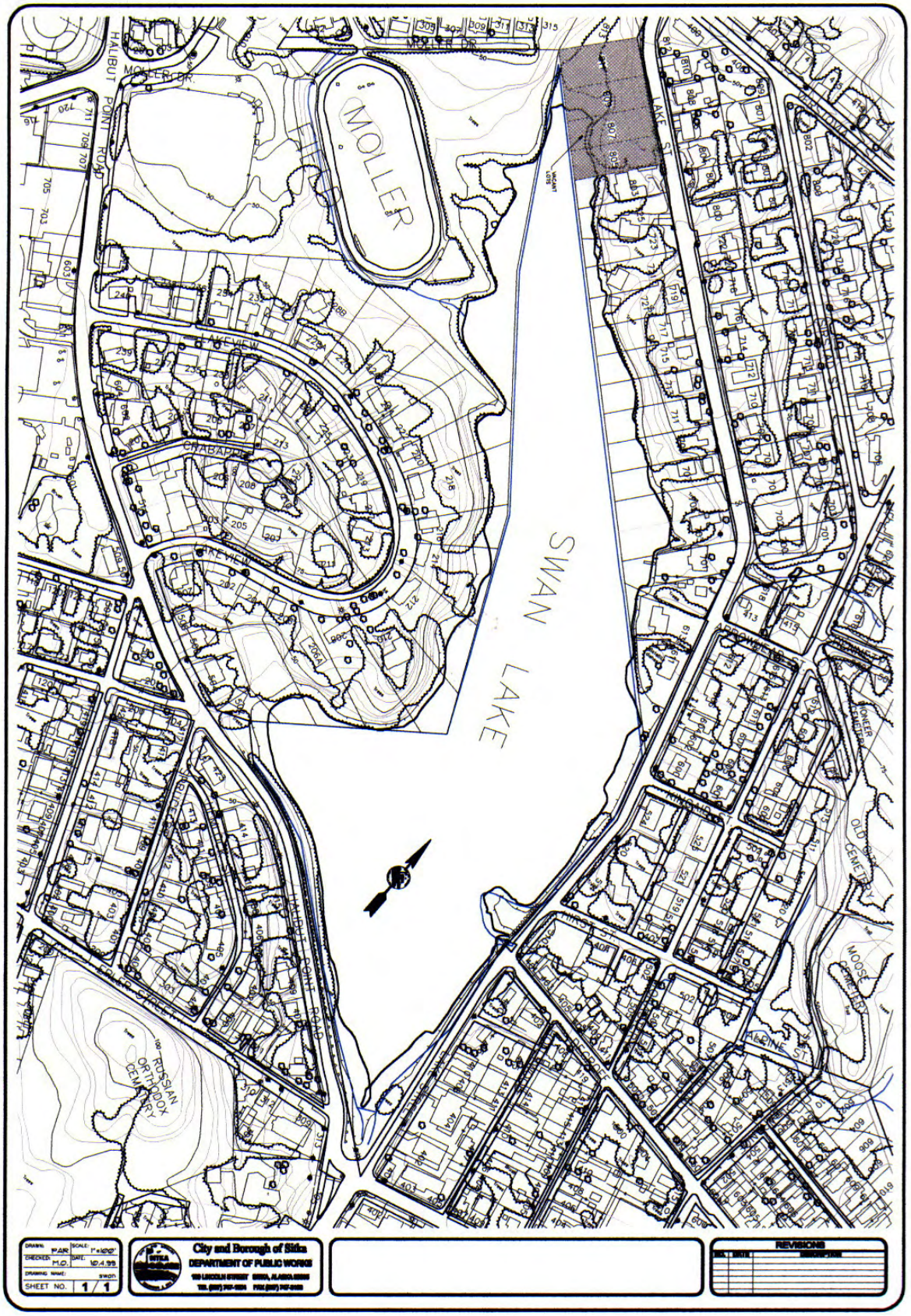

FIGURE 10: SWAN LAKE WATERSHED

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 estimated peak flows of about 25 cubic feet/second (cfs) during fall. The hydrology of both Wrinkleneck and Arrowhead Creeks is driven principally 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 in terms of groundwater discharges to the headwaters of the creeks.

Over the last 20 years, both Wrinkleneck and Arrowhead Creeks have been significantly altered by stream channelization and obstructions, culverting, and filling of adjacent wetlands and flood plains. Residential development around the lake and creeks poses a threat to water quality, the loss of habitat values and acceleration of the natural lake aging (eutrophication) process.

3. CHALLENGES TO FULLY SUPPORTING RECREATIONAL USE

Historically, fill for homes and roads have served to channelize and reduce the flood plains for both Arrowhead and Wrinkleneck Creeks. Reduction and loss in the water-absorbing functions of streamside and lakeside wetlands, coupled with stormwater inputs, have led to a rise in the level of Swan Lake since the mid-1970s. Historical aerial photographs document differences in lake stage over time. A 1929 aerial photograph of Swan Lake shows a considerably lower lake level, with muskegs around the perimeter. More recent open water photographs show a higher lake stage. Coupled with a rising lake stage, Lake Street is estimated to have subsided approximately 6 inches from 1976 to 1985 (Stragier, 1985) and another 6 inches from 1985 to the present (Brian Bergman, personal communication).

Permanent lake elevation benchmarks (a lake staff gage) were installed by the U.S. Geological Survey at the lake outlet channel in June 2001 as part of the Swan Lake restoration project. These elevation gages allow for the long-term assessment of lake height fluctuations and road sinking. For example, the gages have confirmed the beneficial effects of deepening the lake outlet channel in June 2001. Peak lake levels have been lowered and fluctuations moderated by the dredging project.

Years of residential growth and activity along Swan Lake and its tributaries have resulted in accumulations of debris, solid waste, metals and plastics. 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. Since 1999, annual community trash cleanups sponsored by the CBS have successfully reduced trash in the watershed and actively involved residents in keeping their watershed clean.

An issue of considerable importance to Sitkans is the progressive growth and encroachment of aquatic plants on recreational uses of Swan Lake. Actively managing the distribution and density of aquatic vegetation around Swan Lake has been the subject of much lake restoration attention since 2000. Swan Lake suffers from an overabundance of native aquatic plants, rich organic deposits, periodic depression in dissolved oxygen levels and impaired access for recreational boating and fishing from dense vegetative growth. Recreational boating and sport fishing access and fishing from the shoreline are constrained due to a dense assemblage of yellow lilies, pondweed and emergent vegetation.

Prior to completing dredging in 2001, the shallow outlet channel of the lake did not allow the lake to be self-flushing during periods of high water input. The lake is slowing filling up with organic material, much of which are not being oxidized or broken down in deeper bottom sediments. Sediments are introduced from storm drains and road erosion. While no winter fish kills of resident trout have been documented (Tom Brookover, personal communication), concerns remain about depressed levels of dissolved oxygen under winter ice, particularly at the bottom, and effects on the fisheries. Shoreline areas near the spit used for launching inflatables have overgrown. The few existing homeowner boat docks are overgrown. Recreational use impairment and aesthetics are the most visible problems but water quality concerns are lurking.

Active management is necessary to slow the accumulation of native aquatic vegetation in lakes and fully restore recreational uses.

The native plant community has evolved and proliferated to the point of creating a nuisance. Swan Lake's aquatic plant community is dominated by four native species. In order of descending importance, these are: yellow pond lily (*Nuphar polysepalum*); pondweed (*Potamogeton gramineus*); marestail (*Hippuris vulgaris*) and bogbean, also called buckbean (*Menyanthes trifoliata*). These represent a mix of emergent plants in the very shallow zone (marestail and bogbean), to rooted plants with floating leaves in progressively deeper waters (yellow lily and pondweed).

When native aquatic plants occur in low to moderate abundance they are beneficial to the aquatic system and form the foundation of a healthy and flourishing lake. They produce oxygen, stabilize soils and limit shoreline erosion, filter sediments, take up toxic compounds and absorb nutrients that otherwise would stimulate algal blooms. When native plants are overabundant, demands for available dissolved oxygen can become acute. Thinning vegetation and sediments through dredging and manual harvesting has been an important lake rehabilitation activity since 2001.

The problems of excessive plant growth in Swan Lake have long been recognized, with several attempts to address the issue and secure funding to remedy the problem. In August 1968, the Sitka Sportsman's Association hosted a forum with government and civic groups to discuss "the cleaning up of Swan Lake . . . the State Fish and Game said that lilies and other vegetable life in the lake should either be poisoned or reduced because oxygen is eaten by this growth and when frozen over, there is very little oxygen left for the fish to survive" (Daily Sitka Sentinel, August 1968).

Stormwater runoff also affects Swan Lake. Over 20 stormwater outfalls discharge directly to Swan Lake, carrying runoff and chemicals from roads and residences. Allegations of broken municipal sewer lines along Lake Street persist. Fill encroachments on the natural channels and vegetated streamside buffers of Arrowhead and Wrinkleneck Creeks have had a marked effect on drainage, increasing flooding frequency on some streets. Other hydrologic modifications to the watershed that have also affected Swan Lake include road paving, storm drain systems, and culverting the outlet stream.

The main sources of diffuse -- or nonpoint source -- problems affecting Swan Lake are urban runoff and land use management practices around the lake and within the watershed. Several of these have been dealt with over the last 30 years (e.g. municipal sewage collection system replacing septic tanks); many remain to be addressed. While Swan Lake is not listed by the Alaska Department of Environmental Conservation as violating water quality standards for dissolved oxygen, nutrients, sediments, fecal coliform bacteria or other parameters, low level inputs over time are gradually resulting in recreational use impairments.

Sewage inputs to Swan Lake were eventually halted with the installation of the municipal sewage collection system. The Alaska Department of Fish and Game, Sport Fish Division, subsequently agreed to help rehabilitate the lake by stocking rainbow trout. In May 1969, rotenone was applied to Swan Lake to eradicate resident Dolly Varden and cutthroat trout prior to stocking with rainbow trout. Concerns were voiced by ADF&G that the lake depth was marginal for overwintering fish, that aquatic weed growth was excessive which contributed to poor angler access and high oxygen depletion in the winter, and weed growth was encroaching as a result of the lake lowering and increase in shallow areas (ADF&G, 1969). Fish and Game concluded that:

> "we can establish a fishable population of rainbow (trout) in Swan Lake; however, the ultimate success of the project is directly linked to the shallow depth and excessive weed growth" (ADF&G, 1968).

The concept of a planned, multiple use development of the lake was discussed in the community, and included a general cleanup of aquatic plants. With the exception of annual rainbow trout stocking and dredging and aquatic plant removal, none of the other planned actions (expanded picnic area/parking zone, possible swimming area) have been completed to date.

These challenges clearly demonstrate that fully enjoying the recreational uses of the lake and AMSA requires active rehabilitation efforts. These efforts began in 1999 and continue today.

C. CURRENT USES AND ACTIVITIES IN THE SWAN LAKE WATERSHED: A RATIONALE FOR THE AMSA

A new description of the land uses and activities around Swan Lake and its tributaries is necessary in support of AMSA enforceable policies. Current land uses and challenges are discussed in the prior section as well as below.

Swan Lake is a prime recreational area within the city limits, with non-motorized boating, fishing, ice skating, birdwatching, picnicking, walking and classroom instruction among the many uses. Wrinkleneck Creek also contains Dolly Varden char and rainbow and cutthroat trout. The lake is stocked each year with over 300 rainbow trout by the Alaska Department of Fish and Game to provide angling opportunities for kids and adults. The annual Youth Fishing Derby is held on Swan Lake in early June and provides fun and an opportunity for children to learn sport fishing techniques and conservation.

The aesthetic contribution of the aquatic setting is obvious, recognizing that homes now occupy about 60 percent of the lakeside open space and creek corridors. Public access to the lake occurs primarily from Moller Park, the Spit area and the lake outlet.

Ice-skating has long been a very popular winter use of the lake. Swimming is limited due to depth and the thick growth of aquatic vegetation. Kayak and rowboat usage regularly occurs, with the recently-dredged channels at the Spit and lake outlet providing improved access to deeper waters of the lake.

The lake is an important resting and feeding area for swans and waterfowl during migration periods. More than forty species of birds have been identified in and around the lake (Sundberg, 1980). Historically, in excess of 25 swans have been observed on Swan Lake for periods up to several weeks. This number has dwindled over the years due to disturbance and development around the lake, to fewer than five swans for periods of only days. Waterfowl viewing and feeding is very popular at

the Wrinkleneck Creek Spit area, with numerous ducks and geese being year round residents. River otters are also occasionally sighted.

Development within the watershed is principally single family and multifamily residential housing, with a scattering of small commercial businesses (insurance company, Senior Center, dentist, Salvation Army, auto parts store, bank) along Lake Street and Halibut Point Road. Two major roads – Lake Street and Halibut Point Road – surround the east, west and south portions of the lake and carry significant vehicle traffic. Moller Park at the northwest end of the lake offers over 1,000 feet of public lakefront for recreational use. A baseball park, football field and track and play area are included in the park.

The Spit area and lake outlet off Lake Street both offer park benches and vistas for observing waterfowl and launching small skiffs and inflatables. Access improvements realized through dredging and widening lake channels in these areas from 2001 through 2004 have resulted in greater recreational use of these areas.

D. INTEGRATED MANAGEMENT OBJECTIVES FOR THE SWAN LAKE WATERSHED

A number of initiatives have explicit – and closely related -- management objectives for the Swan Lake AMSA and watershed. Most are designed to enhance and protect the unique recreational opportunities afforded by Swan Lake. Primary players include the City and Borough of Sitka (*Swan Lake AMSA, Moller Park/Swan Lake Community Use Plan,* and *Swan Lake Watershed Recovery Strategy*), the Alaska Department of Fish and Game (annual sport fish stocking plan), and the Alaska Department of Environmental Conservation (water quality protection and restoration of impaired waterbodies). The Alaska Department of Natural Resources has transferred title to the lake bottom and feeder creeks to the CBS.

Collectively, these management efforts enhance Swan Lake's recreational opportunities through a combination of park and structural improvements, fish stocking, and lake restoration work (dredging, stormwater runoff improvements). Routine monitoring data gathered in support of these management efforts provides a factual measure of success in protecting uses of the area.

Each of the major Swan Lake management plans/initiatives is briefly discussed below.

1. *THE SWAN LAKE WATERSHED: AN AREA MERITING SPECIAL ATTENTION* (1981)

Swan Lake and its adjacent parks, streams and recreation areas have been called 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. In 1963, the first local Comprehensive Plan for Sitka suggested a periphery park be established around Swan Lake. The urban renewal program in 1964-1965, with highway paving and outlet culvert construction, modified these plans significantly (CBS, Schmidt, 1980). In the late 1960s, a local contractor dredged portions of the lake and used fill to expand the spit area adjacent to Wrinkleneck Creek. The material was stockpiled, dried and sold locally for topsoil due to its high nutrient content. Beginning in 1974, the City Planning Department, with ADF&G, began reviewing possible rehabilitation projects for Swan Lake that would include some dredging to improve overwintering fish habitat and enhance recreation potential. City sewer, water and road reconstruction along Lake Street was completed in the mid 1970s.

The passage of the Alaska Coastal Management Act and enabling regulations in the late 1970s provided new impetus for managing Swan Lake. 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 (CBS, 1981, 1989). The AMSA boundaries are shown in Chapter IV. This formal designation has since led to several recreation and fisheries enhancement proposals and projects by the City and Borough of Sitka and Alaska Department of Fish and Game. Additionally, local efforts to pick up trash, verify sanitary sewer connections, and initial steps to ensure proper aboveground 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 original AMSA (CBS, 1981) was 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."

Proper and improper uses identified for the Swan Lake AMSA are included in Chapter IV along with enforceable policies.

2. THE COMPREHENSIVE PLAN AND SITKA PARKS AND RECREATION ADVISORY COMMITTEE ACTIONS (1991)

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 incorporated City and Borough of Sitka was adopted in 1976. The most recent draft revision to the Comprehensive Plan was issued in July 1998. The Comprehensive Plan incorporates the 1989 Revised 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 a 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 and needed watershed recovery actions, wetlands damage occurring around the lake, and Wrinkleneck Creek and Arrowhead Creek stream cleanup and erosion.

3. SWAN LAKE RAINBOW TROUT ENHANCEMENT PLAN AND DRAINAGE IMPROVEMENT DISCUSSIONS (1998 TO PRESENT)

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

The Department of Fish and Game has worked closely with the CBS on examining drainage and hydrologic issues within the Swan Lake watershed in an effort to reduce flooding (ADF&G, 1994). ADF&G emphasized that Wrinkleneck and Arrowhead Creeks have been affected by filling in flood plains, building sites and roads which have tended to reduce the effective floodplain size and constrain natural stream flows. Recommendations were included for replacing selected culverts, installing more effective trash screens at the inlets of major culverts, and the beneficial effects of dredging the lake at the mouth of Wrinkleneck Creek. (ADF&G, 1983). Correspondence included support for a small dredging project to deepen the water and eliminate the lilies at the duck haul out, which would improve shore-based fishing opportunities from the spit.

4. SWAN LAKE WATERSHED RECOVERY AND RESTORATION EFFORTS (1999 TO PRESENT)

Numerous scientific investigations of the Swan Lake watershed have been completed since the early 1990s, with new federal funds provided for accelerated efforts beginning in 1999.

Historically, residential and commercial development around Swan Lake and its tributaries has resulted in changes to the qualities of the watershed. Encroachment on or near creek banks with attendant loss of riparian vegetation, flooding due to alterations of the area's hydrology, extensive trash and debris, excessive aquatic plant growth, and sediment and nutrient inputs from stormwater runoff and street maintenance are examples. It is precisely for these reasons that the CBS placed a new emphasis on watershed recovery efforts beginning in 1999. The effort included both a near-term and long-term strategy to address the problems in the lake and thus enhance recreational and fish and wildlife opportunities consistent with the purpose of the Swan Lake AMSA. Adopting a comprehensive management approach that networks all landowners in the watershed towards a common goal was the purpose of the Swan Lake Watershed Recovery Strategy completed in 2000.

In summary, subsurface seepage from past on-site septic systems has been addressed by hooking all watershed residents to the municipal sewer system. Fecal coliform bacteria levels have dropped markedly as result. Depressed dissolved oxygen levels in the lake during winter have improved since 2002 through deepening stream mouth and lake channels; continued monitoring of oxygen levels is part of an ongoing program for the lake.

A summary of the variety of scientific studies and watershed recovery efforts conducted since 1999 is found in the following section.

E. SUMMARY OF SCIENTIFIC STUDIES AND LAND USE INFORMATION

This Resource Inventory and Analysis addresses changes that have taken place in the last 20 years in terms of uses and activities and their impacts on Swan Lake. Scientific studies are summarized and referenced in the plan that prove that the Swan Lake area is of unique concern for recreational use.

This section summarizes scientific studies conducted since the original 1981 Resource Inventory and Analysis that supported the original 1989 SCMP and Swan Lake AMSA. It also updates changes in land uses and activities within the AMSA and impacts to recreational uses and (habitats) in the area. This update is required in support of the Swan Lake AMSA's enforceable policies found in Chapter IV.

Detailed data are not reported in this summary of scientific information. The reader is referred to the documents cited in the References section for this information.

1. HISTORIC RESOURCE SURVEYS IN THE WATERSHED: 1980s THROUGH THE 1990s

Several environmental and fisheries surveys preceded ADEC's water quality investigations during the 1990s. In 1979, the Sport Fish Division of the Alaska Department of Fish and Game completed a time series of biological and physical/chemical investigations of Swan Lake and Wrinkleneck Creek. 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. In summary, nutrient levels in the water column were not elevated, zooplankton biomass was typical of alpine or oligotrophic lakes rather than eutrophic lakes, and dissolved oxygen profiles typically ranged from 9 mg/l at the surface, 7 mg/l at depths of five feet and 1 to 3 mg/l at the lake bottom. The specific conductance of 83 umhos for Swan Lake was the second highest studied to that date in Southeast Alaska and was attributed largely to the sodium and sulfate probably from domestic pollution (ADF&G, 1979).

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. These included maintaining streamside vegetation within the 25 foot buffer and revegetating portions of the lakeshore 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 1980s 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. 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. Staff has periodically screened the lake for fecal coliform levels since that time.

During the early 1990s, after the CBS adopted the Swan Lake AMSA, the municipality applied for funding through the U.S. Environmental Protection Agency's Clean Lakes Program to analyze the feasibility and costs of rehabilitating Swan Lake. The Swan Lake AMSA remains the principal "blueprint" for managing uses on and along the lake shore and feeder streams. Funding for the federal Clean Lakes program dried up in 1995 and Congress has since not appropriated any funds for that program. Grants under Section 319 of the Federal Clean Water Act, administered by the Alaska Department of Environmental Conservation, have helped to fill that void since 1992, with considerable funding going to community-based watershed protection projects, including Swan Lake.

ADEC completed on-site water quality investigations of the Swan Lake watershed in October 1996 and April 1997 subsequent to the 1994 listing of portions of the watershed on the state's impaired waterbody list for debris and solid wastes. Redburn Environmental & Regulatory Services, as contractor to the CBS, completed a third survey in September 1999 as part of the Swan Lake restoration project. The findings and conclusions are described in detail in the January 2000 report *Swan Lake Watershed Recovery Strategy. Phase 1: Debris and Solid Waste Removal and Control* (CBS/Redburn, 2000). Turbidity levels of the two feeder creeks and Swan Lake were low and within standards (less than 5 NTUs above natural condition), coloration (which doesn't affect turbidity) was high due to muskeg tannins, and settleable solids levels at the Lake Street culverts discharging Arrowhead and Wrinkleneck Creeks were below the detection limit (less than 0.2 ml/l). Settleable solids concentrations from stormwater outfall discharges were not measured but a visible plume at several outfalls was observed during the September 22, 1999 storm event (2.7 inches of rain). No oil sheens were observed. These screening data suggest that wetland vegetation within the creek buffers is effective at filtering out heavy sediments during high rain events. Available funds were not sufficient for nutrient screening.

For screening purposes, dissolved oxygen concentrations, temperature, lake depth and Secchi depth were measured at twelve stations on Swan Lake on September 24, 1999.

Various school project monitoring and fisheries investigations in Swan Lake and Wrinkleneck Creek since 1994 (Kent Bovee high school classes and Cal Hayashi middle school classes) have provided some citizen-generated water quality information about the lake and Wrinkleneck Creek. These surveys are a good teaching tool for students and provide useful information to help manage the lake and watershed. Parameters measured include pH, dissolved oxygen, conductivity, turbidity, temperature, invertebrates, and rainbow trout and sticklebacks. Student water quality data collected since fall 2001 are guided by the approved Swan Lake QAPP and will be entered into a database that can be broadly shared with Sitka residents and others.

Prior to 2001, the only available nutrient data for Swan Lake were collected from the 1979 ADF&G surveys. Mean ortho-phosphate, nitrate and nitrite concentrations in water were less than 10 ug/liter (0.010 mg/l), less than 100 ug/l (0.100 mg/l), and 20 ug/l (0.20 mg/l), respectively. These levels are not elevated.

2. The Swan Lake Watershed Recovery Studies and Associated Efforts (2000 to present)

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

A two-phase Swan Lake Watershed Recovery Strategy was completed in 2000. The Strategy constitutes the community's consensus approach for restoring recreational and other uses of the AMSA and watershed. *Phase 1* of the Strategy addressed removal and control of solid waste/debris, ensured continued community involvement in the project, confirmed that sanitary connections are made, and verified that home heating oil tanks are in compliance with state and federal regulations or guidelines. *Phase 2* addressed lake eutrophication and actions needed to restore full recreational and habitat uses of the lake. These have included lake dredging, culverting, and many structural improvements. A Monitoring Strategy, State of the Lake Report, Stormwater Control Strategy and educational brochures were products that followed the written Strategy.

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A summary of each of these efforts follows. Readers are referred to the full reports for a more detailed data and discussion.

1) Swan Lake Watershed Recovery Strategy, Phase 1: Debris and Solid Waste Removal and Control (January 2000)

The Swan Lake Watershed Recovery Strategy. Phase 1: Debris and Solid Waste Removal and Control (January 2000) outlines a publicly-endorsed action strategy to improve water quality and habitat conditions in the watershed. The purpose of the Strategy mirrors the purpose of the Swan Lake AMSA; simply, to protect and enhance the recreational, aesthetic, and fish and wildlife values of Swan Lake for the enjoyment and use of the public. Under the Phase 1 plan, annual community trash cleanups of the lake and creeks held since 2000 continue to keep the watershed relatively free of debris and litter. Connections to the municipal sanitary sewer system were confirmed. Improvements in aboveground home heating oil tank management also reduces oil spillage adjacent to Wrinkleneck Creek.

This 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. 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. A detailed discussion of these issues is found in the body of the report.

The recommended actions and tasks below were intended to be 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 watershed protection approach.

The following constitute a "palette" of recommended actions from the Phase 1 Strategy 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.

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.

2) Swan Lake Watershed Recovery Strategy, Phase 2: Eutrophication Report and Action Plan (June 2000)

The Phase 1 Strategy triggered multiple follow-up actions. In an effort to identify the specific actions needed to slow down and reverse the eutrophication – or lake nutrient enrichment and aging process -- the CBS contracted the completion of the *Swan Lake Watershed Recovery Strategy. Phase 2: Eutrophication Report and Action Plan (June 2000).* Also funded by a federal Clean Water Act grant, the Phase 2 Strategy outlined an Action Plan of over 20 tasks to help restore the uses of Swan Lake and its tributaries. A range of alternatives to address the problems are proposed and a preferred alternative was selected after public discussion. Dredging the lake's outlet channel and mouth of Wrinkleneck Creek to improve water flow, selective cutting/thinning of aquatic plants, documenting stormwater quality and improving controls, and implementing new water quality protection practices by lakeside and streamside residents were all important elements. This Strategy remains the key document today in guiding lake restoration priorities.

As stated earlier, the growth of native aquatic plants in the lake has progressed to the point of depressing dissolved oxygen levels and negatively affecting recreational and perhaps fisheries uses of Swan Lake. Maintaining and enhancing these uses of Swan Lake has been a priority of the City and Borough of Sitka since the 1960s and was provided formal impetus with the 1981 adoption of the Swan Lake AMSA. Several communities in Alaska with urban lakes have faced similar challenges. Those experiences are examined in this Strategy as well as lake case histories of Northwest and other northern states.

An Action Plan identifies a range of alternatives to fix the problems related to eutrophication -- i.e. the changes associated with nutrient enrichment and the aging of lakes. Additionally, the Action Plan addresses needed hydrologic improvements in the watershed -- including culverting and improving flow out of the lake -- and best management practices (BMPs) for stormwater management and vegetative buffers. Costs, technical feasibility and the environmental consequences of each alternative are addressed. A recommended approach was presented for public discussion in April 2000. Following public, CBS and agency review, the multi-year Action Plan was adopted with community support.

A phased approach to the rehabilitation of Swan Lake was proposed that integrates several techniques. This is prudent given the current funding realities, and the uncertainties related to the success of controlling macrophytes through the proposed approach. A "Ten Task" program that includes selective thinning and deepening the lake outlet channel is envisioned in the first two years, coupled with cleaning out the Wrinkleneck Creek culvert, sediment removal from lake shorelines, and public education efforts. Testing several aquatic plant removal techniques on a small scale is envisioned. Citizen monitoring is also an element.

The Eutrophication Report relies on existing information. One of the recommendations identifies the need for collecting more information on hydrology and water quality in the Swan Lake watershed as a basis for improving our understanding of eutrophication and long-term changes to Swan Lake. Nutrients, dissolved oxygen, sediment, lake height and water flow into and out of the lake are important long-term monitoring parameters.

This Phase 2 Strategy follows a watershed approach in evaluating cause-and-effect relationships to the health of Swan Lake. Similar to Phase 1 efforts, the Strategy underscores the importance of active community participation in the restoration of Swan Lake and in taking a long-term approach to monitoring, maintaining and enhancing recreational and other lake uses.

Both Near-term and Long-Term Action Plans were included in the Strategy's Action Plan to guide lake rehabilitation. The integrated Strategy included dredging (deepening) several key recreational areas, selective removal of lily pads in high use recreational areas to promote improve boating and fishing access, citizen monitoring and stewardship, and educating Sitkans on the application of best management practices to control lake water quality and enhance recreational uses.

The Proposed Action Plan for the years 2000 through 2002 -- top ten near-term tasks

- Selectively harvest shallow macrophytes in high use recreational areas of Swan Lake

- Deepen the lake outlet channel to control flooding, better manage shallow shoreline vegetation, and improve lake water exchange

- Retain the sedge grass community along the lake fringes and periodically clean sediments from the channel between Lake Street and the sedges

- Document stormwater quality and nutrient source loading to the watershed

  a) Expand the information base on the hydrology, physical, biological and chemical characteristics of the Swan Lake Watershed through a citizen-based inventory and monitoring program

  b) Conduct demonstration/experimental projects on the effectiveness of various aquatic plant controls

- Improve drainage at the Arrowhead Creek/Monastery Street intersection

- Verify the integrity of the length and marine end of the 1200 ft. outlet culvert and assess engineering feasibility of lowering the outlet structure

- Implement best management practices re: stormwater management, maintenance of sediment catchment basins, snow management and road salt usage

  a) Institutional improvements in BMPs affecting Swan Lake

  b) Complete a stormwater management plan for Swan Lake watershed and municipality

- Complete a small public education effort that targets BMPs for lake health

- Deepen and stabilize the lake entrance channel at the mouth of Wrinkleneck Creek

- General Task: Complete required permit applications to the Corps of Engineers, DGC, ADEC and ADF&G

The Proposed Action Plan for the years 2003 and beyond: the long-term strategy

- Continue location-specific manual harvest of macrophytes, drawing on the earlier experiences and successes

- Continue a dialogue with Juneau, Ketchikan and other Southeast communities on common lake problems and possible sharing of harvesting and dredging equipment

- Replace the existing culvert or add a second pipe to the Wrinkleneck Creek/Monastery Street crossing

- Complete a vegetation and forest park management manual to guide lake and streamside buffer uses, including revegetation, clearing and brushing

- Continue dialogue towards consensus on whether to proceed with the ADF&G 1981 fisheries enhancement proposal to deepen portions of the lake to improve overwintering fish habitat

- Consider forming a Swan Lake Association to leverage future funding and focus attention on the lake

- Pursue an ongoing management approach that assesses the "State of the Lake" and the watershed on an annual basis, integrating citizen monitoring results with other information

- Continue to seek ways to improve compliance with local ordinances and established streamside setbacks within the Swan Lake AMSA

3) A Guide to Volunteer and Agency Water Quality Monitoring in the Swan Lake Watershed and a Quality Assurance Project Plan (June 2001)

Closely following the publication of the Eutrophication Report and Action Plan in 2000, *A Guide to Volunteer and Agency Water Quality Monitoring in the Swan Lake Watershed and a Quality Assurance Project Plan (June 2001)* was completed to lay out the procedures and objectives for student and agency water quality monitoring in support of lake rehabilitation. Swan Lake is "data poor." Water quality monitoring is a key task for evaluating the effectiveness of restoration work. Sitka High School students and municipal staff have joined with professional monitors in collecting lake and creek water quality information to evaluate the success of restoration activities.

Ensuring that volunteer and agency-gathered data are both accurate and representative is critical if the data are to be useful. For this reason, this water quality monitoring Guide includes a formal Quality Assurance Project Plan (QAPP) that meets ADEC and federal Environmental Protection Agency

(EPA) guidelines and establishes sampling, preservation, analysis and reporting protocols to be followed by volunteers and agency staff alike.

The goal of the water quality monitoring project is to provide high quality, representative information that accurately reflects environmental conditions and influences land use management decisions in the watershed. Volunteer-gathered information can be of great value toward this goal. The purpose of the Guide is to provide the "tools" and procedures for documenting current and future water quality conditions, help to explain the reasons for these conditions, and the describe positive effects of restoration actions currently being taken in the watershed. The Guide supports and supplements ongoing water data collection efforts conducted by Sitka students on several streams around the municipality and those of resource agencies.

Multiple stations are sampled in Swan Lake, Wrinkleneck Creek and Arrowhead Creek by volunteers and professionals for up to 15 water quality, biological, and hydrologic indicators.
Primary parameters measured are pH, water temperature, dissolved oxygen, sediments, nutrients, turbidity, conductivity, debris, petroleum hydrocarbons, lake height and lake and creek flow rates. Other characteristics are fecal coliform bacteria, macroinvertebrates, resident fish fry surveys and lily pad distribution and abundance.

This *Guide* consists of two parts. The first part (Chapter I) is intended for volunteers and is designed to be a "user friendly" guide that briefly describes the "who, what, when, where and why" of water quality monitoring in the Swan Lake watershed. The rationale for sampling, station locations, and parameters to be measured are discussed. Data quality objectives are included. Field and laboratory methods are discussed. An Executive Summary is also included for those not wishing to read the full document.

The second part (Chapter II) is the formal Quality Assurance Project Plan (QAPP). Ensuring the high quality of data collected is essential to the project. The QAPP addresses elements required by ADEC and EPA, including details on proper water quality sampling, calibration, quality control, training, data management and reporting. It is intended mainly for those responsible for evaluating data quality and training volunteers.

The Guide follows existing published approaches for citizen water quality monitoring. Several are currently used in Sitka. Student and citizen water quality sampling protocols -- developed by the Alaska Department of Environmental Conservation's Alaska Water Watch project in 1994 -- are adopted by reference in this Guide. Stream macroinvertebrate sampling procedures are those adopted from the 1999 *Streamkeeper's Field Guide* published by the Adopt-A-Stream Foundation. These are currently used by Sitka students through the Sitka Water Watch program on Indian River.

Municipal and other agency water quality monitoring will also follow these or other standard EPA methods. These methods are also adopted by reference in this Guide.

Clean water is required to maintain and support healthy trout populations in Swan Lake and its tributaries and to enhance recreational uses of the lake. Residential and commercial development and associated non-point sources of pollution have gradually affected water quality.

A local Water Watch program was initiated for Sitka students by ADEC's Water Quality Management Section in the mid 1990s, using the citizen protocols referenced in this Guide. Several middle school and high school monitoring projects (Sitka Water Watch) have continued, under the leadership of school science teachers and with the assistance of the

Alaska Department of Fish and Game and National Park Service, to collect valuable water quality and fisheries data in several watersheds around Sitka. This project supplements the information gathered by volunteers, local organizations and resource agencies.

A more complete database will allow for improved cause-and-effect analysis of watershed seasonal changes and the success of rehabilitation activities. Solid information using indicator parameters will dictate what additional controls may be necessary and also give a running "report card" on watershed health.

Periodic fecal coliform bacteria monitoring along the lake shore is considered appropriate, as the need arises, to continue the municipality's ongoing evaluation of the integrity of the sewerage system and whether Swan Lake is experiencing elevated fecal coliform bacteria levels. Geese and swans can also contribute to localized, elevated levels of bacteria and should be addressed in the water quality monitoring project. Additionally, visual inspection for oil sheens should be part of a routine practice in the Wrinkleneck and Arrowhead Creek stream surveys to assess the condition of aboveground home heating oil tanks bordering the creeks.

It is also hoped that direct involvement of Sitkans in gathering water quality information will foster a strong sense of stewardship for their lake and creeks and ultimately improve water quality conditions.

4) State of the Lake Report (June 2002): Results of Restoration Work

This *State of the Lake Report* summarizes the results of Swan Lake watershed restoration activities completed from March 2000 through June 2002. A diverse number of tasks were completed during this period. Guided by the comprehensive watershed restoration strategy finished in 2000, a progress report and "report card" on the relative success of each restoration task are included. Recommendations for future lake and watershed rehabilitation activities are included at the end of the report.

Restoration activities that were "graded" in the report include annual community trash cleanups, manual harvest of lily pad in high use recreational areas, dredging the lake outlet channel and the Wrinkleneck Creek delta, citizen and professional water quality monitoring, improving hydraulic efficiency of culverts in the Arrowhead Creek/Monastery Street intersection, completing a stormwater control strategy, and public education and participation in restoration. Some are one-time tasks; other tasks are continuing.

The following "bullets" summarize the accomplishments of individual restoration efforts through June 2002. For each task, the reader is referenced to the full Strategies and Action Plans for a description of purpose and task rationale.

Notable lake and watershed restoration actions taken since 2000 include the following:

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

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

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

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

5) Stormwater Control Strategy and Action Plan for the Swan Lake Watershed (June 2002)

In June 2001, the City and Borough of Sitka received a Section 319 community water quality grant from the Alaska Department of Environmental Conservation to complete a Swan Lake Stormwater Control Strategy by June 30, 2002.

The *Stormwater Control Strategy and Action Plan for the Swan Lake Watershed (June 2002)* recognizes the importance of stormwater management in protecting the lake's recreational and habitat uses. It identifies sources and pathways of stormwater runoff in the Swan Lake watershed, summarizes current controls, and calls for over 20 new actions to improve stormwater management. The adequacy of current CBS controls is evaluated against federal guidelines for stormwater management for small communities subject to Phase II regulations.

The Action Plan proposes a proactive, preventive approach to stormwater management, recognizing that small community response to stormwater management is often reactionary in response to problems. Both approaches must be part of a comprehensive Strategy.

Structural (e.g. sediment catch basins, grassy swales, stream side buffers) and non-structural controls (such as street cleaning, stream bank management, road salt application and snow plowing) are described. Regular maintenance plays a vital role in ensuring the proper operation of both structural and source controls.

Stormwater control has two main aspects. One is to address the increased volume and rate of runoff from impervious surfaces. The second is to control the pollutants in the runoff. Pollutants may include oils and greases, sediment, salts, nutrients, heavy metals, antifreeze and a variety of organic compounds. Effective management of stormwater runoff offers a multitude of benefits, including protection of Swan Lake -- the endpoint of all runoff in the watershed -- flood control, and protection of public health.

Stormwater drainage to Swan Lake is considerable. Both Wrinkleneck Creek and Arrowhead Creek are major conveyances of stormwater runoff to Swan Lake. A series of neighborhood roadside drainage ditches, culverts, and catch basins/underground collection systems transport stormwater to Swan Lake. Underground collection/drainage is generally restricted to the main roads, including Halibut Point Road, Lake Street, DeGroff and Marine Street and some of Lakeview Street. Over twenty separate outfalls discharge stormwater to Swan Lake. The quality of stormwater has been monitored for sediments and turbidity levels and oil sheens over the last several years. Stormwater discharges to Swan Lake carry runoff and chemicals from roads, residences and parking lots. Sediment catchment basins are installed in storm drains on Halibut Point Road, Lake Street, Marine and DeGroff Streets and south Lakeview Street. Several oil/water separators (OWSs) are installed along Halibut Point Road, but the Alaska DOT&PF has an unspecified maintenance schedule for OWSs. Lake Street is sloughing/eroding sediments into Swan Lake. Allegations of leaking municipal sewer lines along Lake Street persist. Fill encroachments on the natural channels and vegetated stream buffers of Arrowhead and Wrinkleneck Creeks have had a marked effect on drainage, and increase flooding frequency on some streets. Other hydrologic modifications to the watershed that have also affected stormwater quality include road paving and land clearing. The recently-completed dredging projects at the Swan Lake outlet channel and the Wrinkleneck Creek delta have helped moderate extremes and fluctuations in lake height and stream elevations.

The main sources of stormwater affecting Swan Lake's water quality are urban runoff and land use management practices within the watershed. Several of these have been effectively dealt with over the last 30 years (e.g. municipal sewage collection system replacing septic tanks); many remain to be addressed. While Swan Lake is not listed by the Alaska Department of Environmental Conservation as violating water quality standards for dissolved oxygen, nutrients, sediments, or fecal coliform bacteria, low level inputs over time are gradually resulting in excessive plant growth and recreational use impairments. Priority actions over the last several years have been directed at understanding and controlling the causes of eutrophication coupled with actively treating the symptoms of lake eutrophication. Stormwater management is an integral part of this effort.

The Stormwater Control Strategy recognizes the unique conditions of Swan Lake in selecting appropriate best management practices. A number of good management practices are already in place to improve stormwater quality. These are individually acknowledged in the Strategy and should be continued. Several new practices are proposed.

The EPA has regulated stormwater discharges through its National Pollutant Discharge Elimination System (NPDES) permit program since the early 1990s. Regulated sources include construction sites, industrial operations, and municipal stormwater systems. EPA issued final Phase II stormwater regulations in December 1999 that generally require some smaller municipalities to prepare

stormwater management plans. However, with a stable population below 10,000 citizens, the CBS is not required by EPA to complete a Phase II stormwater plan for the municipality (Mark Buggins, personal communication).

The Swan Lake Stormwater Control Strategy includes a common sense set of tasks that will only improve stormwater management into the future. The Swan Lake Stormwater Control Strategy is structured to address EPA's six minimum control measures (or elements) for an approvable plan, recognizing that CBS may not be formally required to complete such a plan for the entire municipality. The elements/measures make good sense and it is felt prudent at this point to address them as guidance for purposes of this Strategy.

The goal and objectives for the Swan Lake Stormwater Control Strategy are consistent with the management objectives for the preceding *Swan Lake AMSA* and *Swan Lake Watershed Recovery Strategy*.

The *goal* of the Swan Lake Stormwater Control Strategy is:

> *Manage stormwater quantity and quality to ensure efficient drainage and the reduction of pollutants entering Swan Lake and its tributaries*

Eight *objectives* support this goal. Each is measurable, so that levels of success can be evaluated. Objectives were selected to address each of the six EPA program elements considered to be essential components of an approvable stormwater management plan. Tasks supporting each objective are shown below.

> Objective 1: *Maximize use of natural vegetated swales and wetlands to store and treat stormwater runoff.*
>
> Objective 2: *Substantively involve watershed residents as participants in keeping their watershed clean and in reporting illicit activities.*
>
> Objective 3: *Use a series of structural and non-structural best management practices to actively manage stormwater runoff, including experimental and innovative approaches.*
>
> Objective 4: *Institutionalize CBS operation and maintenance practices and stormwater controls through written procedures and employee education and training.*
>
> Objective 5: *Monitor stormwater quality over time to evaluate effectiveness of controls.*
>
> Objective 6*: Educate developers and residents on best management practices to maintain high water quality in stormwater runoff to the lake.*
>
> Objective 7: *Use the Swan Lake Stormwater Control Strategy as a blueprint for any future municipal-wide approach to managing stormwater runoff.*
>
> Objective 8: *Recognize the strong interrelationship between stormwater quantity and stormwater quality in managing stormwater runoff.*

TABLE 5: ***SUMMARY OF THE STORMWATER ACTION PLAN FOR 2002 THROUGH 2006***			
SWAN LAKE STORMWATER CONTROL STRATEGY	Objective Supported	Responsible Party(s)	Completion Date
ACTION PLAN FOR 2002 TO 2006			
-Continuing Stormwater Control Practices-			
Retain lakeside sedge grass community as sediment trap	1,3,4	CBS PW Maintenance	Ongoing
Continue to document stormwater quality	5	CBS /students/contractor	Ongoing
Continue annual trash and debris cleanups	2,4	CBS Parks and Rec/WW	Annually
Retain riparian vegetated buffers in the AMSA	1,7	Residents; CBS PW	Ongoing
Improve drainage at the Monastery/Wrinkleneck site	8	CBS PW Mainten./Engin.	June 2005
Improve drainage at the Arrowhead/Monastery site	8	CBS Mainten/Engineering	Aug 2002
Implement ongoing stormwater control BMPs	3,4	CBS Depts & residents	Ongoing
Complete revegetation/reseeding manual for disturbed sites	1,2,4	Contractor w/CBS oversight	June 2004
Continue to maintain waste oil and antifreeze/haz waste collection facilities	4	CBS Environment/Harbors	Ongoing
Encourage citizen reporting of illicit dumps/activity	2	Residents/CBS Environ	Ongoing
Regular cleanouts of plugged culverts/catch basins	3,4	CBS Public Works Mainten	Ongoing
Continue use of watershed team to advise CBS	2,4	CBS; Interagency team	Ongoing
-Proposed Stormwater Management Tasks-			
Prepare a reference brochure of stormwater BMPs	1,3,4	CBS and/or contractor	June 2004
Retain grasses/swales in drainage ditches for filtration	1,3	CBS PW Maintenance	Ongoing, 9/02
Prepare written policy on scheduled O&M practices	1,3,4	CBS Public Works Director	June 2003
Outline process to ID illicit connections/illegal dumping	4,.6	CBS Public Works	June 2003
Sponsor volunteer storm drain stenciling, reseeding and plantings	1,2	CBS Parks and Rec/Groundskeeper	May 2004
Maintain oil-water separators/catch basins; consider including oil-retention structures or swales in newly-constructed systems	3	CBS Enginr/Public Works	Ongoing
Complete an engineering analysis of stormwater drainage and identify needed upgrades	3,8	CBS Engin / PW Mainten	June 2005
Designate a lead entity in CBS for SW coordination	4,6,7	CBS Public Works Director	Sept 2002
Include city-wide stormwater drainage map as an element of proposed GIS mapping project	7	CBS PW with contractor	June 2005
Educate developers/train CBS staff on minimum standards for stormwater/water quality protection	4	CBS and course contractor	June 2005
Consider a local development agreement for specifying construction standards in the watershed	4	CBS Publ Works/Building	Jan 2005

6) Community brochures (BMPs and stormwater), vegetation management guidelines

A community brochure – *A Citizen's Guide to Protecting Water Quality in the Swan Lake Watershed (June 2001)* recognizes and emphasizes the importance that Sitkans play in protecting their AMSA. It includes a list of "Dos" and "Don'ts" that focus on simple things citizens can do to improve lake

habitat and water quality. Examples include check your heating oil tanks for leaks, and don't dump grass clippings in the creeks or oil down storm drains. This brochure was soon followed by a second one. *A Contractor and Citizen Guide to Reducing Stormwater Pollution – "When it rains, it drains"* was completed by CBS in June 2004. This brochure outlines stormwater problems, how runoff is regulated, EPA stormwater permit requirements, and simple, local practices that are effective in reducing stormwater pollution. All practices help protect and improve the recreational and other uses of the Swan Lake AMSA.

The CBS completed *Vegetation Management Guidelines for the Swan Lake AMSA* in March 2004. Given a number of tree and shrub thinning actions that were controversial, it was recognized that clearer vegetation management practices were warranted for both lakeside and streamside residents and CBS Parks staff. The purpose of the guidelines is to:

> "Help keep Swan Lake, Sitka's "Central Park," clean, aesthetically pleasing, and accessible for public use and enjoyment and provide recreational and aesthetic enjoyment to Sitkans, and
>
> Provide guidelines for proper and compatible recreation, development and management practices within the Swan Lake AMSA."

and support healthy fish and wildlife populations. The guidelines educate and guide CBS staff and citizens in practices for protecting recreational, habitat and water quality uses in the AMSA. Both proper and improper uses that are compatible or detrimental, respectively, to the purpose of the Swan Lake AMSA are identified.

The management guidelines support retaining buffers or setbacks, revegetation where disturbance occurs, use of vegetated swales to treat polluted runoff, and retention of scenic views.

F. LINKING CURRENT SCIENTIFIC INFORMATION TO PROPER AND IMPROPER USES AND ENFORCEABLE POLICIES OF THE SWAN LAKE AMSA

The Resource Inventory and Analysis lends strong support for the retention of the Swan Lake AMSA, its proper and improper uses, and enforceable policies.

The purpose of the original 1981 AMSA was to ensure a clean and aesthetically pleasing waterbody, maintain and enhance fish and wildlife populations, and provide for recreational opportunities consistent with sound management of the lake's resources.

The Resource Inventory and Analysis clearly shows the changes to the Swan Lake watershed over the last 20 years and the challenges facing Sitkans to maintain and enhance recreational uses of the AMSA. Optimizing recreational use in the AMSA is clearly linked to water quality improvements, vegetation clearing and control over inputs that affect plant growth and maintain healthy fish and wildlife populations. Clean water supports enhanced recreational use.

The purposes of the AMSA have been supported through improving access for boating and fishing and wildlife viewing by lake dredging and manual harvest of vegetation. Annual fish stocking of 300 rainbow trout annually, community participation in keeping the watershed clean for recreational enjoyment, and stormwater and homeowner fuel tank BMPs help support recreational use and link to the original purpose of the AMSA.

Improvements in water quality (as measured by turbidity, suspended sediment, dissolved oxygen, and fecal coliform bacteria) have been documented. Extreme fluctuations in lake elevation have been moderated through deepening/dredging the lake outlet channel and the mouth of Wrinkleneck Creek, thus increasing water flow out of the lake. Structural upgrades to culverts and increasing use of vegetative swales to treat stormwater are other examples of accomplishments. Homeowner participation in keeping their lake clean has been addressed through mailings of community Best Management Practices and stormwater brochures. Annual volunteer trash cleanups sponsored by CBS have resulted in over three tons of metals, debris and plastics over the last four years. The CBS Vegetation Management Guidelines published in 2004 are tied specifically to the Proper and Improper uses of the Swan Lake AMSA and reinforce its enforceable policies.

In closing, the results of resource inventory and restoration work point to the need for careful management of Swan Lake's considerable resources. The need for streamside and lakeside setbacks – a current enforceable policy -- was, and remains, apparent based on survey results that documented resource impairment. Recent CBS vegetation management guidelines address a key enforceable policy on retention of riparian vegetation. Removing obstructions that could decrease use of the AMSA by desirable fish species, swans and other waterfowl is an annual community event and is directly linked to the management objectives of the AMSA.

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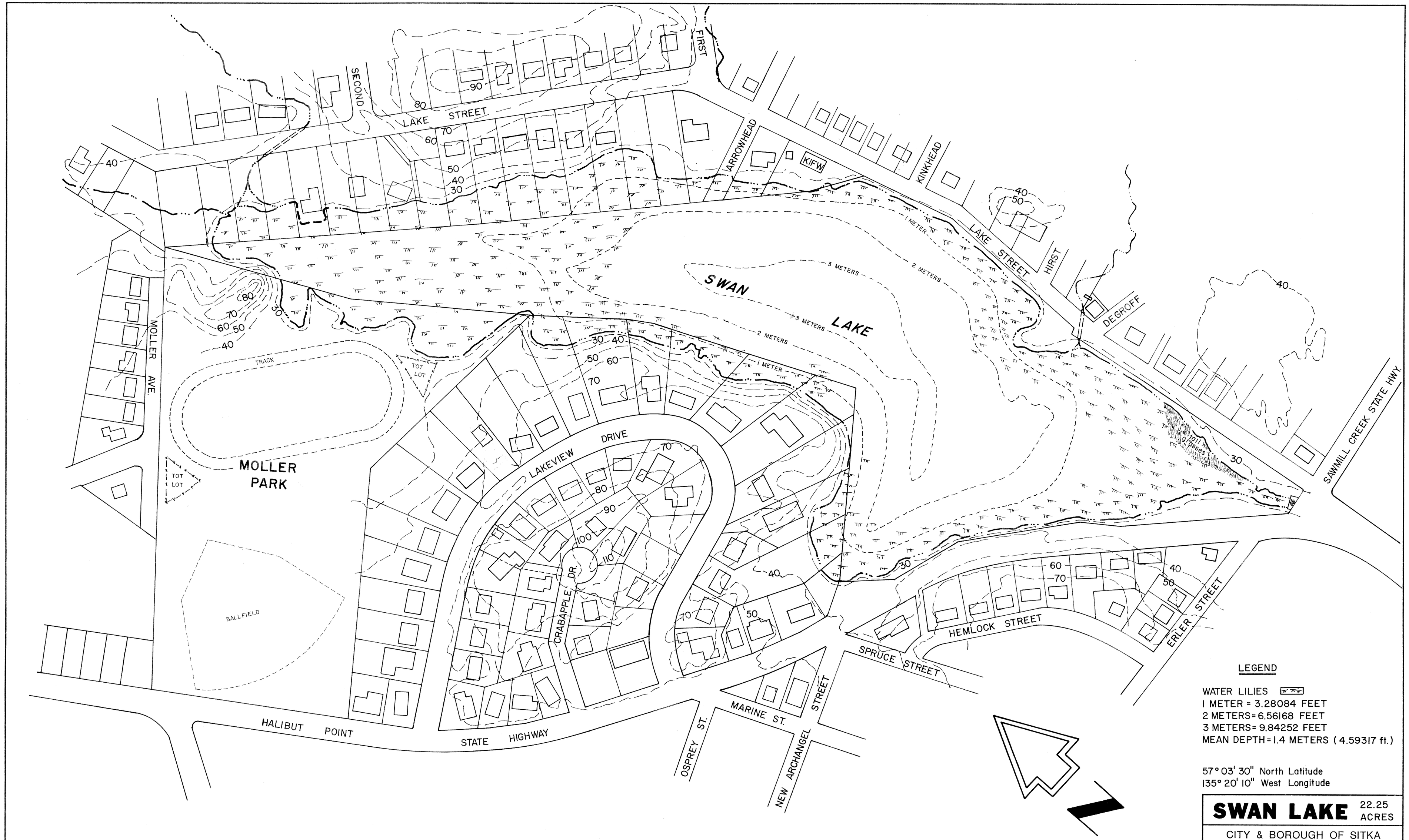

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SITKA
PARKS AND RECREATION PLAN
CITY AND BOROUGH OF SITKA, ALASKA
1991

Prepared by

SITKA PARKS AND RECREATION COMMITTEE

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Sitka Historical Society
Sitka Conservation Society

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INTRODUCTION

Sitka is uniquely blessed with outdoor recreation opportunities. It is the ready availability of boating, hiking, hunting, fishing and other outdoor activities that contribute to the quality of life for the residents of this community. As a small city, Sitka has limited indoor recreation facilities.

The Sitka Parks and Recreation Committee has attempted to list all recreation areas adjacent to the City and to develop an accurate picture of current capabilities & limitations of these facilities. In doing so we have listed and made recommendations for facilities that do not belong to the municipality. This was done to provide each agency with suggestions for future development.

The Sitka Parks and Recreation Committee has prepared this plan for approval by the Assembly of the City and Borough of Sitka as an update of the original 1981 Parks and Recreation Plan for inclusion in the Sitka Comprehensive Plan, now under revision.

The Sitka General Code establishes municipal responsibility for park and playground management and authorizes a Parks and Recreation Committee to make recommendations to the Assembly regarding the development of park and recreation programs. Adoption of a parks and recreation plan is prerequisite to the orderly development of park and recreation programs and is a major element of the City and Borough's Comprehensive Plan.

The land in the City & Borough of Sitka is managed by several agencies. Most land is under the jurisdiction of the U.S. Forest Service. The State of Alaska manages most of the tidelands adjacent to the City and Borough of Sitka. The City of Sitka manages a large block of land in the Goddard Hot Springs area, and Shee Atika Native Corporation owns land at the head of Katlian Bay.

The 1991 Sitka Parks and Recreation Plan is to serve as a guide for:

1. More efficient use of existing recreation facilities, trails and parks.
2. Maintenance of existing facilities, trails and parks.
3. Acquisition and development of park areas.
4. Conservation of open spaces along streams, beaches and other natural features.
5. Maintaining, enhancing and increasing public access to recreation resources.
6. Proposing and developing of new recreation facilities, trails, parks and programs.
7. Obtaining and dispersing funding for parks and recreation.
8. Facilitating government and private coordination in providing recreational opportunities.
9. Preserving and maintaining areas having historic interest and scenic value.

Recommendations for dealing with these items were developed based on the results of the Parks and Recreation Committee's analysis of existing facilities and recreation opportunities, in combination with results of a survey. This public survey was mailed out during the autumn of 1988 to determine the nature of Sitka's recreational pursuits, trends, and to ascertain what recreational facilities may be needed in the future. A copy of the survey is attached as Appendix D.

According to the survey, outdoor recreational activities, including hunting, fishing, boating, beachcombing, picnicking and camping, are popular among Sitkans. Proximity to scenic areas where these forms of recreation are possible is one of the principal assets of living in Sitka. Most Sitkans use the coastal area between Katlian Bay and Goddard for boat-based recreation, and many Sitkans hike the trails accessible from the Sitka road system as well.

Sitka's inclement weather is recognized as a factor affecting recreational needs. This has been demonstrated by increases in both summer and winter Community Schools programs. The survey indicated that more "bad" weather recreational activities are needed.

CRITICAL ISSUES FOR IMPLEMENTATION

Listed below are specific recommendations for action by the Municipality or the Parks and Recreation Committee.

1. Incorporate in the annual budget a section which summarizes all expenditures by the City & Borough of Sitka on recreation related items. This should include labor, maintenance and trash removal as well as funds spent on new facilities. The Parks & Recreation Committee should also become more involved in the budgeting process.

2. Improve City efforts to maintain existing recreation facilities (both indoor and outdoor) and to conduct recreation planning. It is the feeling of committee members that the City & Borough of Sitka has not been devoting sufficient resources toward routine maintenance. It is a fact that there are no City or School District staff with the time or the mandate to undertake recreation planning.

Maintenance of all improvements is vital to a healthy parks and recreation program. Special attention should be given during the planning stage of new facilities so sufficient funds are allocated to maintain that facility. The objectives of a maintenance program are to keep the sites safe, well landscaped and useable. The grounds keeper is a full-time position using summer help to maintain all municipal sites and facilities.

3. The City & Borough of Sitka should hire a full time staff person to oversee Parks and Recreation matters. Major functions of this position would be to obtain and manage parks and recreation related funding, coordinate government and private recreation-related work and facilities, and provide long-term direction for recreation needs in Sitka.

Presently there is no permanently assigned staff liaison on park and recreation matters. In some cases the City Adminstrator represents the public's request. At other times duties are assigned to the Planning Department or Engineering Department. There is also a lack of coordination with the Community Schools' program and staff. No research or grant writing is being done on a routine basis in order to bring State or Federal funding into Sitka that would allow development of recreation sites.

The Community Schools program is a visible success and has reached its saturation point. According to the coordinator, the program has reached 85% occupancy of existing facilities. A Municipal Parks and Recreation Coordinator would provide needed expertise to obtain outside funding, schedule existing park usage, plan recreation activities, and manage maintenance and budgeting constraints. As of July 1, 1981, the Community Schools Coordinator was assigned the above additional duties but has insufficient time to carry them out.

4. Survey results show that there is a great need for indoor recreation facilities. The municipality should continue its efforts to encourage private enterprise through zoning and site selection assistance. The municipality should begin to search for funding for a multipurpose recreation center.

5. Provide the public with more saltwater and fresh water access, including facilities such as boat ramps, shoreside picnic areas, shelters and parks, and log haulout/cutting sites. Specific proposals include:

a. Improving the boat launch ramp and road access to Blue Lake.

b. Provide additional boat launch ramps. Possibly in conjunction with the new boat harbor or south of town in the Jamestown Bay/Silver Bay area.

c. Have the City Engineer study the boat ramp at Crescent Harbor to determine if the ramp can be extended and if a float can be installed without hindering navigation.

d. The municipality needs to provide additional log haul out sites in locations distant from boat harbors or boat ramps.

e. Developing a portion of the City-owned waterfront land north of "The Cove" as a beach picnic area, to provide much-needed additional picnic facilities.

6. Utilize newly reclaimed landfill areas for recreation facilities.

a. Continue to implement the cloverleaf design for the existing landfill ballfields.

b. Dedicate the Granite Creek overburden site to future recreational development.

c. Investigate flooding a portion of the landfill area during cold weather to permit ice skating.

7. Designate bike lanes along the highways from Starrigavan to Herring Cove. This is an especially critical need in the area from Swan Lake to Halibut Point Recreation Area and along Jamestown Bay Hill where the existing situation constitutes a safety hazard.

8. The Indian River Valley and Indian River Trail comprise one of the most accessible of Sitka's nearby recreation areas. This trail is the most heavily used in the community, and the entire valley sees widespread use by local residents. The falls is also a well-known tourist attraction. The Parks & Recreation Committee recommends:

a. That this trail receive the highest priority for maintenance by the managing agency or by the municipality.

b. That the municipality assume greater responsibility for ensuring that the trailhead, the trail and the falls area are regularly cleaned of garbage.

c. That the municipality attempt to provide greater security through increased police patrolling and provide some maintenance of the cemetery sites adjacent to the Indian River Road.

9. Thimbleberry and Heart Lake Trails, while on property belonging to the University of Alaska, comprise a valuable recreation attraction. The committee recommends:

a. That the City and Borough of Sitka oppose any non-recreational development in this area.

b. That the trails between Thimbleberry Lake and Heart Lake be re-established and extended to the Blue Lake Road.

10. The Municipality, in cooperation with other appropriate agencies should begin to implement the Cross Trails Program. In the 1981 Parks and Recreation Plan it was decided to expand the trail system by creating a "Cross Trail System" to connect several existing trails. It was acknowledged then, that this would greatly expand recreational opportunity for residents and visitor to Sitka.

The Parks and Recreation Committee still believes that the Cross Trail System should be developed. First priority, however, must go to the maintenance of existing trails. Once those needs are satisfied then the second priority would be the construction of the shorter links in the Cross Trail System.

The first Cross Trail segments to be completed should be those between Indian River Trail and Gavan Hill Trail, and from Indian River to Mt. Verstovia. Only after those segments have been surveyed and cleared should work begin on more remote sections.

11. Goddard Hot Springs is a unique and valuable community resource. The City's current method of operation, however, has created a situation which exposes the Municipality to great liability. If the City and Borough is going to operate this as a public recreation area, then the City must exercise more responsibility and devote more resources to the upkeep of facilities. The current practice of relying entirely upon volunteer labor for maintenance does not ensure the proper level of safety. As near as can be determined there is no attempt to monitor the hot springs for potential health hazards. The City and Borough of Sitka must protect itself by providing the level of maintenance and environmental monitoring that a popular hot springs demands.

12. The Japonski Island causeway consitutes a great potential recreation area for both residents and visitors. The Committee recommends:

a. That the municipality work to ensure that this area is recognized on the National Register of Historical Places.

b. That the municipality work with the owning agencies to have at least a portion of this complex be dedicated as a World War II Memorial Park.

c. That funding be located to undertake necessary developments to make this area more accessible by boat.

13. There should be established a fee based overnight campground within walking distance of Sitka. The campground should include the following facilities: Campsites, fire rings, picnic tables, garbage service, drinking water and latrines. This campground could be owned and managed by either the public or private sector.

14. The historic downtown area of Sitka deserves a long-ranged and coordinated plan of development. A municipal agency such as the Parks and Recreation Committee or the Sitka Historic Trust should assume responsibility for preserving and enhancing the unique character of this area.

15. The City and Borough of Sitka should endorse and support the Starrigavan Development Project currently being undertaken by the U.S. Forest Service.

16. The City and Borough of Sitka should develop a facility to permit the growing number of skateboarders to have a designated and developed area for skateboarding. Skateboarding is a popular and growing sport, but Sitka skateboarders must "borrow" facilities not intended for skateboard use. The municipality has received formal requests for facilities specifically for skateboarding at one or more of several possible locations with ramps, depressions, etc. Continued community involvement is encouraged to develop this needed recreational facility for Sitka youth.

GENERAL CONCEPTS IN RECREATION PLANNING FOR SITKA

1. Given the multiplicity of agencies which control recreation sites in the Sitka region, systematic and long-range recreation planning demands extensive interagency coordination. The Sitka Parks & Recreation Committee needs to become more aware of other agency recommendations and work to support efforts to improve recreation opportunities in all areas used by Sitkans.

2. Living in an age of lean financial support demands that the City work to encourage volunteerism in recreation matters. The Sitka Parks & Recreation Committee needs to encourage projects such as the adopt-a-trail program, the annual Goddard clean-up and other volunteer efforts. The Committee needs to become more actively involved in public education about recreation opportunities and recreation etiquette.

3. One guiding concept should be to take care of what exists before building something new. Efforts must be made to ensure adequate maintenance and sufficient resources for the existing facilities before creating new facilities. Related to this, the Sitka Parks and Recreation Committee encourages and supports strict law enforcement in recreation areas.

4. Regional recreation systems should be centered around the urban area. Various trails, cabins, shelters and moorings exist within the City and Borough. (As a guideline for federal, state and local agencies, emphasis should be placed on building local improvements prior to more remote facilities.) The missing links to the existing regional system are the long trails, connecting trails to the urban area, alpine shelters and cabins, and marine parks and salt water accessible cabins. The local trail loops, cabins, and marine parks should be constructed first and then expanded into a regional recreation system.

The development of Parks and Recreation facilities should be based on a comprehensive system which ties all recreation activities together and plans for the orderly development in year-to-year increments. For example, a hiker could follow a trail which links up to other trails which lead to a cabin, a day's walk away from a boat moorage and day use facilities. This "small" trail system would then be an increment of a larger system, but would be the focus of one year's improvements. Once completed, the next increment would be started, thus expanding the recreational opportunities of the community on a yearly basis.

5. An ongoing planning component for parks and recreation development is accessibility to persons with disabilities. New facilities should be developed and existing facilities modified wherever feasible to provide access to persons with disabilities.

EXISTING RECREATION OPPORTUNITIES

DISPERSED RECREATION

Dispersed recreation opportunities are abundant in the Sitka area. Either within hiking distance or by boat and plane, excellent camping and wilderness experiences are available. The wild-land attributes of the area should be maintained and enhanced wherever possible.

HUNTING

The area abounds with excellent hunting opportunities for Sitka black tail deer, waterfowl, Alaska brown bear, and mountain goat. The State is responsible for the regulation of wildlife on National Forest land.

FISHING

Approximately 300 miles of coastline and over 1,800 square miles of saltwater are included in the City and Borough of Sitka. Included are approximately 175 freshwater lakes accessible by floatplane, or hiking. 163 anadromous streams and rivers on Chichagof Island and 325 anadromous streams and rivers on Baranof and associated islands are accessible by boat or plane. Fish in these systems are rainbow, cutthroat, and steelhead trout, grayling, two species of char dolly varden and brook trout, and pacific salmon (sockeye, coho, pink and chum).

Within the Sitka road system area there are 5 lakes and 10 streams accessible by either motorized vehicle or foot. Within this area freshwater salmon fishing is allowed in only one stream, Sawmill Creek.

Saltwater fishing occurs around Baranof and parts of Chichagof Islands from Cape Ommaney on the southern outside to Lisianski Inlet on the north, and on the inside waters from the head of Tenakee Inlet down Chatham Straits to just the above Cape Ommaney excluding the City of Port Alexander. Fish available to sport fishermen using boats include: all 5 species of pacific salmon (chinook, sockeye, coho, pink and chum) bottom fish including halibut, rock fish, ling cod, rearing sablefish (black cod), razor clams, herring and smelt. The land based sport fisherman can find plenty of beach access for saltwater fishing along the road system to fish for salmon, herring or smelt and dig hardshell clams. Out-of-state sport fishermen need a sport fishing license to harvest the shellfish (crab, abalone, shrimp and clams) since they may not hold a subsistence or personal use permit. Information for licenses can be obtained from the Alaska Department of Fish and Game, 304 Lake Street, Room 103, Sitka, Alaska 99835, (907) 747-5355 Sport Fish or 747-6688 Commercial Fisheries.

Commercial fishermen use the majority of the saltwater area to harvest many species of marine life including pacific salmon, pacific halibut, sablefish (black cod), rock fish, ling cod, crab (dungeness, tanner and king), abalone, shrimp, herring and kelp. Subsistence or personal use harvest of herring roe on kelp, pacific salmon, crabs, shrimp, octopus, abalone, hardshell clams, herring and smelt is another major user group.

Diving is another popular sport in the area. People frequently dive for crabs, abalone, sea urchins and scallops. Underwater photography is also popular with divers. Whale and other wildlife watching is very popular, and many photographers "shoot" the area.

PUBLICLY OWNED ISLANDS

A number of publicly owned islands are located in Sitka Sound. These are currently undeveloped but receive regular use by local boaters.

The Parks and Recreation Committee recommends that these islands:

1. Be kept in the public domain and be dedicated for use as recreation sites.
2. Be clearly identified by the municipality on a chart or other public document.
3. Not be provided with any facilities.
4. Be monitored by the appropriate agency as to condition and use.
5. Be monitored and cleaned up on regular basis.

JAPONSKI CAUSEWAY

The Causeway linking the WWII defense facilities on Japonski Island is owned by the Federal Government, and the islands they link are owned by the State of Alaska. The whole area is under special management as part of the airport restricted "clear zone" with no access across the airport runway. Public use, while not encouraged, is common with access by boat.

The Parks and Recreation Committee recommends:

1. That this area be officially identified as an important historic site, one with potential as a recreation area, preferably through inclusion in the National Register of Historic Places.
2. That the City undertake efforts to have this area retained in the public domain - the long term objective being the creation of a WWII Memorial Park.
3. That the City staff contact the National Park Service and other appropriate agencies to initiate the process for establishing the Causeway as a memorial.
4. That the City work with the appropriate agencies to obtain funding for improved boat access.

TRAILS

Trails accessible from the road system are administered by the City and Borough of Sitka and the Forest Service, outlying trails are administered by the Forest Service. Trails allow for public access to back country areas, provide vistas, and opportunities to seek solitude. The survey indicated a need for an expanded trail system in the Sitka area for a variety of hiking opportunities: short or longer hikes, camping, variety of grades, etc.

An ongoing maintenance program, performed by the appropriate government agencies, is required to maintain, repair, clear and improve the existing trail system. In addition, community civic organizations could work with various agencies to "Adopt a Trail". The trails should be prioritized as such:

1) Indian River
2) Mt. Verstovia
3) Gavan Hill
4) Thimbleberry Lake and Heart Lake
5) Beaver Lake

The U.S. Forest Service, in partnership with Alaska State Parks, the City and Borough of Sitka, and others, is developing an Old Sitka/Starrigavan Interpretive Trail Project which will significantly increase hiking and other recreational opportunities in the scenic Starrigavan area. This handicapped accessible trail will consist of three interconnected loops that each interpret a different Southeast Alaska ecosystem. The project is being developed on a multi-year basis and will provide opportunities for fishing, walking, picnicking, and nature study.

Other trail construction should be considered. A first step would be the completion of the "Sitka Cross Trail", which would run from Starrigavan Valley to Thimbleberry Lake. Next, local trails should be extended to alpine areas. An alpine trail link between Harbor Mountain and Gavan Hill Trail has been improved by the U.S. Forest Service. Additional alpine trail "links" with existing trails should be evaluated for development. Ultimately, long range planning should begin on a trail running the length of Baranof Warm Springs. The trail system could be built in yearly increments and enlarge upon an interconnected system of trails.

The following is a list of trails in the Sitka area:

Beaver Lake	Gavan Hill	Halibut Point State Rec. Site
Harbor Mt. Ridge	Harbor Mt. Shelter	Indian River
Mt. Verstovia	Sitka Airport Causeway	Sitka National Historical Park
Starrigavan Fish Viewing	Thimbleberry Lake	Heart Lake

CABINS

The Forest Service maintains eighteen cabins throughout the City and Borough. These are listed below. The numbers indicate 12 hour visitor days of use occurred in the indicated year. Permits for these recreation cabins are issued on a first come, first served basis for $20.00 per night. They may be obtained from the U.S. Forest Service, Chatham Area, 204 Siginaka Way, Sitka, Alaska 99835. Phone: 747-6671.

CABIN NAME	1988	1989	1990
Avoss Lake	151	188	140
Baranof Lake	339	200	346
Brent's Beach	1089	988	1436
Davidoff Lake	46	114	104
Fred's Creek	1250	474	900
Goulding Lake	314	296	240
Kook Lake	790	746	326
Lake Eva	940	580	784
Moser Island			New 1991
Plotnikof Lake	36	446	352
Redoubt Lake	296	218	550
Salmon Lake			New 1991
Sam Sing Cove			New 1991
Seven Fathom Bay			New 1991
Shelikof Bay	1068	972	1454
Sitkoh West	734	636	488
Sitkoh East (New - Nov. 1990)			136
Suloia Lake	44	56	162
White Sulphur Springs	770	766	1002
TOTALS	7867	6680	8420

The beach cabins, easily accessible by boat, are very popular, but are frequently vandalized. Improvements are needed on several cabins, and a number of sites should be investigated as potential cabin sites for new construction. Criteria for new cabin construction should include: close proximity to Sitka, accessibility, a variety of recreational opportunities in the area, and a nearby water source.

Cabins and shelters need to be checked often to provide maintenance on a more regular basis. Other agencies and groups could cooperate with the Forest Service to help with maintainance. This assistance could include funding, materials, transportation or labor.

Shelters are an alternative to cabins, and could be constructed on existing and proposed trails. The Forest Service has a shelter on the Fred's Creek trail, Maksoutoff Lake and Lake Suloia. A new shelter between Harbor Mountain and Gavan Hill was completed with volunteer assistance in 1991. Possible areas for new shelters include Indian River alpine area, Starrigavan alpine area, Mud Bay and Ushk Bay.

BOAT LAUNCHING AND LOG HAULING SITES

The need for locations to launch boats and for hauling logs greatly exceeds the capacity of existing facilities. This situation is complicated since these activities need similar facilities, but are not easily compatable.

The Parks and Recreation Committee recommends these measures:

1. Since boat launching ramps are insufficient for existing needs, there is a need to investigate new sites. The following locations are among those that should be investigated for potential use as boat launching ramps: Herring Cove, Dangel Island area, Shotgun Alley. The Parks and Recreation Committee should work with the City staff to complete preliminary studies by the end of FY 1991.

2. There is also a great need for designated areas for hauling logs from the water and for cutting wood. Given that floating logs present a hazard to small boats, log hauling areas need to be located away from boat launching ramps and boat harbors. The committee feels that log hauling needs to be banned by ordinance from Sealing Cove and the new work float areas. Log hauling should be allowed at Dangel Island, the old Seaplane Turnaround, and, for the time being, near but not on, the Old Sitka State Historic Site boat launch. In future years the Parks and Recreation Committee should seek out areas for log hauling and cutting.

MARINE PARKS

The State of Alaska has a system of marine parks, which includes facilities such as docks, mooring floats, beach campsites, trails and toilets. These parks are near well established pleasure boat routes and float plane landing sites. Some are close to communities, while others are in remote wilderness areas. Recreational opportunities include hiking, beachcombing, crabbing, hunting, camping, fishing, scuba diving and photography.

Two areas in the City and Borough of Sitka have been approved as State Marine Parks: Magoun Islands/Port Krestof and Big Bear/Baby Bear Bays. The Magouns contain 1135 acres and is 12 miles northwest of Sitka. Big Bear/Baby Bear contains 1,023 acres and is located 26 miles north of Sitka on the main inland transportation route to Sitka. Both sites have numerous anchorages and campsite areas and are heavily used for fishing, hunting kayaking, camping, beachcombing and wildlife viewing. As marine parks, the areas are not subject to timber harvest, and recreation and habitat values receive greater protection.

Although not selected as a marine park, the U.S. Forest Service has installed a mooring buoy at Mud Bay and at the Brent's Beach U.S. Forest Service cabin site, both on Kruzof Island.

Vehicle Ferry Picnic Area Campground

RECREATION TRAVEL

Restrooms Trailer Sites Litter

Access to recreation sites and facilities on the Sitka Road System is by vehicle or foot. There is a limited road system with only about 8 miles of road either north or south of the city center area available to the public. This greatly limits road access to recrational opportunities and concentracts recreational activities in a very small area along the narrow band of coastline near the road.

During the summer the Alaska Marine Highway brings numerous recreational vehicles (RV) to Sitka. Starrigavan Campgrounds, Sitka Sportsmen's facility, and the RV parking lot at Sealing Cove provide a place for them to park for a daily fee. Starrigavan Campgrounds have individual sites for each RV, which include a fire grill, picnic table, and garbage service. Well water is also available. The Sealing Cove RV area is in a roomy parking lot with electric and water hook-ups, rest rooms, and garbage service. Short term parking (day time use only) is available for RVs in the Centennial Building parking lot. City dump stations at the City Shops and Wastewater Treatment Plant provide a place for the RVs to dispose of sewage.

Access to recreation areas off the road system is rather difficult and can be expensive. Small boats are used to access nearby sites and sites protected from the open ocean. More distant sites and those away from the water are reached by float plane, helicopter or boats. City dump stations for boat sewage are available at Crescent and Thomsen Harbors.

The Alaska Marine Highway system provides a transportation link between communities in the region. Many people use the ferry as an inexpensive way to go to other towns in pursuit of different recreational opportunities. Others ride the ferry for recreation.

NEIGHBORHOOD (POCKET) PARKS AND STREET TREES

Neighborhood parks are in important element of Sitka's Parks and Recreation Plan. A basic requirement of this plan is that all public facilities should be landscaped. Local parks, play areas, picnic tables and open space are needed within walking distance to residential areas. Vacant parcels of land should be acquired for small "pocket parks" at various areas along the Sitka road system. "Pocket parks" should be created and maintained as part of new subdivisions.

There is a need for more "tot lots" specifically designed for young children, especially in residential neighborhoods with large numbers of small children and limited public play areas. Sitka Rotary is supporting the development of a new tot lot and may be a continuing resource for this effort.

A street greenery program should be initiated, especially in the central business district. This program would be of lasting benefit and help improve community character. Sitka has a unique architectural character, which could be improved by a greenery program.

HISTORICAL AND CULTURAL SITES

Sitka has a rich history and a variety of historical, cultural and social sites and facilities. Sitka's heritage and community pride is evident throughout the City and Borough. An objective of this plan is the preservation and appreciation of Sitka's heritage. Sites or structures having significant historic or cultural value should be preserved. The following are examples of such sites:

Russian Bishop's House
Emmons House
St. Peter's Episcopal Church
W.P. Mills House
St. Michael's Cathedral
Castle Hill (Flag Raising Site)
Old Sitka State Historical Site
Russian Blockhouse
Various Cemeteries
Alaska Native Brotherhood Hall
May Mills House
See House
Sheldon Jackson Museum
Building #29 (Tilson Bldg.)
Sitka National Cemetery
Princess Maksoutoff's Grave
#4 U.S. Reserve - Old Post Office

The Centennial Building is located on a spacious waterfront site overlooking Sitka Sound. The building contains an information center, the Isabel Miller Museum, meeting rooms and convention rooms. The building is a valuable community asset and is utilized for conventions, plays, music festivals and community meetings.

The Kettleson Memorial Library is a major source of information regarding historic Sitka. Located next to the Centennial Building, the library is a major asset to the community. The library contains 22,000 volumes and houses much of the recorded information regarding Sitka.

TOURISM

Sitka's historical values, recreational opportunities, and scenic beauty draw visitors. These amenities must be maintained in order for the area to continue drawing visitors. Tourism is an important part of the local economy. Visitors include those from cruise ships, ferries, jets, business travelers, family and friends of residents, independent travelers, group travelers and conventioneers. Recommendations for improving the visitors' experience in Sitka are relevant to Sitkans as well. All of the following recommendations would improve the quality of life for Sitkans, in addition to helping to improve the town for visitors.

- Support efforts to clean up and landscape vacant portions of the downtown area. This could include lawns, small gardens and trees.
- Improve the appearance of the visitor shelter near the cruise ship dock by installing lawns and plantings.
- Crosswalks need to be marked near the bridge, and in the Castle Hill area.
- Drinking fountains and public toilets need to be strategically placed in the downtown area (especially in the Crescent Park area).
- Additional benches are needed throughout the downtown area, and especially in the vicinity of the cruise ship dock.
- Landscape the areas along the side and back of the Centennial Building and improve the appearance of the area around the canoe.
- Support preservation of historically important structures or places.
- More signs marking historic sites and public services need to be installed. An attempt should be made to develop signs using symbols that are internationally recognized.
- Encourage the development of recreation facilities which provide opportunities for older visitors.

COMMUNITY SCHOOLS

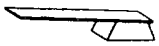
The Community Schools Program is an outstanding source of local recreation and should be supported to insure the maximum use possible. School facilities should be open to the public year round, and funding to do so should be a top priority. Coordination should continue between Community Schools, the University of Alaska Southeast and Sheldon Jackson College. Programs should be designed to accommodate the interests of all age levels. Various groups such as the Sitka Teen Resource Center, Swan Lake Double O Senior Center and Sitka Pioneers' Home should be encouraged to participate in planning recreation programs.

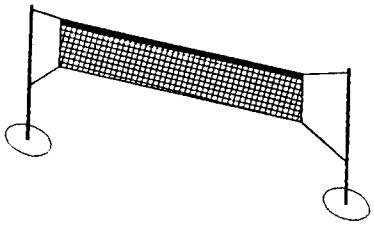
The Sitka Community Schools program was started in 1976 for the purpose of providing maximum usage of school facilities for the public. Community Schools have become focal points for the delivery of community education and recreation to all ages. This has been accomplished by 1) making the schools available for citizen use for academic, cultural, recreational, and social endeavors; 2) organizing the participation of citizens in the community in assessing local needs, setting priorities and planning programs which best meet the needs of the community; 3) facilitating coordination among agencies to deliver educational, recreational and cultural services to members of the community. The purpose of the Community Schools Program is simply to relate community resources to community conditions in an effort to improve lifelong learning opportunities for all citizens.

The Community Schools Program should continue to expand to meet demand for new programs, more recreation time, increased coordination between parent's and children's needs, more day-time recreation, and continued coordination with the municipal Parks and Recreation Committee.

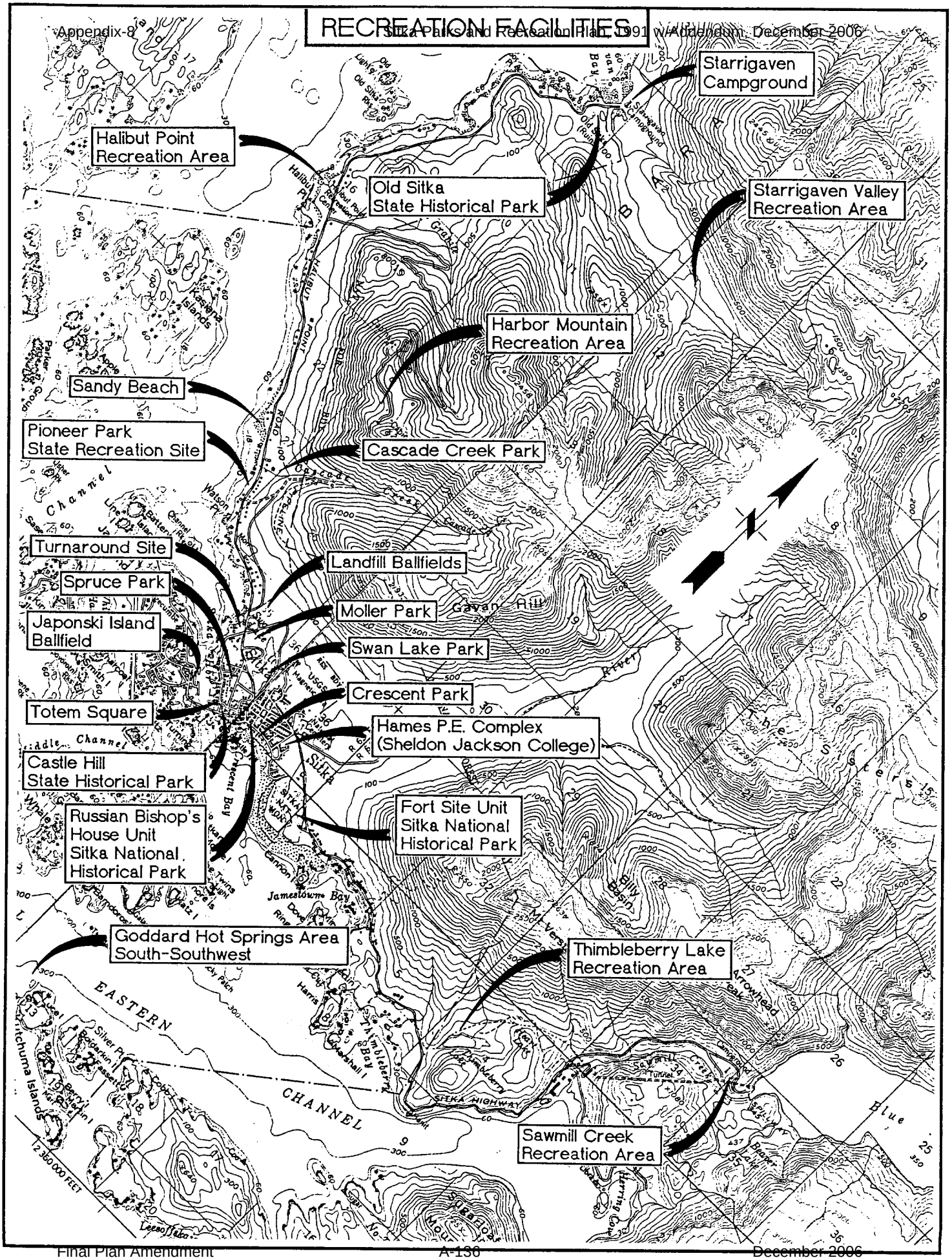
The addition of a full time Recreation Director in 1981 proved extremely successful when combined with the existing Community Schools Program. Many adult and youth programs have developed, expanded and are utilizing facilities to maximum usage--85% of the time. Additional staff is needed to allow 100% utilization. Many adult and youth programs are being served such as softball, basketball, volleyball and soccer. However, there is still a need for more outdoor programs.

The Community Schools Program has reached a saturation point. Many facilities are restricted due to school use, so daytime recreation goes wanting. Community Schools still identified many groups and programs needed in the community. Without additional staff, these programs cannot be facilitated.





RECREATION FACILITIES



RECREATIONAL FACILITIES DESCRIPTIONS WITH RECOMMENDATIONS FOR IMPROVEMENTS

The following facilities, listed alphabetically, comprise the major developed recreation facilities in the Sitka area:

Cascade Creek Park
Castle Hill State Historic Site
Crescent Park
Goddard Hot Springs
Halibut Point Recreation Area
Hames P.E. Complex (Sheldon Jackson College)
Harbor Mountain Recreation Area
Japonski Island Ballfield
Landfill Ballfields
Moller Park
Old Sitka State Historic Site
Pioneer Park State Recreation Site
Sandy Beach
Sawmill Creek Recreation Area
Sitka National Historical Park -- Fort Site Unit
Russian Bishop's House Unit
Spruce Park
Starrigavan Campground
Starrigavan Valley Recreation Area
Swan Lake Park
Thimbleberry Lake Recreation Area
Totem Square
Turnaround Site

These facilities are described and mapped on the following pages. Where appropriate, recommendations have also been made for facilities improvements. In addition to these facilities, the Sitka School District also has facilities used by the cummunity, including Blatchley Middle School gym, ballfield and pool, Sitka High School basketball court and workout room, etc.

Trails are not included in the above listing, as detailed information and maps on Sitka area trails are available from the U.S. Forest Service, Sitka Ranger District, in its publication, Sitka Trails -- Recreation Opportunity Guide.

Cascade Creek Park

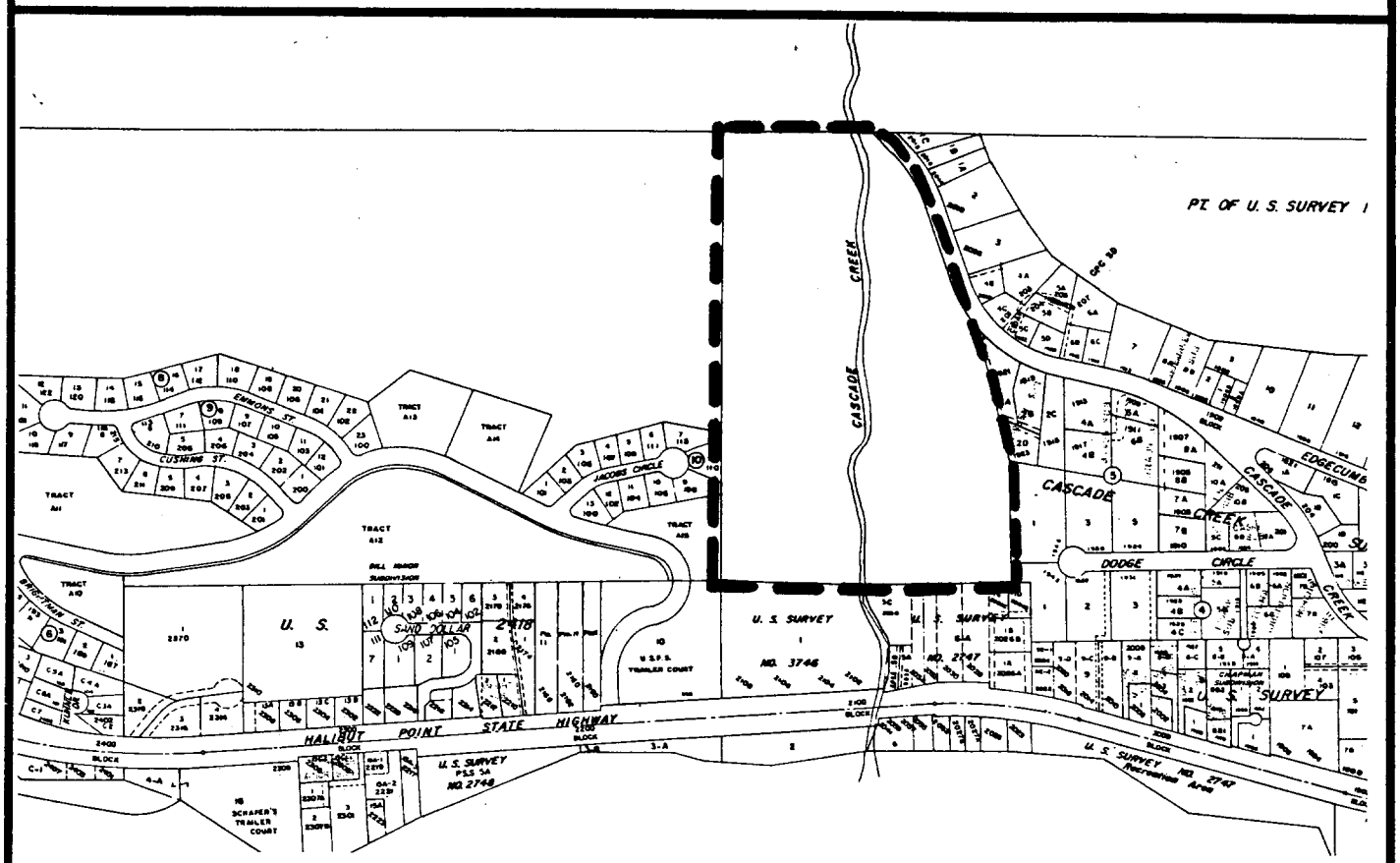
Facility Operator: City and Borough of Sitka

Location: North of Sitka on the east side of Halibut Point Road between Cascade Creek Road and the Forest Service Maintenance Compound.

Current Size: 28.19 Acres

Facilities and Uses: Watershed reserve

Recommendations: Develop a small park along the residential area on Cascade Creek Rd.



LOCATION MAP NOT TO SCALE

Castle Hill State Historic Site

Facility Operator: Alaska State Parks

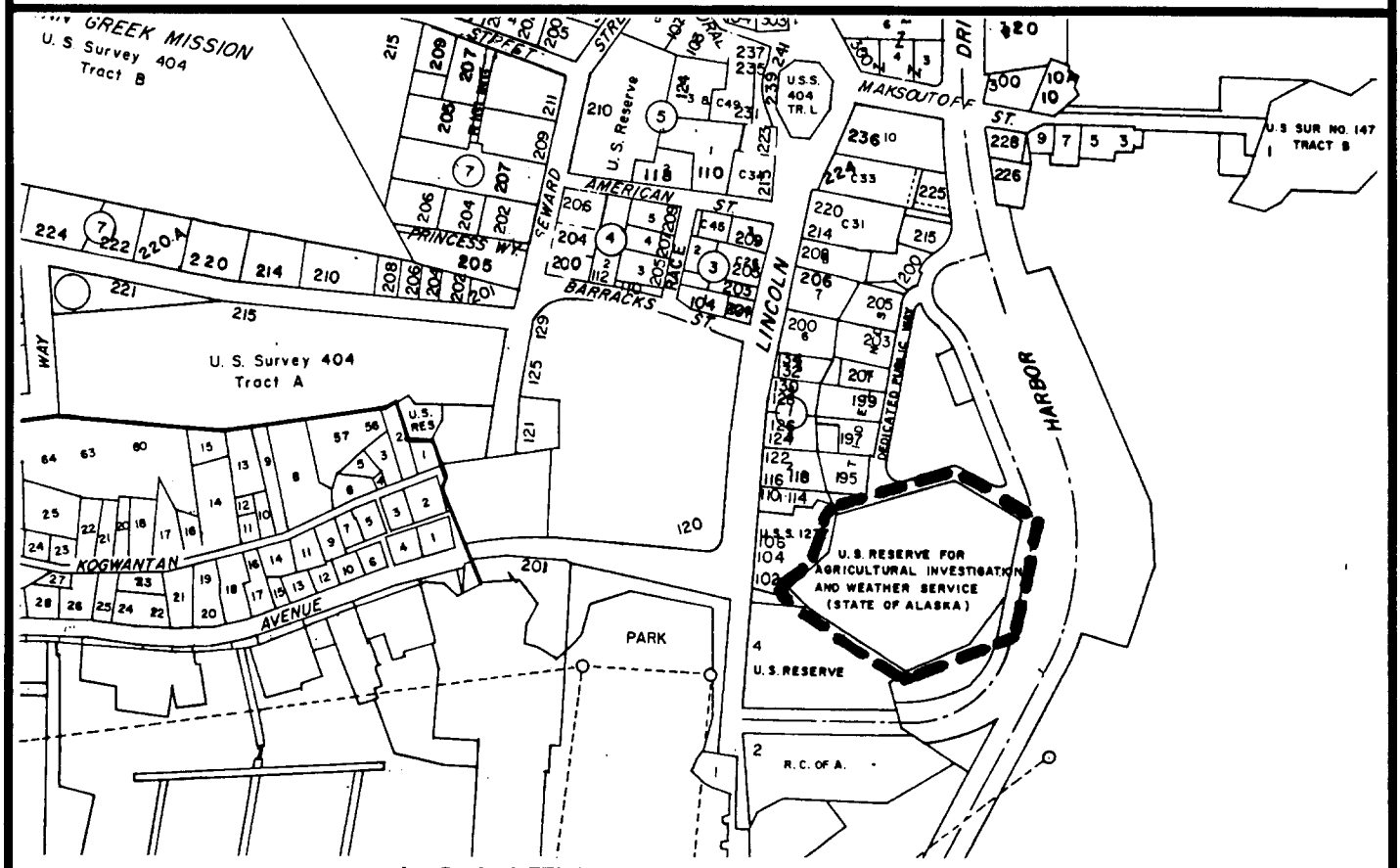
Location: Downtown Sitka off Lincoln Street

Size: 1 Acre

Facilities and Uses:

Viewing area
Interpretive plaques
Russian cannons (7)

Recommendations: Develop plans to improve access for the disabled.



LOCATION MAP NOT TO SCALE

Crescent Park and Environs

Facility Operator: City and Borough of Sitka

Location: On Lincoln Street overlooking Crescent Harbor and Sitka Sound

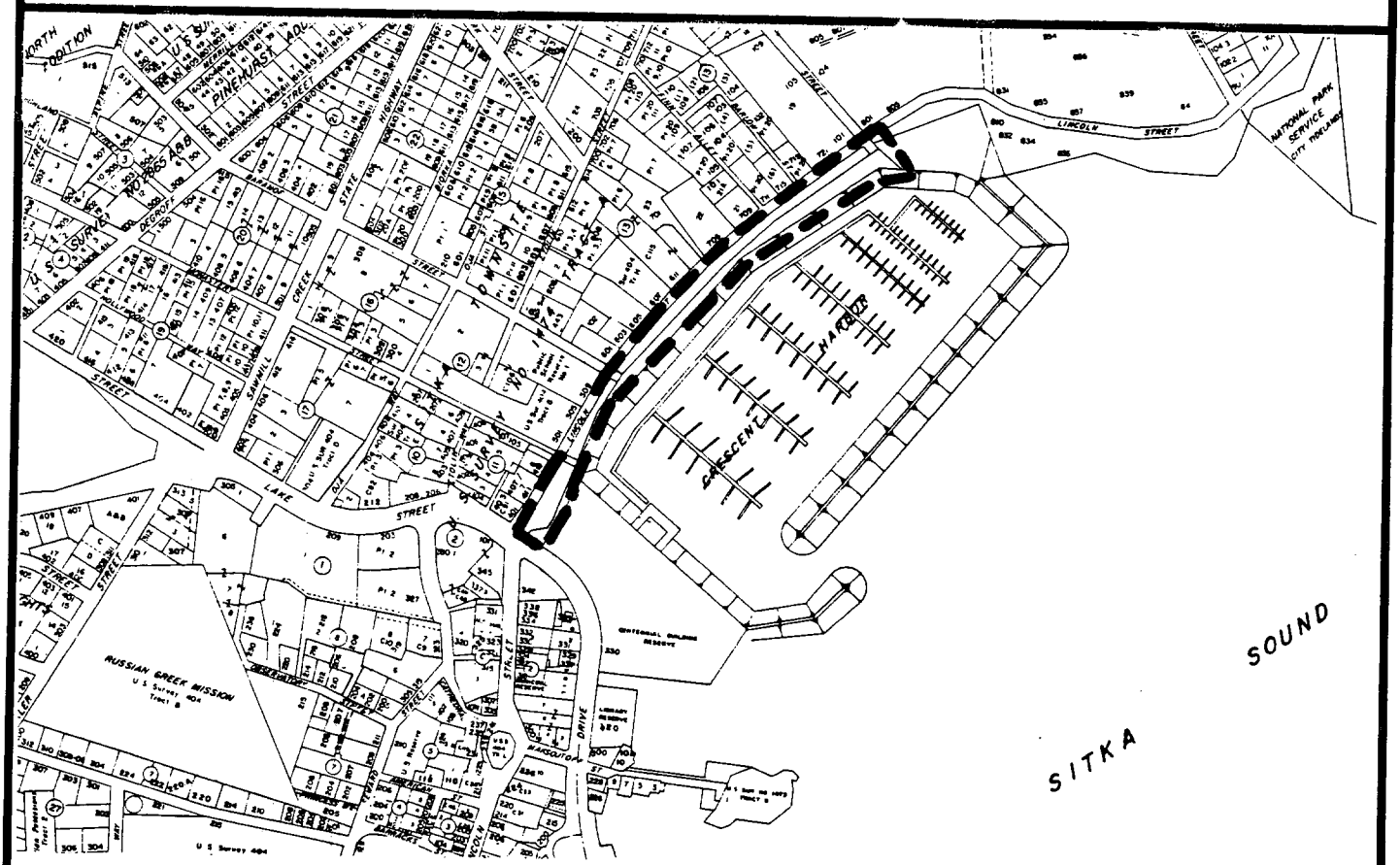
Size: 2.9 Acres

Facilities and Uses:

Parking lot	Covered picnic benches
Basketball court	Tennis court
Skating rink (winter)	Rest benches
Grass play area	

Recommendations:

1) Restrooms be repaired and kept in operation
2) Drinking fountains at the following locations:
   a) Tennis/Basketball courts
   b) First ramp across from Betty Eliason Child Care Center
   c) Covered work area at main dock
3) Float adjacent to boat launching ramp
4) Landscaping of tourist area near shelter
5) Landscaping behind and along the side of the Centennial Building
6) Playground improvements
7) Tennis courts not be flooded for winter ice skating



LOCATION MAP NOT TO SCALE

Goddard Hot Springs Area

Facility Operator: City and Borough of Sitka

Location: 15 miles south of Sitka via boat or air

Current Size: Approx. 2,700 Acres

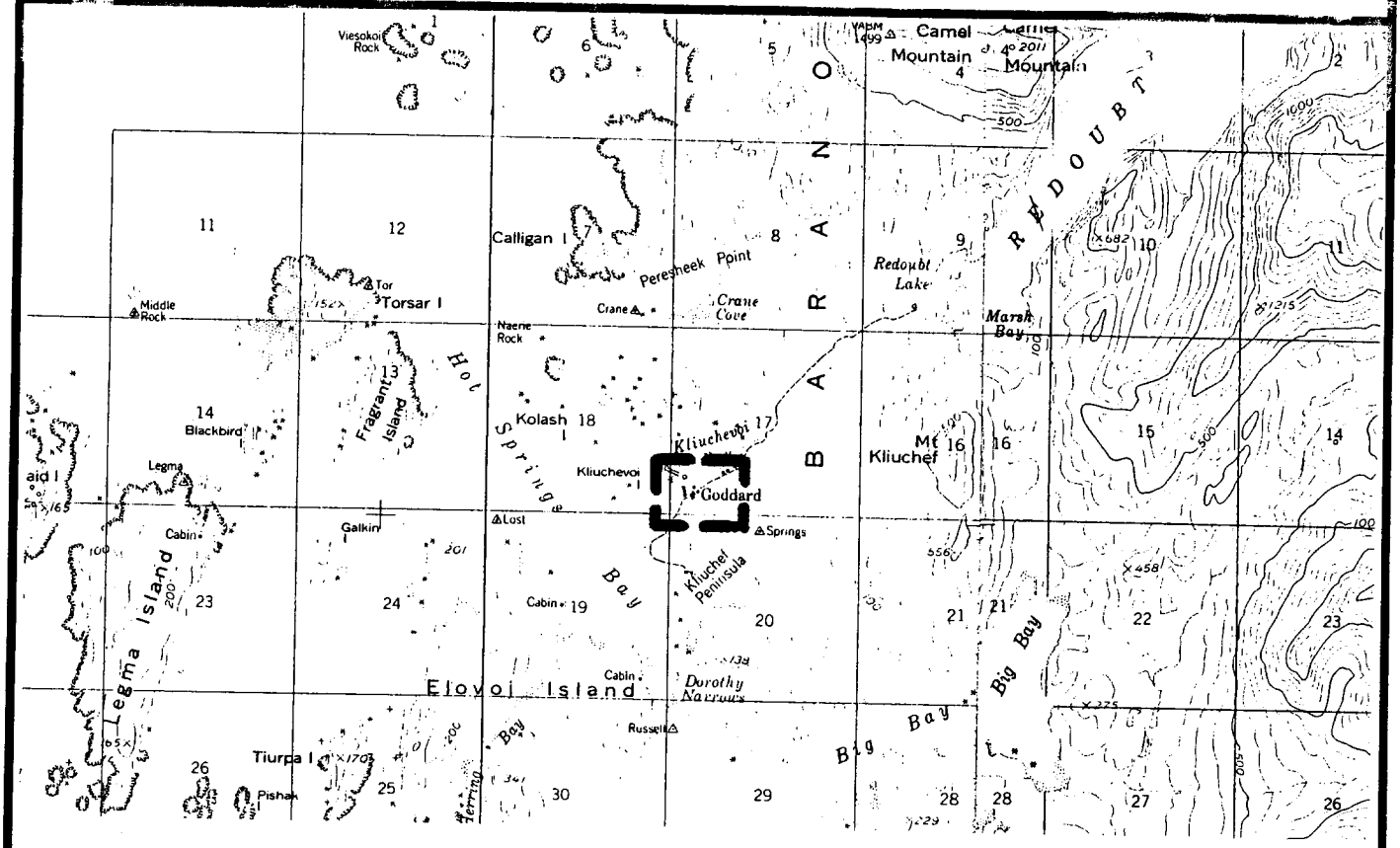
Facilities and Uses:

- Beach area
- Trails to Redoubt Lake
- Fishing
- Beachcombing
- Camping
- Scuba diving
- (2) Hot tubs with shelters
- Walkway (beach to hot springs and private property)
- Photography
- Hiking

Special Notes: A specific plan should be initiated for the municipally owned lands at Goddard. Development should occur with semi-primitive status as a criteria. It is recommended that the municipality look into acquiring the adjacent tidelands to protect the area values.

Recommendations:

1) Designate all public and private lands in area as recreation zone.
2) Develop the springs as a limited municipally owned recreation area.
3) Maintain bath buildings, tubs, waterlines.
4) Periodic garbage pick-up.
5) Construct a dock and mooring buoy.



LOCATION MAP NOT TO SCALE

Halibut Point Recreation Area

Facility Operator: Alaska State Parks

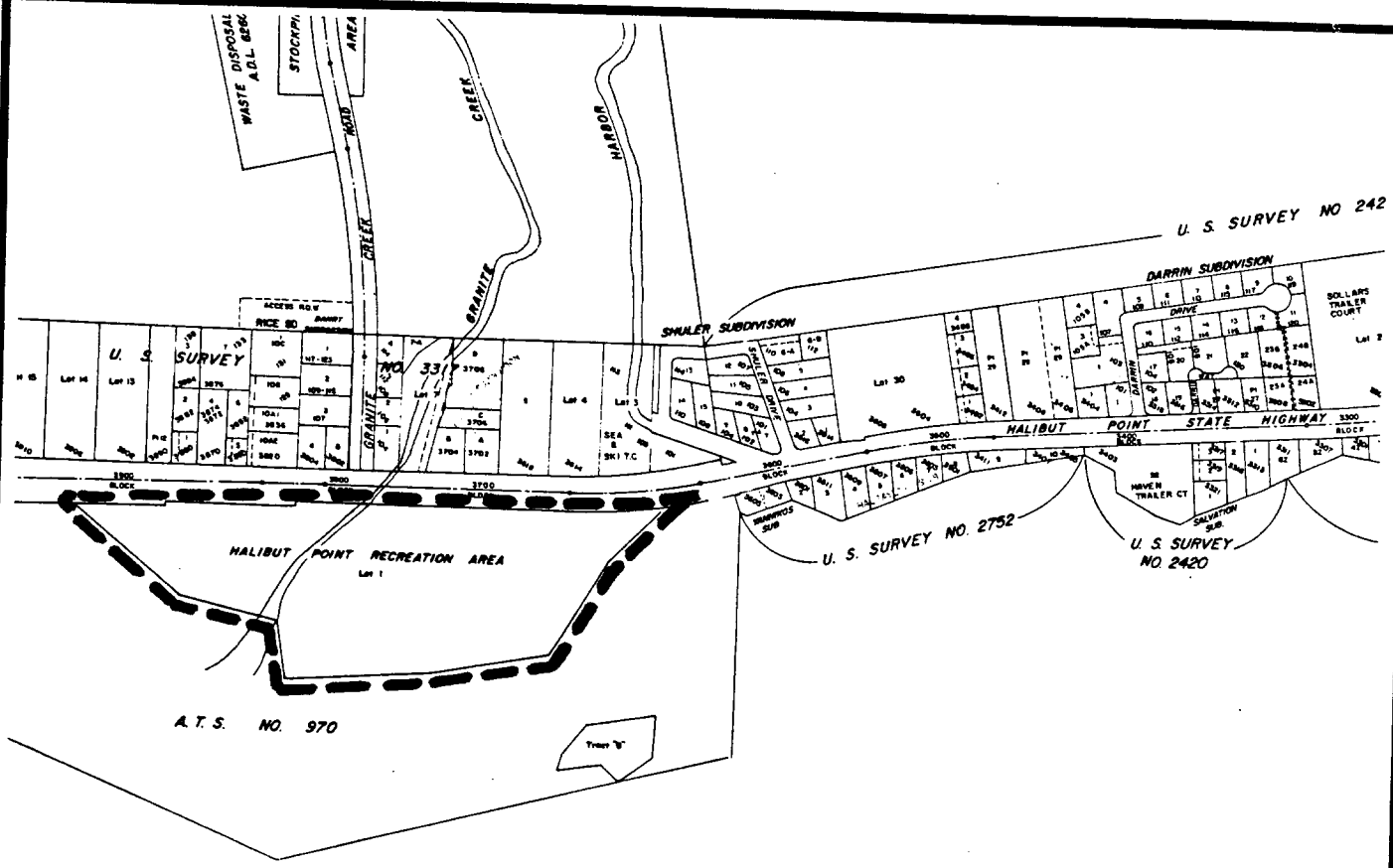
Location: 4.4 miles north of Sitka on Halibut Point Road

Current Size: 22 Acres

Facilities and Uses:

- Picnic shelters
- Fire pits
- Fireplaces
- High water island
- Loop trail
- Group/Family picnics
- Marine mammal viewing
- View of fish spawning
- Picnic benches
- Large parking area at both ends
- Bird watching
- Beachcombing

Recommendations: Enlarge main shelter



LOCATION MAP NOT TO SCALE

Hames P.E. Complex

Facility Operator: Sheldon Jackson College

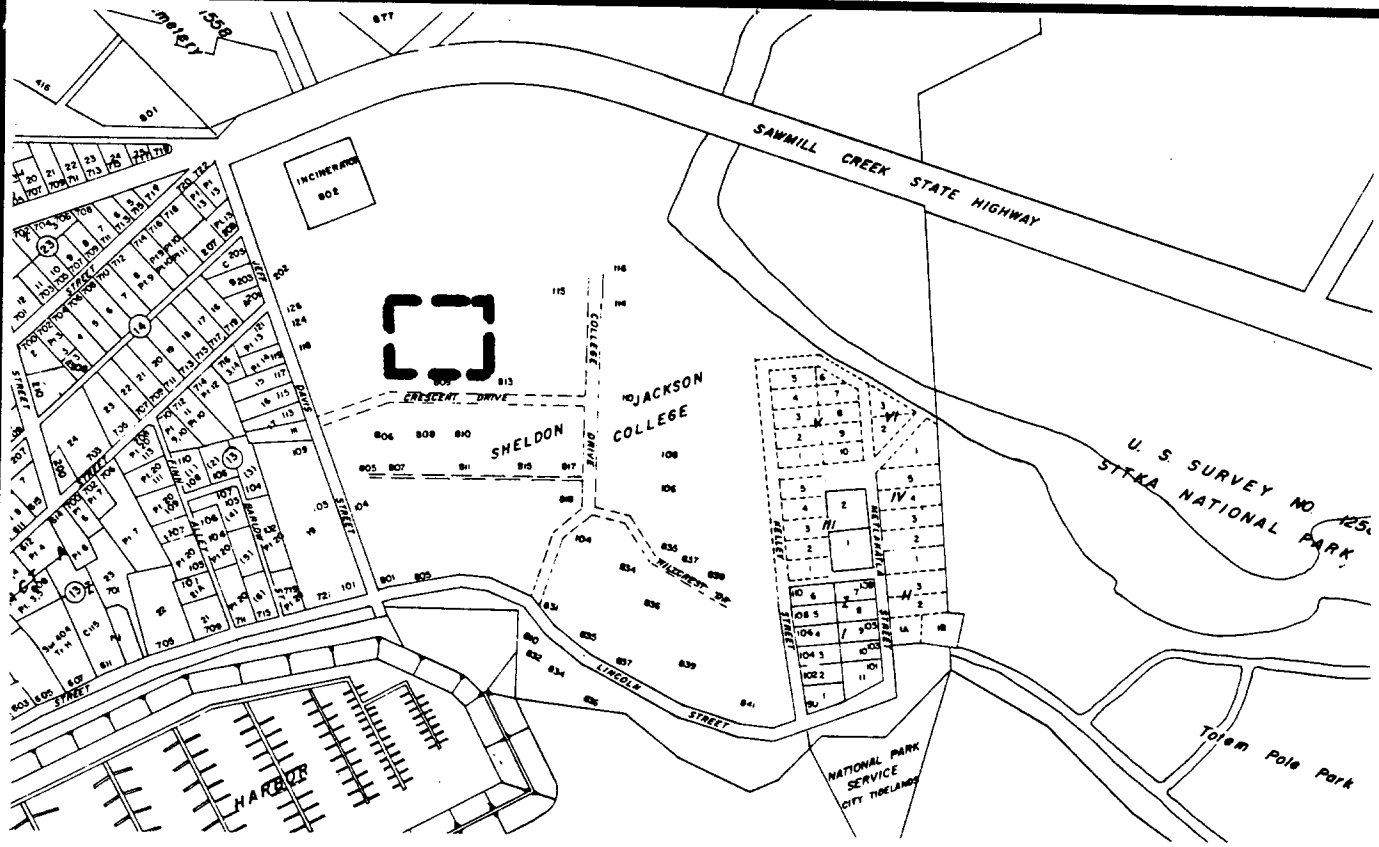
Location: East end of Lincoln Street on the Sheldon Jackson Campus

Current Size: Unknown Acreage

Facilities and Uses:

- 50 meter pool
- Basketball court
- Aerobic work-out room
- Showers
- Large parking area
- Weight room
- Volleyball courts
- Lockers
- Convention space
- Racquetball courts

Recommendation: Ice rink.



LOCATION MAP NOT TO SCALE

Harbor Mountain Recreation Area

Facility Operator: U.S. Forest Service

Location: 4 miles north of Sitka, up Harbor Mt. Rd.

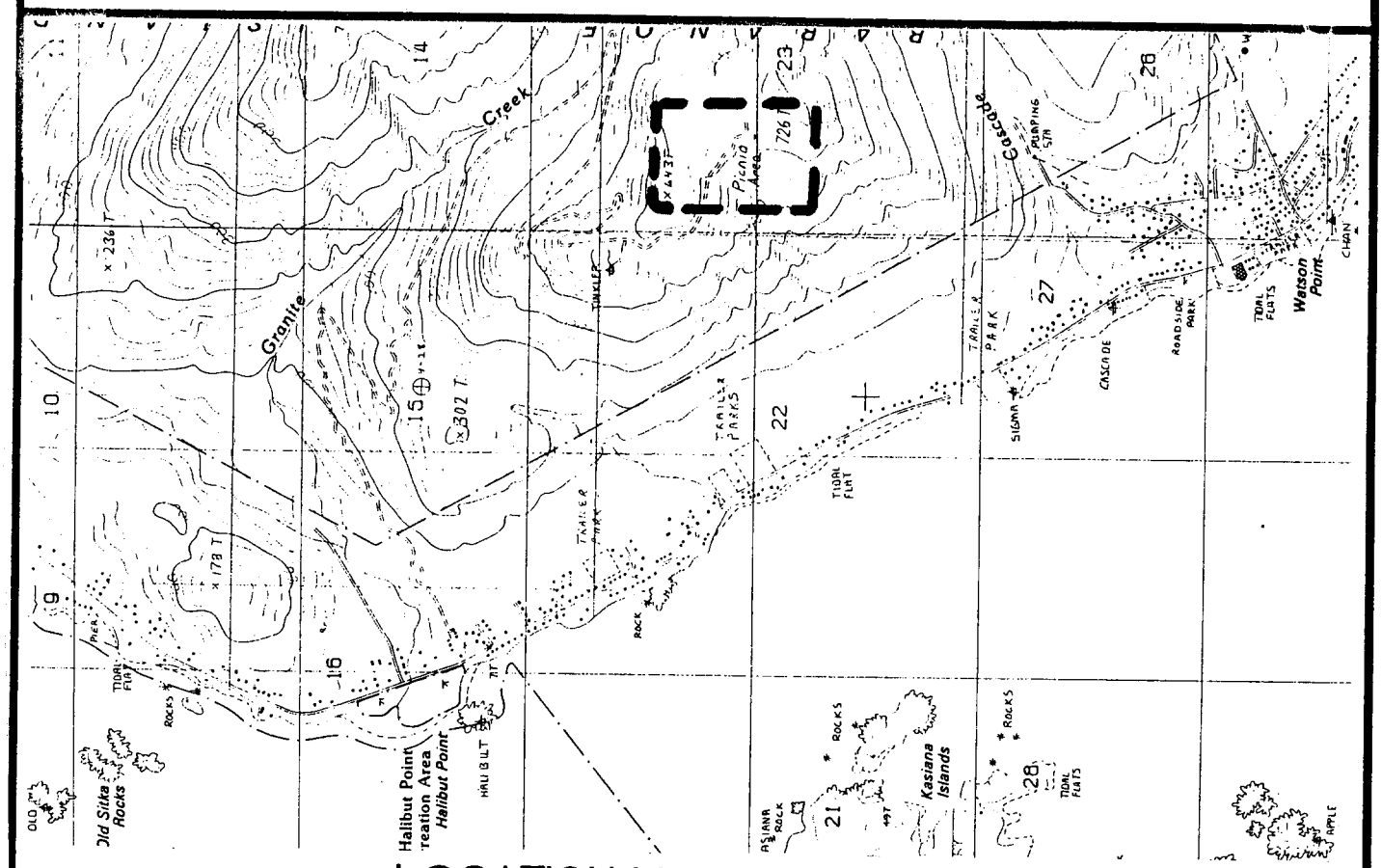
Current Size: Unknown acreage

Facilities and Uses:

- Alpine meadows
- Bird watching
- Picnic sites (6)
- Hiking
- Snowmobiling
- Picnic tables
- Vault toilets
- View of Sitka Sound, islands and outlying areas
- Scenery viewing
- Cross Country skiing
- Sledding
- Fire pits
- Group picnic shelter

Special Notes:

1) Road open depending on snow depth.
2) Not recommended for RV's or motor homes.
3) Must bring own firewood and water.



LOCATION MAP NOT TO SCALE

Harbor Mountain Recreation Area
(Continued)

Recommendations: Eliminate wood cutting at rec area and along the road by City lands.

Support the Forest Service in its recreation planning and management efforts. Provide input to help determine appropriate use areas, need and placement of recreation facilities, and future management.

Coordination is needed with all interested segments of the community in the planning process. Suggested improvements include a ski tow, shelter, enlarged parking area, covered picnic tables and sanitary facilities. The U.S. Forest Service chould investigate the Starrigavan alpine areas as a winter recreation site to help resolve the conflict between snowmobilers, ATV's and skiers that now exists on Harbor Mountain.

The U.S. Forest Service and City and Borough of Sitka are currently studying the feasibility of a new access from Halibut Point Road to Harbor Mountain Road.

Japonski Island Ballfield

Facility Operator: State of Alaska, Dept. of Education

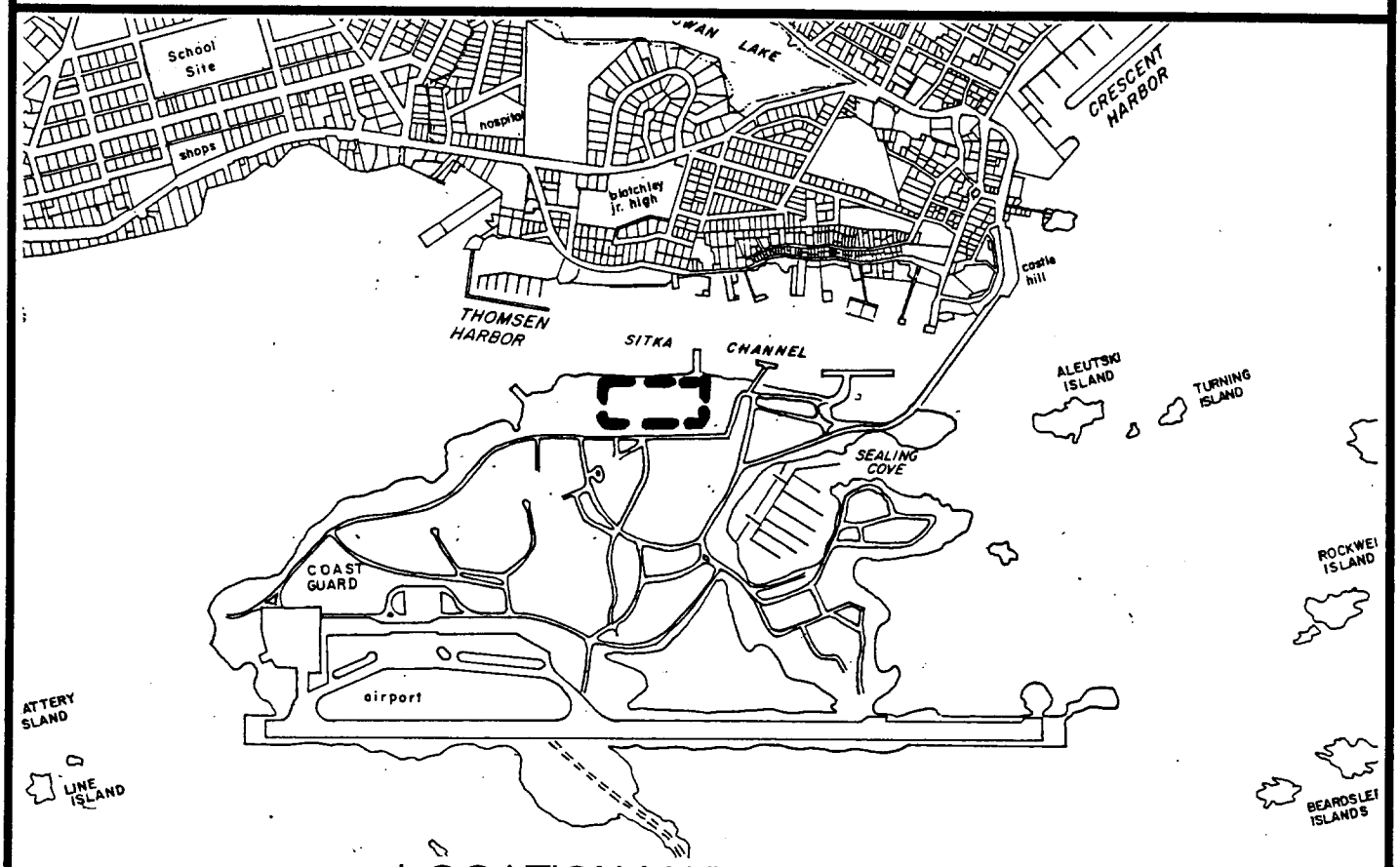
Location: Japonski Island near Mt. Edgecumbe High School

Current Size: 3 Acres

Facilities and Uses:

Parking Outhouse	Main ball fields for Mt. Edgecumbe High School

Recommendations: General maintenance to the grounds and facilities.



LOCATION MAP NOT TO SCALE

Landfill Ballfields

Facility Operator: City and Borough of Sitka

Location: End of Kimsham Street

Current Size: 12 Acres

Facilities and Uses:

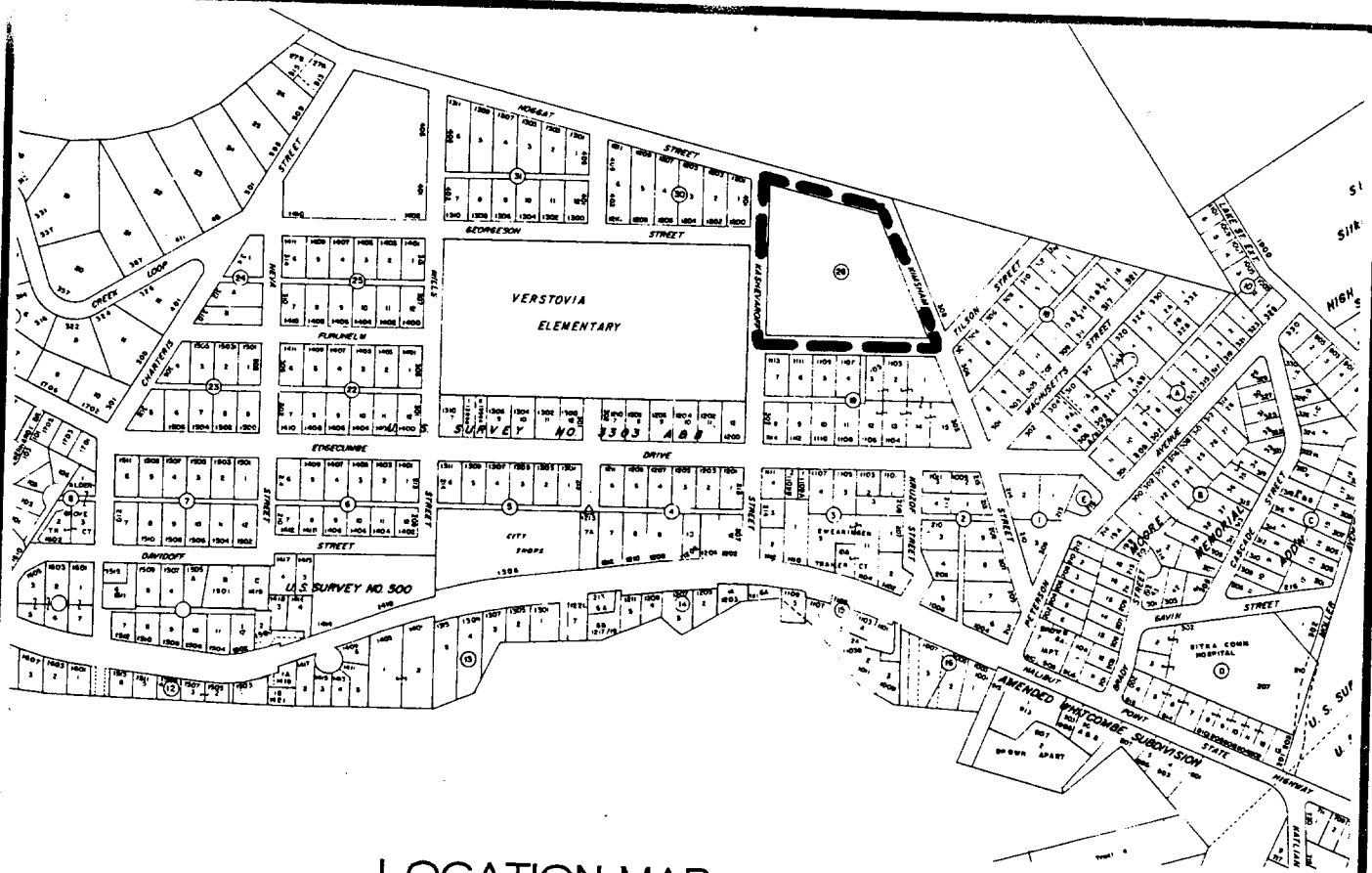
Playground
Parking lot
Port-a-potties
Concession Booth

(2) Softball Fields with backstops and fences
Dugouts

Recommendations:

1) Clean-up outlying areas around fields (especially women's).
2) Build restrooms and snack bar complex.
3) Increase parking space.
4) Additional playground equipment needed.
5) Develop sledding area down the hill behind the women's ballfield.

Long Range Goal Plan: Orientate fields to cloverleaf layout with centralized backstop and scoreboards. Continue long range plan to develop adjacent landfill as recreation area.



LOCATION MAP NOT TO SCALE

Moller Park

Facility Operator: City and Borough of Sitka

Location: Off Halibut Point Road, adjacent to Swan Lake

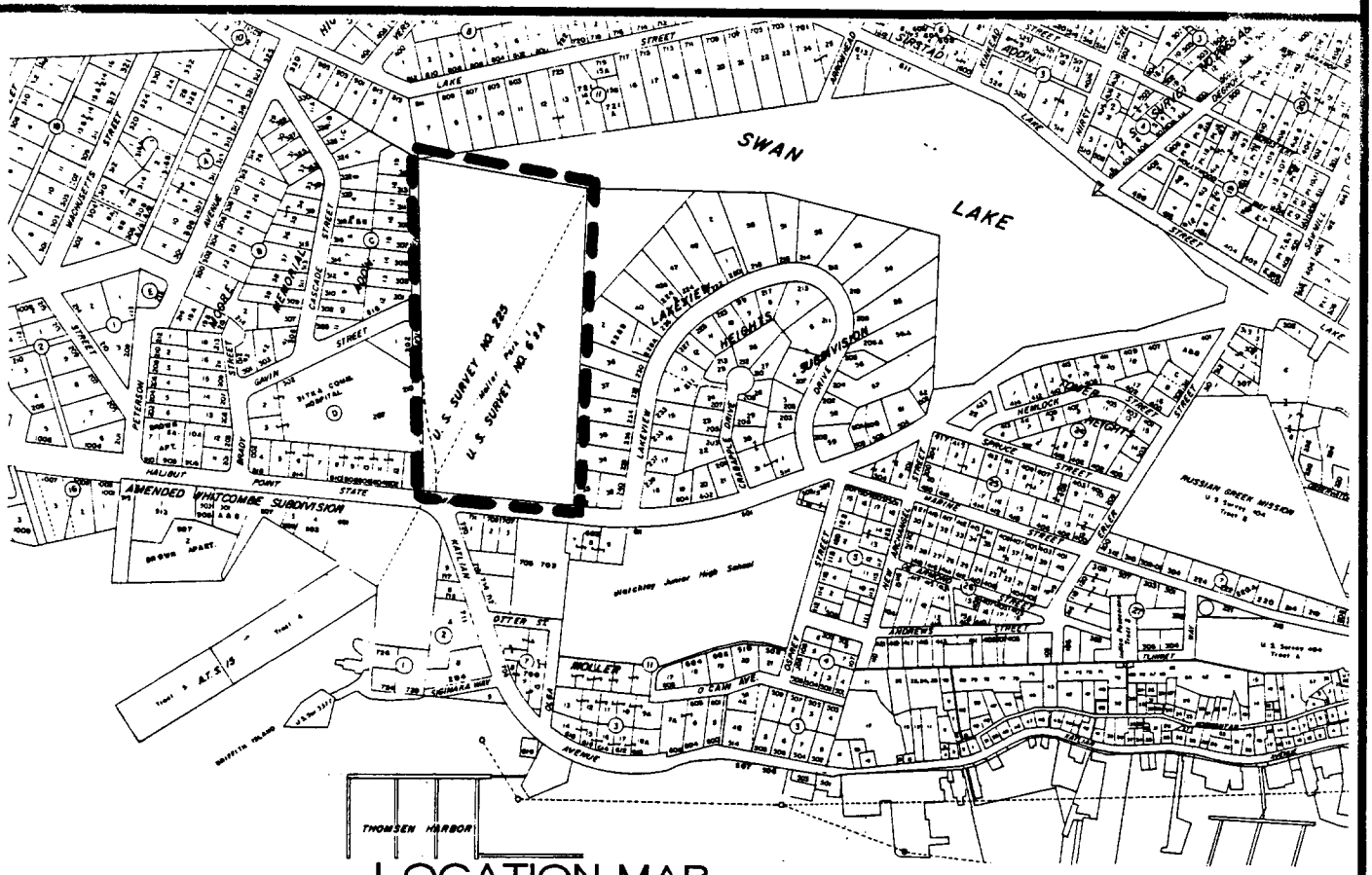
Current Size: 14.86 Acres

Facilities and Uses:

Baseball field	Track
Football field	Soccer field
Playground (2)	Putting greens
Restrooms	Batting cage
Covered bleachers	Flying model airplanes

Recommendations:

1) Track along lake front.
2) Leveling, drainage and resodding of track and field area.
3) Picnic shelter
4) Horseshoe pits be created.
5) Review and redesign playgrounds to improve safety and use.
6) City staff and Parks and Recreation Committee draft development plan to utilize undeveloped areas.



LOCATION MAP NOT TO SCALE

Old Sitka State Historic Site

Facility Operator: Alaska State Parks

Location: 7.5 miles north of Sitka on Halibut Point Road

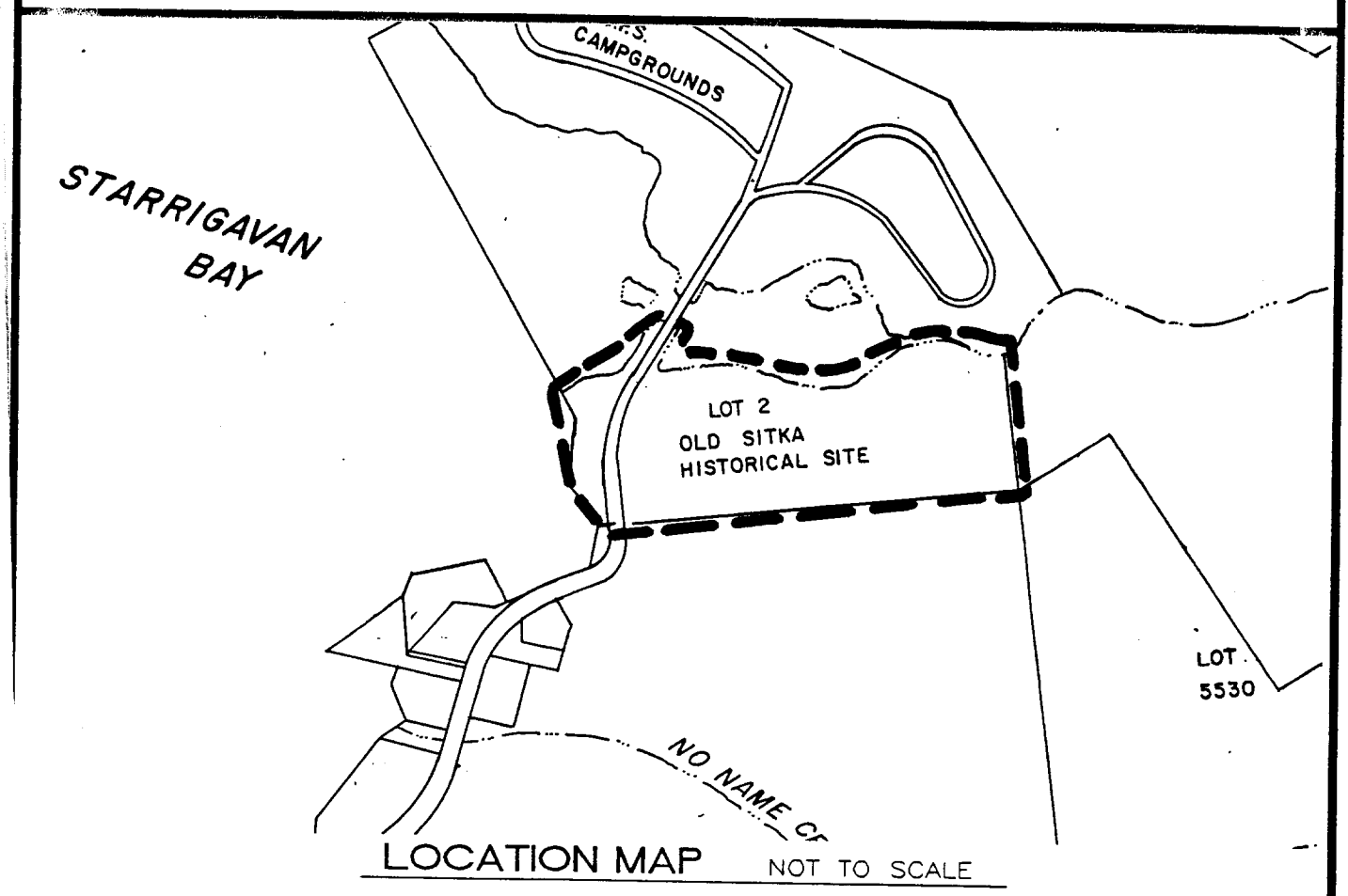
Current Size: 51 Acres

Facilities and Uses:

Boat launch with dock	Bird watching
Fish viewing site	Clam digging
Fishing	Historic/Interpretive plaques
Benches	Beachcombing
Trail	Marine and wildlife viewing
Parking	Picnicking

Recommendations:

1) Eliminate wood cutting in area.
2) Support the development of the Starrigavan Bay Cooperative Recreation (STARR) Project.



Pioneer Park State Recreation Site

Facility Operator: Alaska State Parks

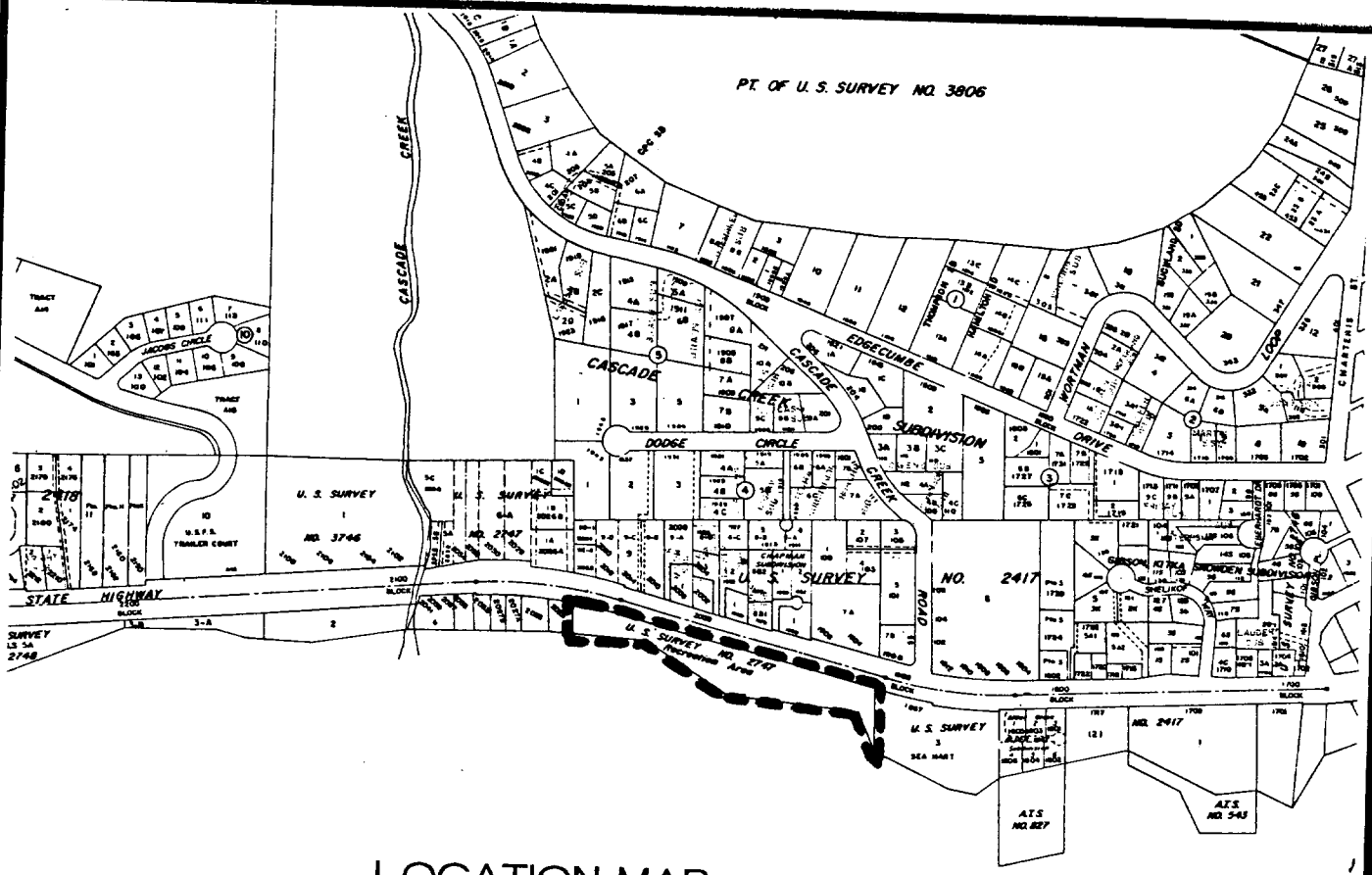
Location: Approximately 3 miles north of Sitka on Halibut Point Road

Current Size: 2.2 Acres

Facilities and Uses:

- Picnic shelters (6) (large main shelter w/4 tables, fireplace/BBQ)
- Fire Pits
- Barbeques
- Picnic tables
- Benches
- Beach area
- Picnicking
- Beachcombing
- Wildlife and plant viewing
- Fishing
- Photography
- Mt. Edgecumbe view
- Outhouses

Recommendations: Routine maintenance and upkeep through a "group adoption" theme, or by the City if state drops funding.



LOCATION MAP NOT TO SCALE

Sandy Beach

Facility Operator: U.S. Forest Service (Uplands), State of Alaska (Tidelands)

Location: Approximately 2 miles from town just past Cascade Creek.

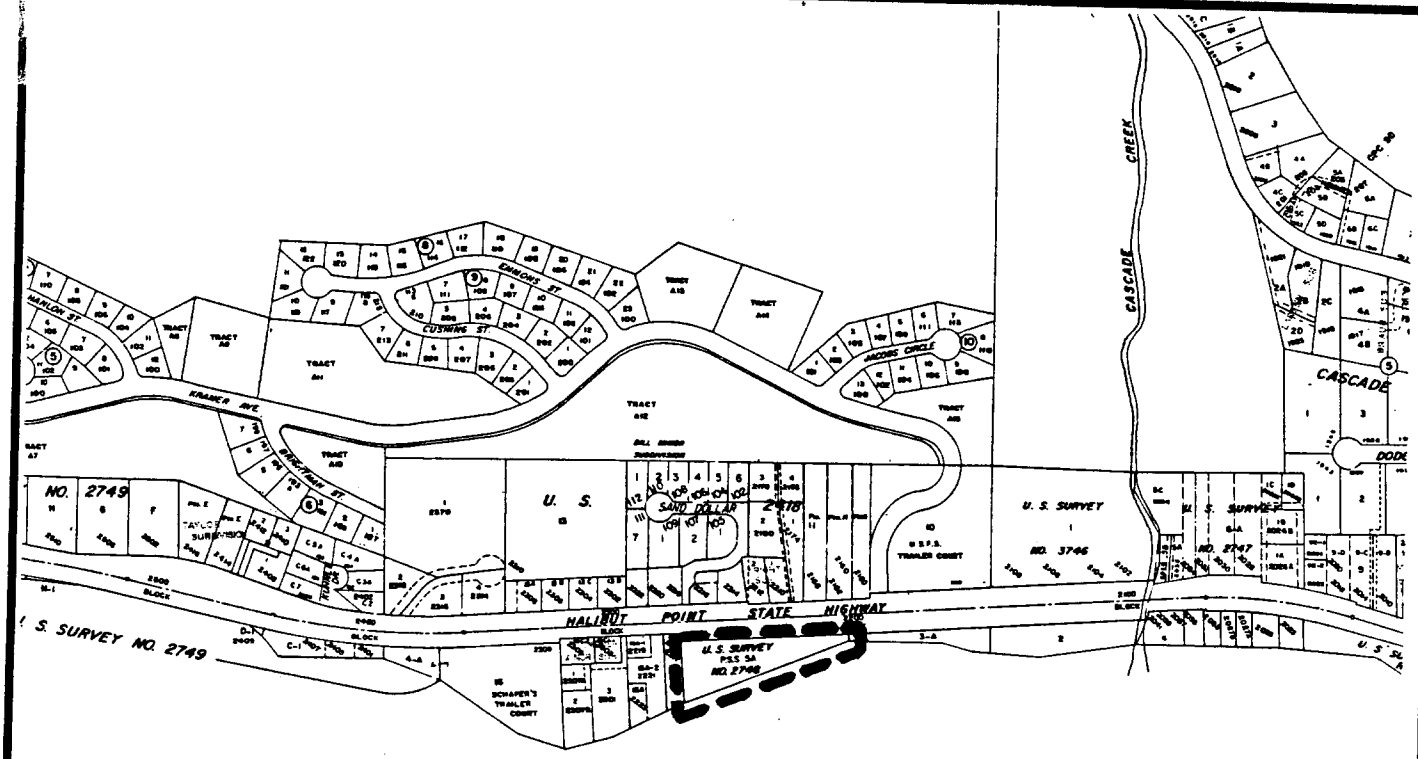
Current Size: 3 Acres

Facilities and Uses:

- View of Sitka Sound
- Bird watching
- Airplane observation
- Beachcombing
- Surfing
- View of Mt. Edgecumbe
- View of marine mammals
- Swimming
- Large turn-out
- Diving

Recommendations:

1) Restroom
2) Outside shower
3) Path on steps to beach
4) Increased garbage pick-up and area clean-up



LOCATION MAP NOT TO SCALE

Sawmill Creek Recreation Area

Facility Operator: U.S. Forest Service

Location: 6 miles Southeast of Sitka

Current Size: Unknown Acreage

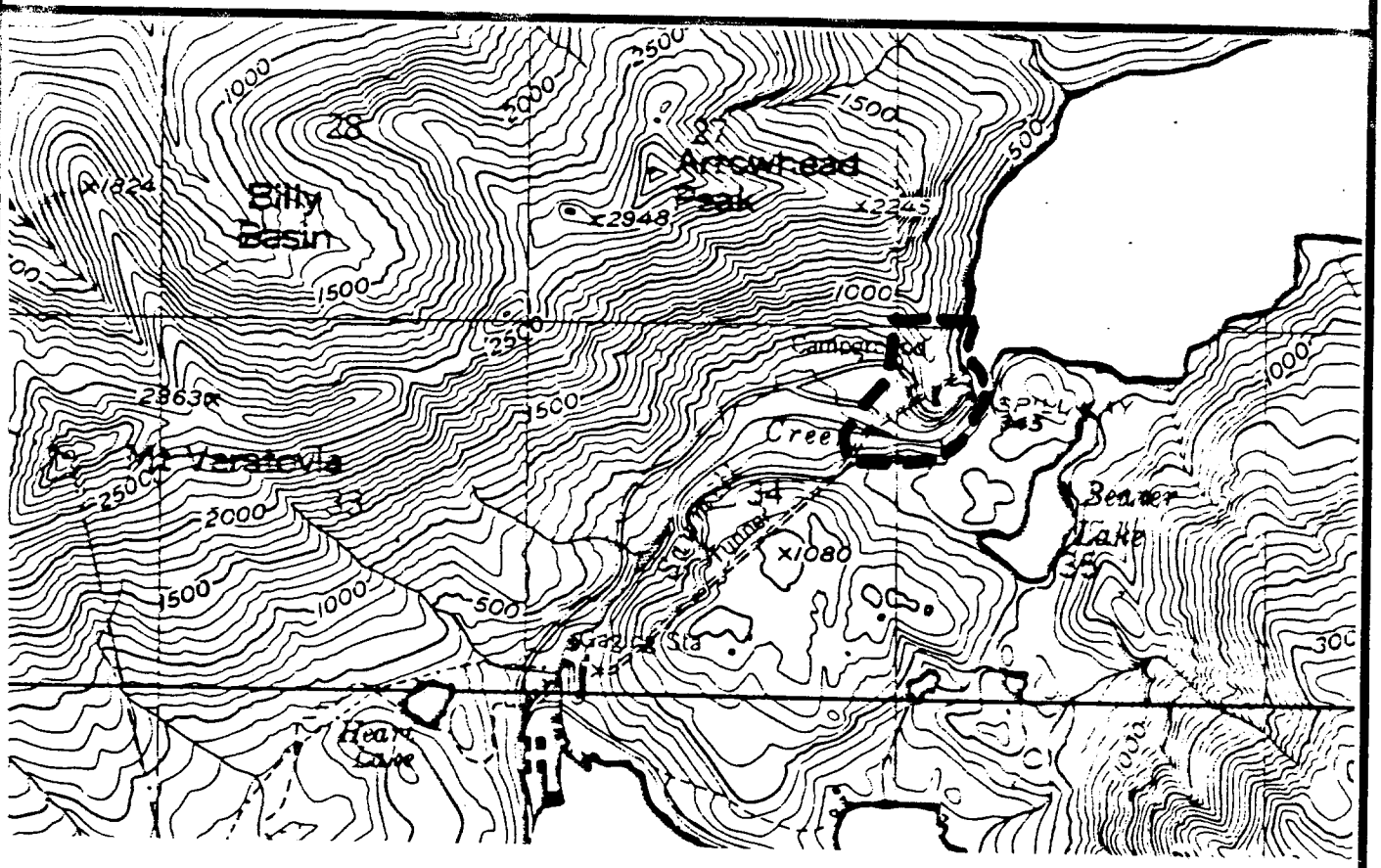
Facilities and Uses:

Campsites	Parking spurs
Fire pits	Walk-in picnic/campsites (4)
Fire grates	Vault toilets (2)
Stream fishing	Trailhead to Beaver Lake Trail

Special Notes: Open year around. Blue Lake road closed Dec. 31st-May 1st (access can be made on foot, ATV, or snowmobile).

Recommendations:

1) Upgrade and maintain campground.
2) Have City maintain road to campground and from spur road to dam.
3) Increase trash removal services.
4) Encourage continuing development of area.
5) Improve boat access to Blue Lake.



LOCATION MAP NOT TO SCALE

Sitka National Historic Park
Fort Site Unit

Facility Operator: National Park Service

Location: 106 Metlakatla Street

Current Size: 106 Acres (including leased State and City tidelands)

Facilities and Uses:

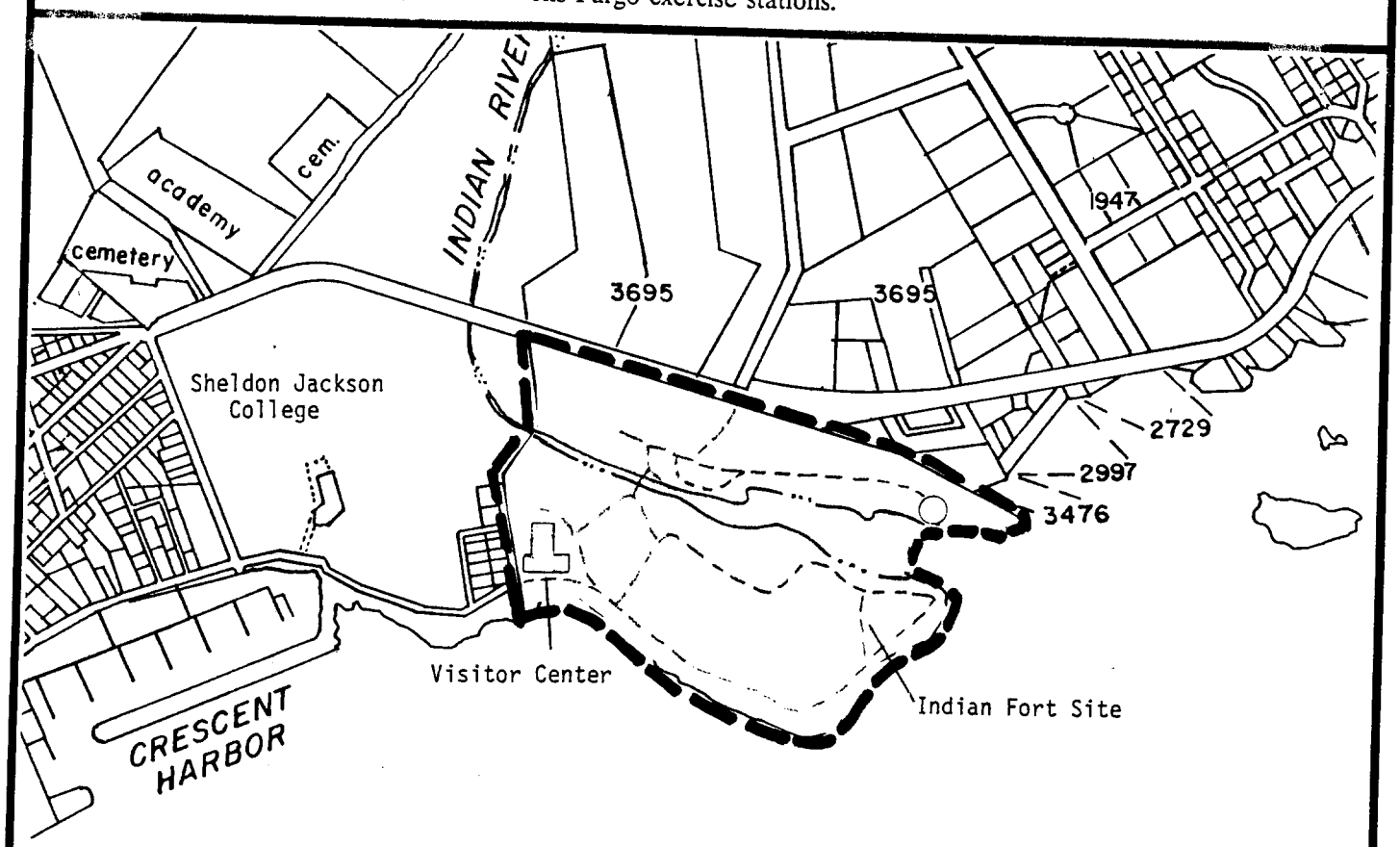
Trails
Picnic Area
Visitor Center
-Exhibits on Tlingit culture
-AV programs
-S.E. AK Indian Cultural Center
-Public restrooms
Totems
Wayside Exhibits

Walking/jogging
Education
Sightseeing
Birdwatching
Fishing (State regulated)
Wildlife viewing
(salmon run, intertidal zone life, etc.)

Special Notes: Park open year around. Day use area only. Park hours and regulations posted at visitor center. Visitor center open 7 days/week in summer and 5-6 days/week in winter. Cultural center operated daily June through September.

Recommendations: The National Park Service proposes to:

1) Implement "pooper scooper" program for dog walkers.
2) Maintain established trails and picnic facilities.
3) Evaluate use of Wells Fargo exercise stations.



LOCATION MAP NOT TO SCALE

Sitka National Historic Park
Russian Bishop's House Unit

Facility Operator: National Park Service

Location: 500 block of Lincoln Street

Current Size: 0.53 Acres of Federal Land

Facilities and Uses:

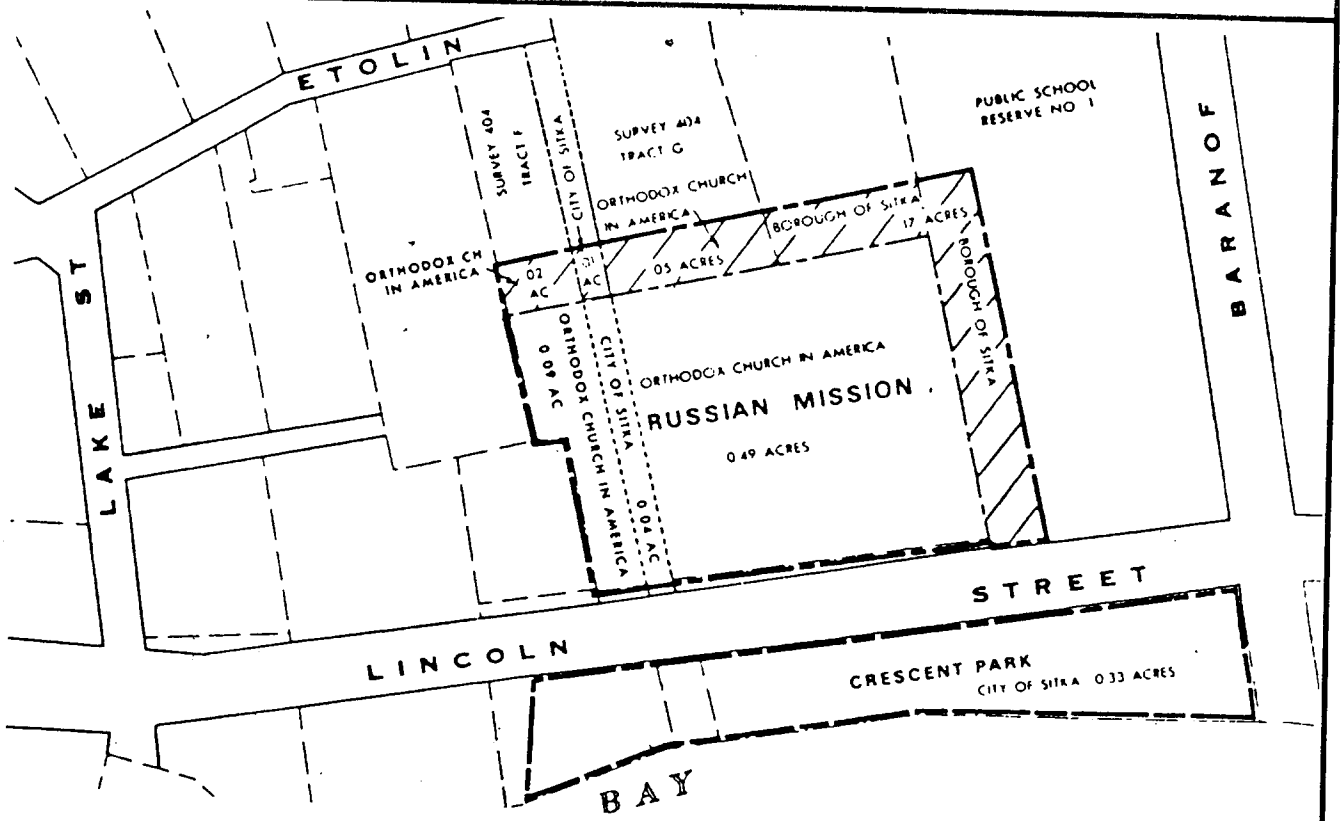
Russian Bishop's House (1842)	Old School House (1897)*
Exhibits & historic furnishings	Priest's Quarters (1887)*
Conducted tours	

* Not Open to the Public

Special Notes: Open daily June through mid September; by appointment the remainder of the year.

Recommendations:

1) Work with adjacent landowners and City Planning Commission to protect and enhance the setting of the Russian Bishop's House.
2) Encourage City to address traffic concerns on Monastery Street from Lincoln to Etolin Street.
3) Encourage City to develop additional public restrooms in the downtown area.



LOCATION MAP NOT TO SCALE

Spruce Park

Facility Operator: City and Borough of Sitka

Location: Between New Archangel and DeArmond Streets

Current Size: .18 Acres (7,887 sq. ft.)

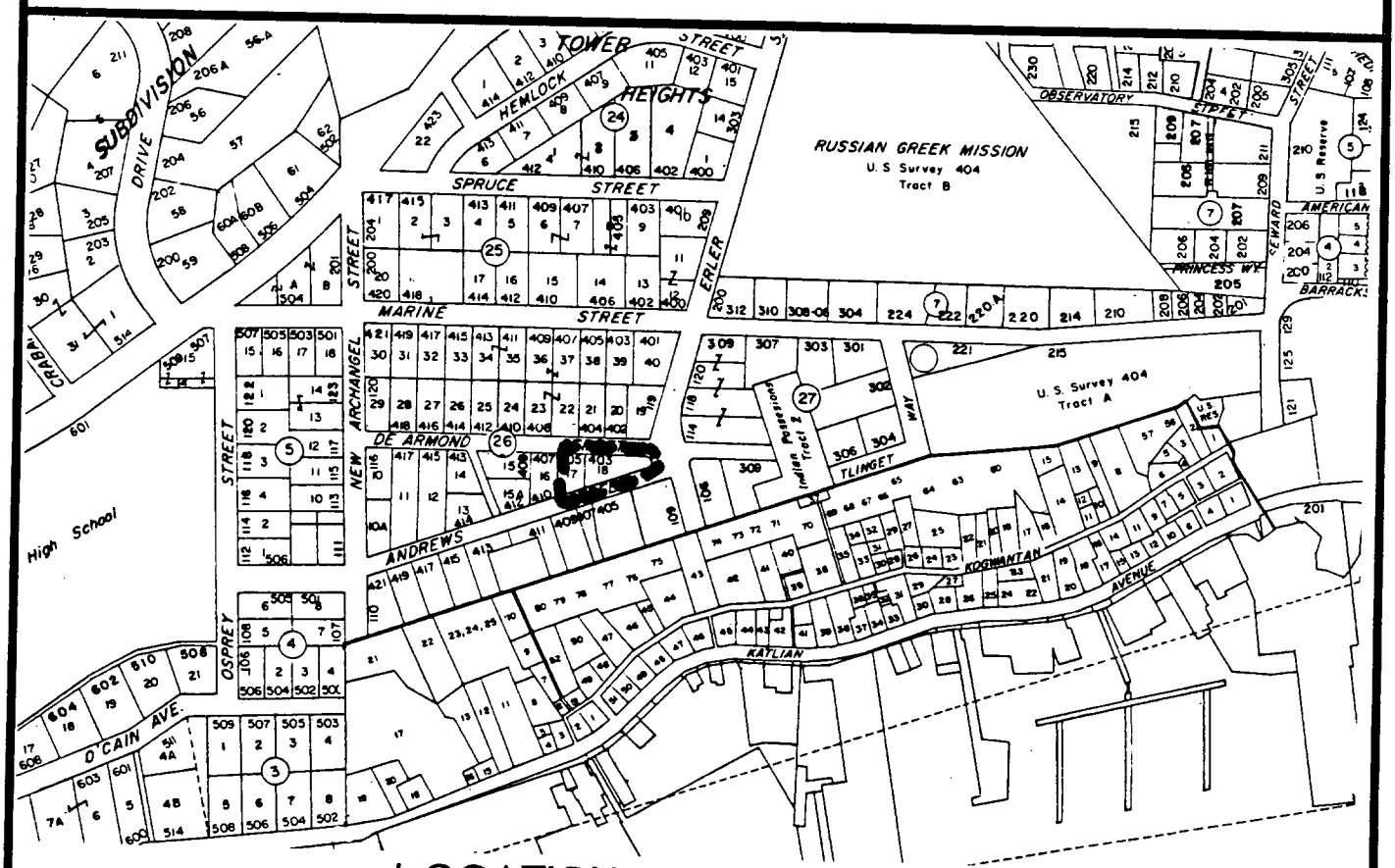
Facilities and Uses:

Basketball court and hoop
Fenced

Children's playground equipment

Recommendations:

1) Improved maintenance
2) Frequent trash pick-up



LOCATION MAP NOT TO SCALE

Starrigavan Campground

Facility Operator: United States Forest Service

Location: 7 miles north of Sitka on Halibut Point Road

Current Size: Unknown Acreage

Facilities and Uses:

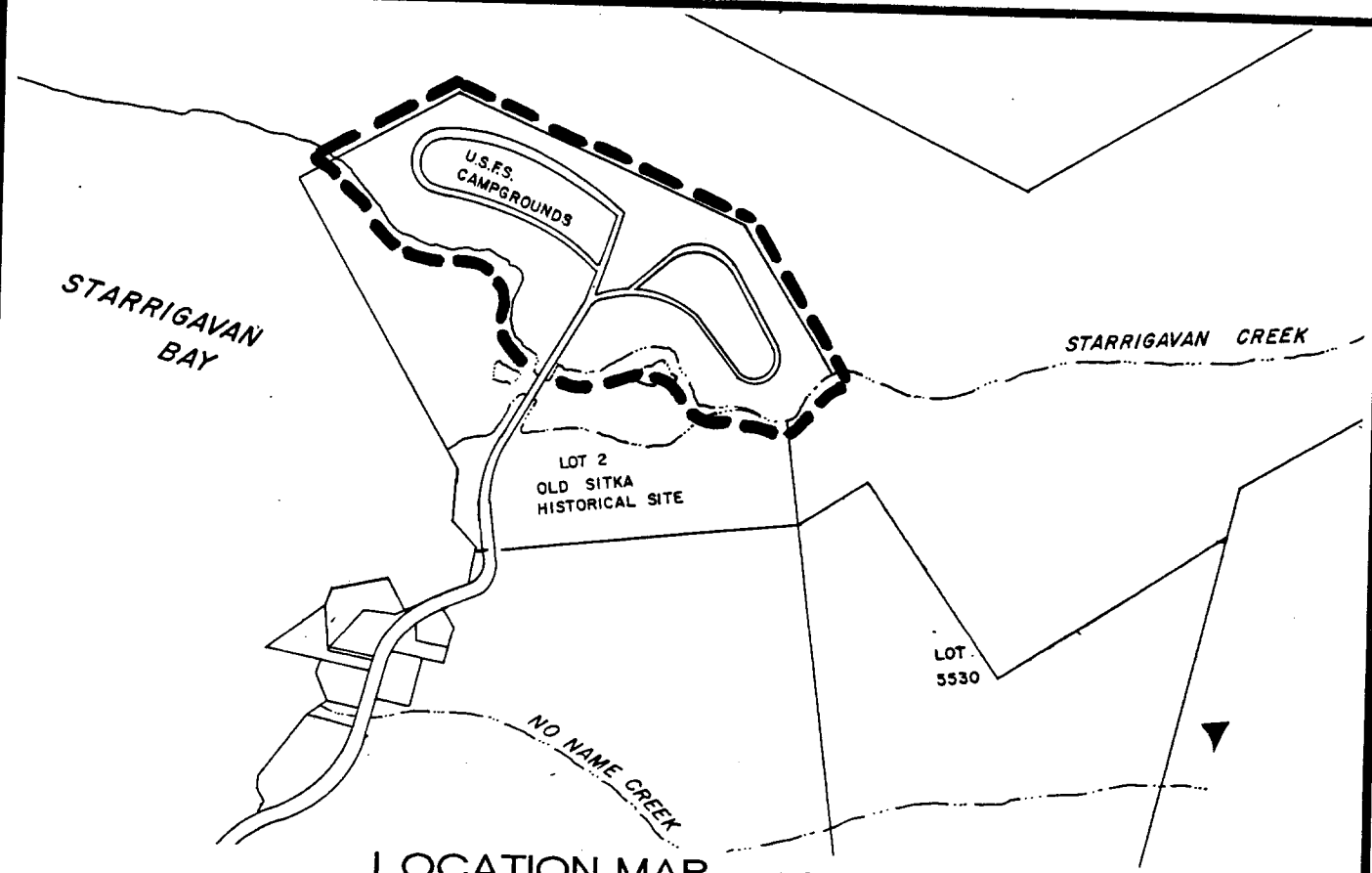
BAY SIDE
Picnic tables
Fire pits
Campsites (5)
Walk-in campsites (6)
Day-use campsites (4)
Vault toilets (2)
Dumpsters (2)
Parking spurs
*best suited for tenters and backpackers

ESTUARY
Campsides (18)
Parking spurs
Campground host site
Vault toilets (2)
Dumpsters (3)
Water taps (4)
*best suited for RV use

Special Notes: A fee per night is charged for all sites except the 4 day-use sites. Day-use sites are closed from 10 p.m.-6 a.m.

Recommendations:

1) Develop cross trail in the future.
2) Expand campground to provide more RV and hike-in campsites.



LOCATION MAP NOT TO SCALE

Starrigavan Valley Recreation Area

Facility Operator: State of Alaska (685 acres in upper valley selected by City & Borough of Sitka)

Location: End of Halibut Point Road across from Old Sitka

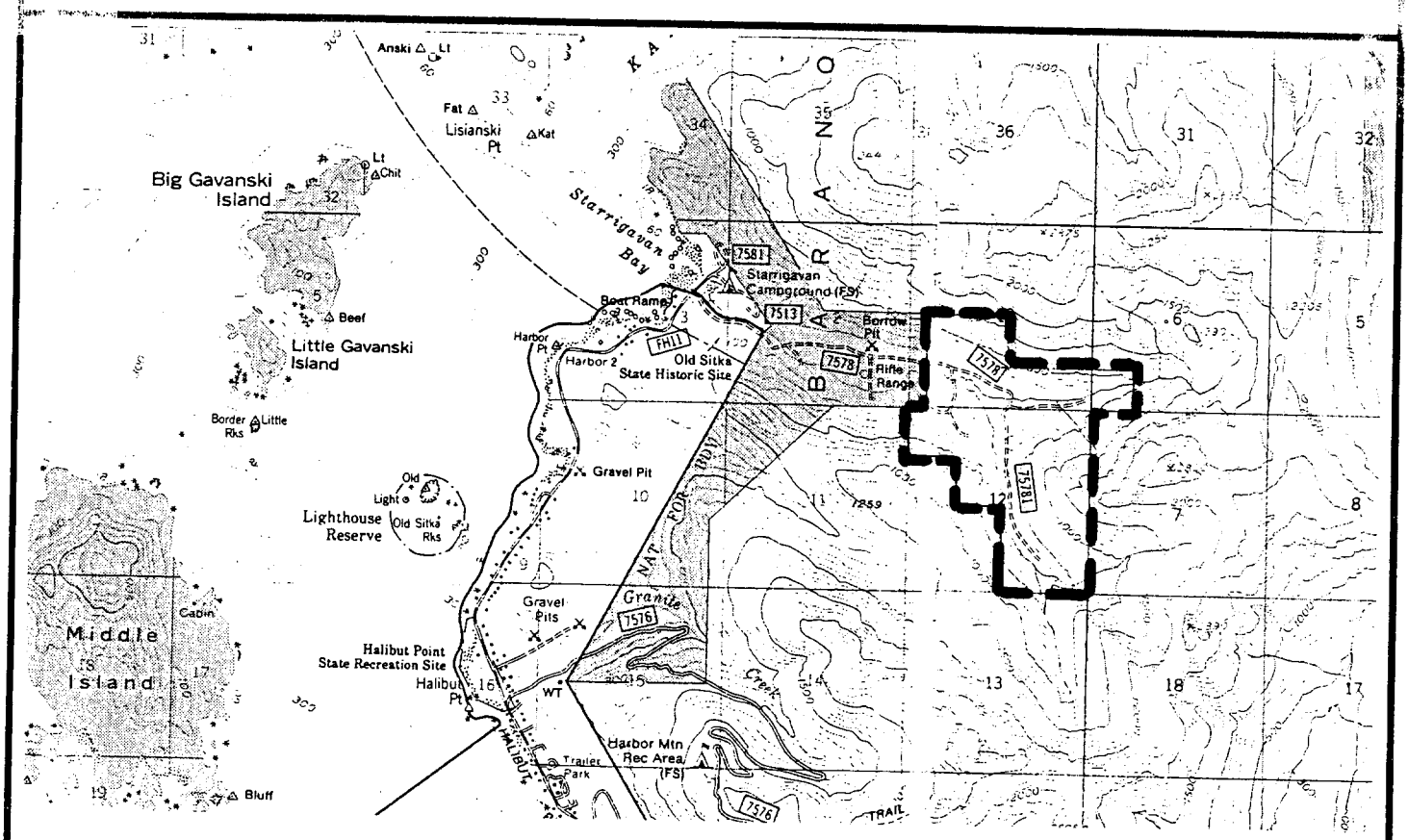
Current Size: 1,280 Acres

Facilities and Uses:

Shooting Range
Trout fishing
Salmon viewing
Picnicking
Hunting
ATV riding
Bird watching
Hiking
Photography
Foraging
Christmas Tree cutting
Target shooting
Motorcycle riding

Recommendations:

1) Zone watershed reserve district
2) ATV track
3) Picnic benches
4) Fire pits
5) Outhouses
6) Develop cross country ski trails
7) Maintenance of road
8) Winter recreation development
9) Tree farming
10) Expand campground to provide more R/V and hike-in campsites
11) Develop cross trail connecting various trails from Starrigavan to Gavan Hill
12) Support Forest Service/Starrigavan Cooperative Interpretive Trail Project development



LOCATION MAP NOT TO SCALE

Swan Lake Park

Facility Operator: City and Borough of Sitka

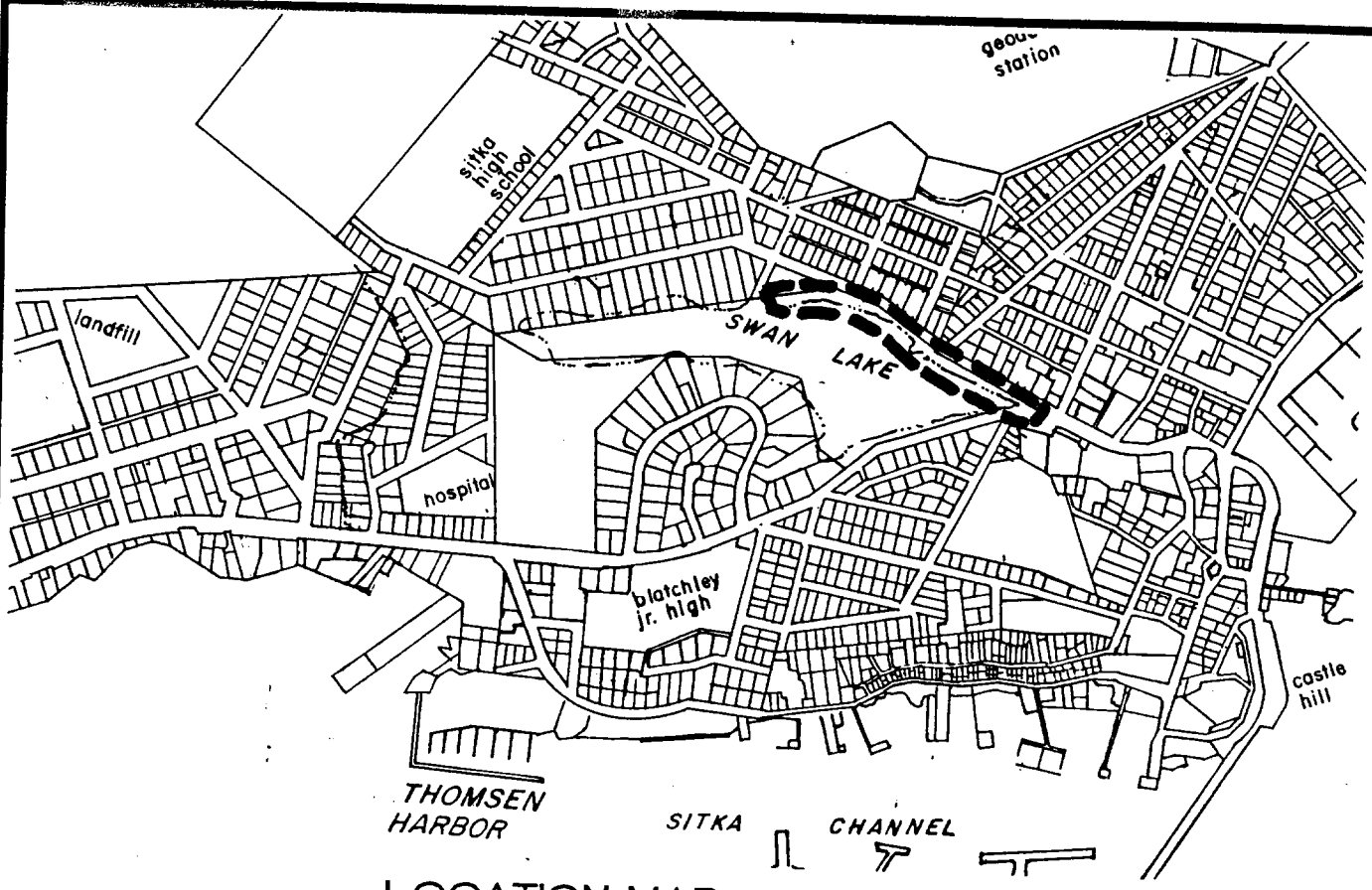
Location: Along Lake Street

Current Size: 22 Acres

Facilities and Uses:

Picnic area	Bird watching
Picnic benches	Fishing
Boating (non-motorized)	Canoeing
Resident ducks, geese, swans	Ice skating
Flying model airplanes	

Special Notes: Often, over the past few years, it has been suggested that the City construct a jogging trail around Swan Lake. At this time the Parks and Recreation Committee feels that the priority for the City should instead be directed towards completing the existing plans for Swan Lake Park. While the proposal has merit, there are also significant problems which need extensive investigation.



LOCATION MAP NOT TO SCALE

Swan Lake Park
(Continued)

The problems facing development of a Swan Lake jogging trail are:

1) That a significant portion of the shore line is privately owned.
2) Alteration of the shore line by the creation of a jogging trail may have detrimental environmental consequences.
3) The construction of a trail on muskeg needs a technical survey to define the construction problems and establish realistic cost estimates.

Unless there is a clear indication that the proposed jogging trail reflects wide-spread community support, the Parks and Recreation Committee intends to take no immediate action.

Recommendations:

1) Landscaping which would include some trees along Lake St.
2) Clean up along Halibut Point Road on lake side of guard rail.
3) Deepen the lake.
4) Continue with the Swan Lake Development Plan to reduce the eutrophication in Swan Lake be eliminating lily pad encroachment and continue development of area around lake.

Thimbleberry Lake Recreation Area

Facility Operator: University of Alaska

Location: 3.5 miles Sawmill Creek Road

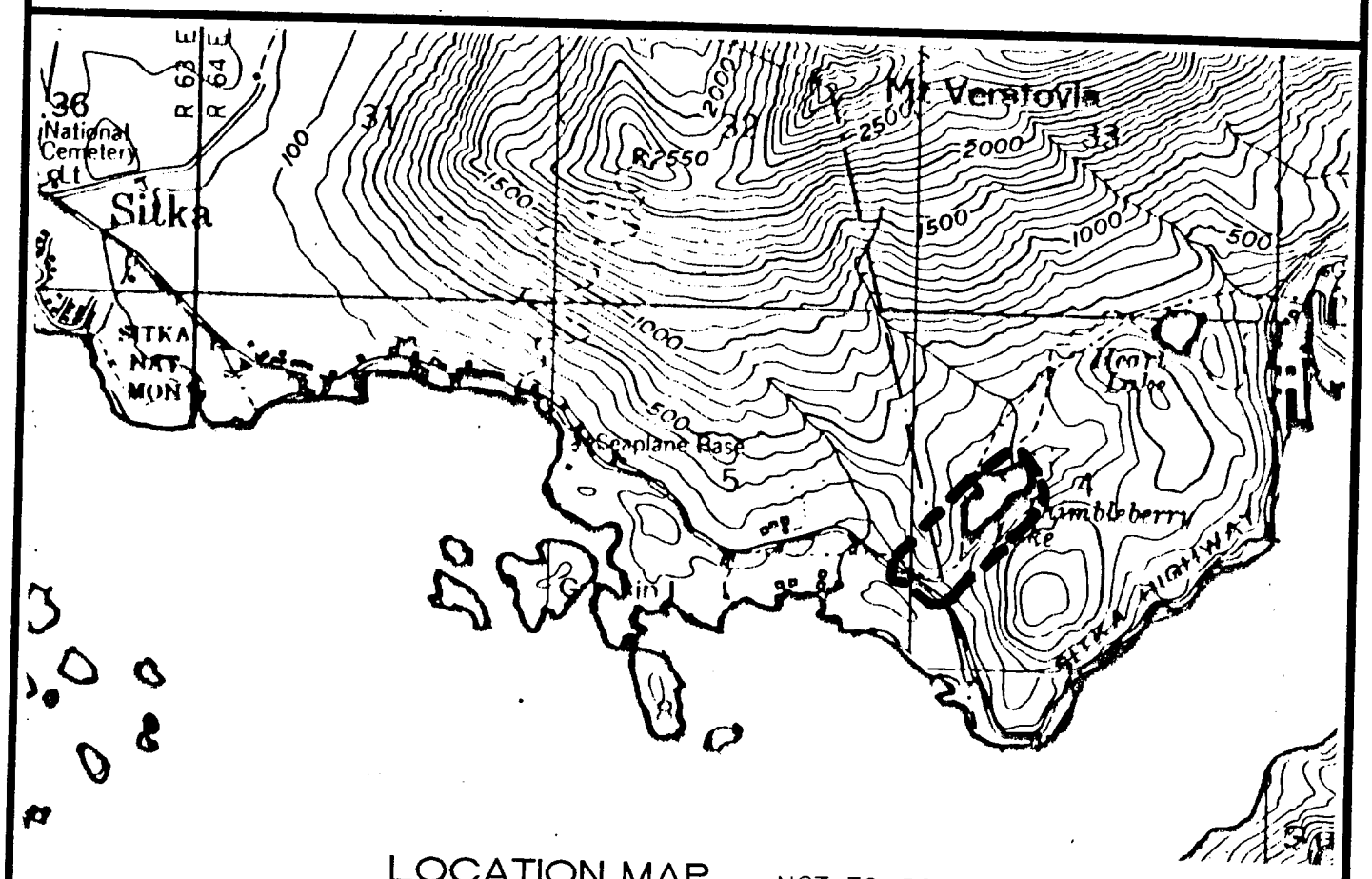
Current Size: 250 Acres

Facilities and Uses:

Ice skating
Fishing/ice fishing
Picnicking
Trail
Berry picking

Recommendations:

1) Continue trail to Heart Lake and down to Blue Lake Road.
2) Maintain this area for recreational uses.



LOCATION MAP NOT TO SCALE

Totem Square and Downtown Sitka

Facility Owner: State of Alaska, with some maintenance by City and Borough of Sitka

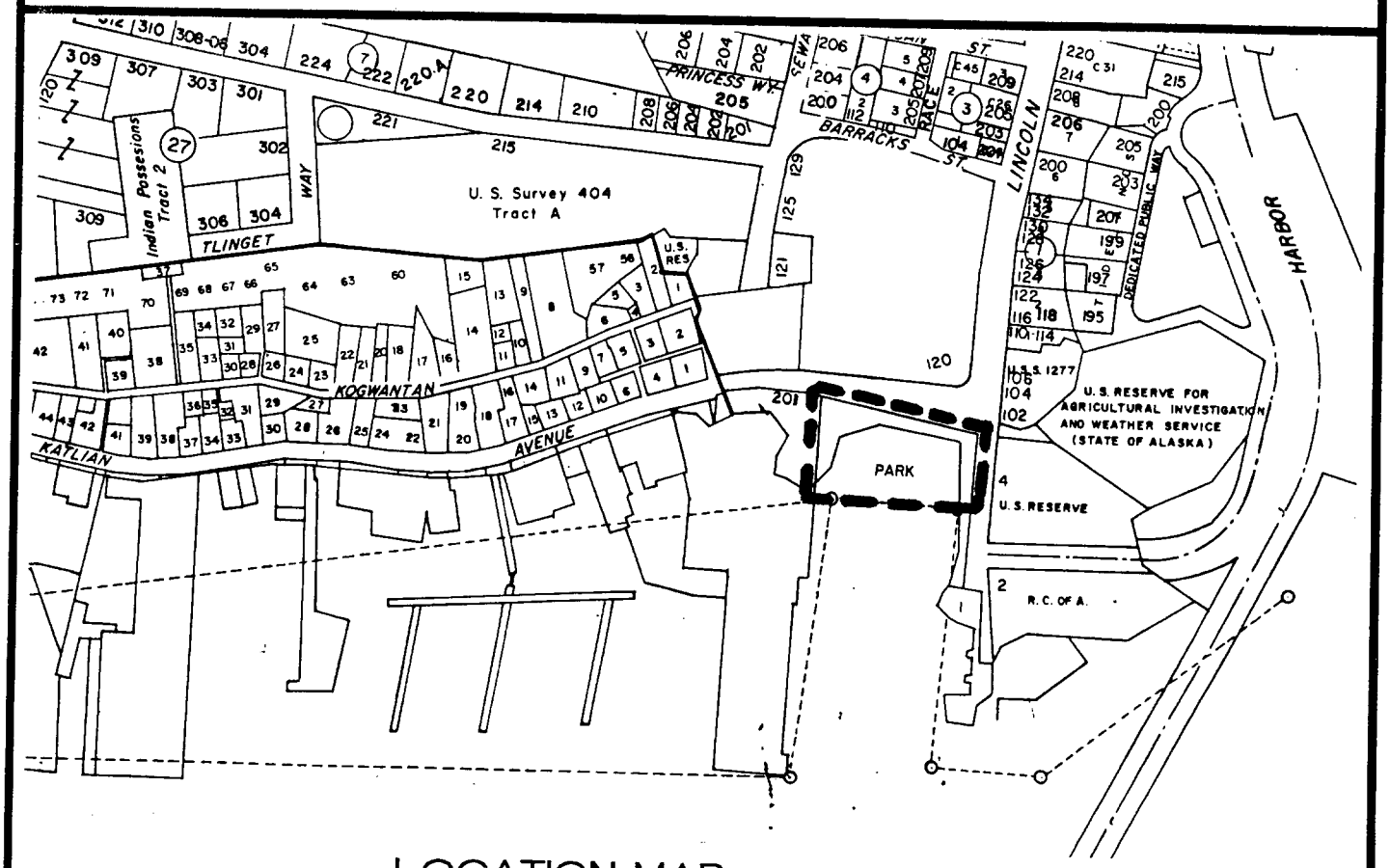
Location: West end of Lincoln Street

Size: Unknown acreage

Facilities and Uses:

Totem pole	Cannons
Walks	Stone Tsunami wall
Elephant ear planter	Petroglyphs
Anchors	

Special Notes: Totem Square and the downtown area of Sitka are critical recreation sites, critical because of the large number of adjacent historic sites, and critical since the active neighborhood is a high density, multi-use recreation area. As such the park and the downtown area need to be a high priority for landscaping, maintenance and trash removal. Further, there needs to be developed a plan which coordinates the efforts of the agencies and other landowners in beautifying and developing this neighborhood. Totem Square, Castle Hill, the Old Post Office and the downtown area are so inter-linked that the neglect of one will reflect on the rest.



LOCATION MAP NOT TO SCALE

Totem Square and Downtown Sitka
(Continued)

Recommendations:

1) This committee should undertake, as a priority project for 1991, to develop an overall long range plan for landscaping Totem Square and the region from the ANB Hall to the Russian Bishop's House.
2) Recognizing that recreation is also important to Sitka's visitors, it is also recommended that the Parks and Recreation Committee obtain funding to publish a Historic Walking Tour pamphlet of Sitka.
3) That Totem Square continue to be a priority for landscaping and maintenance. Specifically, that the retaining wall is maintained and that the planting adjacent to the Sheffield parking lot be improved.
4) The Parks and Recreation Committee urges that the City and Borough of Sitka purchase the Old Post Office, and that the building be dedicated to public use.
5) The Parks and Recreation Committee should work with other agencies and encourage civic groups to undertake the beautification of downtown Sitka.
6) Crosswalks and walking area should be established in the parking area adjacent to Castle Hill. The feasibility of extending the sidewalk from the town side of the bridge to the bridge stairs and other measures to provide better walking access to the Castle Hill area along the parking lot/road should be investigated.
7) The Parks and Recreation Committee should conduct a survey to ascertain whether the old Indian School site is best utilized as parking area or as a park. That as an interim measure the Committee work with the City staff to landscape the old foundations and unused City right of way.
8) An adequate drainage system should be installed in the existing Square.

Turnaround Site

Facility Operator: City and Borough of Sitka

Location: Intersection of Katlian and Halibut Point Road on Seaward Side

Current Size: 3 Acres

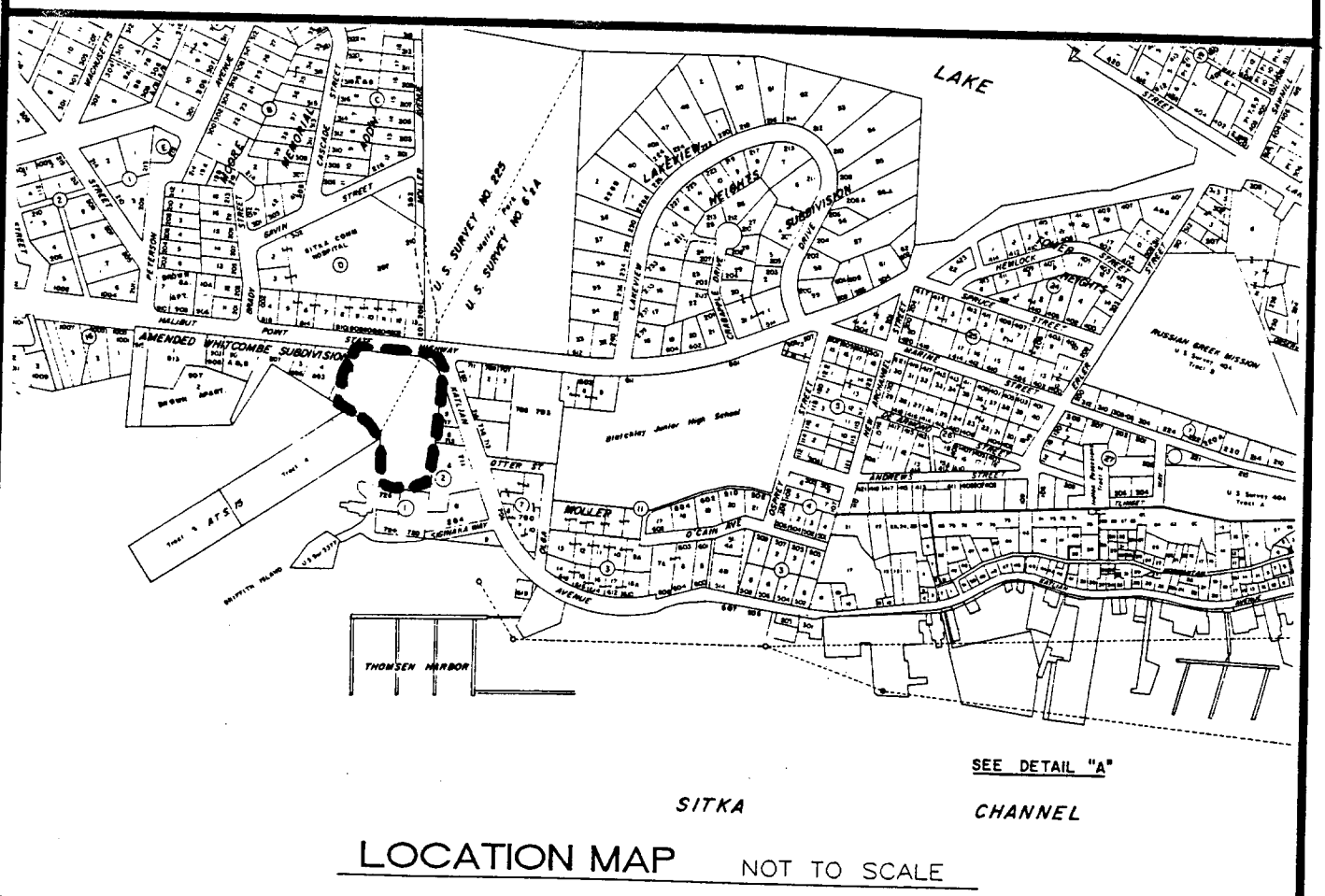
Facilities and Uses:

Firewood cutting
View of Sitka Sound
State Parks office

Site of Aluminum Recycling Center
Flea markets
Occasional circus

Recommendations:

1) Develop plan for coordinating all turnaround uses and activities.
2) Landscape area to include picnic benches at lower end.
3) Retain woodcutting as approved use of area and encourage responsible cleanup of scraps. City staff check feasibility of building a loading ramp for woodcutters.



LOCATION MAP NOT TO SCALE

APPENDIX A

ESTIMATED* COSTS FOR PARK IMPROVEMENTS IN THE CITY AND BOROUGH OF SITKA

p/y = per year

Pioneer Park

While State operated, there has been discussion of the City assuming some of the burden of operation. These are the estimated costs if the City and Borough of Sitka were to undertake routine maintenance and upkeep.

1. Latrine clean-up and waste disposal	$500 p/y
2. Weekly trash pick-up by City crew	3,600 p/y
3. Repair of facilities	1,300 p/y
4. Lawn & Garden Maintenance	1,200 p/y
5. Annual Maintenance & Painting	1,000 p/y
Total	$7,600 p/y

Downtown Area/Totem Square

Recommendations as listed:

1. Long-range landscaping plan for area from ANB to Russian Bishop's House	-0-
2. Publish Historic Walking Tour pamphlet	$12,000
3. Improvements in Totem Square	8,000
4. Purchase of Old Post Office	-0-
5. Encourage private efforts to beautify downtown	-0-
6. Improved crosswalks and designated walking areas near Castle Hill	8,000
7. Survey best use of old Indian School site	2,000
Interim landscaping of site	4,000
8. Improve drainage of Totem Square	12,000
9. Drinking fountain in Sitka National Historic Park	4,000
Total	$50,000

Spruce Park

1. Improve maintenance	$1,400 p/y
2. Weekly trash pick-up by City	2,600 p/y
Total	$4,000 p/y

Halibut Point Recreation Area

While this is a State facility, this Committee has received community input that the main shelter needs to be enlarged. Alaska State Parks Advisory Committee has received this funding and will improve shelter facilities, to be carried out in FY 91.

Total for Shelter $24,000

Sandy Beach

While this is USFS property, this undeveloped area receives great use in the summer. This committee recommends further development of this area.

1. Restroom & outside shower	$24,400
2. Path or steps to beach	5,000
3. Increased garbage pickup	2,600 p/y
Total	$32,000

Starrigavan Campground

1. Support USFS trail development	Unknown
2. Develop link with cross trail to Harbor Mtn Trail (which connects to Gavan Hill Trail)	$30,000 to $50,000
3. Expand campground for more RV & hike-in campsites	$10,000
Total	$40,000 to $60,000

Sawmill Creek Recreation area

1. Increased City maintenance of road	$3,000 p/y

Swan Lake Park

1. Continued landscaping along Lake Street	$ 8,000
2. Continue Swan Lake Development Plan	50,000
3. Reduce lily pad encroachment	100,000
Total	$158,000

Turn-Around Site

1. Picnic benches & tables	$1,500
2. Place wood chips inside concrete turnaround	500
3. Removal of some undergrowth, wood scraps, and landscaping	2,500
4. Create development plan	-0-
Total	$4,500

Thimbleberry Lake Recreation Area

1. Improve existing trail & extend to Blue Lake Road	$30,000

Cascade Creek Park

1. Develop small park or tot lot along Edgecumbe Drive	$15,000

Starrigavan Valley Recreation Area

1. ATV Track	$10,000
2. Picnic Benches	1,500
3. Fire Pits	500
4. Outhouses	3,000
5. Develop Trail System	5,000
6. Maintain/Improve Road	20,000
7. Archery Range	30,000
Total	$70,000

Landfill Ballfields

1. Build Restrooms & Snack Bar Complex	$40,000 to $50,000
2. Additional playground equipment	$2,000
Total	$42,000 to $52,000

Goddard Hot Springs

1. Building Repairs/Facilities Development	$13,000 to $23,000
2. Rebuild dam and waterlines	25,000
3. Periodic garbage pickup	2,000 p/y
4. Construct dock and mooring buoy	50,000
Total	$90,000 to $100,000

(Approximate costs to be modified based on detailed planning)

Skateboarding Facility

1. Develop a site for skateboarding use	$10,000

*These figures are estimates which will be revised subsequent to detailed engineering/site planning. They were developed by the Parks & Recreation Committee in consultation with the Public Works Department based on 1990 cost figures.

APPENDIX B

EXISTING INDOOR FACILITIES
(Responsible Agency in Parenthesis)

Etolin Street Gym (Sitka School District):

Located on Baranof Street. Used heavily for adult recreational basketball, volleyball, as well as school gym functions.

Baranof Multi-Purpose Room (Sitka School District):

Located in Baranof School. Used for many school and Community Schools functions. Has stage and limited capacity.

Blatchley Gym and Track (Sitka School District):

Located on Halibut Point Road. The school is used heavily by adults in the Community Schools programs. Also contains the local swimming pool.

Sitka High School Gym and Weight Room (Sitka School District):

Located at Lake and Verstovia Streets. The gym is heavily used by school programs and Community Schools programs.

Verstovia Gym and Multi-Purpose Room (Sitka School District):

Covered play area, 14,000 sq. ft.

Mt. Edgecumbe High School Gym, Auditorium and Stage (State of Alaska):

Sitka National Historical Park Visitor Center (National Park Service):

Located at the end of Lincoln Street, the Center contains a museum, theater, information and cultural center.

Centennial Building (City and Borough of Sitka):

Located on Harbor Drive, the building consists of a visitors center, Isabel Miller Museum, meeting rooms and convention hall, art gallery, Sitka Visitor's Bureau and the Chamber of Commerce.

Kettleson Memorial Library (City and Borough of Sitka):

Located next to the Centennial Building, the library offers an excellent selection of books, magazines, audio and video tapes, records, reference materials, children's library.

Swan Lake Senior Center (City and Borough of Sitka):

Located on Lake Street across from Swan Lake Park. Facility is used mainly for senior citizen activities but is also available to the public. Includes large and small meeting rooms and kitchen facilities.

Russian Bishop's House (National Park Service):

The National Park Service has recently restored this building, located on Lincoln Street across from Crescent Park.

A.N.B. Hall (Privately owned by Alaska Native Brotherhood):

The Alaska Native Brotherhood was founded in 1912. The hall is located on Katlian Street and was the first of its kind. It is the Native Cultural Center.

Sheldon Jackson Museum (State of Alaska):

The museum is located on Sheldon Jackson campus and was the first portland cement concrete structure in Alaska. The museum contains Alaskan Art and artifacts, and a gift shop.

Stratton Library (Sheldon Jackson College):

Located on the Sheldon Jackson College campus, the library has an abundance of information regarding Alaskan history.

Allen Auditorium/Hames PE Complex (Sheldon Jackson College):

The Allen Auditorium is a multipurpose facility available to the community. The PE center includes a gym, pool, weight and aerobic area.

University of Alaska Southeast:

A 4-year accredited college located on Japonski Island offering a variety of classes to the community and a valuable community resource.

Sitka Sportsmen's Association Indoor Shooting Facility:

Scheduled for completion in 1991. It includes a 10-station, 25-meter range, classroom and training room, kitchen and other facilities. Also at the site is the 8-space Sitka Sportsmen's R.V. Park and picnic facilities, which is planned for future expansion.

APPENDIX C

POTENTIAL INDOOR FACILITIES

Sitka Recreation Center:

An indoor recreation center is badly needed and should include a variety of uses, e.g., ice skating rink, roller rink, etc.

Sitka Cultural Facility:

A cultural facility is needed to accommodate the increasing interest for a multipurpose arts center.

PARKS AND RECREATION NEEDS ASSESSMENT
QUESTIONNAIRE

Sitka Parks and Recreation Committee is updating the Parks and Recreation Plan. We would like your help in assessing our community's recreational needs. Please complete the following survey and return it (no postage necessary) by Nov. 1, 1988.

1. LENGTH OF RESIDENCY IN SITKA?

   _____ 0-1 YEAR _____ 2-5 YEARS _____ 6-10 YEARS _____ 11-15 YEARS _____ 16+ YEARS

2. ARE ANY OF YOUR FAMILY MEMBERS ACTIVE IN THE COMMUNITY SCHOOLS ACTIVITIES?

   _____ YES _____ NO

3. PLEASE LIST THE IMPORTANCE, IN ORDER FROM 1 TO 5 (ONE BEING MOST IMPORTANT), THE FOLLOWING NEEDS:

   _____ ACTIVITIES FOR CHILDREN UNDER 5 YRS. OF AGE

   _____ ACTIVITIES FOR CHILDREN 6 TO 12 YRS. OF AGE

   _____ ACTIVITIES FOR CHILDREN 13 TO 21 YRS. OF AGE

   _____ ACTIVITIES FOR ADULTS 22 TO 50 YRS. OF AGE

   _____ ACTIVITIES FOR ADULTS OVER 51 YRS. OF AGE

4. HOW CAN THE CITY AND BOROUGH IMPROVE THEIR INVOLVEMENT IN COMMUNITY RECREATION NEEDS? (RANK IN ORDER OF IMPORTANCE WITH ONE BEING MOST IMPORTANT)

   _____ RECREATION CENTER FOR CHILDREN AND YOUNG ADULTS UNDER THE AGE OF 21

   _____ UPKEEP AND UPGRADING OF EXISTING FACILITIES FOR USE BY ALL AGE GROUPS

   _____ PROVIDE MONIES FOR NEW FACILITIES AS DESIGNATED BY COMMUNITY WISHES

   _____ YOUR RECOMMENDATIONS: _____

5. PLEASE CHECK OFF THE FOLLOWING ACTIVITIES AS RELATED TO YOUR OR YOUR FAMILY'S INVOLVEMENT IN THE SITKA AREA:

_____ BOATING	_____ FISHING	_____ HUNTING
_____ PICNICKING	_____ INDOOR SOCCER	_____ OUTDOOR SOCCER
_____ HIKING	_____ BICYCLING	_____ CROSS COUNTRY SKIING
_____ BASEBALL	_____ WALKING	_____ BIRD WATCHING
_____ SOFTBALL	_____ PAINTING	_____ PHOTOGRAPHY
_____ Jr. Miss _____ Jr. Boys _____ Women's _____ Men's _____ Co-ed	_____ DANCING	_____ WOODWORKING
	_____ HOME MAKING	_____ ARTS & CRAFTS
	_____ LANDSCAPING	_____ FLOWER ARRANGING
_____ REFINISHING FURNITURE	_____ FOOD PREPARATION	_____ OTHER _____

6. IF THE FUNDING WAS AVAILABLE TO THE COMMUNITY WOULD YOU LIKE TO HAVE ANY OF THE FOLLOWING CONSTRUCTED IN SITKA? (PLEASE RANK IN ORDER OF IMPORTANCE, WITH 1 BEING MOST IMPORTANT.)

_____ ICE SKATING RINK	_____ ROLLER SKATING RINK	_____ GOLF COURSE
_____ FINE ARTS CENTER	_____ RECREATION CENTER	_____ OTHER _____

7. WHAT ADDITIONAL ORGANIZED ACTIVITIES WOULD YOU LIKE TO SEE AVAILABLE IN SITKA? (PLEASE LIST IN ORDER OF PRIORITY WITH YOUR FIRST PRIORITY FIRST.)

   1. _____ 2. _____

   3. _____ 4. _____

8. SHOULD SITKA HAVE A STREET TREE OR DECORATIVE SHRUB PROGRAM? IF SO, WHERE?

   _____ YES _____ NO

   _____

APPENDIX E
PARKS AND RECREATION NEEDS ASSESSMENT
SURVEY RESULTS

1. Length of residency in Sitka (NUMBER: ~~403~~ 446)

_39__0-1yr. 117__2-5yr. _84__6-10yr. _72__11-15yr.

134__16+yr. no response - 1

2. Active in Community Schools?

Yes - 254 No - 176 no response - 3

3. Importance rated from 1-5 (activities)

	1	2	3	4	5
under 5	38	22	77	92	143
6 - 12	92	142	100	44	6
13 - 21	207	91	35	22	10
22 - 50	79	90	98	79	56
over 51	14	38	64	116	138

no response - 1

4. Improve involvement in community rec.

	1	2	3
Rec. center	169	76	62
Existing	152	118	96
New facility	89	107	118

no response - 2

Recommendations:
1) racquet ball, hand ball, volleyball
2) tennis
3) All-Purpose Recreation center
4) tennis nets and backboards at crescent
5) family oriented recreation center
6) clean-up and cont. to improve Swan Lake
7) skating rink
8) teen center
9) performing arts center
10) public awareness/involvement with existing programs
11) playgrounds should have a director for all children under 15- not paid for by families.

12) city does min. maintenance; upgrade and improvements are necessary.
13) easier access for handicapped and transport for elderly.
14) cross country ski trails
15) fitness center
16) more trails
17) atv track
18) mountain skiing resort
19) snow mobile course
20) garbage cans
21) teen center
22) supervised entertainment for teens
23) ak history/oriental theme park
24) finish/upgrade shooting facility
25) sewer dump for rv's and boats
26) YMCA

5. Activities

343__boating

314__picnicking

302__hiking

_56__baseball

_96__softball

_18_ jr. miss
_15 jr. boys
_38_ women's
_44_ men's
_26_ coed

_50__refinishing furniture

279__hunting

_80__cross country skiing

183__photography

180__arts and crafts

348__fishing

_30__indoor soccer

246__bicycling

343__walking

_63__painting

114__dancing

163__home making

148__landscaping

179__food preparation

_42__outdoor soccer

100__bird watching

_91__woodworking

_34__flower arranging

_66 _other

swimming
basketball
jogging
canoeing
camping
weaving
volleyball
aerobics
gardening - veg and fruit
scuba

trapping
tot gym
theatre/ music
amateur radio
skating
tennis
bowling
languages
kayaking
archery
baton
motorcycle track
working
sewing
dog obedience
football
rollerskating
basketball
art exhibits
snow machine rides
beading
kite flying
surfing

6. If funding was available, community would like:

	1	2	3	4	5
Ice rink	123	69	71	49	19
Roller rink	68	84	84	56	22
Golf course	19	29	23	28	103
Fine Arts	68	85	37	73	37
Rec Center	163	75	68	27	8

Other - 14 no response - 1

1) hand ball/indoor tennis
2) bike paths
3) racquet ball
4) health club
5) bowling center
6) archery range
7) combo. rec and arts center
8) finish softball complex
9) mini golf course
10) skate board park
11) softball fields
12) swimming pool
13) rowing rentals
14) picnic grounds
15) petting zoo and rides
16) shooting range-indoor
17) teen club
18) football field
19) drive-in-movie
20) nautical arts center
21) underwater hockey
22) flying club/school
23) covered playgrounds
24) covered tennis courts with lights
25) theme park on ak history

7. Wanted additional organized activities:

1) sea scouts
2) hiking/climbing club
3) stamp/coin club
4) teen activities year round
5) square/folk dance
6) more volleyball
7) tennis lessons
8) ice skating lessons
9) ice hockey teams
10) roller skating
11) bridge lessons
12) dance studios
13) indoor archery
14) open gym for families
15) basketball leagues
16) cross country ski
17) rowing
18) football-youth
19) gymnastics-all age
20) boating safety
21) sailboat races
22) kids hockey
23) martial arts
24) ballet classes
25) alcohol recovery center
26) more bike paths
27) community pot-luck
28) teen center
29) senior rec. center
30) BMX bike races
31) adult cond. class
32) water polo
33) skate boarding
34) mini golf
35) native pow-wows
36) sports equip. rent
37) yr. round camp gr.
38) YMCA
39) friendship club
40) music festival

8. Tree program:

_152_ yes 152__ no ___13_ no response

Where?
1) throughout Sitka
2) along roads, especially Swan Lake
3) Katlian st., intersection of Lake, Lincoln, and Harbor Drive.
4) indian village, around new P.O.
5) Russian church, complete park on Harbor side of Swan Lake.
6) residential areas where natural veg. has been removed.
7) continue with what is being done
8) down-town
9) crescent area and Swan Lake
10) ferry terminal and down-town area. Encourage home owners to improve.
11) landscaping around schools
12) lincoln street
13) mt. edge. high school
14) O'Connel bridge to downtown

9. Sports Arena Activities:

283_roller skating
_93__floor hockey
202__volleyball
_70__martial arts
_65__golf driving range
174__aerobics
130__tennis
_99__mini golf
_68__free style biking
118__sports trade fairs
218__Alaska Day functions
184__flea markets

_111_bike rodeos
165__scouting events
180__July 4th functions
124__indoor soccer
170__gymnastics
_53__lawn bowling
_97__basketball
199__dancing
_81__baton
_61__shuffle board
139__skate boarding
_33__other

1) rental for social func
2) dog and cat shows
3) hand ball
4) archery range
5) ping pong
6) keep teens busy
7) holiday bazaars
8) indoor softball
9) badminton
10) computer programming
11) coin shows
12) indoor rifle range
13) touch football
14) curling
15) circus
16) boat shows
17) bingo
18) tv sports
19) old people gatherings
20) running track
21) weight room

Trail Use

1. Trail types:

Length: _31__ less than 1 177__ 1 - 2 miles

211__ over 2 miles

Grade: _59__ easy 182__ moderate _17__ steep

174__ combination

no response - 9

2. Times per year used:

135__ 0 - 5 _88__ 6 - 10 _64__ 11 - 15 139__ 16 +

3. Need more trails?

240__yes 120__no where: Stargavin, cascade creek, beaver to blue lake, green lake, state owned islands, bear cove. suitable for daily jogging and walking, bear lake, improve verstovia, extention of indian river to saddle of sisters, nat. cem. to new grade school. Green-belt areas along the water, silverbay to goddard.

Picnic Facilities

1. Times per year used:

172__ 0 - 5 153__ 6 - 10 _39__ 11 - 15 _68__ 16 +

2. Where?

207__rural setting

276__with ocean view

_61__next to road

161__off road system

_15 _other

3. Type of facility:

108__none needed 191__fire ring other: game facilities

247__covered 204__tables

4. Need additional outdoor facilities?

_309_yes _63__no

if so?

255_bicycle routes

162__neighborhood parks

_42__outside b-ball courts

_61__tennis courts

_90__mooring buoys

170__cabins

_29__other

1) develop rec sites on outlying islands and develop more R.V. spots
2) outside archery range
3) more beaches
4) flood tennis courts for ice skating
5) covered picnic areas silver bay area
6) walking paths along busy roads
7) separate bike paths from road system with trees
8) jogging trail around swan lake
9) playgrounds
10) improve blue lake boat launch
11) halibut point road
12) baranof warm springs
13) skate boarding
14) safe walking area along HPR
15) boat ramp at blue lake
16) stargavin restrooms
17) 3.1 mile cross country course to compare with high school course in Anchorage
18) water sport equipment rentals
19) close lincoln street in summer

APPENDIX F

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Recreation Opportunity Spectrum, U.S. Forest Service, 1986

Forest Service Trail Guide for the Sitka Area - Sitka Trails - Recreation Opportunity Guide, Sitka Ranger District

Recreation, Park and Open Space Standards and Guidelines, 1983, Roger A. Lancaster

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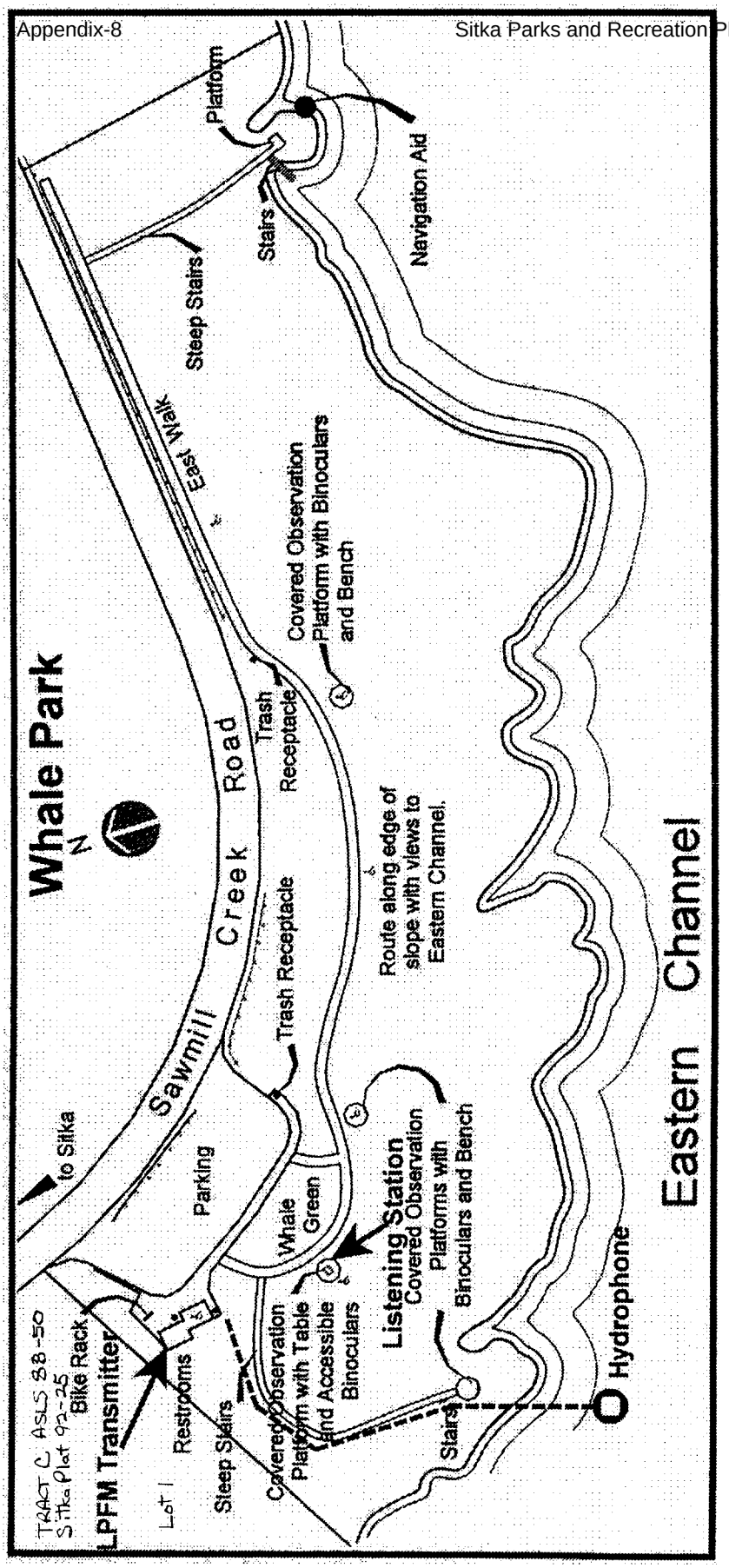
Public Use Management Plan, Sitka Coastal District, in process 1990

ADDENDUM TO SITKA PARKS AND RECREATION PLAN CITY AND BOROUGH OF SITKA 1991 JUNE, 2006 RECREATIONAL FACILITY DESCRIPTIONS

Whale Park

Facility Operator: City and Borough of Sitka
Location: Approximately 5 miles out Sawmill Creek Road on seaward side of road at 2900 block
Current Size: 4.2 acres
Facilities and Uses: Covered waterfront viewing areas with fixed binoculars, "Whale Radio" ocean sound equipment, interpretive signing, boardwalks, chairs, stairs to waterfront, whale sculptures, restrooms, parking area.
Background: Land for this park was purchased from University of Alaska for $218,000 by the Ishiyama Foundation set up by George Ishiyama, former President of Alaska Pulp Corporation. The Park was developed by the State Department of Transportation and Public Facilities with STIP funding, with long-term ownership and maintenance by the City and Borough of Sitka. A considerable amount of volunteer effort was involved in developing this Sitka Park, which was dedicated July 28, 1995.


Whale Park
N
Sawmill Creek Road
to Sitka
Parking
Whale Green
Trash Receptacle
Trash Receptacle
Route along edge of slope with views to Eastern Channel.
Covered Observation Platform with Binoculars and Bench
East Walk
Steep Stairs
Stairs
Platform
Navigation Aid
Listening Station
Covered Observation Platforms with Binoculars and Bench
Covered Observation Platform with Table and Accessible Binoculars
Steep Stairs
Restrooms
Lot 1
LPFM Transmitter
Bike Rack
TRACT C ASLS 88-50
Sitka Plat 92-25
Stairs
Hydrophone
Eastern Channel

John Brown's Beach

Facility Operator: State of Alaska, Sitka Tribe Of Alaska, volunteer efforts
Location: north side of Japonski Island on State Tidelands and uplands adjacent to U.S. Coast Guard Air Station Sitka and Sitka Airport.
Current Size: Approximately 3 acres
Facilities and Uses: Trail along gentle beach fringe permitting picnics, wading, walking, sightseeing, viewing marine wildlife and birds, and other public use of the tidelands area outside of the fenced Coast Guard and Sitka Airport area.
Background: This park area has been utilized throughout history as a public use park area, and has remained accessible for public use due to its long historic public access even though the airport and Coast Guard areas have become more secure around it. As a result it is now a day-use area only.

Meets and Bounds Legal Description of the Portion of Lot 1 of USS 1496 that is the access to and uplands associated with what is popularly referred to as "John Brown's Beach", Sitka Alaska:

Beginning at the meander corner between meanders 47 & 48 of USS 1496 according to the plat approved Aug 27 1926, thence following along the meander line in a clock-wise direction which per said plat traces

meander line 48: N 62°41' W 85.8'; thence along
meander line 49: S 85°35' W 91.74'; thence along
meander line 50: N 7°58' E 335.94; thence along
meander line 51: S 87°41' E 118.8; thence along
meander line 52: N 17°10' E 229.02; thence along
meander line 53: S 83°13' E 292.38; thence leaving the meander line
S 35° E 240'; thence
S 40° W 40'; thence
N 50° W 250'; thence
S 80° W 100'; thence
S 21° 4' W 493.58' to the point of beginning,
enclosing an area of about 3 acres.

Starrigavan Valley Recreation Area

This multi-faceted recreation project is featured on page 40 (A-156) of the Sitka Parks and Recreation Plan. Starrigavan Creek, an anadromous fish stream which runs down Starrigavan Valley to the large highly productive Starrigavan estuary where a covered bird-viewing platform/Estuary Trail are located, and out into Starrigavan Bay, forms the heart of the Starrigavan Valley Recreation Area.

Since the completion of the Plan, the State Parks Forest and Muskeg Trail to the south and Mosquito Cove Trail to the north have all been completed, as has the State's Pedestrian Walkway from Old Sitka State Historic Site to the end of the road. These trails provide excellent opportunities to complete walking loops through the Starrigavan Valley Recreation Area. The STARR project was a multi-agency project including the City and Borough of Sitka, State of Alaska Division of State Parks, State of Alaska Department of Transportation and Public Facilities, and USDA Forest Service. However, the Sitka Coastal Management Program Starrigavan Valley Recreation Area cannot include any Federal lands or facilities. Therefore, the Starrigavan Campground, described on page 39 of the Sitka Parks and Recreation Plan, is a USDA Forest Service facility and it and its adjacent bird-viewing platform/Estuary Trail are EXCLUDED from this recreation area.

Pioneer Park

Facility Operator: Pioneer Park, which was a State Recreation Site at the time of the Parks and Recreation Plan (page 33/A-150), has now been returned to the City and Borough of Sitka for ownership and management.

Sandy Beach

Sandy Beach is described on page 34 (A-151) of the Sitka Parks and Recreation Plan. It is owned by the State of Alaska seaward of 9.1 Mean High Tide (MHT). While the description of Sandy Beach in the Plan includes the upland U.S. Forest Service-owned parking lot, the recreation area includes only the actual Sandy Beach recreation area below Mean High Tide and EXCLUDES the Federal uplands.

Makhnati Island Japonski Causeway

The Japonski Causeway linking the World War II defense facilities on eight islands westward from Japonski Island via a causeway is owned by the Federal government, and the islands they link by the State of Alaska. This extremely important historic and recreational area was discussed in two places in the 1993 Sitka Parks and Recreation Plan, on page 9 (A-125) under "Critical Issues for Implementation", and on page 12 (A-128) under "Disbursed Recreation". The Plan stated, "The Japonski Island causeway constitutes a great potential recreation area for both residents and visitors." The Plan recommended that funding and status be acquired to dedicate this area as a World War II Memorial Park.

After more than two decades of effort to move in this direction, the State Parks Citizens Advisory Board, in cooperation with Sitka Trail Works, Inc. and the City and Borough of Sitka, are formally requesting that the State of Alaska legislatively designate the Causeway the Fort Rousseau Causeway State Historic Park, and acquire full ownership of all the lands and tidelands necessary to protect and manage the Park for the future. Sitka Trail Works has secured several large Federal and State grants to help renovate the crumbling historic structures, restore pedestrian access, and interpret the area. It is hoped legislation can be passed during the 2007 Alaska Legislative Session to establish an LDA and allow acquisition of the additional lands and management oversight to proceed.

Fort Rousseau is an extremely important historical site of great cultural and scenic value to the State of Alaska and the nation. During World War II the Army Coastal Defenses built fortifications around Sitka Sound to protect the Sitka Naval Operating Base and air station. The Fort Rousseau site is composed of an 8,100 foot rock causeway linking 8 islands.

All the original concrete structures built by the military are still in fair to good condition. They include a tri-level command post, anti-aircraft gun batteries, three ammo magazines and two bunkers. Construction of the Sitka Airport in the late 1960's eliminated pedestrian and vehicle access to the Causeway. For the past 30 years the site was passively managed as part of the Sitka Airport. Vandalism occurred, trash accumulated, and thick brush chocked the old roadbed and the wooden historic structures deteriorated.

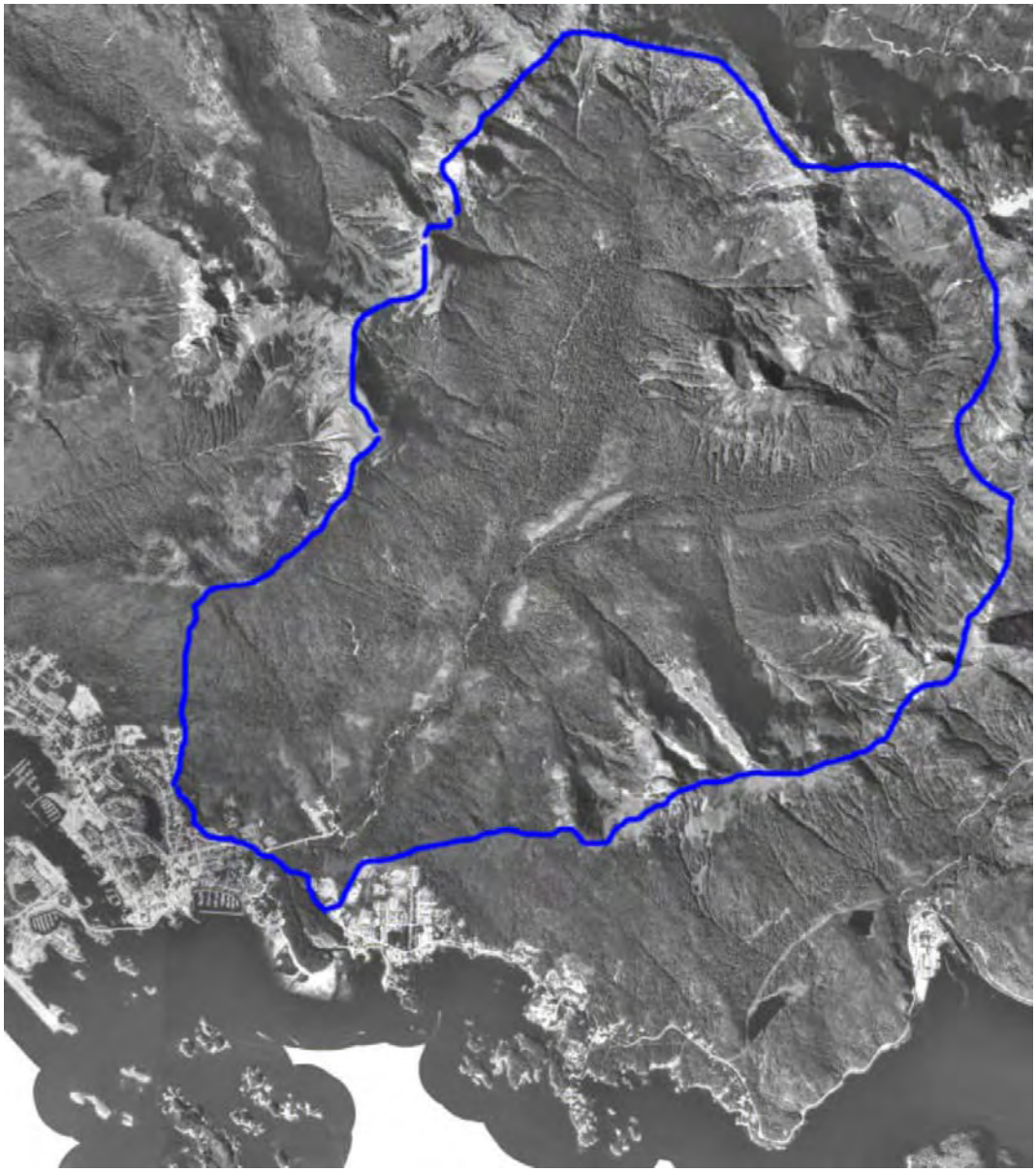
Management of the area is being transferred from the Alaska Department of Transportation and Public Facilities to the Department of Natural Resources. A clean-up of the site by Sitka Trail Works has begun, and unsafe conditions are being corrected. An environmental assessment and business plan are proceeding. The recommendations from the Parks and Recreation Plan, including obtaining funding for improved boat access, are being implemented. It is hoped that within a year or two all management issues can be resolved, and the State can acquire final title to the entire facility and manage the Fort Rousseau Causeway State Historic Park as part of the Sitka State Parks system.

Lands included in AS 41.21.191 (b): Subject to valid existing rights, the land and water presently owned or managed by the State, and all land and water acquired in the future by the State, lying within the following described boundary, are hereby designated as the Fort Rousseau Causeway State Historic Park. Land and waters within Township 56 South 63 east of the Copper River Meridian described as: Section 2: That portion of Lot 86 within section 2; That portion of Lot 86A within section 2. Section 3: E1/2 SE l/4 NW l/4 NE l/4 NW l/4; E l/1 NE l/4 SW l/4 NE l/4 NW l/4; NW l/4 SE l/4 NE l/4 NW l/4; SW l/4 NE l/4 NE l/4 NW l/4. Lot 74. Lot 75. Lot 75A. Lot 76. That portion of Lot 77 within Section 3. Lot 78. Lot 78A. Lot 79. Lot 80. Lot 80A. Lot 81. Lot 81A. Lot 82. Lot 82A. That portion of Lot 83 within section 3. Lot 84. Lot 84A. Lot 85. Lot 85A. That portion of Lot 86 within section 3. That portion of Lot 86A within section 3. Lot 87. Lot 88. Lot 89. Lot 90. Lot 91. Lot 92. Section 4: That portion of Lot 77 within section 4. That portion of Lot 83 within section 4. This includes approximately 58.34 acres of uplands, 14.99 acres of filled tidelands, and 6 acres of submerged lands for total park acreage of 79.42 acres.

The Sitka Coastal Plan includes the Makhnati to Japonski Island Causeway as a designated recreation area in Policy 3.4.

INDIAN RIVER CORRIDOR AND WATERSHED MASTER PLAN

CITY AND BOROUGH OF SITKA, ALASKA



Final Master Plan
October 2004

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CITY AND BOROUGH OF SITKA

RESOLUTION NO. 2004-30

A RESOLUTION OF THE ASSEMBLY OF THE CITY AND BOROUGH OF SITKA, ALASKA SUPPORTING THE INDIAN RIVER CORRIDOR AND WATERSHED MASTER PLAN

WHEREAS, a portion of the Coastal Impact Assistance Program grant was used to permit the City and Borough of Sitka to develop a master development plan for Indian River corridor and watershed, and

WHEREAS, the mission of the Master Plan was to inventory the resources, existing conditions and potential development within the Primary Study Area of the Indian River Watershed and develop a plan that protects the watershed resources while encouraging responsible residential, commercial, industrial, cultural and recreational development; and

WHEREAS, the Master Plan is intended to promote community understanding of the assets and issues in the watershed and will be used as a guideline for future conservation, recreation, and municipal development; and

WHEREAS, Indian River and its riparian zone may be included as a designated site in the Sitka Coastal Program's current revision to permit the Sitka Plan's anadromous stream setback policy to be maintained in this important river corridor;

NOW, THEREFORE, BE IT RESOLVED by the Assembly of the City and Borough of Sitka, Alaska that Sitka endorses the Indian River Corridor and Watershed Master Plan to guide development and maintain the water quality of the Indian River Corridor and Watershed.

PASSED AND APPROVED by the Assembly of the City and Borough of Sitka, Alaska on this 12th day of October, 2004.

Fred Reeder, Mayor

ATTEST:

Colleen Pellett, CMC
Municipal Clerk

INDIAN RIVER CORRIDOR AND WATERSHED MASTER PLAN

Prepared for:

City and Borough of Sitka
100 Lincoln Street
Sitka, Alaska 99835

Prepared by:

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Mark B. Sherman, P.E

In association with:

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Klawock, Alaska
Mark Storm, P.E.

Aquatic Sciences, Inc.
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Dr. Liz Flory, PhD

October, 2004

Funding for the Indian River Corridor and Watershed Master Plan was provided by a Coastal Impact Assistance Program grant administered by the Office of Ocean and Coastal Resource Management, National Oceanic and Atmospheric Administration, U.S. Department of Commerce

Executive Summary

The City and Borough of Sitka developed the Indian River Corridor and Watershed Master Plan as a tool for encouraging and managing responsible development within the Indian River watershed. The Master Plan document is a guide and resource for project planning, development and watershed management that protects watershed assets that were identified as important to the Sitka community.

The first phase of the Master Plan developed a comprehensive inventory of watershed assets. Because of the limited budget resources for the project, the watershed was divided into Primary and Secondary areas for study and inventory purposes. The Primary study area south of the Tongass National Forest boundary and north of Sawmill Creek Road was considered the area most likely to see development that could potentially have an adverse impact to the watershed. The majority of the project resources were devoted to the inventory in this area, and the inventory was limited to those items that were most likely to affect or be impacted by changes in water quality and fish habitat. Separate chapters of the Master Plan, including figures, charts, tables and maps were devoted to each of the following topics:

- **Property Ownership**
  A comprehensive list and maps of all of the major property owners within the watershed.
- **Hydrology and Water Resources**
  Includes descriptions of the watershed hydrology, water protection devices and structures in place, water resources including municipal, fish hatchery and hydropower, and a discussion and summary of water rights. Includes hydrological maps, tables and figures.
- **Recreational Trails and Historical Areas**
  Describes the current trail systems and recreational facilities, and provides information on historical and cultural backgrounds and issues in the watershed. Includes a map of the current trail system.
- **Wetlands**
  Provides an overview of different types of wetlands to be found in the watershed and describes some of the permitting requirements for developing wetlands. Includes a map of the probable wetland areas.
- **Utility Infrastructure**
  Summarizes the various types of utility infrastructure that are currently in place including water, sewer, electric, storm drains and roads, and includes maps of the utility infrastructure.
- **Solid Waste**
  Provides an overview of solid waste issues and concerns in the watershed and shows the solid waste features on a map.

- **Existing Permits and Planning Documents**
  Includes a discussion and summary of current permits that have been issued for projects within the watershed and a summary of relevant planning documents that could impact project planning and development.
- **Proposed and Potential Development**
  Provides an overview of projects that are in various stages of planning and development within the watershed and shows the projects on maps. Includes an analysis of projected land development area requirements.
- **Fish Habitat and River Environment**
  Presents and summarizes the fish habitat and river environment field studies that were preformed to support the Master Plan, analyzes potential development impact, and provides recommendations to maintain water quality and fish habitat in the riparian areas of the watershed. Includes a series of maps showing fish habitat and river environment conditions.

At the conclusion of the Inventory tasks, a list of potential improvement projects was developed. Chapter 11 describes potential watershed improvements for the current level of development that will protect and enhance water quality and fish habitat and provides a scope of work and cost estimates for these projects.

Finally, Chapter 12 includes a discussion of watershed protection best management practices, current management tools, and recommendations for future management guidelines.

Mission Statement

Our mission is to inventory the resources, existing conditions and potential development within the Primary Study Area of the Indian River Watershed and to develop a plan that protects the watershed resources while encouraging responsible residential, commercial, industrial, cultural and recreational development that is consistent with community needs and governmental regulations. The Master Plan is intended to promote community understanding of the assets and issues in the watershed and will be used as a guideline for future conservation, recreation and municipal development.

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Introduction

The Indian River Watershed in Sitka is currently used as a scenic, educational, historical, cultural, recreational, industrial, water supply and bird and fish habitat resource. Existing development includes Sheldon Jackson College, the Alaska Raptor Center, the Public Safety Academy, residential subdivisions, a rock quarry, a backup municipal water supply, the Sitka National Historical Park, recreational hiking trails, cemeteries and other facilities. Sitka is also a growing community, and the City and Borough of Sitka recognized the potential for additional development within the watershed, and also acknowledged the need to conserve and protect the existing resources that help define the community. The Indian River Corridor and Watershed Master Plan project grew out of the awareness that a proactive role was needed to ensure that future development in the watershed was consistent with the Sitka community's needs and interests.

The City and Borough of Sitka has asked *Summit Consulting Services*, and their sub consultants Dr. Liz Flory, PhD. of *Aquatic Sciences, Inc*. and Mark Storm, P.E. of *Keta Engineering* to produce a Master Plan document that accurately describes the current conditions in the watershed, identifies critical and valuable community assets, and provides guidelines for development that protect and enhance the resources of the Indian River Watershed. Dr. Flory researched and developed information of fish habitat and river environment and Mr. Storm assisted with the hydrological and hydraulic evaluation of the watershed study area.

Master plans are guidelines for development of a resource that is valued by the community. The Master Plan will be used to guide future development of the Indian River Watershed in accordance with needs and desires of the local community and within the limitations imposed by available funding, local, state and federal government regulations and development requirements. There are diverse needs, values and viewpoints within the Sitka community; a good master plan takes all these considerations into account when planning resource development. Sitka residents value the scenic, cultural and recreational aspects of the Indian River, yet also recognize that it is vital to the economic health of the area to permit and encourage the responsible development of the land and resources. The Indian River Corridor and Watershed Master Plan will be a key tool in ensuring that necessary development is accomplished in an environmentally and culturally sensitive and acceptable manner.

In order to narrow the focus of the Master Plan and to accomplish as much as possible with the limited funding available for this project, the watershed was divided into two sections: The Primary Study Area, from Sawmill Creek Road north to the northern edge of Sheldon Jackson College property, and the Secondary Study Area, south of Sawmill Creek Road to the mouth of the river, including the Sheldon Jackson College campus and the Sitka National Historical park, and north of the SJC property line into the Tongass National Forest. The majority of the inventory and planning effort is focused on the Primary Study Area. The Secondary Study Area is included in general discussions of the watershed to the extent that they impact the watershed with development plans.

The Master Plan process was divided into a series of tasks, identified as follows:

Task 1 – Refine the Scope of Work
Summit Consulting Services met with the City and Borough of Sitka (CBS) in November of 2003. The Master Plan format and the scope of work were refined to meet the needs of the CBS staff and still permit the work to be completed within the available budget. A preliminary schedule was also determined.

Task 2 - Inventory
The Inventory task developed an inventory of the existing resources within the Primary Study Area. Chapters 1 through 10 of the Master Plan include inventories and discussion of the following items:

- Property ownership.
- Watershed hydrology and water resources, including drinking water, water rights and hydroelectric resources.
- Recreational trails and historical areas.
- Wetlands.
- Utility infrastructure including water, sewer, electric, storm drains and roads.
- Solid waste issues.
- Current development and environmental permits and conditions.
- Current and planned subdivisions and other proposed developments.
- Fish habitat and river environmental inventory.

In addition to developing an inventory of the Indian River Watershed, the consultant met with watershed landowners and agencies that have regulatory oversight responsibilities within the watershed. In order to make this task more efficient, the Indian River Working Group (IRWG) was formed. IRWG member met periodically with the consultant, both individually and in group meetings and provided information essential to the completion of the Master Plan. A list of the IRWG members is included in Appendix A of the master Plan. Appendix B includes a list of some of the source documents that were used as to provide background information for the Master Plan.

Task 3 - Community Meeting on Inventories
The findings of the Inventory Task 2 were presented in an open community meeting on March 17, 2004 in Sitka, and public comment and input into the Master Plan process was solicited. In order to further enhance the public notification and input process, an electronic PDF version of the draft Master Plan was developed and posted on the City and Borough of Sitka web site, www.cityofsitka.com. The draft Master Plan was periodically updated on the web site as comments were received.

Task 4 - Development of Potential Watershed Improvements for Existing Development and Management Guidelines for Future Development
Based on the findings of the Inventory Task and input from the IRWG and the general public, specific projects were identified that could help maintain the water quality and fish habitat within the existing developed areas of the watershed. Rough order-of-

magnitude cost estimates for these improvements were developed, and the information was presented in Chapter 11.

Chapter 12 of the Master Plan recommends management guidelines and strategies that will limit the impact of future proposed and potential development on water quality and fish habitat. The goals of the management guidelines are to prevent any degradation in water quality or fish habitat, and to maintain the current hydrological characteristics of the watershed, including peak runoff flows and sediment loads in the storm water.

Task 5 - Public Meeting on Potential Watershed Improvements and Future Development Management Guidelines

IRWG and public meetings were held to review the proposed watershed improvement and management guidelines strategies. Meetings were held in Sitka on September 15, and September 21, 2004.

Task 6 - Refinement of Potential Watershed Improvements and Future Development Management Guidelines

The watershed management strategies identified in the previous task were revised and refined based on public and IRWG comments. The final Master Plan was presented to the City and Borough of Sitka Assembly on October 21, 2004.

Task 7 - Publication of Summary Brochure and Final Master Plan

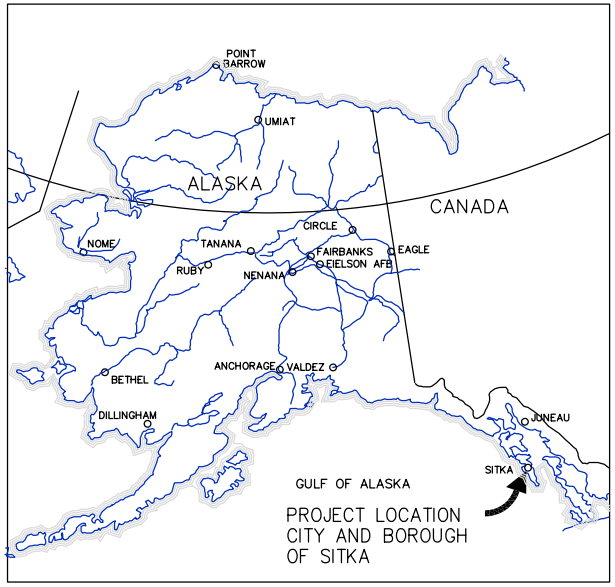
Thirty copies of the final Master Plan and 30 copies of a Master Plan summary were prepared and submitted to the City and Borough of Sitka. In addition, 3 unbound copies of the Master Plan with 11 x 17 color maps and digital copies of all Master Plan documents were also provided. The Final Master Plan was also posted to the cityofsitka.com website.

Chapter 1: Study Area

Indian River is located about one mile east of the center of Sitka on Baranof Island in Southeast Alaska, as shown in the general location and vicinity map on Figure 1, page 7. The Master Plan study divides the watershed into two separate areas: The Primary Study Area, bounded by Sawmill Creek Road on the south, the northern edge of the Sheldon Jackson College property on the north, and by the Indian River Watershed drainage boundaries on the east and west. The Secondary Study Areas are the watershed drainage to the south of Sawmill Creek Road, primarily the Sheldon Jackson College campus and the Sitka National Historical Park, and the Indian River Watershed to the north of the Sheldon Jackson property. The Primary and Secondary Study Area boundaries are shown on Figure 2, page 9. The Primary Study Area is approximately 1,300 acres, and the secondary study area is approximately 6,600 acres. The decision to divide the study into two areas was based on the likelihood that most development within the watershed will take place within the Primary Study Area, enabling the limited Master Plan budget to focus on developing an inventory of the watershed resources in areas most likely to be impacted by future development plans. The Secondary Study Areas, although important to the health of the watershed, are either already mostly developed (SJC or Sitka National Historical Park to the south) or will likely remain undeveloped (national forest and state land to the north).

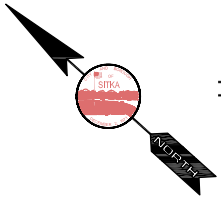
Also shown on Figure 2 is the outline of the base map photo coverage. The City and Borough of Sitka is in the process of developing a Geographic Information System mapping project, and has recently completed detailed aerial mapping of the Sitka vicinity. The photo coverage, although not completely covering the entire Primary Study Area, is very high resolution, and provides a good visual background to help in developing the inventory and understanding of the watershed in the Primary Study Area.

Figure 3, page 11, is a larger scale map of the Primary Study Area, with the study area boundaries shown in red.



LOCATION MAP

VICINITY MAP



Appendix-9

SUMMIT
PROJECT MANAGEMENT, INC.

INDIAN RIVER CORRIDOR AND WATERSHED MASTER PLAN

CITY AND BOROUGH OF SITKA, ALASKA

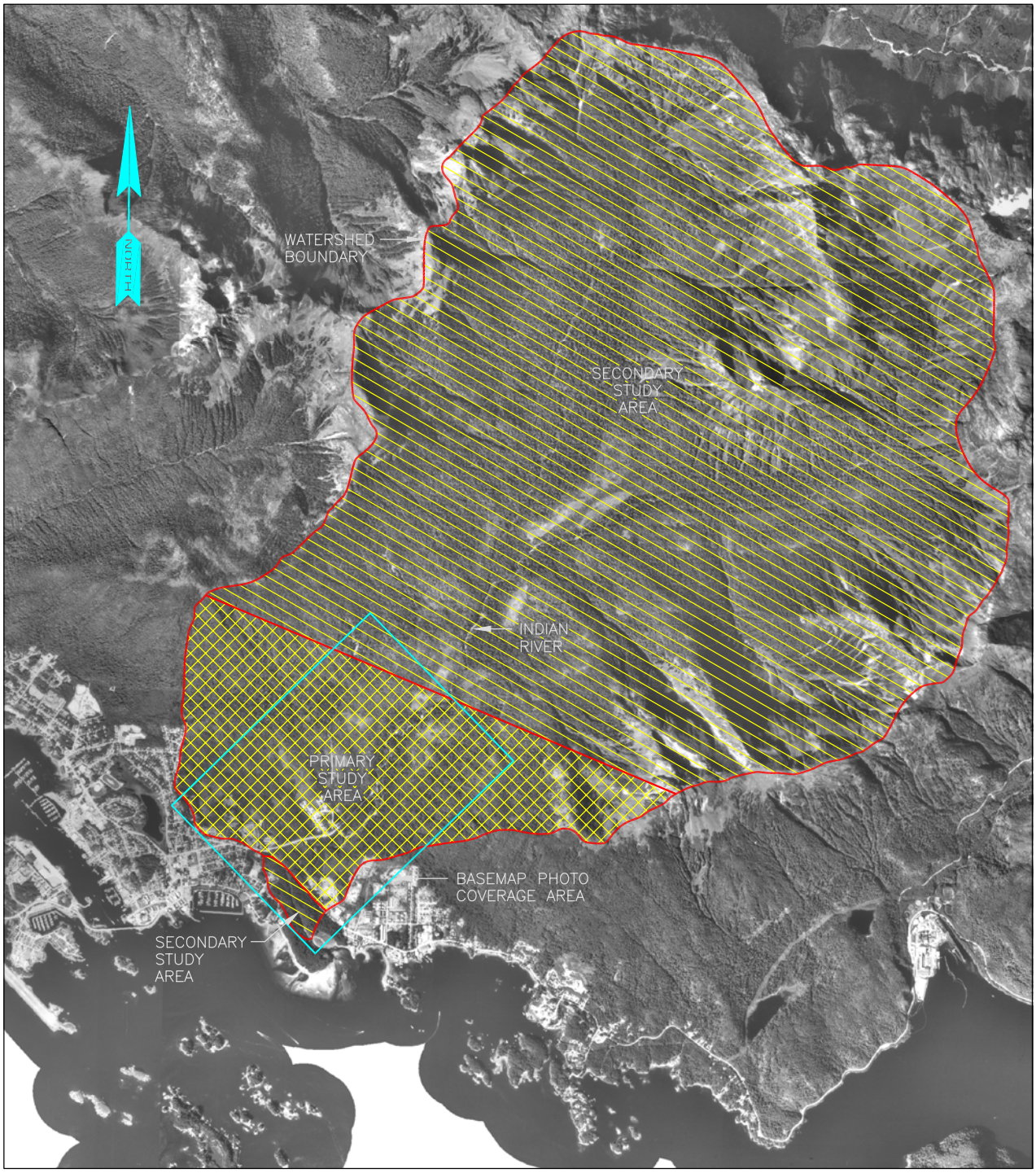
LOCATION AND VICINITY MAPS

FIG 1

December 2006

INDIAN RIVER WATERSHED

APPROXIMATE SIZE: 7900 ACRES



PRIMARY STUDY AREA: 1300 ACRES	NORTH OF SAWMILL CREEK ROAD TO THE NORTHERN BOUNDARY OF SHELDON JACKSON PROPERTY
SECONDARY STUDY AREA: 6600 ACRES	NORTH OF THE SHELDON JACKSON PROPERTY LINE, SOUTH OF SAWMILL CREEK ROAD

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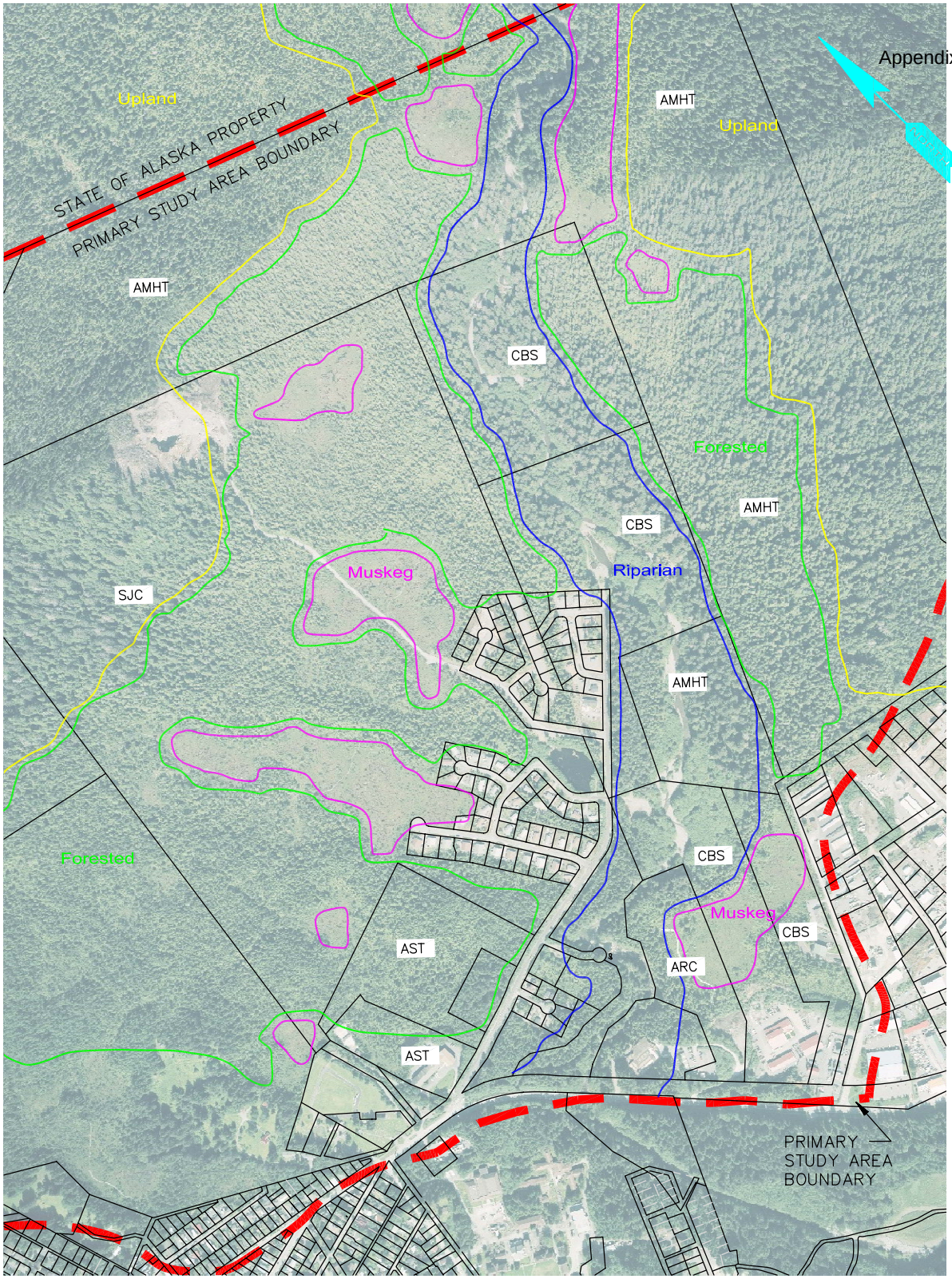
INDIAN RIVER CORRIDOR AND WATERSHED MASTER PLAN

CITY AND BOROUGH OF SITKA, ALASKA

PRIMARY AND SECONDARY STUDY AREAS

FIG 2

SCALE: 1" = 2840'



WETLAND BOUNDARIES

RIPARIAN

FORESTED

MUSKEG

UPLAND (NON WETLAND)

NOTE: REF. CHAPTER 5 AND FIG. 8 FOR ADDITIONAL WETLANDS INFORMATION.

PRIMARY STUDY AREA: SAWMILL CREEK ROAD TO NATIONAL FOREST BOUNDARY, BOUNDED BY THE RIVER WATERSHED ON THE EAST & WEST

PHOTOGRAPHIC BACKGROUND: BASED ON 2003 AERIAL PHOTOGRAPHY BY DELTA AERIAL SURVEYS

MAJOR PROPERTY OWNERSHIP:
AMHT – ALASKA MENTAL HEALTH TRUST
ARC – ALASKA RAPTOR CENTER
AST – ALASKA STATE TROOPERS
CBS – CITY & BOROUGH OF SITKA
SJC – SHELDON JACKSON COLLEGE

FOR ADDITIONAL PROPERTY OWNERSHIP REFERENCE FIGURES 4A AND 4B

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INDIAN RIVER CORRIDOR AND WATERSHED MASTER PLAN

CITY AND BOROUGH OF SITKA, ALASKA

PRIMARY STUDY AREA

FIG 3

SCALE: 1" = 600'

Chapter 2: Property Ownership

Property ownership within the watershed is a mixture of public and private entities, with the largest proportion of land in public ownership. Two maps, Figures 4A and 4B, have been prepared with property ownership information shown.

State of Alaska

In Figure 4A, page 17, the extent of State of Alaska-owned land in the upper watershed area is shown. The total amount of this area is approximately 1,427 acres, and was nominated by CBS and selected by the State of Alaska from land within the Tongass National Forest to be managed as a municipal watershed and for community recreation. The state land in the Indian River Watershed is designated Pr, Ru. The specific State of Alaska land use designations are as follows (from the Northern Southeast Area Plan, Alaska Department of Natural Resources): The State of Alaska also owns the submerged riverbed beneath Indian River to the extent granted by the Alaska Statehood Act, which grants ownership of navigable river beds to the State.

Pr – Public Facilities – Retain

These sites are reserved for a specific infrastructure to serve state interests. These units are classified Reserved Use Land and are not selectable by municipalities under state law (except under AS 38.05.810). Units designated "Public Facilities – Retain" will be retained in state ownership, while units designated "Public Facilities – Transfer" may be converted to municipalities, but not sold to individuals.

Ru – Public Recreation and Tourism – Undeveloped.

This designation applies to those areas that offer high potential for dispersed recreation or tourism and where desirable recreation conditions are scattered or widespread rather than localized. Developed facilities are generally not necessary other than trails, trail signs, primitive campsites and other minor improvements. Land in this designation may be conveyed to municipalities depending on the unit's management intent and the relative value of the recreation resources for which the unit was designated. These lands cannot be sold to individuals. This designation can also apply to tidelands. If used as a tideland designation, it applies to areas that are widely used for recreation by either commercial operators or the public and is usually associated with the use of fisheries or the viewing of a unique or scenic area. Use patterns are dispersed over a fairly large area, and few public facilities are provided other than boat launches, docks, and mooring buoys. Tidelands can be conveyed to municipalities under certain conditions, but cannot be transferred to individuals.

The Northern Southeast Area Plan management intent for the Indian River area is as follows:

"Parcel is to be retained in state ownership and managed to protect and maintained its public recreation and watershed values. The type of public recreation is intended to be

that associated with the dispersed recreation designation of Undeveloped Recreation. The Parcel should also be managed as a watershed. Development authorizations should be limited to structures related to public recreations or a water supply system, although easements and rights-of-ways are considered appropriate.

"This very large, flat parcel is drained by the Indian River. It is characterized by western Hemlock and Sitka Spruce in the better drained areas and is moderately sloping terrain. The remainder of the parcel is palustrine wetlands, primarily of a shrub or forested type. There are some riverine wetlands adjoining the Indian River. The parcel contains a number of trails which provide access to the remainder of Indian Valley, but also connect to the city's trail system, situated to the north and west. The trail system is used extensively for hiking during the summer months. This parcel also functions as part of the watershed for the community water system, providing the primary supply for the Sitka National Historic Park and the Sheldon Jackson University hatchery and functioning as the city's back up supply system. This parcel was selected for the purpose of watershed protection and community recreation."

Federal Lands

The remaining land in the upper watershed is part of the Tongass National Forest, and is managed by the U.S. Forest Service. National Forest Lands within the secondary study area and the 104-acre parcel within the Primary Study Area are designated as *Municipal Watershed* in the 1997 Tongass National Forest Land and Resource Management Plan. The emphasis of this Land Use designation is to provide protection of the municipal water supplies for the incorporated City and Borough of Sitka. U.S. Forest Service management prescriptions for lands designated as Municipal Watershed are:

Goals:

To maintain these watersheds as municipal water supply reserves, in a manner that meets State of Alaska Drinking Water Regulations and Water Quality Standards for water supply.

Objectives:

Limit most management activities to the protection and maintenance of natural resources. Fish habitat enhancements, and watershed and wildlife habitat improvements, may occur if they are compatible with the municipality's watershed management objectives.

Classify forested land as unsuitable for timber production. Salvage logging will only occur after consultation with the municipality.

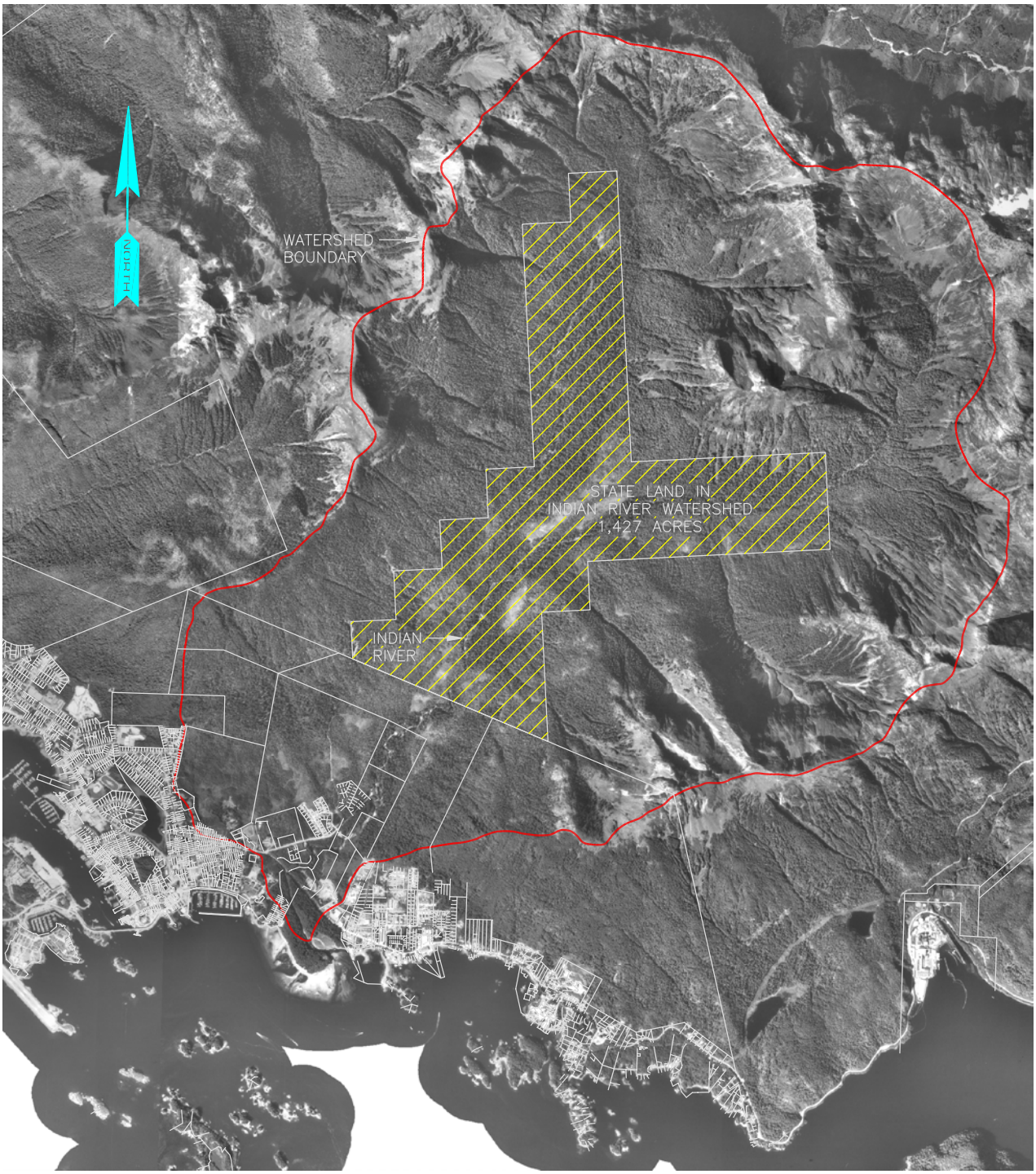
Recreation uses will be authorized by the Forest Service officer with delegated authority, in consultation with the municipality and will be limited to those that will protect water quality and flow.

Desired Condition:
Lands managed as Municipal Watersheds are generally in a natural condition. Facilities or structures to provide municipal water supplies may be present. Uses or activities that could adversely affect water quality or supply do not occur. These watersheds provide municipal water that meets all State Drinking Water Regulations and Water Quality Standards for water supply.

In Figure 4B, page 19, land in the Primary study is shown. The landowners are identified and the approximate size of their holdings is shown. The property ownership maps are based on information obtained from the CBS Planning Department, and the boundaries and lot sizes area approximate. Prior to any development work, a land survey is recommended for each specific project.

Primary Study Area Landowners
The major landowners and facilities are:

- State of Alaska Mental Health Trust (AMHT)
- U.S. Forest Service (USFS)
- State of Alaska Department of Public Safety (DPS)
  - Public Safety Academy
- City and Borough of Sitka (CBS)
  - Municipal Animal Shelter
  - Public Works Garage and Electric Substation
  - Solid Waste Transfer Station
- National Park Service (NPS)
  - Sitka National Historical Park
- US Coast and Geodetic Survey (USCG)
  - Geomagnetic Station
- Sheldon Jackson College (SJC)
  - Flume to Fish Hatchery
- Baranof Island Housing Authority (BIHA)
  - Kaasda Heen Shaak, Kadak w. Adi, Ashaak
- Alaska Raptor Center
- Sitka Counseling and Prevention Services (SC&PS) (leased from SJC and CBS)
  - Treatment Center
- Mick Tisher Construction Quarry (leased from SJC)
- Private landowners, Pamco Subdivision
- There are also a number of public cemeteries within the watershed.



NOTE: PROPERTY LINE LOCATIONS ARE APPROXIMATE, AND ARE BASED ON CITY OF SITKA PROPERTY BASEMAPS. REFER TO FIGURE 4B FOR ADDITIONAL INFORMATION ON PROPERTY OWNERSHIP IN PRIMARY STUDY AREA.

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INDIAN RIVER CORRIDOR AND WATERSHED MASTER PLAN

CITY AND BOROUGH OF SITKA, ALASKA

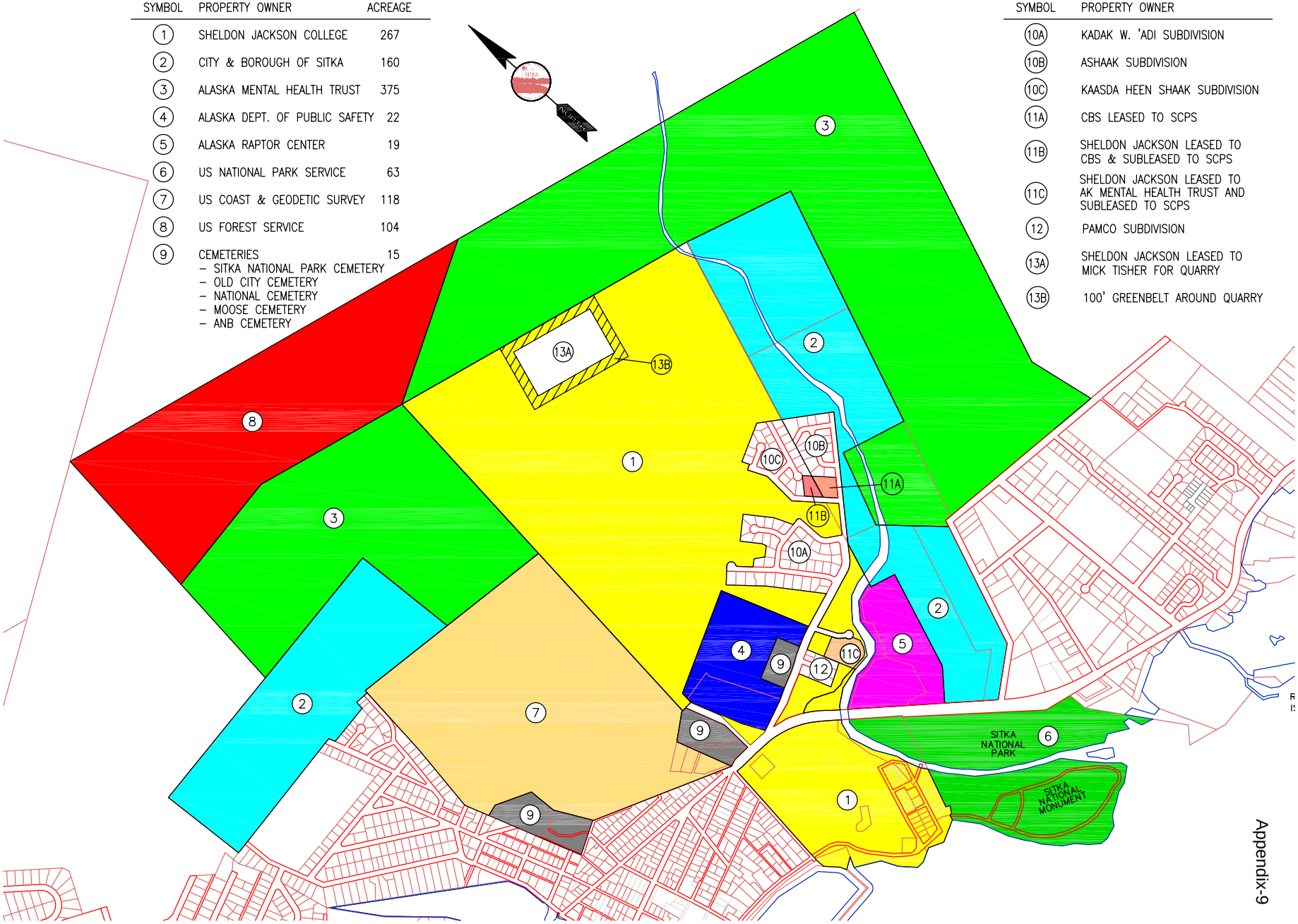
STATE SELECTED LAND IN TONGASS NATIONAL FOREST

FIG 4A

SCALE: 1" = 2840'

SYMBOL	PROPERTY OWNER	ACREAGE
1	SHELDON JACKSON COLLEGE	267
2	CITY & BOROUGH OF SITKA	160
3	ALASKA MENTAL HEALTH TRUST	375
4	ALASKA DEPT. OF PUBLIC SAFETY	22
5	ALASKA RAPTOR CENTER	19
6	US NATIONAL PARK SERVICE	63
7	US COAST & GEODETIC SURVEY	118
8	US FOREST SERVICE	104
9	CEMETERIES – SITKA NATIONAL PARK CEMETERY – OLD CITY CEMETERY – NATIONAL CEMETERY – MOOSE CEMETERY – ANB CEMETERY	15

SYMBOL	PROPERTY OWNER
10A	KADAK W. 'ADI SUBDIVISION
10B	ASHAAK SUBDIVISION
10C	KAASDA HEEN SHAAK SUBDIVISION
11A	CBS LEASED TO SCPS
11B	SHELDON JACKSON LEASED TO CBS & SUBLEASED TO SCPS
11C	SHELDON JACKSON LEASED TO AK MENTAL HEALTH TRUST AND SUBLEASED TO SCPS
12	PAMCO SUBDIVISION
13A	SHELDON JACKSON LEASED TO MICK TISHER FOR QUARRY
13B	100' GREENBELT AROUND QUARRY



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INDIAN RIVER CORRIDOR AND WATERSHED MASTER PLAN

CITY AND BOROUGH OF SITKA, ALASKA

PRIMARY STUDY AREA PROPERTY OWNERSHIP

FIG 4B

December 2006

Chapter 3: Hydrology and Water Resources

The hydrology and water resources section is divided into separate subsections: Hydrology; Water Resources; Water Rights; and Hydropower. Each section is preceded by an overall summary of the issues, and is followed by a more technical analysis and supporting documentation.

Hydrology Summary

Sitka and the Indian River Watershed are located on the outer coast of Southeast Alaska's Alexander Archipelago. Weather is influenced by the temperate maritime climate with frequent precipitation in all months throughout the year. Annual precipitation is approximately 90 inches in Sitka. Fall months are the wettest and late spring months are the driest. Precipitation in the watershed is higher than in town due to the orographic effects produced by the mountains. Figure 5, page 23, illustrates the hydrological features of the study area.

Fall months generally have the highest streamflows. These events are usually the result of large sustained precipitation events in the basin. Streamflow in Indian River closely corresponds to precipitation events. The basin's lack of lakes, high drainage density (miles of stream per acre of watershed), generally shallow soils, steep upper slopes and relatively small size make streamflow peaks mirror precipitation peaks with only a short lag in time between the two.

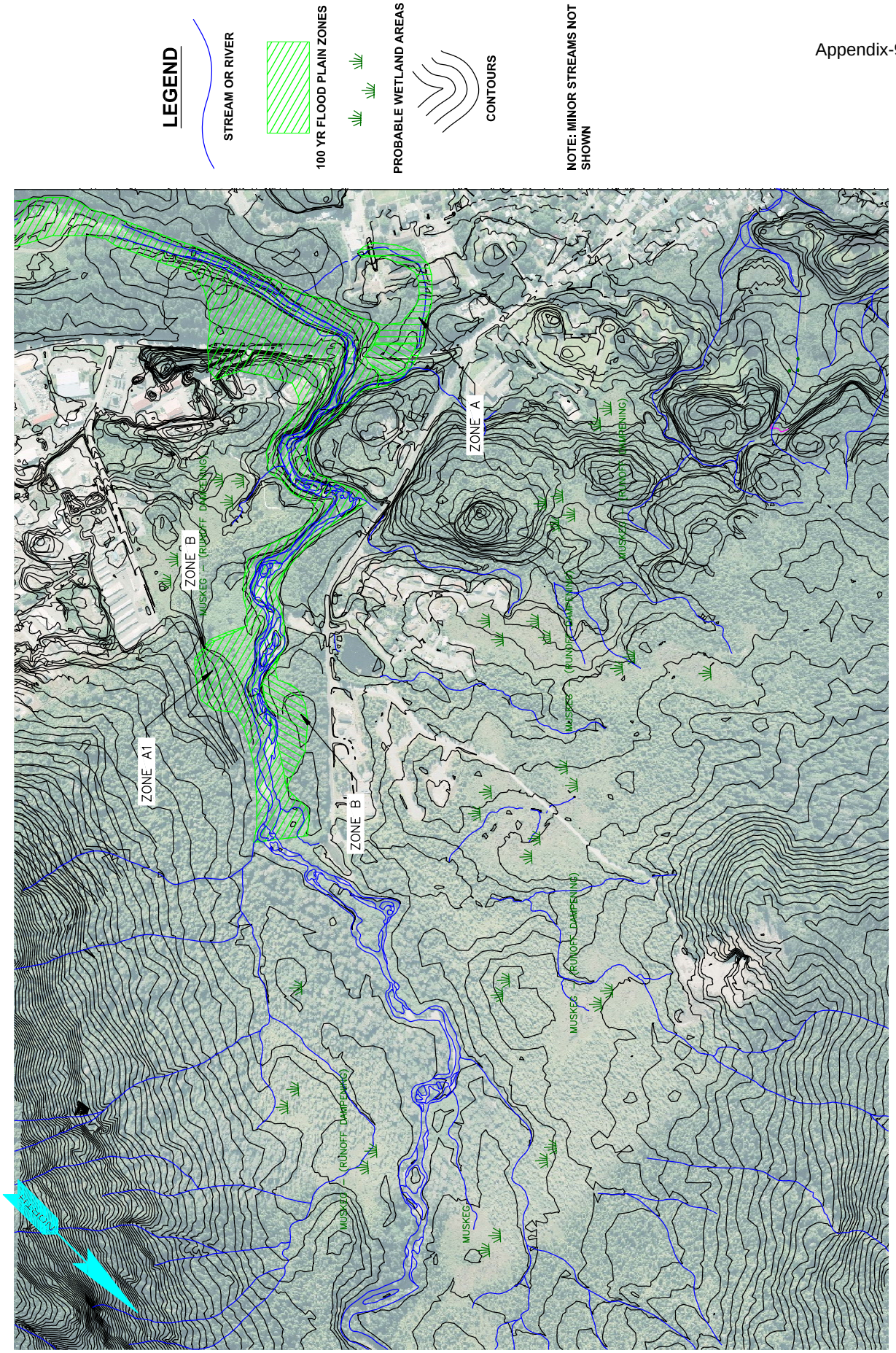
Muskeg wetlands are present in much of the watershed, particularly in the relatively level benches above the valley floor. These muskeg wetlands general locations are illustrated on Figure 5, page 23. The muskegs help to attenuate streamflows by detaining precipitation and releasing it as runoff more gradually over time than if the precipitation had fallen on other surfaces that make up the watershed. This process dampens runoff peaks from tributary streams draining the muskeg areas thereby reducing peak flows in Indian River. Similarly, baseflows are augmented by the gradual releases of water that is stored in the muskegs. These releases help to bolster low flow levels in Indian River when runoff from other areas is minimal or nonexistent. This function of runoff attenuation that the muskeg areas produce is valuable to reduce flood peaks (and therefore flood damage) and also to maintain flows to provide habitat and a source of water for consumptive uses during extended dry and/or sub-freezing conditions.

Stream discharge and water quality measurements have been made by the U.S. Geological Survey (USGS) at several stations over a period of years. Water quality measurements made by the USGS for SNHP reveal that water quality is good for all parameters examined. Water quality in Indian River has shown little variation between pristine upstream locations and reaches downstream of existing development where development-related impacts might be expected to be present. USGS Gage 15087690 is located a short distance upstream of the end of Indian River Road and has the longest period of record (POR) of all gages on the system. This station was operated between

1980 and 1993. The gage was re-established in 1998 and is presently being operated and maintained by USGS. Data was available through water year 2001 for an available POR of 17 years. Respective streamflow and precipitation data from this gage and the weather station located at the airport are summarized in the hydrology technical memorandum following Figure 5, page 23.

Low flows can occur in any month in Indian River, but are most severe in late winter and in summer months. Fall months have higher flows due to the frequent storms from the Gulf of Alaska that bring precipitation to the watershed. Streamflow in the spring months is supplemented by snowmelt and low flows during these months tend not to be as severe due to this additional input.

Annual peak flows are most likely to occur in the late summer, fall and winter months when heaviest precipitation occurs. No annual peak flow events have occurred in spring and summer months (March through July) during the periods of recorded streamflow in Indian River.



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INDIAN RIVER CORRIDOR AND WATERSHED MASTER PLAN

CITY AND BOROUGH OF SITKA, ALASKA

HYDROLOGY

FIG 5

SCALE: 1" = 600'

Water Resources Summary

Water resources in the Indian River Basin are comprised of both natural and man-made features. Natural features include the river channel and floodplain corridor which provide recreational areas, habitat for fish and wildlife and provision and protection of water for consumptive use. Water resources features in the project area are illustrated in Figure 6A, page 27.

Muskeg wetlands provide a resource in the basin for attenuating river flows and for promoting sedimentation and filtration to naturally treat stormwater runoff. Muskegs are illustrated on Figure 5, page 23. These areas represent probable wetlands areas as determined through aerial photo interpretation and the limited field investigations conducted. The areas illustrated in Figure 5, page 23 are intended for planning purposes and are not intended as a formal wetland delineation such as may be required for permitting purposes. A detailed and site specific wetlands delineation and mapping effort is beyond the scope of this project due to budget constraints.

Several hydraulic structures exist in the Indian River Watershed. CBS owns and operates a run-of-the-river diversion facility at approximately river mile 1.4. This facility was the City's primary source of water but is now operated only as a backup source since CBS developed the Blue Lake project. The existing diversion facility on Indian River is in jeopardy of failing if the river changes its course. The river channel braids upstream of the diversion and threatens to abandon its right braid (which feeds the CBS intake) in favor of the left braid. The dam exacerbates depositional and erosional processes that are causing the channel to change course. Figure 6B, page 37 illustrates these processes that are currently underway in the reach of Indian River where the CBS water intake is located. The Indian River water intake in its current condition most likely will not be able to meet CBS water demand without significant renovations.

Stormwater detention and treatment facilities exist in the Indian River Watershed in the BIHA subdivision areas. These facilities consist of a detention pond with smaller basins that are connected and provide additional detention for large runoff events. These basins provide primary treatment of stormwater runoff by promoting sedimentation of particulates. Grass-lined ditches and swales also exist in this area and provide treatment, detention and retention of stormwater via bio-filtration, controlled release and infiltration respectively. Stormwater detention and treatment areas are shown on Figure 6B, page 37.

SJC owns and operates a dam on lower Indian River. This facility supplies water to the SJC hatchery and, until 1988, also powered a small hydroelectric turbine on the SJC campus. This facility does not have any significant storage volume and therefore provides no flood attenuation. The facility does promote deposition of bed material in its pool. This sediment is not able to migrate downstream of the dam. This may be increasing channel scour in reaches downstream of the dam.

Two existing bridges cross Indian River within the Primary Study Area. The Sawmill Creek Road Bridge and an adjacent pedestrian bridge cross Indian River just upstream of SNHP. Scour has occurred at the right-bank foundation of the pedestrian bridge causing

its failure. Some scour was also evident at the Sawmill Creek Road Bridge although this structure appeared to be in no imminent danger. A pedestrian bridge is planned to cross Indian River in the vicinity of an existing ruins of an abandoned log bridge near the BIHA subdivision. This site is shown on Figure 6A, page 27. The river at the site of the existing bridge ruins is braided and has low stream banks that provide good connectivity to the floodplain. Alternative sites where the river is better to suited to bridge crossing should be considered in lieu of the site of the log bridge ruins.

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INDIAN RIVER CORRIDOR AND WATERSHED MASTER PLAN
CITY AND BOROUGH OF SITKA, ALASKA

WATER PROTECTION STRUCTURES

FIG 6A
SCALE: 1" = 600'

Hydrology and Water Resources Technical Memorandum

This memo presents the findings of a field investigation and document review for Task 2A of the Indian River Watershed Master Plan. The investigation and research was intended to observe and characterize watershed's existing hydrological conditions within a planning context to assess impacts and results of past development and to identify water resources that are the most like to be affected by proposed development.

The Indian River basin was visited on November 18-20, 2003. During this period the basin was walked and conditions observed to characterize the basin. City and agency personnel were consulted to obtain data, reports, maps as well as to obtain anecdotal evidence of the of the Indian River Watershed's characteristics.

The weather was clear and dry in Sitka during the period when field investigation took place. Consequentially, surface runoff was not present in much of the basin. This made evaluation of storm drainage systems in existing developments difficult as no runoff was present. However, dry weather made good conditions for observing drainage having groundwater sources, e.g. muskeg sources, and for exposing much of the riverbed in the baseflow conditions that were present in streams of the Indian River Watershed at that time.

Watershed Climate and Hydrology

Sitka is located on the outer coast of Southeast Alaska's Alexander Archipelago. Weather is influenced by the maritime climate and precipitation is high throughout the year. Annual precipitation is approximately 89 inches at the NOAA NWS weather station (NWS Station cooperative ID 508494) located at the airport on Japonski Island near the Indian River Watershed. Precipitation varies greatly with locale in Southeast Alaska and precipitation is no doubt greater in the upper Indian River Watershed than it is at the airport weather station. Precipitation in the Sitka area is highest in the fall and winter. Winter precipitation falls as both rain and snow with snow predominating at higher elevations. Hydrological features in the study area are illustrated on Figure 5, page 23.

Stream discharge and water quality measurements have been made by USGS at several stations over a period of years. USGS Gage 15087690 has the longest period of record (POR) of these gages. This station was operated between 1980 and 1993. The gage was re-established in 1998 and is presently being operated and maintained by USGS. Data was available through 2001 for an available POR of 17 years. Average, minimum and maximum monthly streamflows in Indian River are illustrated in Chart 1, page 40.

Table 1, page 30 shows average monthly precipitation for the NOAA NWS weather station at Japonski airport and the corresponding average monthly streamflow at USGS Gage 15087690 expressed as inches of runoff from the watershed. The ratio of Indian River streamflow to airport precipitation is always greater than one. This reveals precipitation in the watershed is greater than at the airport weather station. The monthly streamflow/precipitation ratio's change from the annual ratio reveals basin water budget characteristics. Negative changes are seen in winter months and are indicative of water

being stored as snow in the basin. Highly positive changes, e.g. May and June, reveal snowmelt augmenting stream runoff.

Table 1: Average Monthly Precipitation, Stream Discharge and Ratios

Month	Precipitation (in) NWS Station 508494	Streamflow (in) USGS Gage 15087690	Ratio of Streamflow to Precipitation	Change of Ratio from Annual Average
January	7.40	11.5	1.55	-3.7%
February	6.19	8.4	1.36	-15%
March	5.95	7.3	1.23	-24%
April	4.76	7.7	1.62	+0.6%
May	4.63	12.3	2.66	+65%
June	3.44	10	2.91	+81%
July	4.27	7.3	1.71	+6.2%
August	6.76	9.8	1.45	-9.9%
September	11.11	19.2	1.73	+7.5%
October	13.43	21.7	1.62	+0.6%
November	9.62	11.4	1.19	-26%
December	8.65	11.8	1.36	-16%
	86.21	138.6	1.61	0%

Streamflow in Indian River is generally highest in the fall months of October and November. Peak flow events generally coincide closely with storm events. The Indian River Basin has no major lakes and relatively small amounts of depression storage areas for precipitation to be detained. Flood peaks usually occur within 24 hours of the peaks of precipitation events (Paustian 1998). Most annual peak flow events occur in the fall months. Table 2, page 32, shows the magnitude of peak flow events measured by the Indian River gage, their ranking and their month of occurrence. Table 3, page 32, shows the number of annual peak flow events for each month of the year. All peak flow events occurred in the fall and winter months reflecting the effects of heavy precipitation events that occur during the season. Annual peak flow events occurred in the fall months of August, September or October in 11 out of the 17 years of POR (65%).

Low Flow Events

Low flows in Indian River occur when sustained high-pressure weather systems produce fair weather in southeast Alaska. During these periods, baseflow conditions generally occur in streams throughout the entire region. These conditions can occur in any month, though the lowest flows are not likely to occur in late spring i.e., May and June, when snowmelt adds to baseflow levels. Winter low flows are usually the lowest flows experienced annually in Indian River. Indian River's lowest annual flows have occurred during the winter months in 13 of the 17 years of stream gaging (72% of time). Summer and winter low flows average the same flow rate at 19.2 cfs each. The lowest recorded one-day flows in Indian River have occurred in winter months.

Water Quality

The USGS is currently studying water quality in Indian River in cooperation with the National Park Service. This study is examining water quality at both upstream areas where the basin is relatively pristine and downstream sites where development in the basin could affect water quality. Upstream and downstream areas have shown similar water quality throughout the range of flows where water quality measurements were made. Preliminary results of the draft USGS study indicate that Indian River has suffered minimal water quality impacts from development (USGS, 2003), although the study results may not be comprehensive enough to accurately forecast development influences on water quality throughout the study area. Water quality in Indian River can be generalized as follows:

- Indian River has a low buffering capacity with concentrations of dissolved ions and nutrients generally low in both the upstream and downstream sites. Total Alkalinity expressed as $CaCO_3$ ranged from 10 to 15 mg/l.
- Dissolved oxygen concentrations ranged from 11.2 to 14.1 mg/l and were nearly both equal at the upstream and downstream locations.
- Concentrations of major ions and dissolved solids were low at both sites.
- Nutrient concentrations (Nitrogen ions and Phosphorus) were low at both sites.
- Suspended sediment concentrations are low at both sites. Suspended sediment concentrations ranged from none detected to 4 mg/l and varied little between the two sites. Suspended sediment concentrations were higher when flows were higher in Indian River.

Development Influences

Existing development affects runoff processes in the Indian River basin. Roads and impervious areas associated with residential subdivisions provide a source of sediment and increase the volume and rates of stormwater runoff. Various contaminants can be adsorbed to sediment particles and conveyed to the stream by storm runoff.

Table 2: Annual Peak Flood Events for POR by Month

Event Rank	Discharge (cfs)	Month
1	6460	November
2	5710	September
3	5390	October
4	5080	August
5	4560	October
6	4060	November
7	3860	February
8	3320	October
9	3320	September
10	3270	December
11	3090	October
12	3080	October
13	2940	February
14	2820	October
15	2600	September
16	1780	January
17	1580	September

Table 3: Seasonal Occurrence of Annual Peak Flows

Month	No. of Annual Peak Flow Events	% of total Annual Peak Flows
August	1	6%
September	4	24%
October	6	35%
November	2	12%
December	1	6%
January	1	6%
February	2	6%

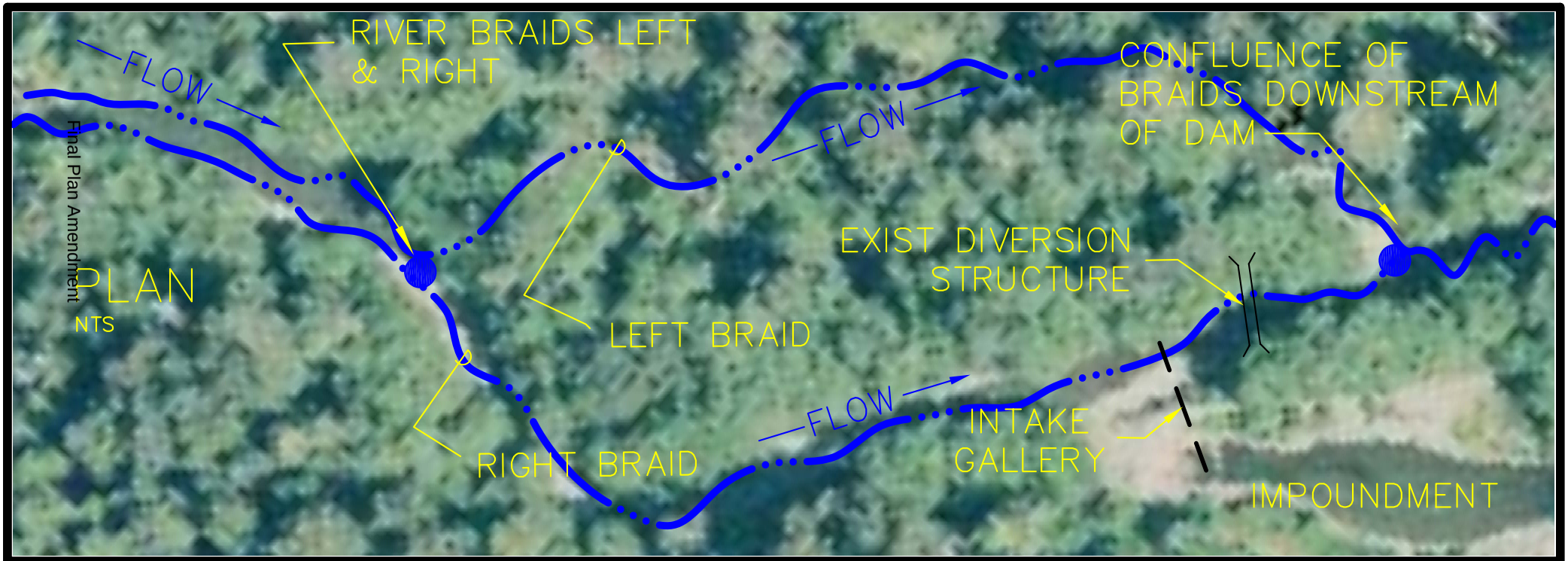
The existing drainage system employs several stormwater Best Management Practices (BMPs). These BMPs include stormwater detention ponds that reduce peak post-development flow rates and promote deposition of particulates that may carry adsorbed contaminants. Construction is ongoing in the subdivisions and several construction stormwater BMPs such as silt fences were observed in place during the site visit. Permanent BMPs generally appear to be in good condition. Lack of runoff during the field visits did not allow observation of BMP performance during storm-event conditions. Exposed earth in construction areas, while protected by temporary BMPs, is susceptible to erosion and transport to surface-water resources in the area and should be stabilized as soon as possible.

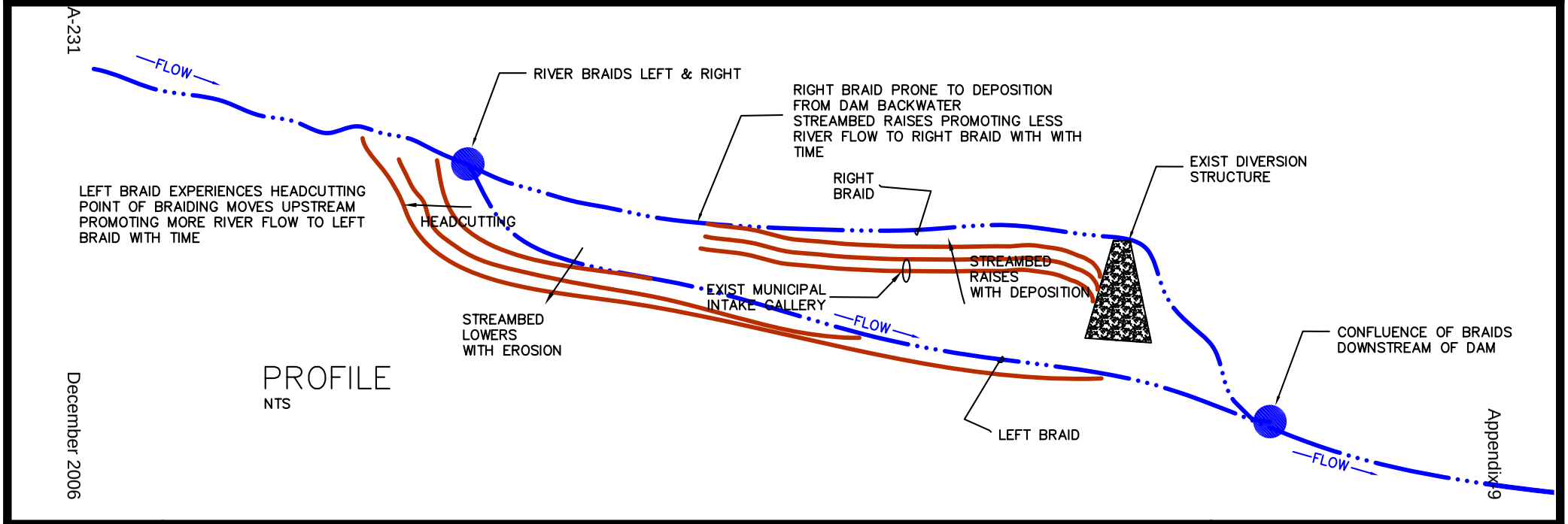
An existing culvert crosses Indian River Road at the corner of Naomi Kanosh Lane. This culvert acts as an overflow from the stormwater drainage system in the Ashaak

bypasses the CBS diversion structure. Flow entering the steeper left braid in turn leads to degradation of that channel which lowers the streambed and further encourages more flow to leave the right braid in favor of the left. If left in its current state, the channel will abandon the right braid entirely leaving the CBS secondary water source unusable. Events resulting from channel processes such as described above are extremely difficult to predict in a quantitative timeframe with any degree of accuracy; it may take several years for Indian River to abandon the right braid or it may occur as of the writing of this memorandum. Nevertheless, while the timeframe is near impossible to predict, the direction and outcome of the process are clear if left unchecked. Recent observations by the CBS Public Works Department in the fall of 2004 indicate that the river flow is split approximately 65%/35%, with the majority of the water now flowing in the left channel.

The CBS Public Works Department is currently planning minor improvements to the water intake structure, including in-stream improvements to the intake dam and infiltration piping that connects the river to the impoundment area. Preliminary estimates for renovating the intake dam and infiltration piping have been produced, and funding has been requested to be included in future budgets.

Figure 6B, page 37, illustrates the erosion and depositional river processes that are occurring in the channel at the reach where the CBS water source is located. Figures 6A, page 27, shows the braiding river channel in locations upstream and downstream of the CBS water diversion.





SCALE
HOR.: 1"=100'
VERT.: N/A

Figure 6B. River Erosion and Deposition Processes at CBS Intake

Keta Engineering
P.O. Box 640
Craig, Alaska 99921

Findings

1. Streamflows in Indian River are highest in the fall months of September, October and November.
2. Peak floods can occur in any month though are most probable in fall months.
3. Snowmelt comprises a significant portion of the streamflow in the months of April, May and June.
4. Both summer and winter low flows occur in Indian River. Winter lows have been the annual one-day minimum flows in 72% (13) of the 17 years of record.
5. Water quality in Indian River is generally good. Water quality parameters measured in downstream areas that receive runoff from developed areas show little variation from corresponding measurements made in pristine upstream areas.
6. The existing municipal water diversion owned and operated by CBS is in jeopardy of losing its source water because the river is changing its course upstream. Such a channel change by the river would leave the existing right braid where water enters the CBS system with little or no water thus making the existing CBS diversion inoperable.
7. The river channel is braided and highly connected to its flood plain at the site of the existing abandoned log stringer bridge. These natural conditions make channel migration likely and make the site problematic for use for the proposed pedestrian bridge crossing of the river. Alternative locations should be considered for the proposed trail and bridge.

References

U.S. Department of Commerce. NOAA National Weather Service. Weather station data for Sitka Japonski Island Station 508494. 1948 through 2001.

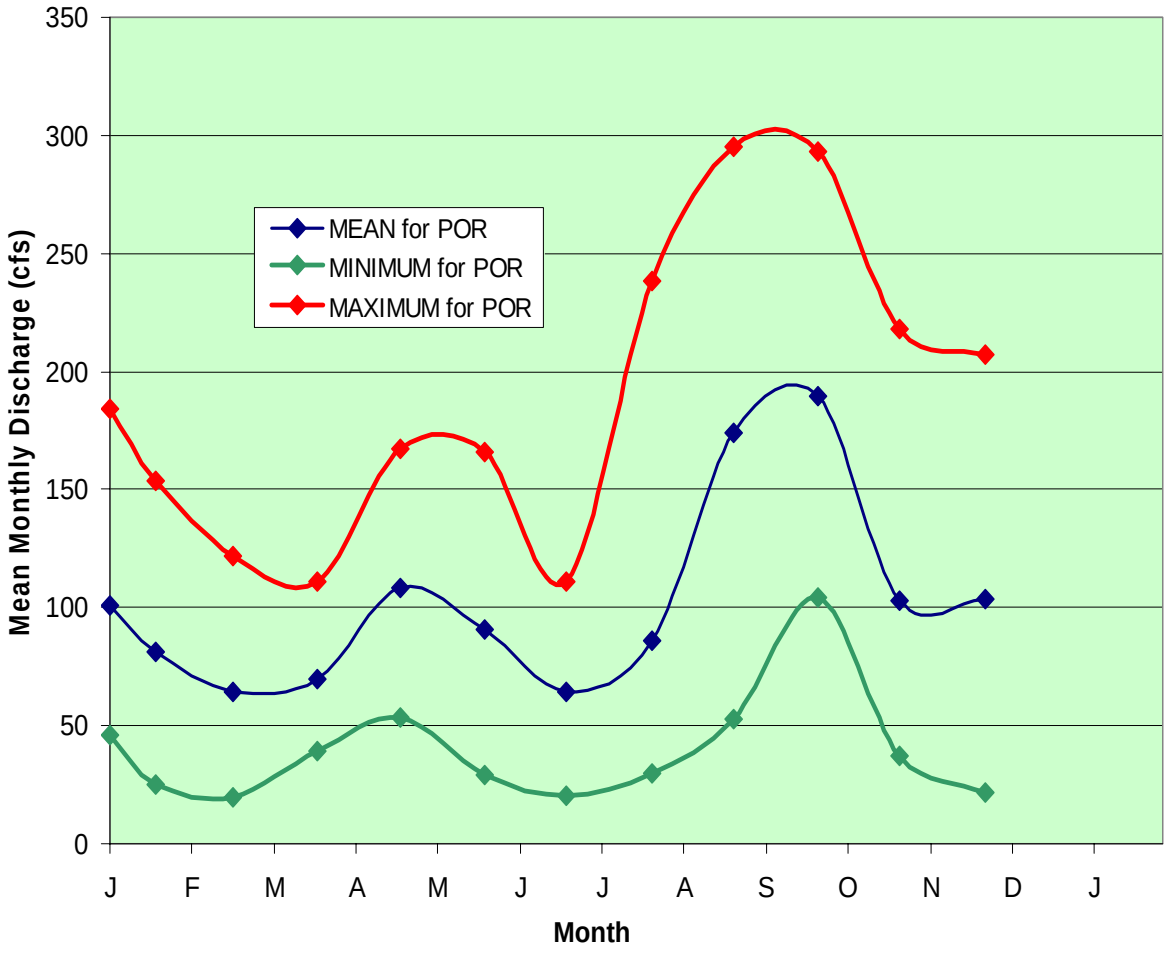
US Department of Interior. USGS. Gaging Station Data for Station 15087690, Indian River near Sitka, Alaska. Water years 1980 - 1993 and 1998 - 2001.

Paustian, S.J. and T. Hardy 1995. Aquatic Resource Survey: Indian River, Sitka National Historical Park, Alaska. USDA Forest Service, Chatham Area, Sitka AK. Prepared for US Dept. of Interior, NPS, Anchorage, AK.

US Department of the Interior. USGS. 2003. Water Quality of Indian River, Sitka, Alaska, 2001-2002. Draft report. Prepared in cooperation with US Dept. of Interior, NPS, Anchorage, AK.

Chart 1: Indian River near Sitka, Alaska 15087690

Average, Maximum and Minimum Monthly Stream Discharge



Water Rights in Sitka

In Alaska's Constitution, water was declared a public resource belonging to the people of the state to be managed by the state for maximum benefit to the public. All surface and subsurface waters on all lands in Alaska are reserved to the people for common use and are subject to appropriation in accordance with the Alaska Water Use Act. The Water Resources Section of the Alaska Department of Natural Resources (ADNR) adjudicates water rights.

What are water rights?

A water right is a legal right to use surface or ground water under the Alaska Water Use Act (AS 46.15). Water rights typically apply to withdrawals, impoundments, diversions, and for instream uses. Instream uses are for uses of water within a river or a lake and are categorized as a reservation of water, which is simply a water right for retaining a portion of water in a river or a lake. A water right allows a specific amount of water from a specific water source to be diverted, impounded, or withdrawn for a specific use. When a water right is granted, it becomes appurtenant to the land where the water is being used for as long as the water is used. If the land is sold, the water right transfers with the land to the new owner, unless the ADNR approves its separation from the land. In Alaska, because water, wherever it naturally occurs, is a common property resource, landowners do not have automatic rights to ground water or surface water. A water right may be subject to revocation by ADNR if it is forfeited (through non-use of five years or more) or abandoned (through non-use for any period of time with intent to abandon).

Water rights typically apply to wells and diversions, but water can also be reserved for fish and wildlife, recreation, transportation, and sanitation through a similar process called "Reserving water for instream use." A reservation of water for instream use sets aside the water necessary for these activities and keeps later water users from appropriating water that may affect the instream activity. For both water rights and a reservation of water for instream use, priority is given chronologically.

How are water rights obtained?

Water rights are obtained by submitting an application to the ADNR office in the area of the water use. In Sitka, water rights are maintained through the Juneau office of the DNR. The priority date for a water right is established on the date that the ADNR receives the application. The priority date is provisional, however, until the Permit to Appropriate Water is issued. This permit is a legal document that establishes water rights. A person with water rights has priority to use water over persons who file later for water rights from the same source. Anyone who diverts, impounds, or withdraws a significant amount of water for use, without a permit or certificate, is guilty of a misdemeanor (AS 46.15.180).

Water Rights Ownership in Sitka

Four entities hold generally recognized water rights on the Indian River. They are the City and Borough of Sitka (CBS), Sheldon Jackson College (SJC), the National Park Service (NPS) and the Alaska Department of Fish and Game (ADF&G). These water rights are summarized in Table 4 on page 43.

CBS has been granted only one water right, ADL 43672, and an application for an additional Right, ADL 101686, has not been granted. The CBS water right is used for a public water supply. Although the primary water supply for the city is the Blue Lake Reservoir, Indian River does provide a backup water supply during emergencies and during regularly scheduled maintenance on the Blue Lake Dam. Although seldom used, the Indian River water intake is a vital and necessary part of the city infrastructure. CBS has one certified water right and one unapproved application on the Indian River for a total of 6 million gallons per day for public water supply.

Sheldon Jackson College initially used its water rights, up to 30 cubic feet/second, to provide water for both hydropower and a fish hatchery. There is some dispute as to how much was allocated for each, and there has been no formal adjudication of this issue. Water is diverted through a small dam and flume to the SJC fish hatchery and hydropower facility. The hydropower facility has not operated since 1988.

The Alaska Department of Fish and Game water right reserves instream flows for spawning, incubation, and rearing of salmon for the Indian River from the mouth as it enters tidewater at the extreme low tidal stage of Jamestown Bay upstream to river mile 2.5. The right reserves a seasonally variable flow ranging from 35 cubic feet per second (cfs) during December 1st through April 15th to 101 cfs during October 1st through the 15th. It should be noted that the ADF&G water right has a later priority date and is considered junior to the CBS and SJC water rights. The ADF&G water right does not constrain CBS or SJC in their right to withdraw water up to their permitted flow. The ADF&G water right is only legally effective against a later appropriator.

In addition to the water rights held by CBS, SJC, and the ADF&G, the National Park Service (NPS) claims an inchoate, unquantified, Federal Reserved water right for instream flows on the Indian River to maintain fish habitat, recreational use and historic interpretation. The NPS claims a priority date of 1890, the date when the Sitka National Monument was established. To date, ADNR has not adjudicated the NPS right. It is possible that legal action may eventually be undertaken to clarify and establish water rights on the Indian River. It is not unusual for water rights litigation to be very time consuming, and it may be years before the final adjudication is completed. In the meantime, the NPS has approached Sheldon Jackson College to see if the College is interested in selling a portion of the water right on the Indian River to resolve long-standing resource protection issues. This issue has yet to be resolved.

Table 4: Water Rights at Indian River

Name and File Number	Water Right or Reservation	Priority Date	Quantity
Sheldon Jackson College ADL 43671	**Water Right**	**12/31/1914**	**30 cfs**
City and Borough of Sitka ADL 43672	**Water Right**	**12/31/1914**	**2,500,000 gpd**
City and Borough of Sitka ADL 101686	**Application***	**9/23/80**	**3,500,000 gpd**
National Park Service, Sitka National Historic Park	**Implied federal reserved water right.**	**1890**	**Unadjudicated**
Department of Fish and Game LAS 12236	**Reservation**	**1/12/89**	**Varies seasonally**

***This application has not been granted.**

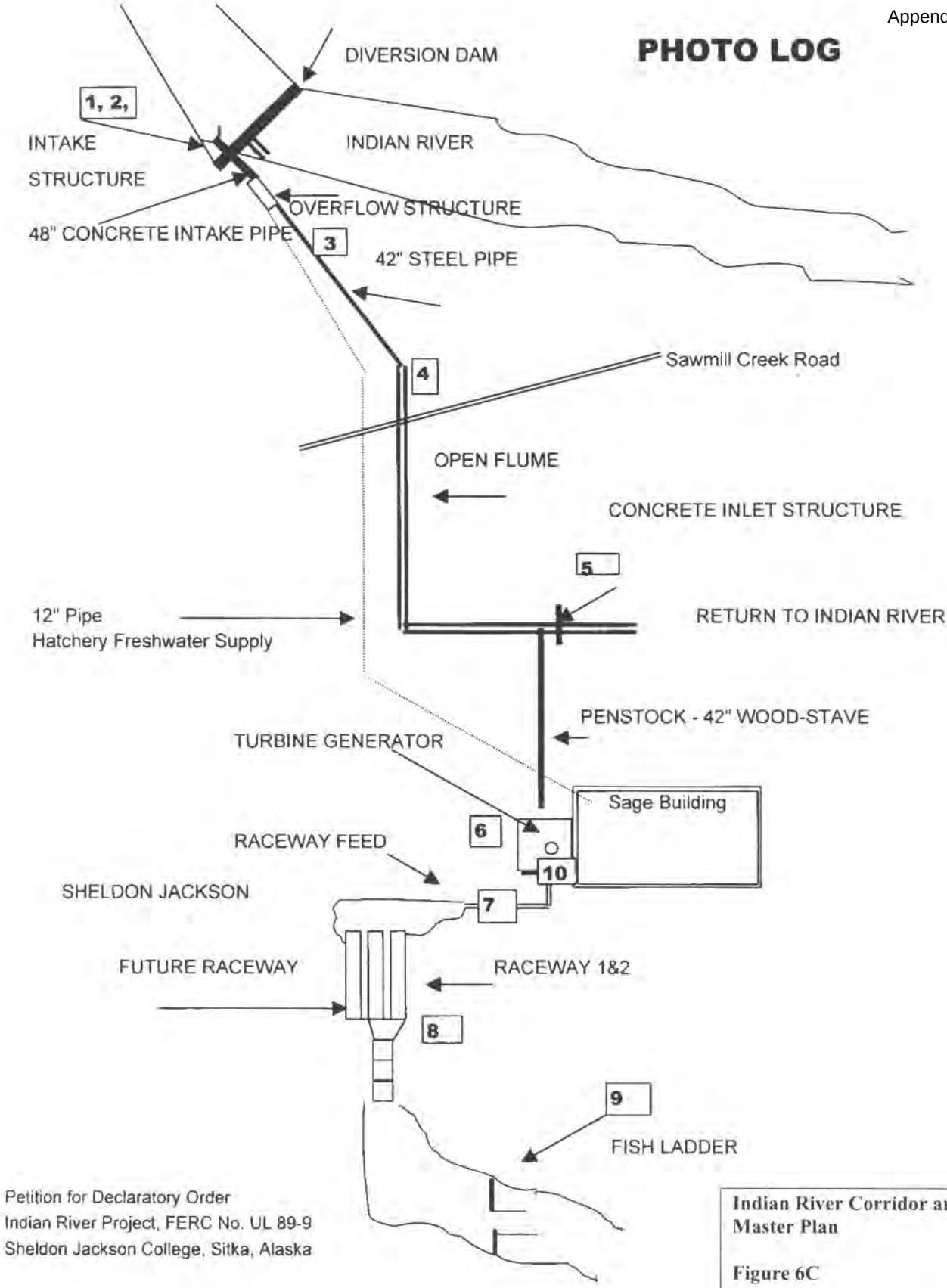
Hydropower

There was one hydropower facility in the Indian River Watershed, which was operated by Sheldon Jackson College. Initially established in the 1920's, the hydropower plant provided electricity to SCJ until 1988 when it was shut down for maintenance and rehabilitation. A schematic diagram of the hydropower system is shown on Figure 6C, page 46. This drawing was obtained from the Federal Energy Regulatory Commission (FERC) Online website, http://www.ferc.gov/docs-filing/elibrary.asp.

Water for the hydropower facility was impounded at the dam upstream and flowed through a combination piped and open channel flume. A photo of the pipe flume is shown at right. The impoundment dam and flume were recently improved during the summer of 2003. The water flows to both the fish hatchery and the electric turbine facility. The hydropower system has been shut down since 1988, although SJC has funding available for upgrades in the form of a grant given to CBS by the U.S. Department of Energy in 2001. SJC has requested that it be exempted from FERC jurisdictional regulations regarding hydropower generation, and to date FERC has denied its petition. It is not known when, if ever, the hydropower station will be put back into service. If the SCJ hydropower water rights were revoked by ADNR as a result of non-use (forfeited), the hatchery water right would remain to the extent it could be shown that water withdrawn from Indian River had continued in use for hatchery purposes. Forfeiture of the SCJ hydropower water rights would require adjudication by ADNR.

Water withdrawals for hydropower use compete with other uses of Indian River water. Water withdrawn for hydropower production should be carefully evaluated to ensure that it is the best use of the sometimes limited quantity of water available in Indian River.

PHOTO LOG



Petition for Declaratory Order
Indian River Project, FERC No. UL 89-9
Sheldon Jackson College, Sitka, Alaska

Indian River Corridor and Watershed Master Plan

Figure 6C

Sheldon Jackson Hydropower Schematic
(From FERC Online File Retrieval System)

Chapter 4: Recreational Trails and Historical Sites

The Indian River Watershed is a significant recreational and historical resource to Sitka. Fishing, hiking, camping, hunting, berry picking and subsistence gathering and trapping, and mining activities have all taken place in Indian River at various times in Sitka's history. Although the current usage of the watershed today is primarily hiking and hunting, in the past the river valley was a significant resource to the early settlers and the indigenous people of the Sitka region. A map of the trails and historical areas within the Primary Study Area has been developed, and is shown as Figure 7 on page 48.

Of interest outside of the Primary Study Area in the north end of the valley is the Cascade Claim gold mine, located in Billy Basin on the east fork of Indian River. Although the Cascade Claim was never a significant source of gold, it is described in the 1912 USGS Bulletin 504 on the Sitka Mining District as one of the only ore deposits discovered in the near vicinity of Sitka. The mine has been inactive for many years.

The Sitka National Historical Park was established at the mouth of Indian River in 1890 by President Benjamin Harrison as a public park to commemorate the battle between the Russians and the Kiks.ádi Tlingit, known as the Battle of Sitka. The park eventually evolved to a Monument in 1910, then reached National Park status in 1972.

The Sitka Tribe of Alaska was asked to participate in identifying historical sites and items of particular cultural importance to them as part of the Master Plan project. The following paragraph was provided by STA for inclusion in the Master Plan, and is taken from an archaeological report of a site adjacent to Indian River written by Robert Betts1

> Ethnographically, the Kiks.adi clan is known to have used Indian River (called Kahsdahin (Kaasda Heen) in Tlingit) and its drainage for salmon fishing (pink, coho, and chum salmon all spawned in Indian River), deer and brown bear hunting, berry picking (currants and blueberries) and eventually trap lines (Goldshmidt and Haas (1946:108). The Point House traditionally gathered a variety of plants in the vicinity of Indian River in May and June. Plants collected included wild celery, salmonberry sprouts, seaweed and another leafy green plant that grows along the beach (Herb Hope (1992:3)). A few bark-stripped spruce are present in Sitka National historical Park but it is not known how far upstream along Indian River this activity may have occurred. A major subsistence resource for the Tlingit was the herring run in Sitka Sound. Goldschmidt and Haas (1946: 118) report that "in the old days there were many smokehouses at the mouth of the river and the native village of Sitka extended from the mouth of the river to Jamestown Bay." As late as 1880 a population of 43 Tlingits were reported to occupy a seasonal fish camp at the mouth of Indian River.

[1] *Archaeological Clearance Survey Indian River Subdivision Lot # 2, Sitka, Alaska June 1996*

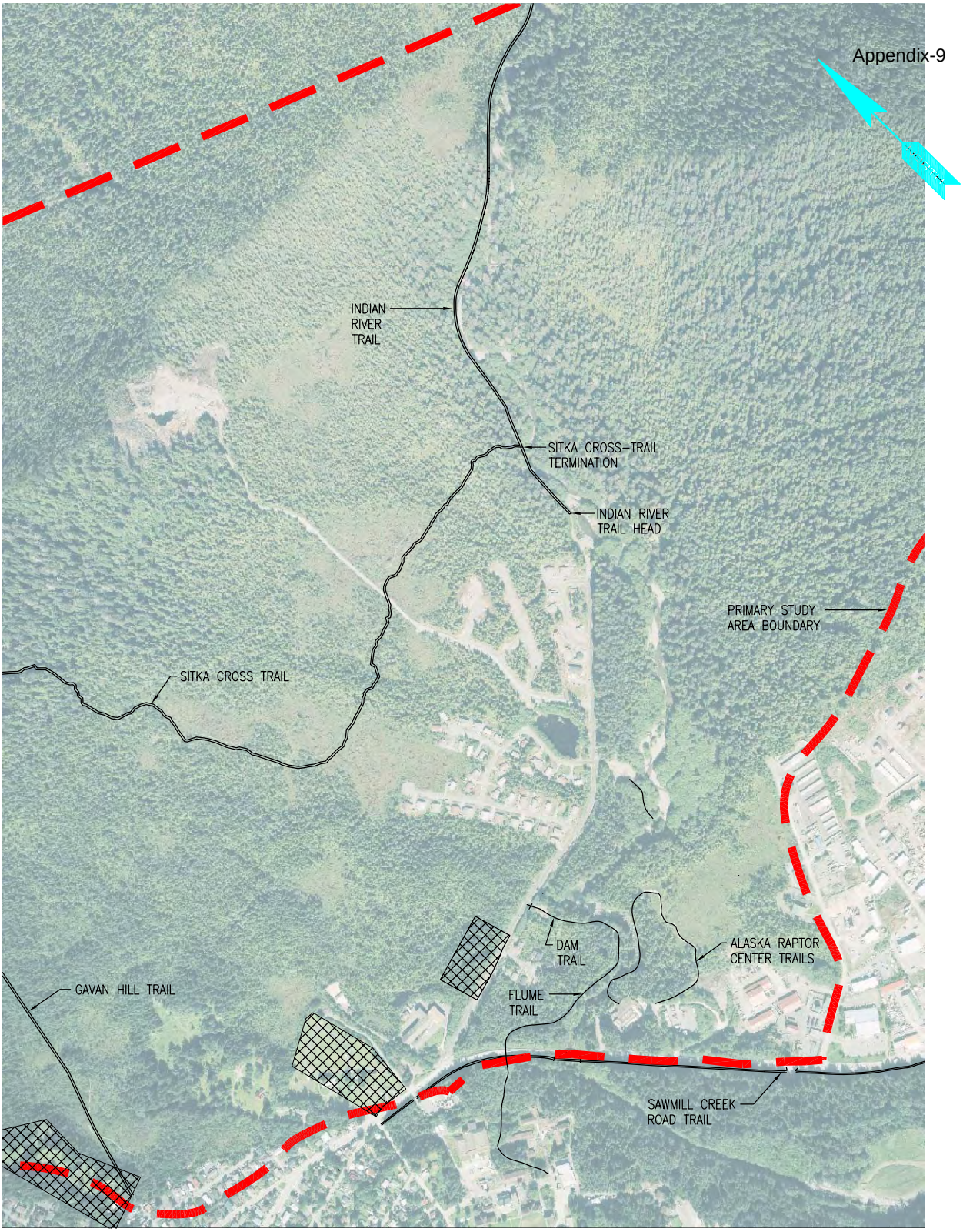
Indian River and the immediate areas of the watershed are one of the most culturally important sites for Sitka tribal citizens. The Sitka Tribal Council met and discussed their history as it relates to Indian River. They noted that seasonal native camps and smokehouses historically existed at the mouth of Indian River and today people continue to hunt deer, pick berries and gather other wild plants in the watershed. They specifically identified three sites with historical and cultural significance: The Indian River Cemetery, an ancient village site, and the location of the origin of the Woman Who Became an Owl legend. The last two sites are not specifically identified on the map but are located within the Indian River Watershed. The Tribal Council passed a resolution supporting protection of the Indian River Watershed as historically and culturally important to the Tribe. Their efforts are very much appreciated. A copy of this Resolution is included in this chapter on pages 53 and 54.

Sport fishing is also a recreational activity on Indian River, primarily for steelhead, Dolly Varden and cutthroat trout. Indian River and other salmon streams along the local road system are closed to both sport and subsistence salmon fishing. Recent improvements in pink salmon stocks may permit the Alaska State Board of Fish to reopen them for some limited salmon fishing.

Hunting is also an important activity in the watershed, and deer hunting in particular is popular. To a lesser extent, bear hunting and smaller game animal trapping also takes place, but deer hunting remains the most common hunting activity.

Sitka has an extensive trail system, with the Sitka Cross Trail being one of the most popular non-motorized trails. The Cross Trail connects from the west to the Indian River trail near the CBS water intake facility. The Indian River Trail starts at the upper end of Indian River Road and goes up the Indian River Valley to the falls on the east fork of the river. Gavan Hill Trail also crosses through the west side of the watershed.

In addition to those popular trails, the Alaska Raptor Center has a network of trails on its property on the east side of Indian River. Its trails are extensively used by visitors to the Raptor Center, but get less use from the general Sitka population.



EXISTING TRAILS

SITKA CROSS-TRAIL
DAM TRAIL
GAVAN HILL TRAIL
INDIAN RIVER TRAIL
ALASKA RAPTOR CENTER TRAIL
SAWMILL CREEK ROAD TRAIL
INDIAN RIVER TO VERSTONIA TRAIL
FLUME TRAIL

HISTORICAL/CULTURAL SITES

CEMETARIES:

ADDITIONAL CULTURAL SITES ARE LOCATED IN THE WATERSHED. REFER TO SITKA TRIBE OF ALASKA ORAL FOR ADDITIONAL INFORMATION.

SUMMIT CONSULTING SERVICES, INC.

INDIAN RIVER CORRIDOR AND WATERSHED MASTER PLAN

CITY AND BOROUGH OF SITKA, ALASKA

TRAILS AND HISTORICAL AREAS

FIG 7

SCALE: 1" = 600'

Sitka Tribe of Alaska
456 Katlian Street
Sitka, Alaska 99835

907-747-3207
Fax: 907-747-4915

Tribal Council Resolution 54-2004

Resolution Regarding Historic and Cultural Importance of Indian River Watershed Area

WHEREAS, the Sitka Tribe of Alaska is the federally recognized tribal government for more than 3,100 enrolled tribal citizens in Sitka, Alaska organized under the Indian Reorganization Act of 1934 as amended; and

WHEREAS, the Sitka Tribe of Alaska is responsible for the health, safety, welfare and cultural preservation of its tribal citizens and their use of the Sitka Tribe's traditional territory; and

WHEREAS, the Sitka Tribe of Alaska's traditional territory reflects the lands and waters historically and presently the stewardship responsibility of the Sheet'ka Kwaan and as such are composed of the western side of Baranof Island, the greater reaches Peril Strait, southwestern portions of Chichagof Island and the myraid of islands as well as the waters between these locations; and

WHEREAS, the Indian River watershed is within the traditional territory of the Sitka Tribe; and

WHEREAS, the Cultural Committee of the Sitka Tribe of Alaska consists of tribal elders and cultural bearers of the Sitka Tribe and is called upon to address cultural issues of the Sitka Tribe and has thus forwarded this resolution to the Tribal Council for consideration; and

WHEREAS, the City and Borough of Sitka has requested input regarding the historical and cultural significance of the Indian River Watershed in order to incorporate such knowledge in the development of the Indian River Watershed Master Plan, and

WHEREAS, the Cultural Committee of the Sitka Tribe of Alaska recognizes the Indian River Watershed as an important cultural resource for its historical significance to the people of the Sheet'ka Kwaan, for subsistence gathering of resources, and because several important events of the Sheet'ka Kwaan occurred within the watershed.

NOW THEREFORE BE IT RESOLVED, that the Sitka Tribe declares that three important cultural sites are located in the Indian River watershed area and should be protected from development, including protection by the City and Borough of Sitka's recognition of them as a historic site. These sites are the Indian River cemetary and burial grounds, an ancient village site, and the location of the origin of the Women Who Become an Owl Legend; and

BE IT FURTHER RESOLVED, that the Sitka Tribe of Alaska declares that Indian River and the flat land surrounding the river are vital to the deer population of the area which is crucial to the subsistence lifestyle of the Native people of Sitka, and thus such habitat should be avoided as much as possible when considering development options for the Watershed; and

NOW THEREFORE BE IT FINALLY RESOLVED, that the Sitka Tribe of Alaska declares that the run of coho and humpy salmon are culturally vital to our people, and several salmon runs have already been terminated, and the health and water quality of Indian River is important to the coho and humpy salmon population, and the salmon runs of Indian River must be protected from this day forward from development impacts, including erosion.

CERTIFICATION

The foregoing Resolution was adopted at a duly called and convened meeting of the Tribal Council of the Sitka Tribe of Alaska held on **February 18, 2004**, at which a quorum was present by a vote of **_9_In Favor, _0_, Against _0_Abstain, _0_Absent.**

Gilbert Truett
Sitka Tribe of Alaska - Tribal Vice-Chairman

Attest:

Sitka Tribe of Alaska - Tribal Secretary

Chapter 5: Wetlands

Wetlands predominate within the Primary Study Area. Virtually all of the remaining undeveloped land in the Primary Study Area can probably be classified wetlands as defined by the US Army Corps of Engineers (USACE), which regulates development of wetlands. However, it may be useful for potential development plans to identify, within certain broad categories, the types of wetlands that may be encountered in specific areas. As part of the Inventory process, some informal mapping was performed within the Primary Study Area to identify potential wetland types. It should be stressed that the mapping that was performed for the Master Plan is not an official wetlands determination which will be required for specific development projects within the watershed.

The wetlands classifications used in the mapping are loosely based on the definitions used for the Granite Creek Soils Probe and Wetlands Investigation, performed by Stephl Engineers for HDR Alaska and Kean and Associates as part of the Granite Creek land clearing landfill development project. Since a detailed wetland mapping process was beyond the scope of the Indian River Master Plan, the wetland types were narrowed to three general classifications - Forested, Muskeg, and Riparian, and one non-wetland classification, Uplands. The results of the informal mapping are shown on Figure 8, page 61.

The general wetland classifications are as follows (excerpted and paraphrased from the Stephl Wetlands Investigation report):

Open Muskeg Wetlands

These sites are on the flattest ground within the Primary Study Area. They are saturated to the surface and often include small ponds. The soils are organic, with peat soils predominating. Although peat probes were not undertaken, it is common to find peat layers up to 15 feet thick in this area. Muskeg wetlands are found in patches of up to 20 acres in size throughout the Primary Study Area. Muskeg wetlands will require wetland development permits.

Forested Wetlands

This classification includes both open canopy and closed canopy spruce and hemlock forests on undulating lands and slopes of up to 40%. Most of the forested undulating terrain (up to 15% slopes) will generally be classified as wetlands, and some if not all of the forested lands between 15% and 40% slopes will be classified as wetlands, although some may qualify as marginal uplands. These areas are most likely to require specific wetlands classifications prior to any development.

Riparian Areas

Although not specifically having the types of vegetation and soils found in other wetland classifications, these areas along the river channel are periodically flooded during times of high flow in Indian River. Because the Corps of Engineers has jurisdiction over even small and intermittent stream channels, a permit from the Corps is likely to be needed for any development within this area.

Uplands (Non-wetlands)

The Uplands classification generally includes hemlock or spruce-hemlock forests on steep slopes. These areas are characterized by relatively well-drained soils, with large stands of hemlock and spruce. These forested areas are generally found along the eastern and western edges of the watershed, above the valley floor. Although not classified as wetlands, much of this land may be difficult to develop due to steep terrain.

Regulation of Development in Wetlands

The US Army Corps of Engineers (USACE) regulates wetlands development and is responsible for issuing permits through Section 404 of the Clean Water Act. Currently, the USACE defines wetlands as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. "Wetlands generally include swamps, marshes, bogs, and similar areas." (Corps of Engineers Wetlands Delineation Manual) As noted earlier, virtually all of the land within the Primary Study Area will most likely be classified as wetlands under this definition.

Typical Activities that Require a Wetlands Permit (Section 404) Include:

- Discharging fill or dredged material in waters of the U.S., including wetlands.

  Fill material includes garbage, rock, sand, soil, clay, plastics, construction debris, wood chips, overburden from mining or other excavation activities, and materials used to create any structure or infrastructure in a wetland. Land clearing operations involving vegetation removal with mechanized equipment such as front-end loaders, backhoes, or bulldozers with sheer blades, rakes, or discs in wetlands; or windrowing of vegetation, land leveling, or other soil disturbances are considered placement of fill material under Corps of Engineers jurisdiction.

- Site development fill for residential, commercial, or recreational developments.
- Construction of revetments, groins, breakwaters, levees, dams, dikes, and weirs.
- Placement of riprap and road fills.

Who Needs a Wetlands Permit

A wetlands permit is needed by any person, firm, or agency planning to discharge, dump, place, or deposit material in a wetland. The permitting process can be lengthy, requiring between 30 days and six months depending on the type of permit. Wetlands permits must be obtained before any site development occurs. In order to avoid delaying construction, an application for a wetlands permit should be sent to the USACE during the early design phase of the project. USACE has legal authority to enforce violations of the Clean Water Act and constructing without the appropriate permits can result in fines, an expensive restoration project, or legal action. If you are planning a project, USACE should be contacted to confirm if a wetlands permit is required.

The Permitting Process

When planning development in the Indian River Corridor, the following steps should be taken to comply with wetlands regulations.

1. Determine if any land affected by the project is a wetland. If the extent of the wetlands is unknown, a Wetlands Delineation can be performed to define the location of the wetlands. Wetlands Delineations must be performed by a certified professional and approved by the USACE.
2. Develop a concept level project description that describes where the development is located, the size of the development (in acres), and how many yards of fill material will be used. A site plan, drawn from an aerial perspective, will be needed when corresponding with the USACE.
3. Contact the USACE, Regulatory Division, for a permit application. Even if the site is not a wetland, it is prudent to discuss the development with the USACE so that they can determine whether a permit is or is not needed.
4. Submit the project description, drawings, and permit application to the USACE during the early design phase of the project. USACE has a minimum of thirty days to review the application.
5. Submit any additional permit applications or forms, such as a Fish Habitat permit or Coastal Project Questionnaire.

The USACE regulatory division can be contacted in Anchorage.

Telephone:
Toll Free from within Alaska: (800) 478-2712
Anchorage or Outside Alaska: (907) 753-2724
Fax: (907) 753-5567

Mailing Address:
U.S. Army Corps of Engineers
Regulatory Branch
P. O. Box 6898
Elmendorf AFB, Alaska
99506-6898

Physical Address (Express Mail):
2204 3rd Street
Elmendorf AFB, AK 99506

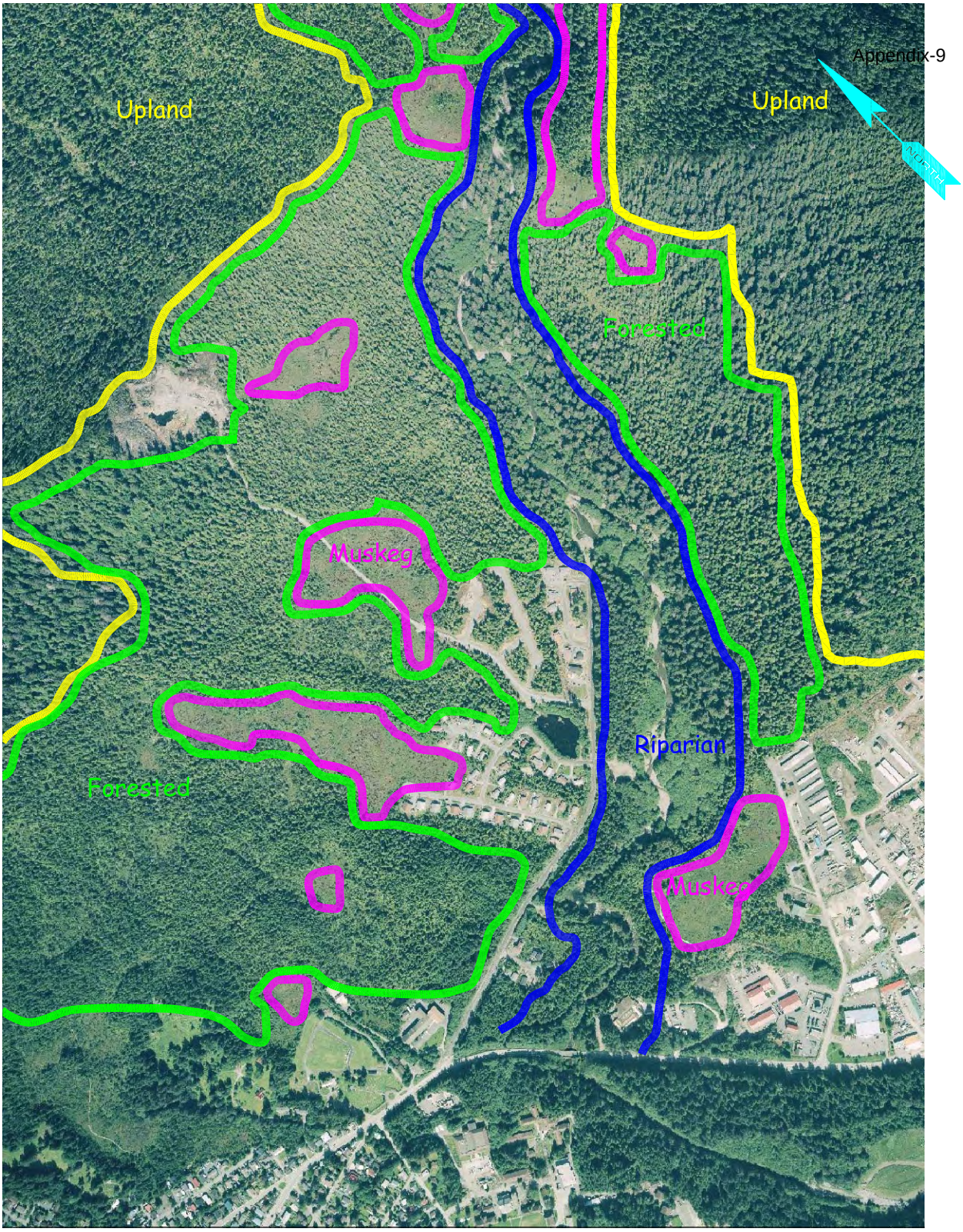
Web:
http://www.poa.usace.army.mil/reg/default.htm

Send mail to: regpagemaster@poa02.usace.army.mil

For more information about the Coastal Project Questionnaire and Fish Habitat Permits, contact the ADNR in Juneau.

Additional Permits May be Needed

It is important to note that other regulatory agencies may require additional permits or procedures for the development. Almost any project in Sitka will need to submit a completed Coastal Project Questionnaire to the ADNR. The Coastal Project Questionnaire is not a permit. Instead, it is a fill-in-the-blank survey that is used by the State to make sure that the development is pursuing all of the necessary state and federal permits. The Coastal Project Questionnaire does have its own approval period, typically lasting between 30 and 60 days for small projects. In addition to the Coastal Project Questionnaire, any development that could impact a waterbody may need an ADNR Fish Habitat Permit.



WETLANDS LEGEND

- UPLAND AREAS (NON-WETLANDS)
- FORESTED WETLANDS
- MUSKEG WETLANDS
- RIPIRIAN WETLANDS

NOTE:

WETLAND BOUNDARIES ARE APPROXIMATE, AND WETLAND CLASSIFICATIONS ARE BASED ON CURSORY FIELD AND PHOTO INTERPRETATIONS.

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INDIAN RIVER CORRIDOR AND WATERSHED MASTER PLAN

CITY AND BOROUGH OF SITKA, ALASKA

WETLANDS

FIG 8

SCALE: 1" = 600'

Chapter 6: Utility Infrastructure

This section of the Master Plan Inventory deals with the existing utility infrastructure in place in the Indian River Watershed. The systems inventoried include:

- Water Supply
- Water Distribution
- Sewer Collection
- Roads
- Electrical and Lighting Systems
- Communications and Cable TV

The Inventory is not intended to be an extensive analysis of the condition and serviceability of the infrastructure, but rather a brief summary of the type and extent of the systems within the watershed.

A map of the water and sewer systems is shown in Figure 9A, page 67, and a map of the lighting, electrical power and telecommunications and cable TV systems is shown on Figure 9B, page 69.

There are several subdivisions in the Indian River Watershed that are served by municipal utility systems. Most of the subdivisions have been developed by the Baranof Island Housing Authority.

Water

The water system in the Indian River subdivisions is connected to the main water system coming from the Blue Lake Reservoir that is located approximately ten miles east of Sitka. The water is chlorinated and piped 5.3 miles through 24" and 30" transmission pipes, and reaches the main part of Sitka proper by following Sawmill Creek Road. The CBS stores water in two tanks within the distribution system that have a total capacity of approximately two million gallons.

The main 18-inch cast iron pipe (CIP) water supply line that serves the Indian River subdivisions branches off of the 24-inch Blue Lake transmission main west of Indian River Road and backtracks east along Sawmill Creek Road to the intersection with Indian River Road. It then goes north up Indian River Road all the way to the Water Intake Facility at the north end of the road. Smaller branch lines of 6, 8 and 12-inch diameter ductile iron pipe traverse through the subdivisions, connecting back together to permit back feeding the residences, increasing reliability and fire flow capability. Pamco Subdivision on the east side of Indian River Road is supplied with a single 6-inch line. The entire water main layout, including pipes sizes is shown on Figure 9A, page 67.

The CBS Water Intake Facility at the end of Indian River Road serves as the backup water supply for the City in the event that the Blue Lake Reservoir or the transmission main are out of service. The Water Intake Facility, when put into service, backfeeds through the 18-inch main to the Blue Lake transmission main. Pumps located in the facility draw water from beneath the reservoir that is fed by an infiltration gallery beneath Indian River. The water is disinfected with chlorine and then pumped back into the transmission main along Sawmill Creek Road.

Under normal circumstances, the standby facility is seldom used. However, it is regularly tested and kept in good operating condition. A planned shut down of the Blue Lake Reservoir in the spring of 2005 will necessitate putting the standby intake facility into service for up to a month or longer to complete repairs and maintenance on the dam.

Concerns have been expressed by the Public Works staff regarding sanitary conditions at the small reservoir adjacent to the Indian River Intake. The main Indian River Trail goes past the facility, and there is a good potential for contamination of the water supply. Fencing is being considered to protect the facility and to provide more security.

One issue that must be addressed if expansion of the water system along Indian River is considered is system water pressure. The Blue Lake reservoir provides water pressure as a function of elevation head. System pressures will drop as a function of distance from the reservoir, pipe size, elevation and flow. At some point it may be necessary to either provide booster pumps on the system or to install an additional water storage reservoir located at a sufficiently high enough elevation to provide adequate head pressure. CBS is currently calibrating a computer model of the water system. This will allow water demands and system pressure to be analyzed and provide solutions to low flow and low pressure situations that may occur as the system expands.

Sewer

Sewage along Indian River flows though a series of gravity sewer mains in the upper reaches of the subdivisions to a lift station located on Indian River Road near the intersection with Andrew Hope Street. From there the lift station pumps the sewage south along Indian River Road in a pressurized force main. Another small lift station collects wastewater from Pamco Subdivision and pumps it into the force main on Indian River Road. The force main on Indian River Road connects into the 10-inch ductile iron pipe sewer interceptor that runs along Sawmill Creek Road. Through a series of gravity mains, lift stations and pumped force mains, the sewage eventually reaches the Wastewater Treatment Plant located on Japonski Island. The plant provides primary treatment to the sewage, and the effluent is gravity piped through a 24" outfall to an underwater discharge near the southeast end of the airport runway. Figure 9A on page 67 shows the existing sewer system.

Roads

There are a number of paved and unpaved roads and streets that serve as access through and into the Primary Study Area. The largest is Sawmill Creek Road, crossing Indian River at the northern edge of the Sitka National Historical Park. This is a two-lane paved secondary highway that is maintained by the State of Alaska department of Transportation and Public Facilities. On the east side of Indian River is Jarvis Street, a paved road that provides access to the Solid Waste Transfer Station, the Borough Animal Shelter, and the subdivision located on the east side of Jarvis Street.

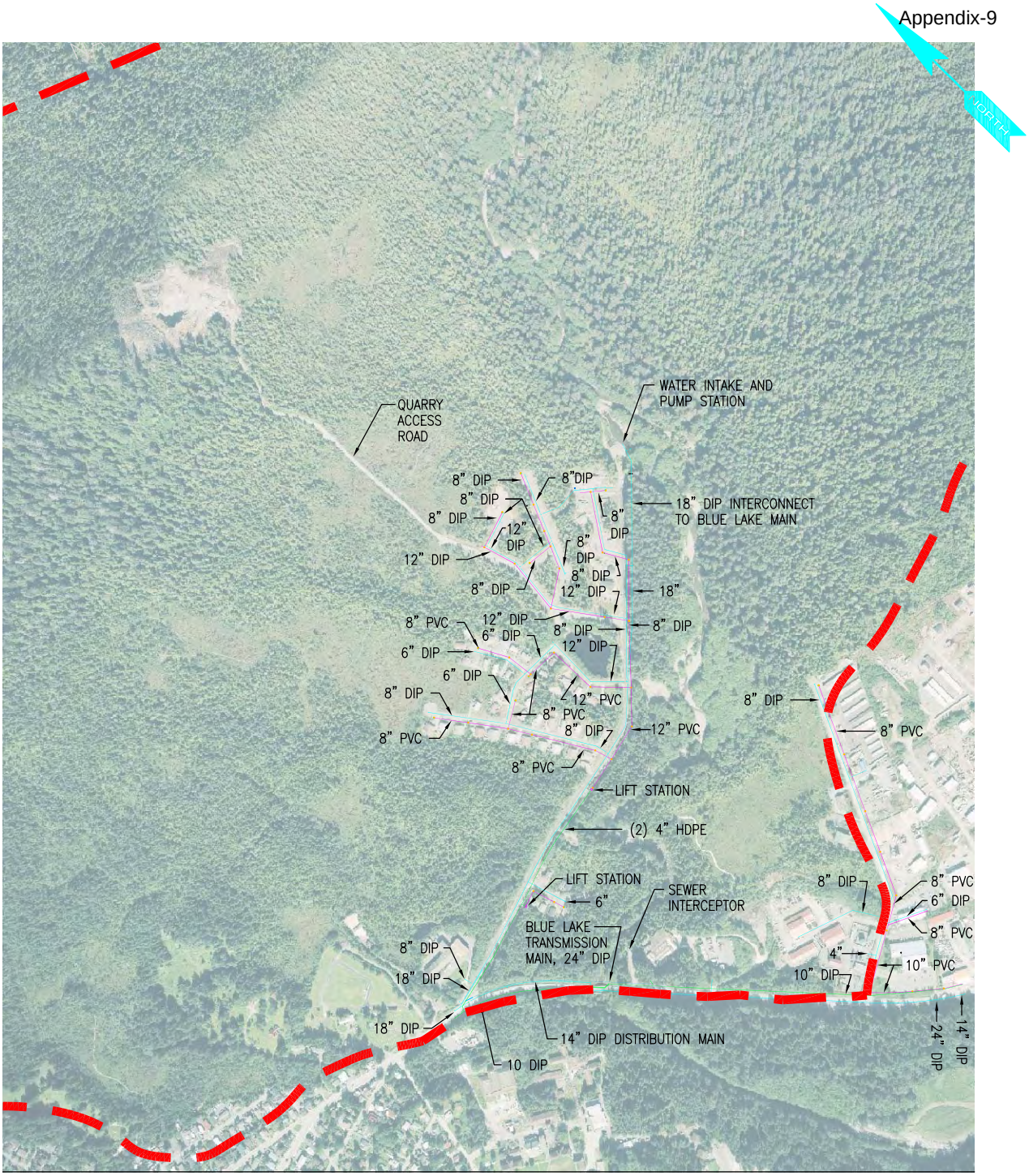
Indian River Road, on the west side of the river, provides access to the residential subdivisions, to the CBS Water Intake Facility, and to the Indian River Trail. Indian River Road is not paved, and is maintained by the City. Most of the residential subdivision roads are unpaved minor residential streets that serve only the residential areas. An exception is Yaw Drive, which connects at the northern end to an unpaved

road that provides access to the quarry near the northern edge of the Primary Study Area. There is concern among the residents that commercial truck traffic poses safety and noise problems, and is generally incompatible with the residential character of the neighborhood.

Electrical & Telecommunications

Power to the Indian River area is supplied from CBS-owned aerial and underground primary electrical distribution system. The main electrical distribution line runs west along Sawmill Creek Road from the electrical substation on Jarvis Street. Primary power is overhead down Indian River Road to near the end of the road at the Water Intake Facility. The side roads in the subdivision are served by underground feeders, with pad-mounted transformers. Luminares for roadway lighting are attached to the main utility poles along Indian River Road, and extend in underground conduit to individual light poles within the subdivisions. A map of the overhead and underground electrical distribution system is shown in Figure 9B on page 69. Figure 9B also includes street rights-of-ways and some easements.

Alaska Communications Systems provides telephone service, and cable television is provided through GCI. Most of the telephone and television cable in the subdivisions are underground systems, and follow the same general layout as the underground electrical distribution system. Like the primary electrical system, they reach the subdivisions overhead down Indian River Road, utilizing the same utility poles serving the electrical system. Overall, the electrical, lighting and telecommunications equipment is relatively new, and expansion of the system to new subdivisions should be relatively straightforward.



LEGEND

WATER	
SEWER	
SEWER FORCE MAIN	
PRIMARY STUDY AREA BOUNDARY	

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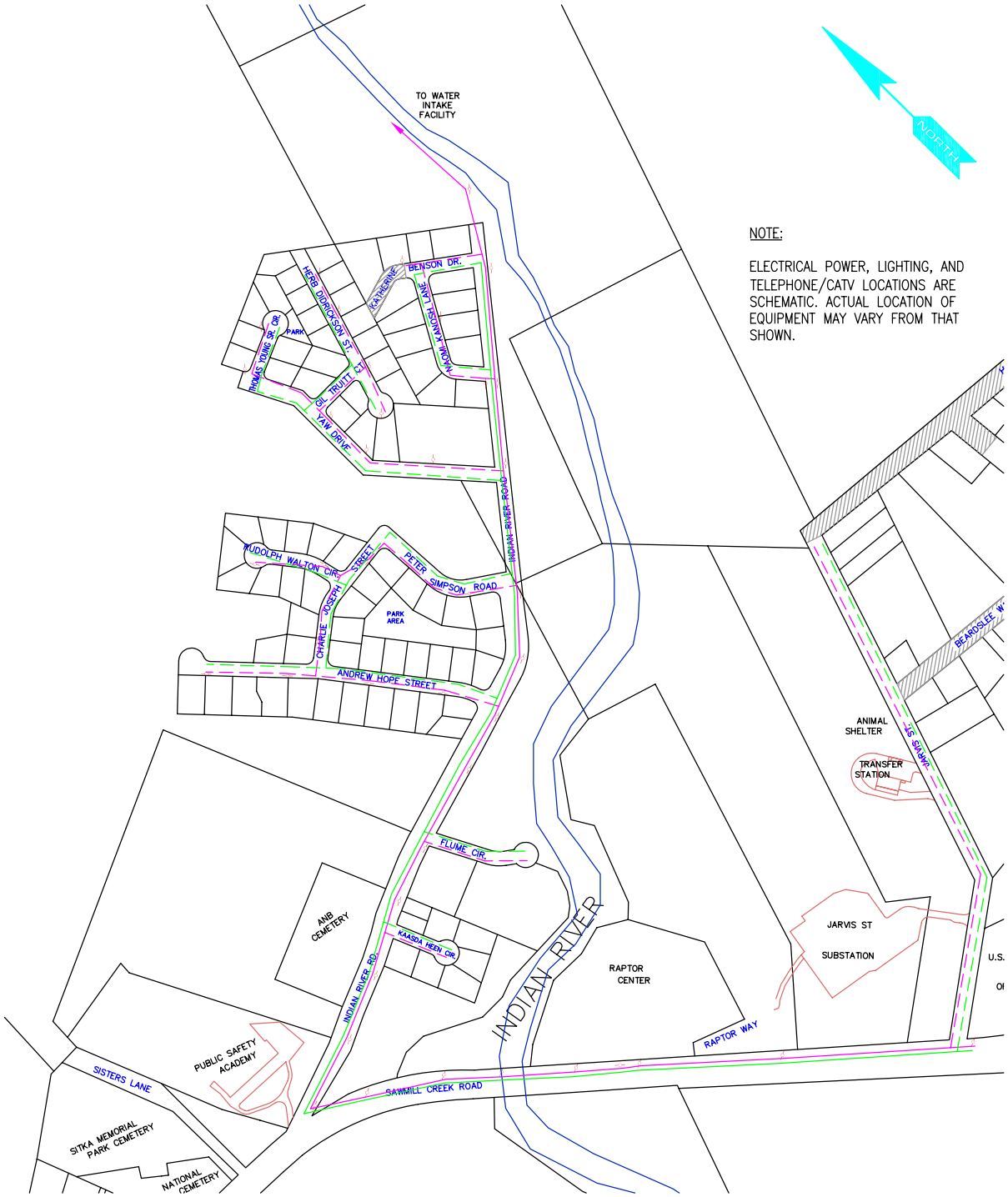
CITY AND BOROUGH OF SITKA, ALASKA

UTILITY INFRASTRUCTURE - WATER AND SEWER

FIG 9A

SCALE: 1" = 600'



LEGEND

- OVERHEAD POWER
- OVERHEAD TELEPHONE/CATV
- UNDERGROUND POWER/CATV
- UNDERGROUND TELEPHONE
- POWER/LIGHT POLE

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CITY AND BOROUGH OF SITKA, ALASKA

UTILITY INFRASTRUCTURE - ELECTRICAL, TELEPHONE, AND STREETS

FIG 9B

NOT TO SCALE

Chapter 7: Solid Waste

Solid waste issues and facilities in the Indian River Watershed include the Solid Waste Transfer Station, the former incinerator facility, large quantities of abandoned heavy equipment and metal debris along the edge of the river, campsite debris from illegal or informal campsites in the watershed, and overburden spoils from the rock quarry. Figure 10, page 75 shows the locations of documented solid waste sites in the watershed.

Solid Waste Transfer Facility

The existing Sitka Solid Waste Transfer Facility is located on Jarvis Street, east of the river. This facility is owned by the City and Borough of Sitka, and is used to consolidate solid waste that is collected from city residents by a commercial solid waste handling company. Waste collected at the facility is hauled elsewhere for disposal. The site is well maintained, and does not appear to be a source of detrimental solid waste problems in the watershed. The transfer station is a valuable resource for Sitka, and the continued operation is essential to addressing and solving solid waste problems in the community.

Sitka Incinerator

Incineration of solid waste debris is a commonly accepted method of reducing solid waste volume and the associated handling costs of waste disposal. The incinerator, operated for many years by the City on property leased from Sheldon Jackson College just south of Sawmill Creek Road, is now closed. The facility is no longer used for burning. Site investigations are underway at the partially dismantled facility to provide information regarding ultimate cleanup requirements and final closure of the site. Once the site is formally closed, the property will revert back to Sheldon Jackson College.

Large Equipment and Scrap Metal Debris

During field visits to the watershed, a large quantity of metal debris, consisting primarily of heavy equipment, auto and truck parts, and other substantial metal scrap was observed between Indian River Road and Indian River, across from Peter Simpson Road. Most of the debris is located on CBS property, although it is possible that additional buried debris is located elsewhere along the banks of the river or buried near or under the riverbed. It is believed that the debris is left over from commercial operations in the area, and is most likely 30 to 50 years old. It is unlikely that the debris is contributing any substantial amount of contamination to the watershed or water in Indian River, although it is unsightly and dangerous from an injury standpoint. There are potentially many tons of scrap metal debris in this area, and a cleanup will involve substantial cost and effort. If undertaken, cleanup activities must also not further damage the fish habitat along the river, particularly large-scale disturbance of gravel spawning beds and woody areas important to fish habitat.

The Sitka Tribe of Alaska (STA) has been active in efforts to both raise community awareness of the solid waste problems, and to clean up and remove solid waste debris from the watershed. The photographs in this section were used with the permission of James Craig, an STA tribal citizen who has been instrumental in solid waste cleanup activities.

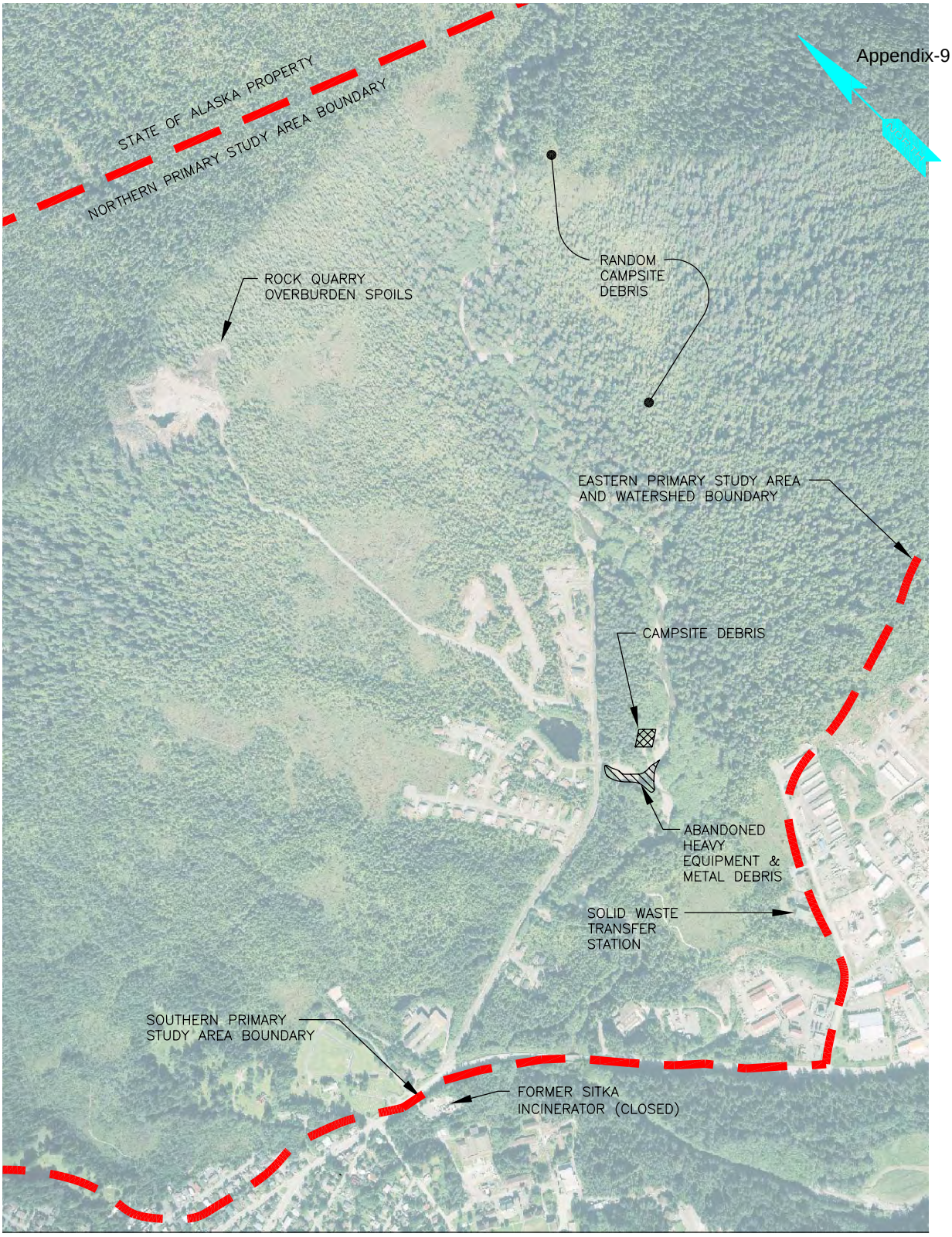
Campsite Debris

During the summer of 2003, the STA discovered a substantial quantity of trash and debris in illegal campsites located in the watershed. This area has significant cultural and historical value to the STA, and they organized a cleanup of the campsites. The photos taken by the STA on this page document the large amount of trash left behind, and the cleanup effort required to return the area to its natural state. In addition to the unsightly mess, uncontrolled and untreated human waste can contribute to the degradation of the water quality, a serious concern in the watershed, since it also serves as a water supply for Sitka.

One additional campsite was also noted between Indian River Road and Indian River, near the Pond on CBS property. This campsite has more permanent structures such as the "tree house" shown on this page. Although not particularly damaging from an environmental standpoint, this does point out the multiple uses that the watershed has. In order to better manage the watershed, unorganized activities such as those represented by this site may need to be more closely monitored.

Rock Quarry Overburden Debris

The remaining solid waste site is the spoil area used for overburden disposal next to the rock quarry. As the quarry expands and rock is extracted, the organic debris must be moved in order to remove the rock. The existing disposal site is located immediately adjacent to the rock quarry, near the northern boundary of SJC property. This site is also adjacent to the site proposed for the land clearing landfill, and is operating under all required permits from CBS and the State of Alaska. The overburden site is shown in the center middle distance of the photo. The total disposal site is less than 0.1 acres in size.



LEGEND

CAMPSITE DEBRIS: RUBBISH, BUILDING MATERIALS AND CAMPING DEBRIS

HEAVY EQUIPMENT AND METAL DEBRIS: ABANDONED/JUNKED EQUIPMENT AND MATERIAL

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CITY AND BOROUGH OF SITKA, ALASKA

SOLID WASTE SITES

FIG 10

SCALE: 1" = 600'

Chapter 8: Current Permits and Planning Documents

This chapter of the Inventory deals with existing permits, master plans, regional plans, and other planning documents that are being used or are in effect for the Indian River Watershed.

Development Permits
A number of permits for operation and/or future development within the Indian River Watershed were researched. They are summarized as follows:

USACE Permit 4-900230 (Silver Bay 21)
This permit was issued to Sheldon Jackson College in 1993. Issued concurrently with this permit was a Section 401 Clean Water Act Certificate of Reasonable Assurance from the State of Alaska Department of Environmental Conservation, a Coastal Zone Management Program Conclusive Consistency Determination issued by the State of Alaska Division of Governmental Coordination, a Fish Habitat permit issued by the Alaska Department of Fish and Game, and clearance from the State Historical Preservation Office.

This was the principal permit issued to SJC for the development of what are now the subdivisions in the Indian River Watershed. The permit was issued for the development of the SJC property north of Sawmill Creek Road, and encompassed the development of 159 one-acre lots and 42 one-third acre lots. The Permit had an original expiration date of May 31, 1996. The Permit was subsequently extended to May 31, 1999. The USACE has not renewed this permit and considers it to have expired, and requires that any new development obtain a new permit.

USACE Nationwide Permit #18 concurrence, Sitka National Historical Park
The NPS proposed to improve a small parking area within the National Park. They applied for and received permission from the USACE to construct the parking lot improvements in accordance with the NWP #18 (Minor Discharges) conditions.

Storm Water Pollution Prevention Plan (SWPP), File No. MSGP 2000-117 Conditional Approval, issued by the Alaska Department of Environmental Conservation to Tisher Construction.

This permit was issued to Tisher Construction in February of 2003 for the continued operation of the Rock Quarry on property leased from SJC. Subsequent to that permit, A Notice of Intent to discharge storm water was filed by SJC and Tisher Construction and authorized by the Environmental Protection Agency, AKR05A602.

Conditional Use Permit (CUP), City and Borough of Sitka, 1995.
This CUP permitted the operation of the SJC quarry by Winnop's Excavation pending rezoning of the quarry property. The CBS Assembly also approved Ordinance 95-1319, rezoning 18.8 acres from R-2 to Industrial Zoning, which permits the operation of a rock quarry with Conditional Use Permit.

Planning Documents
It is important that the Indian River Watershed Master Plan be consistent with other existing planning documents. Toward this end, a review of existing and draft planning documents pertaining to the Indian River Watershed was done. These documents include the following:

- City and Borough of Sitka Coastal Management Program
- City and Borough of Sitka, Alaska Draft Comprehensive Plan
- Alaska Department of Natural Resources Northern Southeast Area Plan
- Tongass National Forest Land and Resource Management Plan
- Sitka Non-Motorized Transportation Plan
- Sitka Trail Plan 2003
- US National Park Service, General Management Plan, Sitka National Historical Park.

All of these documents were reviewed, but few focus exclusively on the Indian River Watershed. The planning documents expected to have a distinct impact on development within the watershed include the *Northern Southeast Area Plan*, the *Sitka Non-Motorized Transportation Plan* and *The Sitka Trail Plan.*

City and Borough of Sitka, Alaska Comprehensive Plan
The *City and Borough of Sitka, Alaska Draft Comprehensive Plan* was completed in 1999, and will be revised in 2004. The Plan includes a review of existing conditions and presentation of Borough-wide and area-specific goals and objectives. Where found inconsistent with other plans, the Comprehensive Plan is intended to take precedence and the Borough will work toward amending the inconsistency identified in the other plan(s). Goals and plans that may have impacts to planning in the Indian River Watershed include:

Access
- Maintain public access to recreational areas wherever feasible;
- Support inter-agency cooperation to provide the public with additional river access and recreational access.

Land Use
- Require that infrastructure costs be borne by the developers/users;
- Require the submittal and approval of a master development plan before staged development on large parcels;
- Facilitate the availability of adequate land zoned for residential, commercial, industrial and waterfront development;
- Support development that includes greenbelts and parks.

City and Borough of Sitka Coastal Management Program

The City and Borough of Sitka began participating in the Alaska Coastal Management Program in 1979. The *City and Borough of Sitka Coastal Management Program* was completed in 1981, and a significant amendment to the program was approved in 1989. The Program seeks to provide guidance in the management of coastal resources for the long-term benefit of citizens. The boundaries of the Sitka Coastal Management District Program are the boundaries of the City and Borough of Sitka located within the coastal zone (72% of all CBS land).

The Program outlines appropriate use of coastal areas related to topics such as development, energy facilities, transportation and utilities, air, land and water quality, and historical resources. The Program works in cooperation with the State of Alaska Department of Natural Resources Office of Project Management and Permitting's Consistency Review process that requires that projects undertaken within a coastal zone undergo an evaluation to confirm that the project is compatible with statewide and local long-term development policies. The Alaska Coastal Management Program is undergoing major revisions, including redefinition of the Coastal Zone. Therefore the new Consistency Review process could substantially change.

Specific impacts of the current Sitka Coastal Management Program within the Indian River Watershed include restricting development within 25 feet of the 100-year flood high water mark of Indian River.

Alaska Department of Natural Resources Northern Southeast Area Plan

The Northern Southeast Area Plan sets out goals and objectives for management of state lands, including Baranof Island, and specifically the state land within the Tongass National Forest in the Indian River Watershed. State land within the watershed is classified as "Pr – Public Facilities – Retain" and "Ru – Public Recreation and Tourism – Undeveloped." The goals and objectives for the state lands within the Indian River Watershed are:

- *Ownership* - The state land is to be retained in state ownership.
- *Land Use Management* - To be managed to protect and maintain its public recreational and watershed values.
- *Development* - Limited to structures related to public recreation or a water supply system. Easements and rights-of-ways are considered appropriate.

Tongass National Forest Land and Resource Management Plan

In 1997 the U.S. Forest Service developed the Tongass National Forest Land and Resource Management Plan. It designated the upper Indian River Watershed as an *Enacted Municipal Watershed.* The intent of this designation is to manage the land primarily as a municipal water supply, limiting development to that which will not impact water quality and flow.

The management prescriptions for lands designated as Municipal Watershed are:

- *Goals:* To maintain these watersheds as municipal drinking water supply reserves in a manner that meets the State of Alaska Drinking Water Regulations and Water Quality Standards for water supply.
- *Objectives*: Limit most management activities to the protection and maintenance of natural resources. Fish habitat enhancements, and watershed and wildlife habitat improvements, may occur if they are compatible with the municipality's watershed management objectives. Classify forested lands as unsuitable for timber production. Salvage logging will only occur after consultation with the municipality. Recreation uses will be authorized by the Forest Service officer with delegated authority in consultation with the municipality and will be limited to those that will protect water quality and flow.
- *Desired Condition*: Lands managed as Municipal Watersheds are generally in a natural condition. Facilities or structures to provide municipal water supplies may be present. Uses or activities that could adversely affect water quality or supply do not occur. These watersheds provide municipal water that meets all State Drinking Water Regulations and Water Quality Standards for water supply.

Sitka Non-Motorized Transportation Plan

The *Sitka Non-motorized Transportation Plan* started out in 1993 as the *Sitka Preliminary Bicycle Plan.* The goal of the plan was to provide better and safer bicycle facilities, reduce conflicts between bicyclists and other modes of travel, to remove physical barriers and meet ADA accessibility standards, and to provide a more viable alternative to motorized transportation. CBS initiated the *Sitka Non-Motorized Transportation Plan* in early 2002, which served as the successor to the Bicycle Plan.

The *Sitka Non-Motorized Transportation Plan* has the stated goals of Development, Education, Safety, Funding, Maintenance, and Implementation of a non-motorized transportation system in Sitka. It specifically makes recommendations for enhancing existing facilities, and installation of new ones to create an area-wide system of trails throughout the Sitka vicinity. Specifically, the recommendations that impact the Indian River Watershed include:

- Realignment of the Sitka Cross Trail to provide easier and better access.
- Improvements to the Indian River Trail, including a multi-use pathway, and trailhead improvements and upgrades.
- Construction of a non-motorized underpass beneath the Indian River bridge on Sawmill Creek Road.
- Construction of a bridge and the extension of the Sitka Cross Trail across Indian River to connect with the existing Thimbleberry Lake Trail.

Sitka Trail Plan 2003

The *Sitka Trail Plan* is a cooperative effort between Sitka Trail Works, Inc., the City and Borough of Sitka, the USDA Forest Service, the ADNR, the Sitka Tribe of Alaska, and the USDI National Park Service. The Plan's primary stated goal is to set "a clear

direction for managing, maintaining and promoting Sitka trails." Specifically, the improvements targeted in the Indian River Watershed are very similar to the Sitka Non-Motorized Transportation goals, primarily the extension of the Sitka Cross-Trail across Indian River to Thimbleberry Lake.

US National Park Service, General Management Plan, Sitka National Historical Park.
This plan is specific for the Sitka National Historical Park, and as such it has little or no impact on the Indian River Watershed within the Primary Study Area.

Planning and Zoning
The City and Borough of Sitka has adopted Title 21 – Subdivision Code, and Title 22 – Zoning Code as part of its Code of Ordinances.

Subdivision Code – Title 21
The Subdivision Code establishes requirements for the orderly development of new property in Sitka. Any proposed subdivision in the Indian River Watershed will be required to submit preliminary subdivision plats for approval.
The regulations provide for utility and access easements, pedestrian and vehicular traffic control, recreation, common spaces, survey and other elements of land and property development that are consistent with local regulations, comprehensive plans and zoning requirements. The subdivision ordinances apply to all public and private property within the Borough, including state and federal property, subject to some exceptions. It is the responsibility of the developer to submit plans for review and approval by the Planning Commission before a plat for a new subdivision can be approved. The Planning Commission can impose use restrictions on subdivisions within limits connected to topography, road access or other pertinent factors. The final plat must be approved by the Planning Commission for minor subdivisions and by the Planning Commission and Assembly for major subdivisions. Additional information on the Subdivision Ordinances can be found at the City and Borough of Sitka web page, http://www.cityofsitka.com/dept/Planningoffice/Subcode.pdf.

Zoning Code – Title 22
The zoning ordinances also provide for the controlled development of land areas within Sitka, seeking to keep development consistent within areas and regions defined by the zoning maps. The zoning regulations define the types of development that can be constructed within each zone, and designate which zoning regulations apply to specifically zoned areas within the borough. Each zone has permitted uses, those uses which are consistent for the type of development within the zone, and conditional uses, those uses which can be permitted within the zone under certain conditions, for which a conditional use permit is required. Most of the undeveloped areas within the Primary Study Area of the Indian River Watershed are zoned as R-2 MHP or P, with smaller areas zoned as C-1 and I. Table 5, page 81, summarizes the types of zoning and the generally permitted uses for these designations.

Table 5 - Zoning Within the Indian River Primary Study Area

Zoning Code	Type of Zoning	Principal Land Uses
P	Public Lands	Public recreation and educational or institutional uses
C-1	General Commercial	Developed areas involving personal services, convenience goods, and automobile related services.
R-2 MHP	Multi Family and Mobile Home	Urban development for single family and multi family residences and mobile home parks.
I	Industrial	Industrial and heavy commercial uses.

The above table only indicates the overall general uses permitted within these zoning designations. Other specific general and permitted uses for these zones and additional information on the Zoning Ordinances can be found at the City and Borough of Sitka web page, http://www.cityofsitka.com/dept/Planningoffice/Zonecode.pdf.

Chapter 9: Proposed and Potential Development

An important element of the Master Plan Inventory is the documentation of future development plans within the watershed. The planning horizon for this master Plan is 20 years, and any development plans that might be implemented within that horizon were investigated. Reviews of land status maps and interviews with public and private landowners within the watershed were conducted. Based on this information the land within the watershed was placed into one of 5 categories: Currently Developed, Proposed Development, Potential Development, No Development Planned, and Restricted Development. Table 6, page 87, summarizes the development within the Indian River watershed based on these categories. Figure 11A, page 89, shows the various types of development for the areas outside of the Primary Study Area and includes the development summary table. The proposed and potential development in the Primary Study Area is included at larger scale on Figure 11B, page 91. The following paragraphs describe the various development categories.

Currently Developed – 189 acres
These are areas that have already reached a significant level of development, and include the residential subdivisions, roads, the rock quarry, and educational, recreational and institutional development including Sheldon Jackson College, the Alaska Raptor Center, trails, and CBS facilities. Although not all of the land within this category has necessarily reached maximum development, most of the remaining land within these areas will amount to a statistically minor amount of land within the watershed.

Proposed Development – 36 acres
Proposed development is defined in this section as development that has proceeded at least to the initial planning stages. Permits may or may not have been applied for, funding may or may not be available, and plans may or may not have been developed. These are projects that are in the process of being implemented or planned. It should be noted that to the best of our knowledge, no permits for construction have yet been issued for any planned or potential project.

There are six projects that are proposed for development at this time in the Primary Study Area. The project and scope of development is described in the following paragraphs. They are not listed in any particular order, and no significance should be given to the order in which they are presented.

Landclearing Landfill

A landclearing landfill has been proposed by CBS as a way to permit development of much needed residential and commercial space elsewhere in Sitka. The unsuitable overburden soils and vegetation that occur on otherwise developable property must be removed before foundations can be installed and construction can begin. The current landclearing landfill near Granite Creek is rapidly filling up, and when it is full, development of most types of residential and commercial property may come to a halt unless a suitable site can be found for overburden disposal.

This landclearing landfill will be designated as a disposal site of organic topsoil and inorganic unsuitable soils only. No other debris or solid waste of any type will be permitted to be disposed of at this site. The primary proponents of the landfill development project are CBS and Tisher Construction, the operator of the adjacent rock quarry. The land is currently leased by Tisher Construction from SJC, and the project presumably won't move forward without support from SJC. The estimated project area is approximately 18.5 acres. If the landclearing landfill proposed development moves forward, it is likely that the current road access through the quarry will require a significant upgrade. Both the nature of the upgrades and the location of the access road should be carefully evaluated to minimize adverse impacts to the watershed that can occur from road development.

Public Safety Academy Driver Training Course

The current driver training course on the old concrete landing strip on Japonski Island is not suitable for thoroughly developing driving skills in troopers attending the Academy. In addition, Mt. Edgecumbe High School and the University of Alaska Sitka are concerned over pedestrian safety in this area, and would like to develop a more structured approach to their campuses. Any modifications or reductions in the driving area will render the course virtually unusable for driver training as required by the Troopers. The Academy is, therefore, exploring building a new course

on Public Safety Academy land. Some funding for preliminary planning may be available soon. The total development is estimated to occupy approximately 8.8 acres.

Sitka Counseling and Prevention Services (SCPS) Housing and Parking Improvements

SCPS has begun preliminary development of additional 12 to 15 parking spaces at Max's Place Treatment Center on Indian River Road, on property leased from SJC and CBS. That project has been temporarily suspended until permit issues can be worked out. In addition, SCPS is planning on constructing up to three eight-plexes on Flume Circle. This project is in the initial stages of design, and funding is not yet in place for the entire project. Expansion of their existing treatment facility is also under consideration and preliminary planning. Total project development will be about 2.75 acres.

Sitka Cross Trail Realignment and Indian River Trail Head Improvements

The Cross Trail improvements are in the Sitka Non-Motorized Transportation Plan, and are among the highest priorities in the Plan. Improvements would include a realignment of the Cross Trail east of Indian River to permit easier access, the construction of a bridge across Indian River to extend the Cross Trail to Thimbleberry Lake, resurfacing of the trail, construction of an underpass beneath the Sawmill Creek Road bridge over Indian River, and parking and access improvements to the Indian River Trail Head. Of lower priority is a proposal for an addition to the Indian River Trail along Indian River Road and improvements to the Sheldon Jackson College Flume Trail. These proposed routes have not been verified or cleared with landowners nor have funding sources been identified for design or construction.

69KV Electrical Intertie, CBS Electrical Department

With the potential extension of the Sitka Cross Trail across Indian River, the CBS Electrical Department would like to examine the feasibility of extending their 69KV distribution along the same route in the trail easement. The line would be buried approximately 5 feet below the trail surface, within the trail prism. The line is safe and has no significant external electrical or magnetic fields. This project is very preliminary at this time, but it is desirable from the CBS Electrical Department viewpoint as a way of enhancing and protecting the existing electrical distribution system in Sitka.

CBS Residential Subdivision

The City and Borough of Sitka is currently in the preliminary planning stages for a small subdivision on the east side of Indian River Road, opposite Ashaak Subdivision, on the CBS property between Indian River Road and Indian River. The subdivision will be approximately 2 acres in size. It is not known at his time how many lots will ultimately be developed.

Sheldon Jackson College

Much of the remaining undeveloped property within the Indian River watershed that could potentially be developed is owned by SJC. Alpine Partners of Anchorage is currently in discussion with SCJ regarding acquisition of a parcel at the end of Andrew Hope Street to develop a low-income housing. Specific development plans are not available at this time, but some level of planning is now being considered.

Potential Development – 189 acres

The primary difference between proposed development and potential development is that the property owners have stated that they have no plans for development at this time. However, the land that they control may be suitable for future development. SJC is mandated to manage its property for the maximum benefit of its constituents. At some point, development is liable to occur, and it may likely be driven by the costs of development versus the potential return on the investment. CBS also has substantial land which could potentially be developed.

Both of the areas shown for potential development on Figure 11B, page 91, are undeveloped at this time. In the case of the SJC property west of Indian River, the area was originally slated for residential development. Up to 159 one-acre lots and 42 one-third acre lots were originally planned, and about 60 have been constructed so far. It is not unreasonable to expect that the same level of development may eventually be considered.

CBS has no specific plans for development of its property on the east side of Indian River, and the ultimate development plans are a matter of speculation at this time. However, the terrain is relatively flat, and is potentially suitable for residential or commercial development. If developed to the same residential density as the SJC/BIHA subdivisions, there could be room for 10 to 20 residences in this area.

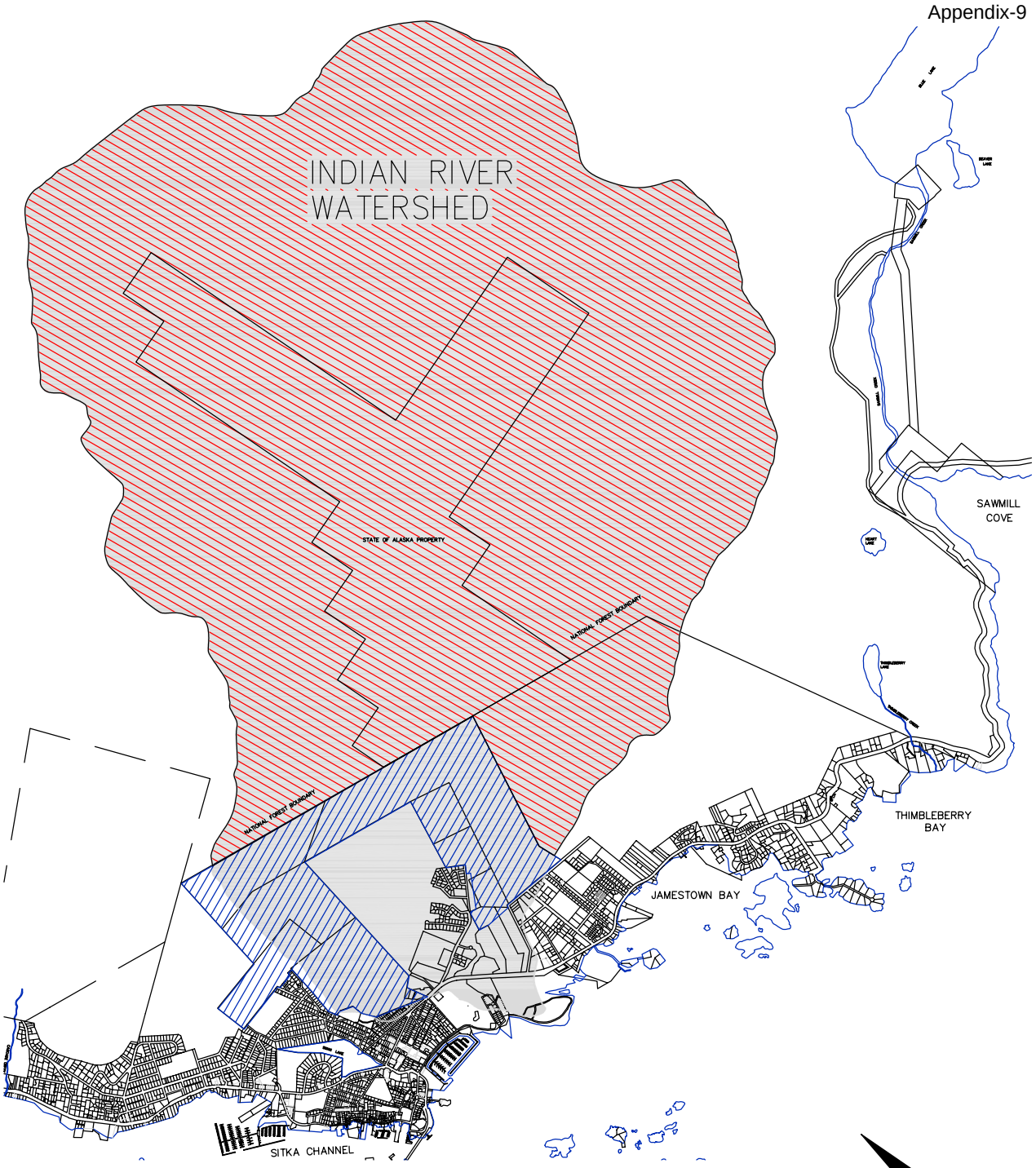
Restricted Development – 6,913 acres
Restricted development is that development which is restricted by the underlying land use requirements. Specifically, State of Alaska land within the Tongass National Forest was selected specifically as a municipal watershed, and devolvement is restricted to minor recreational trails and improvements. No significant development may take place that would change the water quality or hydrology of the watershed. Likewise, the U. S. Forest Service is required to manage the upper Indian River Watershed as a Municipal Watershed in the 1997 Tongass National Forest Land and Resource Management Plan. The vast majority (87%) of the land within the Indian River watershed falls into this category.

No Development Planned – 573 acres
In this category are lands owned by public agencies within the watershed and outside of the Tongass National Forest boundary. Parcels include tracts owned by the U.S Forest Service, the City and Borough of Sitka, the U.S. Geophysical Survey and the Alaska Mental Health Trust. Land managers for these properties were contacted and plans for future development were discussed. None of the parcels identified, with the exceptions already noted under Proposed or Potential development, have any identifiable development plans within the 20-year planning horizon of this Master Plan.

Summary
In all cases, development will be contingent on a number of factors, including permitting issues, constructability, utility infrastructure cost and community support. The purpose of this Master Plan is to provide a good background and understanding of the issues facing development in the Indian River Watershed ahead of project planning.

Table 6 – Development Summary

Development Classification	Area (Acres)	% of Watershed
Currently Developed	189	2.4%
Proposed Development	36	0.5%
Potential Development	189	2.4%
Restricted Development	6,913	87.4%
No Development Planned	573	7.3%
Totals	7,900	100%



INDIAN RIVER WATERSHED

CURRENTLY DEVELOPED		189 ACRES	2.4%
PROPOSED DEVELOPMENT		36 ACRES	0.5%
POTENTIAL DEVELOPMENT		189 ACRES	2.4%
TOTAL DEVELOPABLE AREA		414 ACRES	5.3%
NO DEVELOPMENT PLANNED		573 ACRES	7.3%
RESTRICTED DEVELOPMENT *		6913 ACRES	87.4%
TOTAL ACREAGE		7900 ACRES	100%

*DEVELOPMENT LIMITED TO MINOR RECREATION IMPROVEMENTS CONSISTENT WITH MUNICIPAL WATERSHED MANAGEMENT RESTRICTIONS.

NOTE: REFERENCE FIGURE 11B FOR PROPOSED AND POTENTIAL DEVELOPMENT AREA DETAILS

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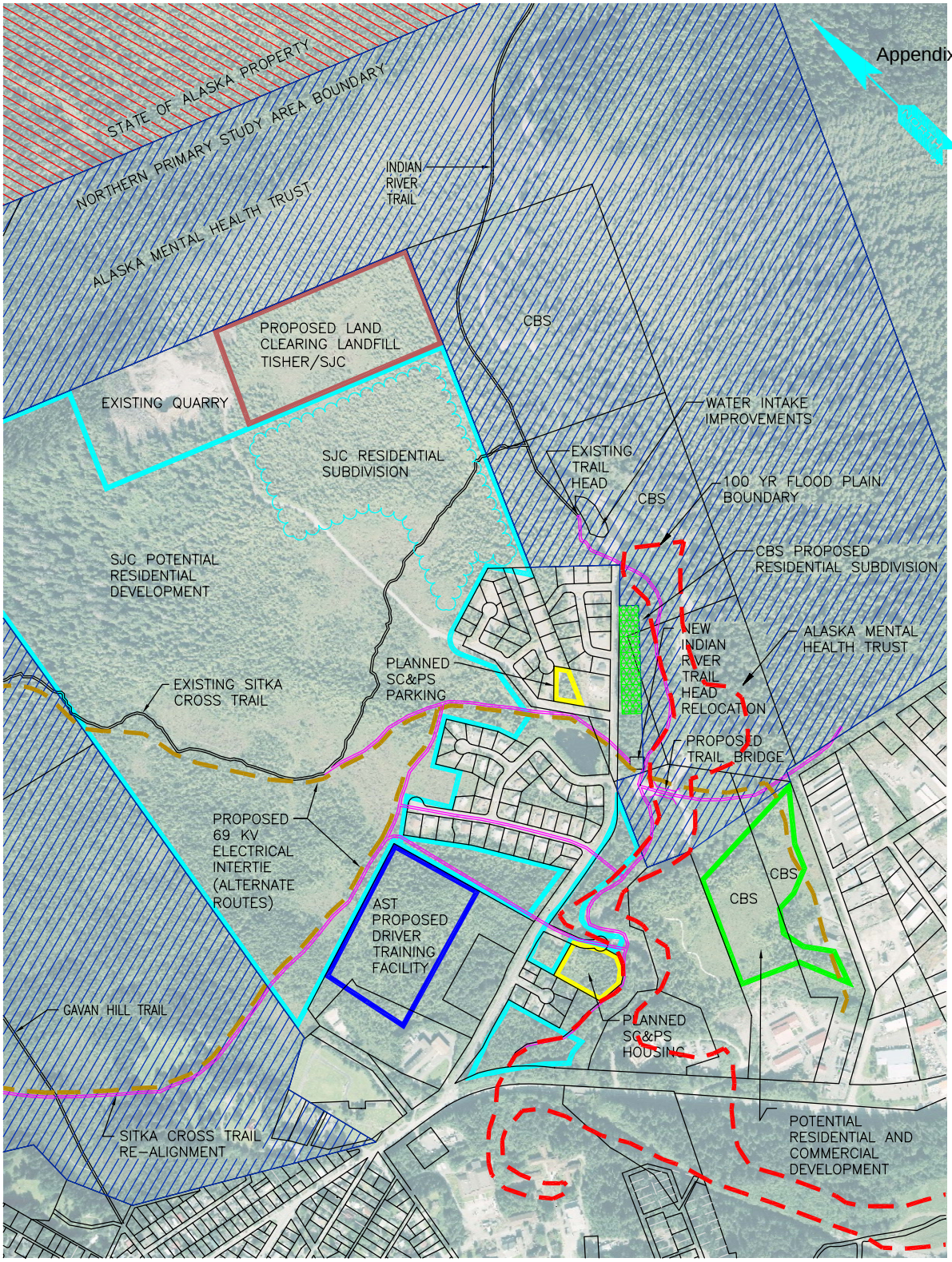
INDIAN RIVER CORRIDOR AND WATERSHED MASTER PLAN

CITY AND BOROUGH OF SITKA, ALASKA

WATERSHED DEVELOPMENT SUMMARY

FIG 11A



PROPOSED DEVELOPMENT

- LANDCLEARING LAND FILL, 18.5 ACRES
- TROOPER DRIVER TRAINING FACILITY, 11.0 ACRES
- SC&PS PARKING, 0.7 ACRES
- SC&PS HOUSING, 2.1 ACRES
- SITKA CROSS TRAIL REALIGNMENT & TRAIL HEAD, 1.5 ACRES
- 69KV ELECTRICAL INTERTIE LINE
- CBS RESIDENTIAL SUBDIVISION, 2.0 ACRES

POTENTIAL DEVELOPMENT

- SJC RESIDENTIAL HOUSING, 180 ACRES
- CBS RESIDENTIAL/COMMERCIAL, 9 ACRES

OTHER

- NO DEVELOPMENT PLANNED
- MUNICIPAL WATERSHED MANAGEMENT ONLY
- 100 YR FLOOD BOUNDARY

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INDIAN RIVER CORRIDOR AND WATERSHED MASTER PLAN

CITY AND BOROUGH OF SITKA, ALASKA

PROPOSED AND POTENTIAL DEVELOPMENT WITH FLOOD PLAIN BOUNDRY

FIG 11B

SCALE: 1" = 600'

Chapter 10: Fish Habitat

Many species of fish and terrestrial wildlife make their home in Indian River. Land mammals include deer, bear, marten, mink, squirrel and goat. Birds include eagles and other raptors, mergansers, a variety of ducks, songbirds and others. Due to budget and time constrains, the Indian River Master Plan habitat inventory has been limited primarily to fish habitat. Human development has affected and will continue to affect other animal species and habitat, but a detailed analysis of this impact is beyond the scope of this current planning effort.

Fish Habitat Summary

A fish habitat survey was conducted on November 18-20, 2003 to assess condition and availability of fish habitat in the Indian River. USDA channel types were assigned to different reaches so that Best Management Practices could be utilized for habitat protection. A total of seven Reaches were identified and an overview of the Reaches is shown in Figure 12, page 95. Habitat inventory mapping was performed for Reaches 1-5 by ground survey totaling 22 hours. Habitat for Reaches 1-3 are shown in Figure 12A, page 97. Habitat for Reach 4 is shown in Figure 12B, page 99. Habitat for Reach 5 is shown in Figure 12C, page 101. Detailed habitat mapping was not performed for Reaches 6 and 7 which are above the confluence of the east and west forks of the river and are outside of the Primary Study Area.

Coho salmon, pink salmon, chum salmon, steelhead trout, Dolly Varden char, resident rainbow, and cutthroat trout utilize Reaches 1-5 and the lower portions of Reaches 6 and 7 for passage, spawning, incubation, and rearing. The times at which they utilize these Reaches are identified in Table 7, page 106. Yearly (1962-2003) pink salmon peak escapement counts conducted by ADF&G are provided in Table 8, page 107. Escapement to the river is strongly influenced by straying of fish from the Sheldon Jackson Hatchery.

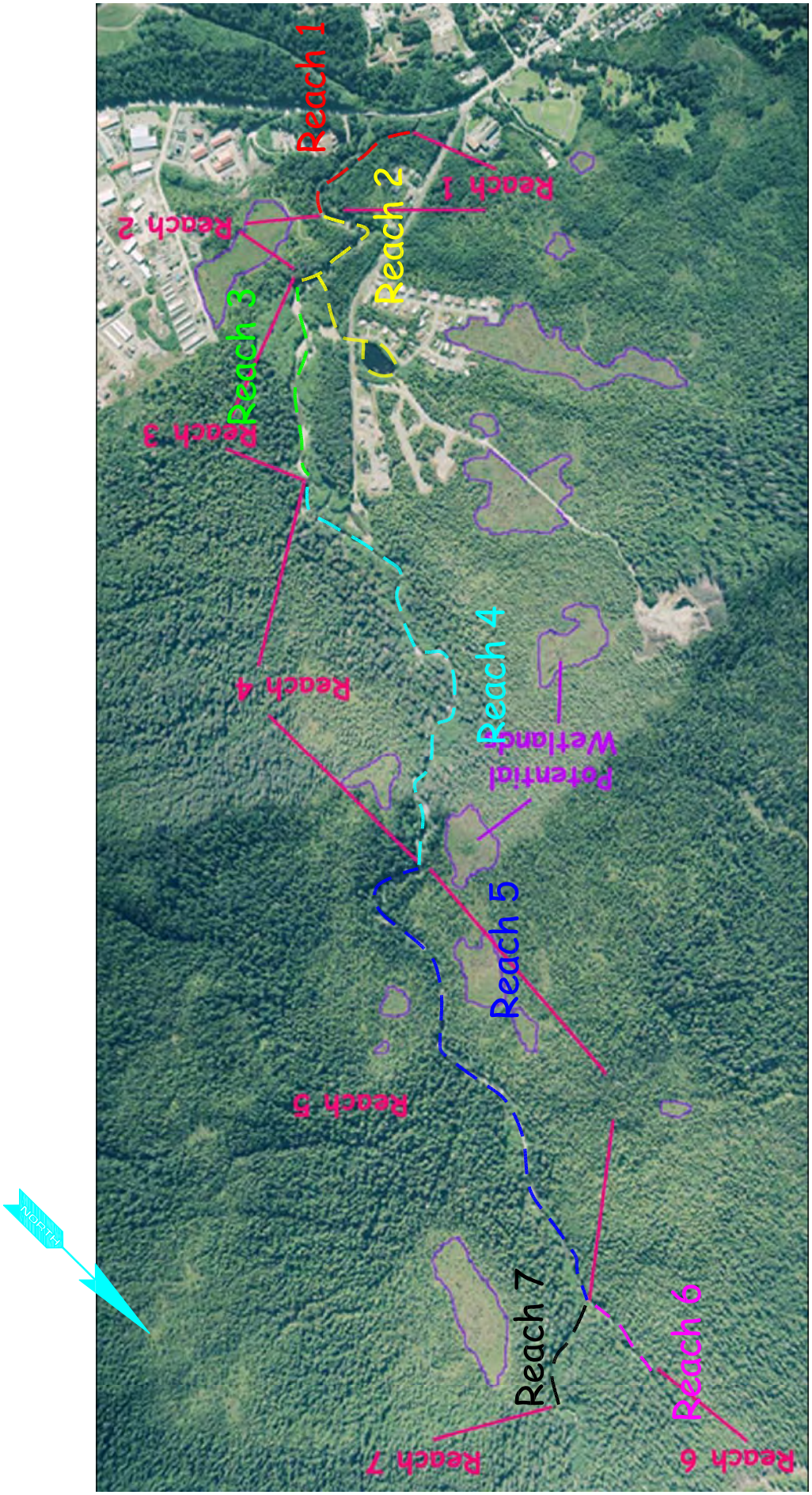
Suitable spawning habitat for salmon present in the river typically consists of 2-4 inch gravel with sufficient depth and flow of water to provide oxygen to developing embryos. Suitable salmon spawning habitat is present up to the lower portions of Reaches 6 and 7. The largest uniform area of preferred spawning habitat for coho salmon and steelhead was located from 500m to 1000m upstream from Sawmill Creek Road Bridge (Reach 3 in Fig 12A). Spawning habitat is sensitive to the deposition of fine sediment. Any development near the stream or its tributaries should include erosion control measures to minimize potential sediment sources (Forest Service Handbook 2509.22, available on line at http://www.fs.fed.us/r10/ro/policy-reports/bmp/index.shtml, best management practices (BMP) 13.11-13, 14.9, 14.11, 14.13) stream bank protection (BMPs 13.16, 14.17) and control of in-channel operations (BMP 14.14). Braided channel areas should be avoided for stream crossings (BMP 14.2).

Desirable rearing habitat contains instream cover to provide physical shelter from high velocities and a visual barrier from predators. Large woody debris (LWD) is particularly

important in forming pools with cover and can help trap substrate suitable for spawning. Juvenile coho are frequently found to be strongly associated with LWD. Reaches 4, 6 and 7 have the highest concentrations of LWD and likely depend on it for pool formation and bank stability. The Tongass Timber Reform Act passed in 1990 mandated a minimum buffer zone of 100 ft (33m) on all Class I streams (those containing anadromous fish). Best Management Practices 12.6 describes how the riparian zone may best be managed to ensure continuous input of LWD over time and maintain habitat capability in these reaches. Buffer zones should extend along tributaries utilized by both anadromous and resident fish.

Reach 2 and Reach 5 are less influenced by LWD and stream banks are relatively stable due to bedrock; however, steep banks are susceptible to erosion if disturbed by road cuts or timber harvest. Riparian management in these areas should emphasize protection of unstable side-slopes. Stream crossings are generally not practical in these channels and road construction should emphasize the maintenance of channel side-slope stability (BMPs 14.2, 14.3, 14.7, 14.8). Lack of LWD in Reach 2 may be due to logging and development on adjacent banks that has reduced recruitment of LWD to the stream.

There is some concern for providing fish access through culverts in narrower reaches and tributaries. Moderate gradients can make it difficult to maintain fish passage through culverts. BMP 14.17 describes correct installation of culverts such that they do not restrict fish passage or create bed scour or velocity barriers.



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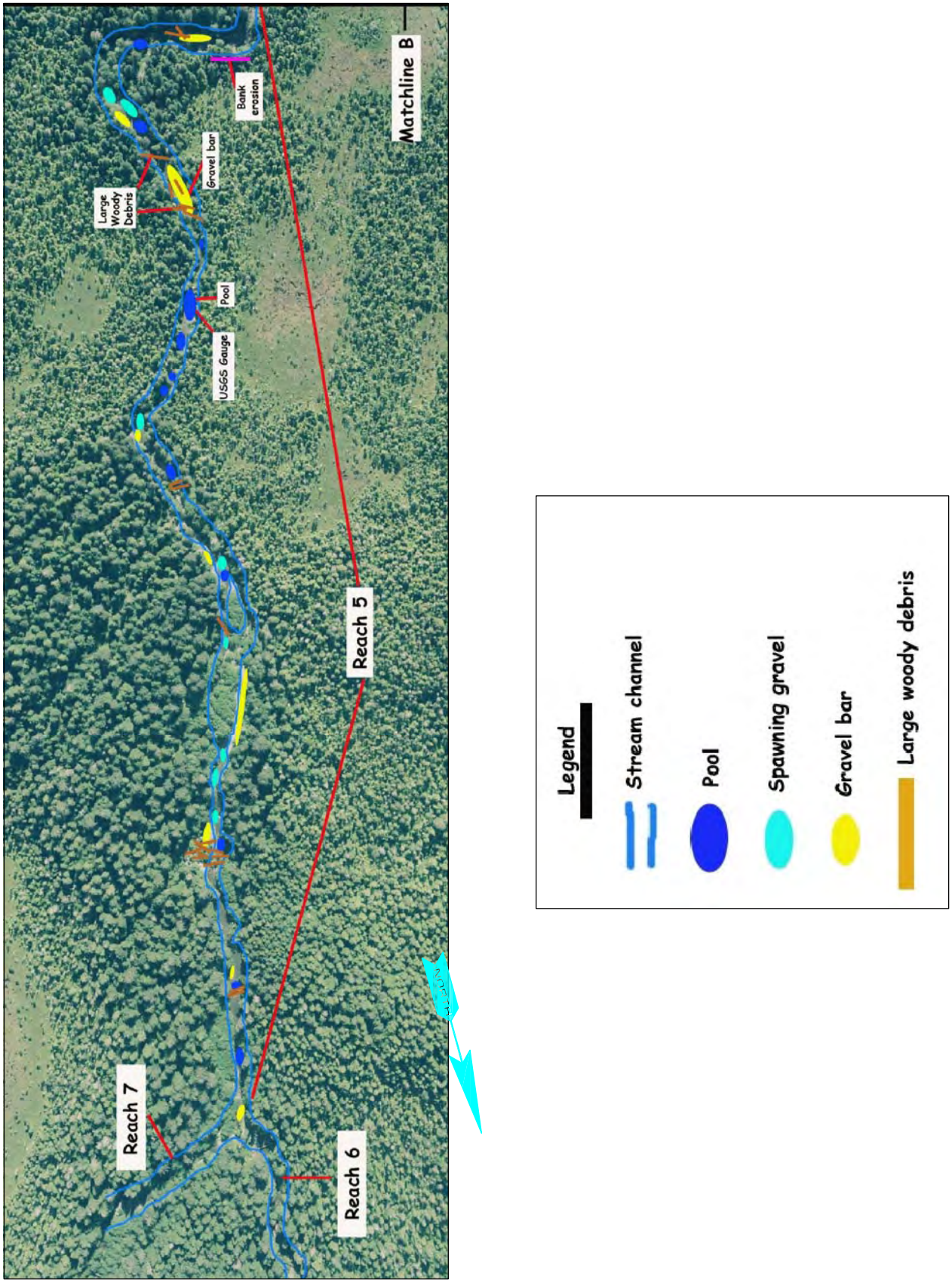
INDIAN RIVER CORRIDOR AND WATERSHED MASTER PLAN

CITY AND BOROUGH OF SITKA, ALASKA

FISH HABITAT INVENTORY

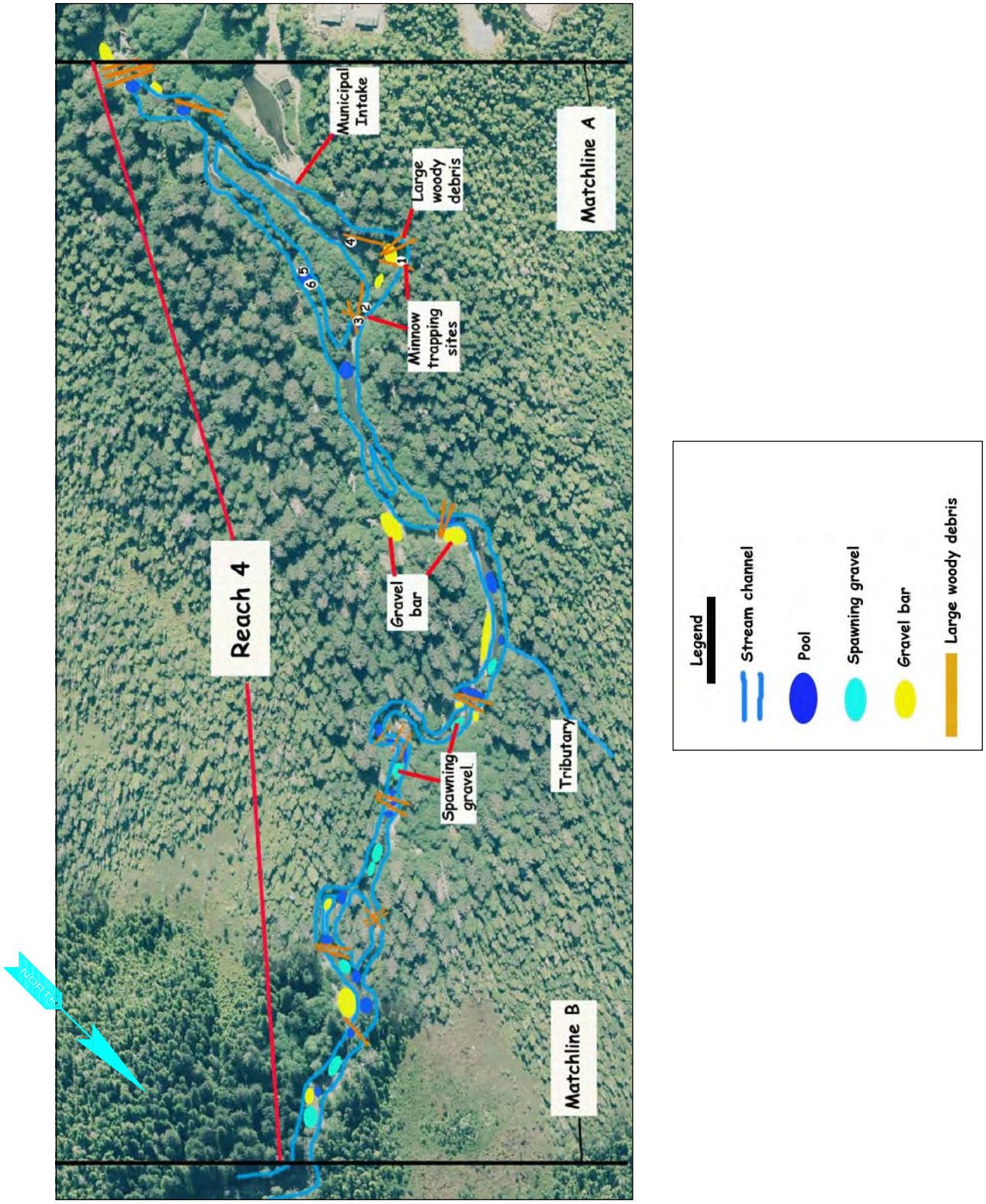
FIG 12

SCALE: 1" = 800'



INDIAN RIVER CORRIDOR AND WATERSHED MASTER PLAN
CITY AND BOROUGH OF SITKA, ALASKA
REACH 1-3 FISH HABITAT INVENTORY

FIG 12A
NOT TO SCALE



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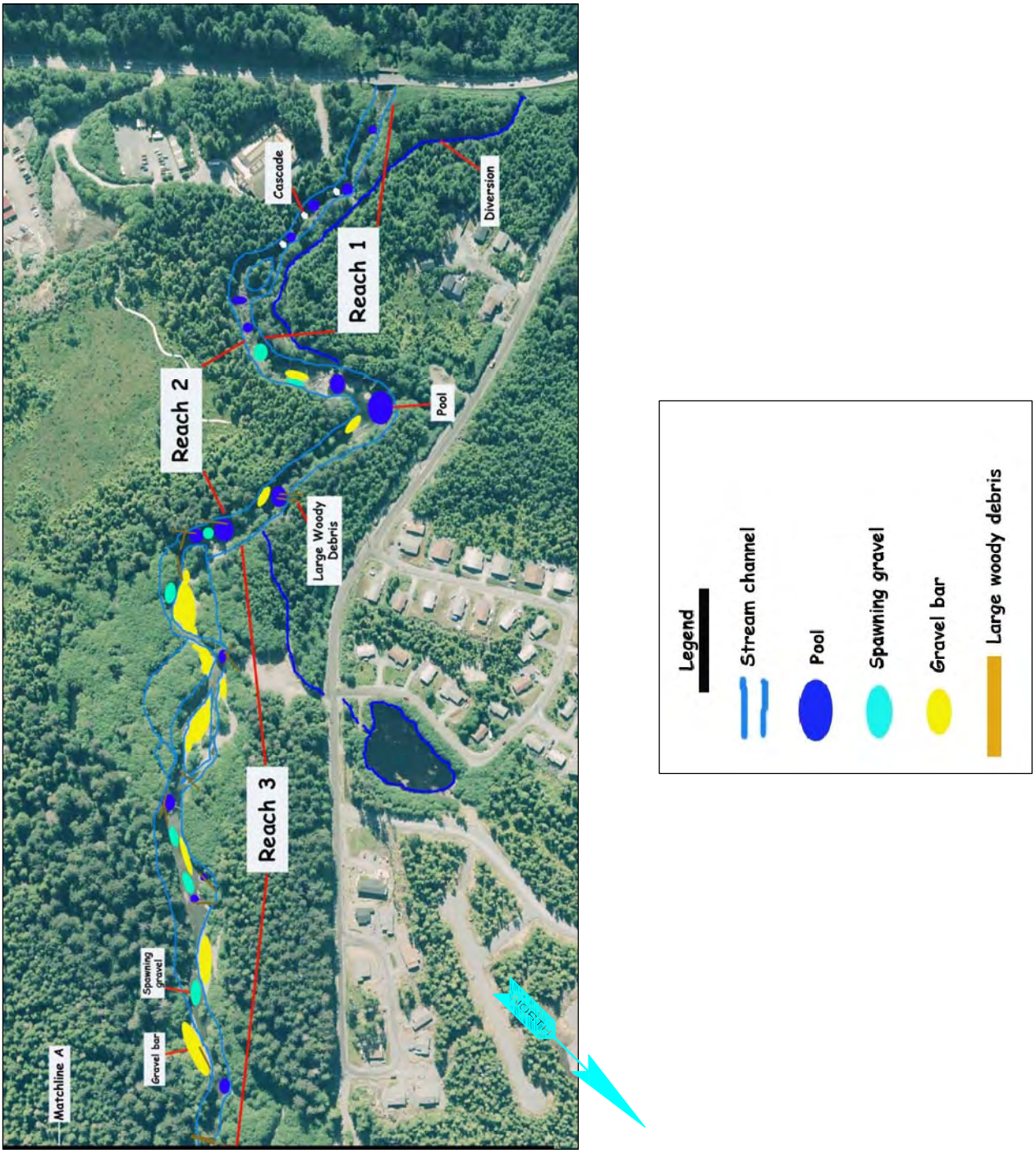
REACH 4 FISH HABITAT INVENTORY

FIG 12B

NOT TO SCALE



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INDIAN RIVER CORRIDOR AND WATERSHED MASTER PLAN

CITY AND BOROUGH OF SITKA, ALASKA

REACH 5 FISH HABITAT INVENTORY

FIG 12C

NOT TO SCALE

Fish Habitat Assessment Technical Memorandum

Introduction

The Indian River supports several anadromous fish species including pink salmon (Onocorhynchus gorbuscha), chum salmon (O. keta) and coho salmon (O. kisutch), steelhead trout (Salmo gairdneri) and Dolly Varden char (Salvalinus malma). Non-anadromous resident fish include rainbow trout (Salmo gairdneri), coast-range sculpin (Cottus aleuticus) and resident Dolly Varden that do not migrate to sea (Nadeau & Lyons 1987). Cutthroat trout (O. clarki) and Chinook salmon (O. tshawytscha) have also been reported in the river (Williams 2001) although the latter are likely strays from the Sheldon Jackson Hatchery.

This report is an assessment of fish habitat in the Indian River upstream of Sawmill Creek Road Bridge. The reach downstream of the bridge has already been well documented (Paustian & Hardy 1995). The aim of the fish habitat assessment is to identify the key habitat areas that are essential in maintaining healthy fish populations and could be at risk from degradation by proposed developments. This will allow measures to be taken to help protect key areas during development.

Objectives

1. Assess the condition and availability of fish habitat in the Indian River upstream of Sawmill Creek Road Bridge.
2. Identify keys areas of spawning and rearing habitat needed to sustain indigenous fish populations.
3. Make recommendations for protecting fish habitat during development activities.

Methods

Habitat Condition and Availability

A habitat survey was conducted on November 18 to 20, 2003, beginning at the Sawmill Creek Road Bridge and extending 3600m upstream to where the river branches into two forks. Both the east and west forks were then surveyed for a further 1300m. A total of 22 hours were spent on the ground conducting the habitat survey. The reaches within the Primary Study Area were covered four times (two roundtrips) by the stream surveyor operating a metric hip chain and recording features at measured distances along the river. A handheld GPS device was used to mark waypoints of major features to help locate them on the aerial photograph. Stream habitat was categorized as pool, glide, riffle or cascade following the classifications of Bisson et al (1981). Pools are defined as having slow water flow and are deeper than the average depth of the reach. Riffles are relatively shallow with fast water velocity. Glides have uniform depth, moderate water velocity and smooth water surface. Cascades or falls have fast, turbulent water flow and steep gradient associated with bedrock steps. The length and width of each habitat unit was measured in meters using the hip chain and a Leica laser rangefinder. The dominant substrate size on the stream bed and the number of pieces of large wood in the stream was also recorded. Large woody debris (LWD), defined as woody material greater than 4 inches in diameter and 10 ft in length, is critical in providing habitat diversity and maintaining stream

channel structure. Data collected during the survey are summarized in Table 10, page 114 and Table 11, page 114.

The river was divided into reaches according to USDA channel type classification, which defines a stream channel based on physical attributes such as gradient, substrate, stream bank incision and channel containment. The USDA Forest Service Best Management Practices for protecting fish habitat utilize these channel types (USDA 1992, 1996).

Fish Species Presence
Fish species present at the time of the survey was investigated under ADFG permit SF-2003-143 by setting 6 minnow traps baited with cured salmon eggs in an area of high quality rearing habitat. Captured fish were anesthetized in a solution of tricaine methanesulfonate (MS-222), weighed to the nearest 0.1g, and their total length measured to the nearest 1mm. The fish were then placed in a container of fresh stream water to recover before being returned to the stream.

Results
Reach Descriptions
Table 9, page 113, and Table 10, page 114, summarize the proportions of habitat type present in each reach. Table 13, page 115, compares amounts of LWD among reaches. Table 9 gives some indication of habitat complexity for each reach. A low mean habitat area indicates greater habitat complexity since it results from a greater number of small units. A high mean habitat area resulting from a small number of large units would indicate more uniform habitat. Reaches 1, 4 and 6 exhibit high habitat complexity while Reaches 2 and 5 have more uniform habitat. Table 10 gives estimates of the amount of habitat available for rearing and spawning in each reach and the amount of LWD present per 100m of stream.

Habitat maps for each reach are presented in Figure 12A, 12B, and 12C. These maps are based on sketch maps drawn in the field. GPS waypoints taken in the field helped locate major features on aerial photographs. Reach 1 begins just above Sawmill Creek Road Bridge and passes through a steep-sided bedrock gorge for 265m. The Raptor Center is situated on the east side of the gorge. The channel has a moderate gradient and is characterized by steep riffles and bedrock cascades (Plate 1), but these are not significant barriers to fish migration (Nadeau & Lyons 1987). The USDA channel type chosen for this reach is MC2, moderate width and incision, contained channel, due to the observed gradient and bedrock control of the stream. There is limited pool habitat present (13%) and only two pieces of LWD were recorded. Suitable rearing habitat for fish is limited. Spawning habitat is limited by the lack of suitable spawning gravel, the substrate being dominated by bedrock and boulders.

Reach 2 is 210m long and begins where the stream emerges from the rock gorge and continues over the Sheldon Jackson diversion dam. The diversion dam profoundly alters the character of the channel in Reaches 1 and 2. The dam flattens the stream gradient upstream, creates an extensive backwater, interrupts gravel and LWD transport

downstream and exacerbates scouring of the riverbed downstream. A fish ladder allows access to andromous fish over the dam. The gradient is low and the substrate ranges from sand to 3-inch gravel. Pool habitat constitutes 46% of the habitat due to the large pool area above the dam (Plate 2). Channel type is LC1, low gradient contained channel. There is a little LWD and spawning habitat is limited by small substrate size and low flow. Riparian vegetation consists of second growth spruce and hemlock forest. Reaches 1 and 2 have limited LWD perhaps as a result of the logging and development that has taken place adjacent to these reaches, reducing the recruitment of LWD to the stream from the riparian zone.

Reach 3 (Plate 3) is characterized by extensive gravel bars, among which the channel is often braided. The substrate is dominated by 3-5 inch gravel and provides extensive spawning habitat. The channel type is FP5, wide low gradient flood plain channel. Riparian vegetation is dominated by alder reflecting the more unstable, meandering nature of the channel. This reach is approximately 75% riffle and 25% pool and glide habitat. Reach 3 ends when the channel becomes narrower, 535m upstream of an old log bridge. The remains of old vehicles are present on the west bank just upstream of the log bridge.

The first major log jam in the stream, 1085m from Sawmill Creek Road Bridge, marks the beginning of Reach 4 (Plate 4). The channel type is FP4, low gradient flood plain channel. The channel splits around an island near the municipal intake site then continues to meander through large woody debris piles for 1240m. The dominant substrate is gravel ranging from 1 to 5 inches in diameter. Pools with LWD make up over 35% of the habitat and provide good rearing areas. A large proportion of the riffle habitat is suitable for spawning. A tributary enters the stream in Reach 4 on the west bank 470m upstream from the municipal intake site. There was insufficient time during the stream survey to follow tributaries upstream. Their position in Figure 12 is based on examination of the aerial photograph.

The beginning of Reach 5 is 2325m upstream from Sawmill Creek Road Bridge and is marked by a sharp bend to the east where some bank erosion has occurred (Plate 5). A small tributary enters the stream on the east bank 266m upstream from the USGS stream gauge located in this reach. The stream is more contained and incised in Reach 5 due to the influence of bedrock, and is characterized by long, deep pools and some bedrock cascades (Plate 6). The channel type is LC2, moderate gradient, contained, narrow valley channel. Suitable spawning habitat is limited by the presence of fine clay and bedrock. There is almost as much pool habitat as in Reach 4, but pools are larger and fewer and associated with bedrock rather than LWD. The riparian area on the west bank is dominated by muskeg. The stream splits into two forks at the end of Reach 5, 3600m from the Sawmill Creek Road Bridge (Plate 7).

Reach 6 is the west fork of the river. The channel narrows to an average of 7m wide and meanders among frequent LWD piles (Plate 8). Pools associated with LWD comprise 33% of the habitat. The channel type is FP3, narrow low gradient flood plain channel.

The dominant substrate is fine gravel which is less preferable for spawning. Reach 7 is the east fork of the river and has a large amount of LWD and similar width to the west fork. Gravel bars are more prevalent than in the west fork and gravel size is more suitable for coho spawning (Plate 9). Deep plunge pools associated with LWD dams make up about 35% of the habitat. The channel type is MM1, narrow, mixed control channel. The gradient increases upstream as adjacent hillside slopes become steeper. Four small tributaries enter the stream on the west bank at 300m, 400m, 630m and 1150m upstream from the confluence of Reaches 6 and 7.

Fish Habitat Use

Coho salmon, pink salmon, chum salmon, steelhead trout, Dolly Varden char, resident rainbow, and cutthroat trout utilize reaches 1-5 and the lower portions of Reaches 6 and 7 for passage, spawning, incubation, and rearing (ADFG 2004). The times at which they utilize these Reaches are identified in Table 7 on page 106.

Yearly (1962-2003) pink salmon peak escapement counts by type of survey conducted by ADF&G are provided in Table 8 on page 107. These counts are lower than total escapement but give an indication of run strength and the minimum escapement. Escapement to the river is strongly influenced by straying of fish from the Sheldon Jackson Hatchery (Paustian and Hardy 1995). The high numbers observed in some years (over 200,000) may reflect hatchery returns rather than the numbers the river can support.

Table7 – Species Periodicity

Species Periodicity Chart - Indian River
(Based on professional judgement of ADFG biologists)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Coho Salmon												
Passage									XX	XXXX	XXXX	
Spawning										XXXX	XXXX	
Incubation	XXXX	XXXX	XXXX	XXXX	XX					XXXX	XXXX	XXXX
Rearing	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Pink Salmon												
Passage							XX	XXXX	XXXX	X		
Spawning							XX	XXXX	XXXX	X		
Incubation	XXXX	XXXX	XXXX	XXXX	XX		XX	XXXX	XXXX	XXXX	XXXX	XXXX
Rearing			XX	XXXX	XXXX	X						
Chum Salmon												
Passage							XX	XXXX	XXXX	XXX		
Spawning								XXXX	XXXX	XXX		
Incubation	XXXX	XXXX	XXXX	XXXX	XX			XXXX	XXXX	XXXX	XXXX	XXXX
Rearing		XX	XXXX	XXXX	XXXX	XXX						
Steelhead Trout												
Passage				XXX	XXXX							
Passage-Upstr.						XXXX	XX					
Spawning-Dnstr.				XXX	XXXX	XX						
Incubation				XXX	XXXX	XXXX	XXXX	XXXX				
Rearing	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Dolly Varden												
Spawning									XX	XXXX	XXXX	
Incubation	XXXX	XXXX	XXXX	XXXX	XX				XX	XXXX	XXXX	XXXX
Rearing	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Rainbow Trout												
Spawning				XXX	XXXX	XX						
Incubation				XXX	XXXX	XXXX	XXXX	XXXX				
Rearing	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX

Incubation life phase includes period from egg deposition to fry emergence.

The November 2003 habitat survey was conducted towards the end of the salmon run, but a small number of adult coho salmon were observed throughout the stream. Individual coho were observed 4620m and 4800m upstream of the Sawmill Creek Road Bridge in the west fork. In the east fork, salmon eggs were observed exposed in gravel approximately 4400m upstream and a salmon carcass was found at 4650m upstream from Sawmill Creek Road Bridge. Juvenile fish were retrieved from minnow traps after 22 hours soaking in the stream. Stream temperature on retrieval of traps was 3.3^{o}C. Figure 12B on page 99 shows the location of minnow trapping sites. Traps 4 and 5 contained no fish, but the remaining traps contained a total of 7 Dolly Varden and 8 juvenile coho. Lengths, weights and age classes of captured fish are given in Table 11 on page 114.

Table 8. Indian River Peak Escapement Counts by Year and Type.

Year	Species	Peak Count	Survey Type
1962	Pink	500	FOOT
1963	Pink	300	FOOT
1963	Pink	300	FOOT
1964	Pink	300	FOOT
1965	Pink	500	FOOT
1966	Pink	300	FOOT
1967	Pink	150	FOOT
1969	Pink	500	FOOT
1971	Pink	300	FOOT
1972	Pink	200	FOOT
1973	Pink	500	FOOT
1977	Pink	17,500	AERIAL
1978	Pink	2,000	FOOT
1979	Pink	5,991	FOOT
1980	Pink	2,893	FOOT
1981	Pink	16,000	FOOT
1982	Pink	12,000	FOOT
1983	Pink	21,000	AERIAL
1984	Pink	6,000	AERIAL
1985	Pink	11,000	FOOT
1986	Pink	10,000	AERIAL
1987	Pink	3,000	AERIAL
1988	Pink	1,651	FOOT
1990	Pink	1,750	FOOT
1993	Pink	800	FOOT
1994	Pink	55,000	AERIAL
1995	Pink	14,000	AERIAL
1996	Pink	185,000	AERIAL
1997	Pink	260,000	AERIAL
1998	Pink	66,000	FOOT
1999	Pink	160,000	FOOT
2000	Pink	85,000	AERIAL
2001	Pink	90,000	AERIAL
2002	Pink	68,000	AERIAL
2003	Pink	270,000	AERIAL

These are yearly peak count, total escapement would be greater.

Discussion

Suitable spawning habitat for pink, chum and coho salmon and steelhead trout typically consists of 3-4 inch gravel with sufficient depth and flow of water to provide oxygen to developing embryos (Bjorn & Reiser 1991). Dolly Varden prefer smaller gravel of 1-3 inches (Kitano & Shimazaki 1995). Areas suitable for spawning are places that are free from deposits of fine material which are typically found in riffles and the lateral margins and tailout areas of bars and pools.

Pink and chum fry migrate out of the river shortly after hatching, but other salmonids spend part of their growth period rearing in the stream. Coho salmon may remain in the Indian River for three years before migrating to the ocean (Williams 2001) while steelhead can spend up to four years in freshwater (Meehan & Bjorn 1991). Desirable rearing habitat contains instream cover to provide physical shelter from high velocities and a visual barrier from predators. Boulders, deep pools, water turbulence, undercut banks, overhanging riparian vegetation and woody debris may all provide cover to some extent. Large woody debris is particularly important in forming pools with cover and can also help trap substrate suitable for spawning. Juvenile coho are frequently found to be strongly associated with LWD pools, particularly in winter when the need to minimize energy expenditure is greatest (Cunjak 1996). Large woody debris increases habitat complexity which provides more opportunity for intra- and inter-specific fish species segregation and therefore increased diversity. Juvenile salmonids, particularly steelhead, utilize riffle habitat as well as pools.

Pink and chum salmon utilize Reaches 1 to 5 and the lower portions of Reaches 6 and 7 for spawning, particularly in years where returns exceed 200,000 fish. Such large numbers result in pink salmon attempting to spawn throughout the river. Coho utilize gravel for spawning a long way upstream, at least 4800m from Sawmill Creek Road Bridge and also make use of several tributaries on the way (ADFG 2003). The largest uniform area of preferred spawning habitat for coho and steelhead is available in Reach 3.

Large woody debris is most abundant in Reaches 4, 6 and 7 providing abundant rearing habitat there. The LWD and associated pools in Reach 4 provide good high habitat complexity and extensive rearing habitat for juvenile coho, steelhead and Dolly Varden. Several age classes of Dolly Varden and juvenile coho were found in this Reach in November suggesting these species overwinter in the river. The deep bedrock pools of Reach 5 provide cover for resident Dolly Varden, but may be less attractive to juvenile coho fry that prefer LWD.

Recommendations for Habitat Protection

The essential role of LWD in the stream should be maintained by protecting riparian areas. Natural recruitment of LWD into the stream from riparian zones occurs slowly as a result of stream bank erosion and windthrow. Removal of trees from the riparian zone eliminates this source of LWD and adversely impacts fish habitat. Although the majority of LWD (94%) is derived from trees growing within 20m (66ft) of the stream (Martin Environmental 1998), a 20m wide buffer zone is often not wide enough to ensure the

supply of LWD. If trees are cut down to within 20m of the stream, remaining trees tend to fall more quickly due to windthrow. There may be an initial increase in LWD recruitment to the stream, but the future supply of LWD is diminished and fish habitat is eventually degraded.

The Forest Service Handbook 2509.22 states that riparian areas serve to store sediment, contribute to the maintenance of desirable water temperature, stabilize banks and the flood plain as well as contributing LWD to the stream. In Reach 4 (FP4) habitat capability is particularly dependent on the continuous input of LWD over time. Best Management Practice 12.6 in the handbook describes how the riparian zone may best be managed for this channel type. The Indian River is assigned a stream value of Class I owing to the presence of anadromous fish. The Tongass Timber Reform Act (1990) mandated a minimum buffer zone of 100 ft (33m) on all Class I streams and on Class II streams (resident fish present) flowing into a Class I stream. Buffer zones should extend along tributaries as these are likely used by coho for spawning and rearing.

FP4 and FP5 channels (Reaches 3 and 4) are also sensitive to the introduction of fine sediment from upstream. The quality of the extensive spawning habitat of here could be degraded by the deposition of fine material. Care should be taken to minimize impacts to stream banks that could accelerate bank erosion. Removal of vegetation from stream banks should be avoided. The removal of old vehicles and other waste from banks should be a priority. Areas disturbed by cleanup efforts should be revegetated. Any bridge crossings and roads near these reaches should include erosion control measures to minimize potential sediment sources (FSH 2509.22, BMPs 13.11-13, 14.9, 14.11, 14.13) stream bank protection (BMPs 13.16, 14.17) and control of in-channel operations (BMP 14.14). Braided channel areas should be avoided for stream crossings (BMP 14.2). Development of riparian areas where the stream has a tendency to migrate laterally could lead to undesired channelization and hardening of riverbanks. Riparian areas adjacent to unconfined channel types should be protected.

LC1 (Reach 2) and LC2 (Reach 5) channels are less influenced by LWD and stream banks are relatively stable due to bedrock, however, any steep banks present are susceptible to erosion if disturbed by road cuts or timber harvest. Riparian management should emphasize the protection of unstable side-slopes. Stream crossings are generally not practical in these channels and any road construction should emphasize maintenance of channel side-slope stability (BMPs 14.2, 14.3, 14.7, 14.8).

FP3 (Reach 6) channels are significantly influenced by LWD and sediment loading can adversely impact spawning gravels. Stream banks are composed of fine textured alluvium, which due to low stream power, are only moderately sensitive to disturbance (USDA 1992). Riparian management here should emphasize erosion control (BMPs 13.11 to 13.13, 13.16, 14.9 to 14.11). There is some concern for providing fish access through culverts in narrower reaches and tributaries. Culverts should be installed such that they do not restrict fish passage or create bed scour or velocity barriers (BMP 14.17).

MM1 (Reach 7) channels depend on LWD for trapping gravel substrates and pool-formation, and riparian vegetation plays an important role in bank stabilization. The riparian buffer must be well maintained (BMP 13.16). Upstream migration of fish is a major concern when planning for stream crossings in these channels as moderate gradients make it difficult to maintain fish passage through culverts (BMP 14.17). Control of in-channel operations is also important to minimize stream channel disturbances and related sediment production (BMP 14.14).

Conclusions

Coho salmon, pink salmon, chum salmon, steelhead trout, Dolly Varden char, resident rainbow, and cutthroat trout utilize Reaches 1-5 and the lower portions of Reaches 6 and 7 for passage, spawning, incubation, and rearing. The largest uniform area of preferred spawning habitat for coho and steelhead is present in Reach 3. Reaches 4, 6 and 7 have the highest concentrations of LWD and likely depend on it for pool formation and bank stability. Riparian areas should be managed according to Forest Service Best Management Practice available online at http://www.fs.fed.us/r10/ro/policy-reports/. A minimum riparian buffer zone of 100ft is required by the Tongass Timber Reform Act (1990) on anadromous streams. Reaches 3 and 4 are sensitive to bank erosion and spawning habitat could be degraded by the deposition of fine material resulting from bank disturbance. It is recommended that bank disturbance be minimized and any developments should include erosion control and bank protection measures (BMPs Chapter 13). These management practices should also be adopted along Indian River tributaries.

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Table 9: Summary Statistics for Indian River above Sawmill Creek Road Bridge

Stream Reach	Habitat Variable	Riffle	Pool	Glide	Cascade	All Units
Reach 1 MC2	Number of Units	7	6	0	4	**17**
Length: 265m	Area (m^2)	2016	438		886	**3340**
Width: 9-20m	Mean Area	288	73		222	**196**
	% of Total Area	60.4	13.1		26.5	100
	Habitat Variable	Riffle	Pool	Glide	Cascade	All Units
Reach 2 LC1	Number of Units	5	3	1	0	**9**
Length: 210m	Area (m^2)	1424	1727	570		**3721**
Width: 14-37m	Mean Area	285	576	570		**413**
	% of Total Area	38.3	46.4	15.3		100.0
	Habitat Variable	Riffle	Pool	Glide	Cascade	All Units
Reach 3 FP5	Number of Units	14	11	1	0	**26**
Length: 610m	Area (m^2)	6154	1642	360		**8156**
Width: 8-27m	Mean Area (m^2)	440	149	360		**314**
	% of Total Area	75.5	20.1	4.4		100.0
	Habitat Variable	Riffle	Pool	Glide	Cascade	All Units
Reach 4 FP4	Number of Units	25	21	3	2	**51**
Length: 1241m	Area (m^2)	6093	3872	838	72	**10875**
Width: 7-19m	Mean Area (m^2)	244	184	279	36	**213**
	% of Total Area	56.0	35.6	7.7	0.7	100.0
	Habitat Variable	Riffle	Pool	Glide	Cascade	All Units
Reach 5 LC2	Number of Units	18	11	1	1	**31**
Length: 1280m	Area (m^2)	7956	4178	180	280	**12594**
Width: 8-20m	Mean Area (m^2)	442	380	180	280	**406**
	% of Total Area	63.2	33.2	1.4	2.2	100.0
	Habitat Variable	Riffle	Pool	Glide	Cascade	All Units
Reach 6 FP3	Number of Units	27	14	0	0	**41**
Length: 1342m	Area (m^2)	5922	2903			**8825**
Width: 5-12m	**Mean Area (m^2)**	219	207			**215**
	% of Total Area	67.1	32.9			100.0
	Habitat Variable	Riffle	Pool	Glide	Cascade	All Units
Reach 7 MM1	Number of Units					
Length: 1350m	Area (m^2)	Estimate of % area from subsampling				**9000**
Width: 4-14m	**Mean Area (m^2)**					
	% of Total Area	65.0	30.0	0.0	5.0	100.0

Table 10: Habitat Availability for Spawning and Rearing of Coho and Steelhead

% Area Available			
Reach	**Spawning**	**Rearing**	**# Pieces LWD per 100m**
Reach 1 MC2	<1	10	0.75
Reach 2 LC1	5	25	0.95
Reach 3 FP5	50	20	2.8
Reach 4 FP4	25	40	4.9
Reach 5 LC2	10	20	3.2
Reach 6 FP3	5	30	5.1
Reach 7 MM1	10	25	7

Table 11: Lengths and Weights of Fish Trapped in November

Dolly Varden			Coho		
Length (mm)	Weight (g)	Age (yrs)	Length (mm)	Weight (g)	Age (yrs)
175	50.1	4	95	7.3	2
123	16.6	2	90	7.2	2
87	6.6	1	90	7.1	2
87	5.7	1	87	6.1	2
78	4	1	80	4.6	2
78	4.5	1	79	4.8	2
77	5.6	1	73	3.7	1
			65	2.5	0.5

Age is inferred from length data collected by Williams (2001)

Table 12: Percentage Habitat Type of Reach

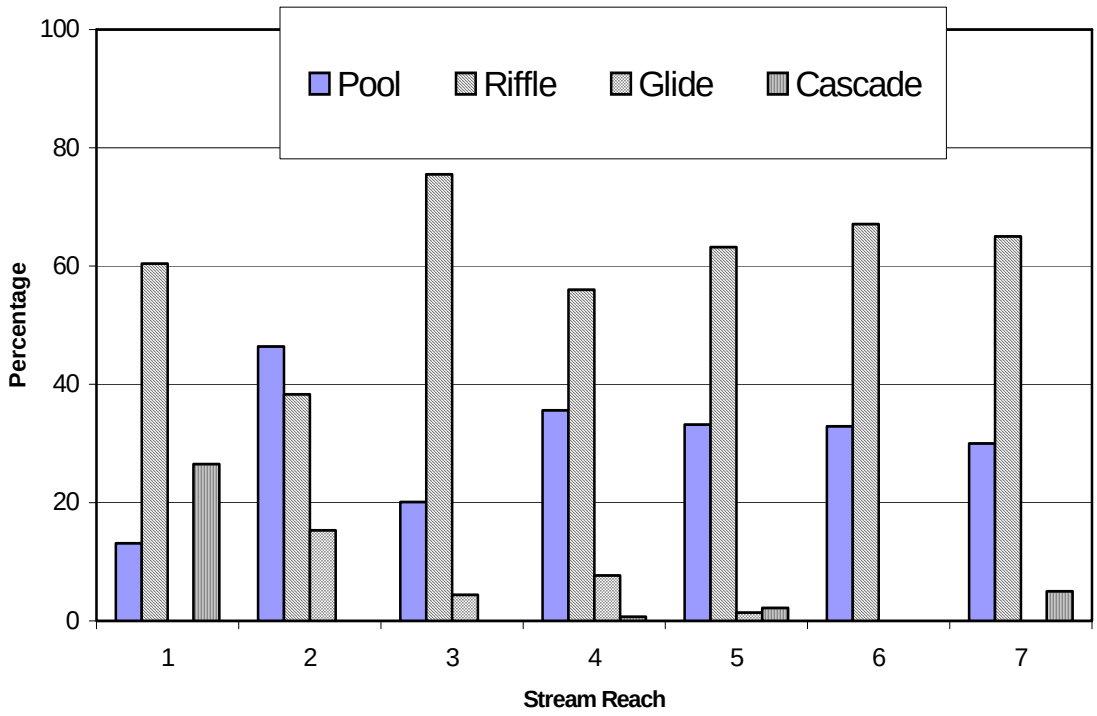

Table 13: Large Woody Debris in Stream

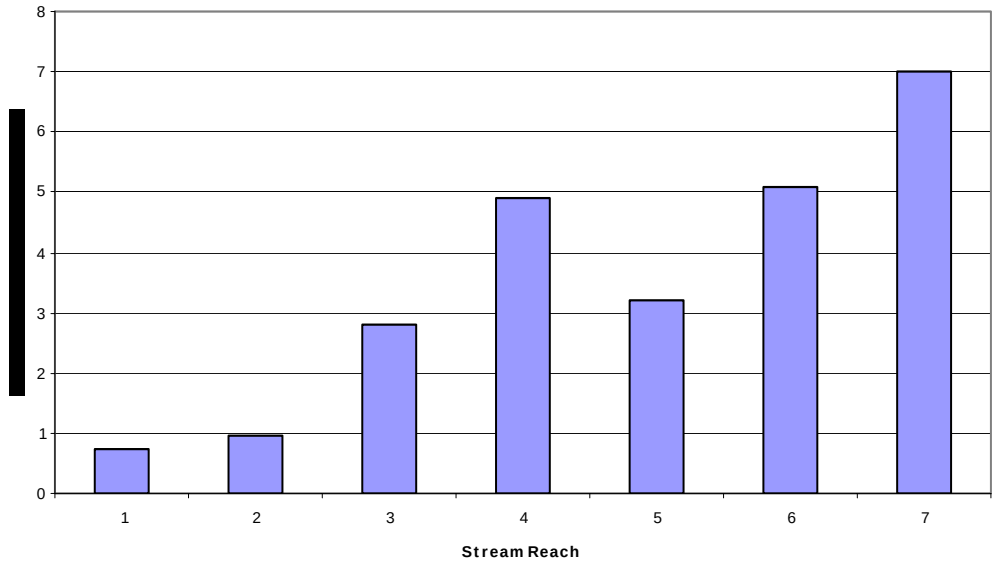

Plate 1: Bedrock gorge of Reach 1 taken from the Raptor Center.

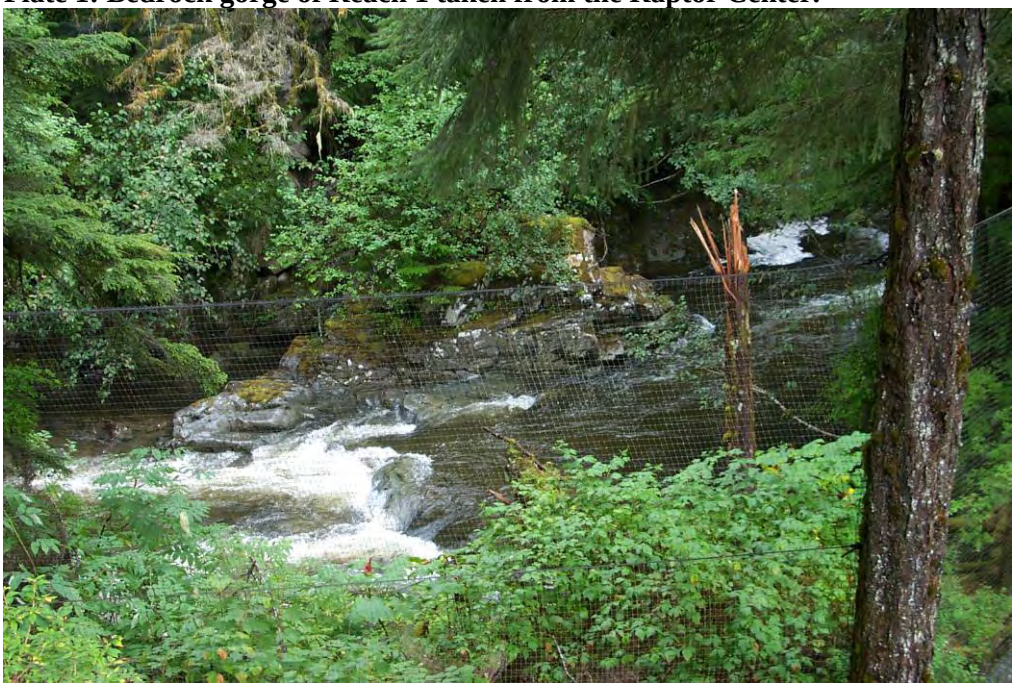

Plate 2: Low gradient reach above the dam of Reach 2

Plate 3: Reach 3 is characterized by low gradient and a large amount of gravel.

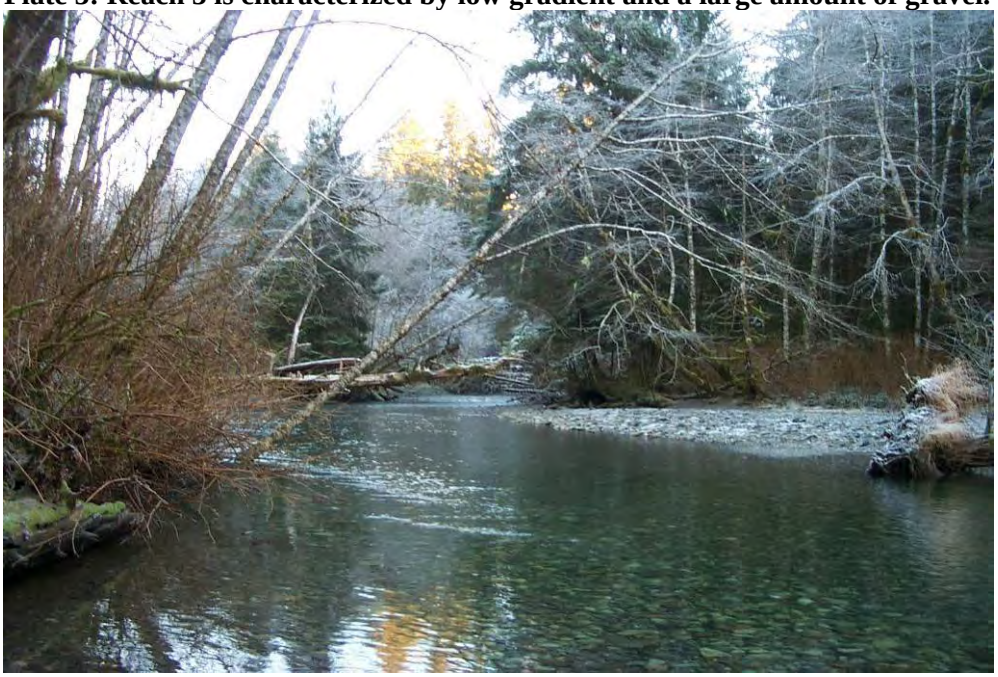

Plate 4: Looking downstream to the east of the island in Reach 4.

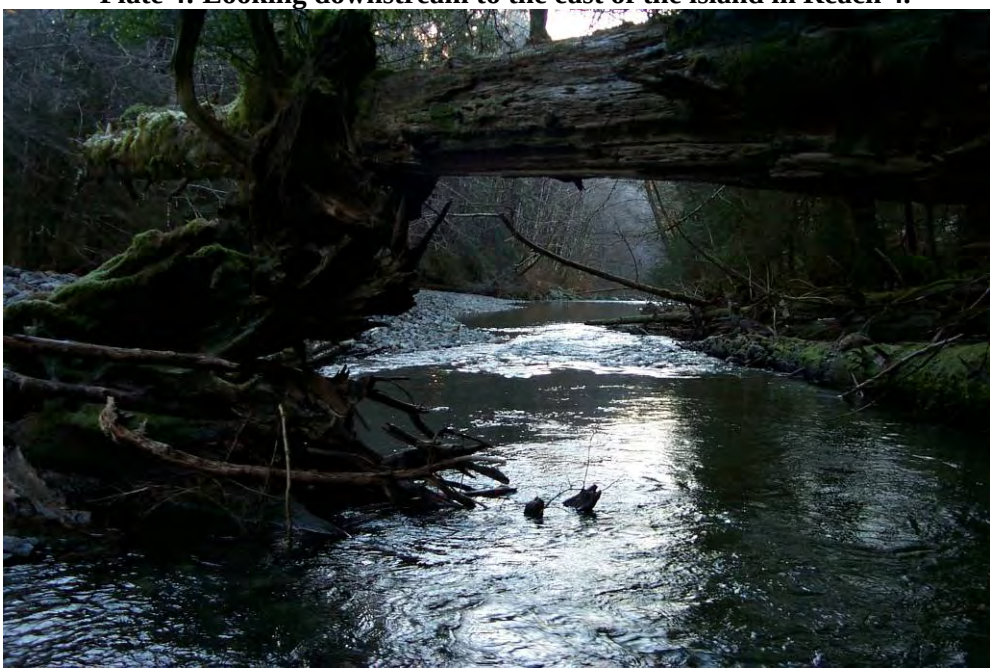

Plate 5: Bank erosion at beginning of Reach 5.

Plate 6: Reach 5 is characterized by large pools and bedrock cascades.

Plate 7: Upstream end of Reach 5 looking toward channel split

Plate 8: The north fork (Reach 6) has a large amount of LWD.

Plate 9: The south fork (Reach 7) has frequent log jams.

Chapter 11: Watershed Improvements – Current Development

Introduction

In the previous chapters an inventory of the current status of the Indian River watershed was developed. The hydrological and fish habitat characteristics were studied and infrastructure development was described. Current, planned, and potential development information was collected, and permitting issues for future development were discussed. In this chapter, specific projects will be described that will help to maintain the water quality and fish habitat within the existing developed areas of the watershed.

In general, the water quality of the Indian River is very good and the overall condition of the watershed is excellent. Only a very small percentage of the watershed has seen any development, including projects such as the SJC diversion dam, subdivision and road construction, the CBS water intake facility and historical construction, logging and dredging of the river estuary. These projects have undoubtedly impacted the watershed, but the nature and extent of the direct impacts of the development, if any, are not known. Current water quality and fish habitat remains good. Water quality monitoring at both upstream and downstream locations from the developed areas shows very similar water quality results. The water requires only minimal filtering and disinfection prior to use as a potable water supply for the City and Borough of Sitka and is also acceptable for use in the Sheldon Jackson fish hatchery.

Fish habitat is well developed throughout the study area and in general supports a healthy and varied fish population. The quantity of water flowing through the primary study area is usually adequate to support fish habitat and the permitted withdrawals for use at the water intake and the fish hatchery while still maintaining the recreational, scenic and historic values of the river. Occasional periods of low flow have been noted during periods of reduced rainfall, but the shortages are of short duration.

Current development Improvements

As noted in some of the previous chapters, there is concern that deficiencies in some of the existing watershed development may adversely impact the long-term health of the river system. These potential problems include transport of potential pollutants into the river, unregulated storm water runoff surges and accumulation of sediment in the river bed. In order to address these deficiencies, several potential watershed improvement and enhancement projects are proposed, using some of the Best Management Practices (BMPs) identified in earlier chapters. In some cases, a different BMP or a combination of BMPs could be used, and not all BMPs were considered applicable. The following list of potential projects is not all inclusive. There may be other watershed concerns that have not yet been identified and that may benefit from enhancement activities. The projects listed are intended to address concerns that were identified in the Inventory portion of the Master Plan.

CBS Water Intake Improvements

The river channel is braiding upstream from the CBS water intake structure as described in Chapter 3, page 33 and as shown on Figure 6A, page 27 and Figure 6B, page 37. Some of the braiding is attributable to the water impoundment dam and some is a result of natural erosional forces. As a result, a significant portion of the water is now flowing down the left braid, bypassing the right braid where the water intake is located. If this condition continues to develop unabated, the right braid will no longer flow and the water intake structure will be unusable. The water intake dam also promotes sedimentation, resulting in downstream scour and loss of fish habitat. A river restoration project at this location will restore stream flow to the right braid, ensuring a continued supply of water for the water intake structure. The work will include excavation and river channel restoration and the reconstruction of the water intake structure. Bio-engineered features, e.g. log deflectors, vegetation, etc., may also be employed if deemed necessary and appropriate to stabilize the braiding channel and promote river flow to favor the left braid where the intake exists.

Timing on this project will be critical to avoid impact to fish habitat during spawning and migration. Permits may be required to be obtained from the Corps of Engineers, the Alaska Department of Natural Resources, Office of Habitat Management and Permitting and the Alaska Department of Environmental Conservation, among others. The total cost of this project is estimated to be as much as $300,000 to $400,000.

Sheldon Jackson Dam Maintenance

The Sheldon Jackson dam is used primarily for a water intake source for the fish hatchery, although in past years it has been used for a hydropower water source. Some of the same problems as were observed in the sediment trapping at the CBS water intake structure were also noted at this dam. Some maintenance was performed on the SJ dam last year with the removal of some of the accumulated sediment and maintenance on this dam has been performed in previous years. Periodic maintenance on this dam is recommended. The actual intervals between sediment removal are difficult to predict, since sediment accumulation is a function of stream flow and sediment load in the river and reservoir trap efficiency with the latter changing (decreasing) as the impoundment fills with deposition of stream bed materials. Sediment accumulation should be monitored and logged at least once a year. The ability of the dam to impound and divert water will be reduced over time, and sediment removal should occur periodically. Sediment removal can be accomplished mechanically with excavation equipment, or by installing an outlet

control weir that will permit the dam to be drawn down periodically, releasing the sediment load to the lower reaches of the river. Coordination of periodic sediment removal, whether mechanically removed by dredging or by out weir flushing will be required with downstream users including the Alaska Department of Fish &Game and the National Park Service.

Timing for the maintenance or construction work is also important to avoid adverse impacts on fish habitat and water quality, and permits will most likely be needed from the same agencies as required for the CBS water intake project.

The periodic cost for maintenance at the dam is estimated to be $10,000 to $30,000 per maintenance cycle. Alternatively, a one time installation of a drainage device is estimated to cost between $25,000 and $50,000 with only minor costs for on-going maintenance and permitting.

Camp Site Debris

Debris from unauthorized camps and recreational sites along the river has resulted in an accumulation of solid waste that could potentially contaminate the water supply. The sites of the camps vary seasonally and from year to year, and clean up efforts should occur at least on a biannual basis. At the present time the cleanup efforts are being performed on a voluntary basis by concerned members of the community, most often Sitka Tribe of Alaska members. A twice-yearly monitoring and cleanup program should be implemented that will identify and remove and dispose of waste before it becomes a problem. A regular monitoring and clean up program is estimated to cost approximately $1,500 per inspection, or about $3,000 per year.

Sheldon Jackson Quarry Runoff

In order to extract useable material from the SJ rock quarry, the overburden must be stripped and stockpiled. The stripping operation can result in erosion and off-site sediment transport, and long-term overburden stockpiling will also contribute to sediment production. At the present time there are sedimentation basins in use which trap most of the quarry sediment, and silt fences below the quarry trap most of the runoff from the current overburden stockpile area. These devices are working well and little if any sediment load is contributed to Indian River from the quarry operation.

Stripping and overburden removal will increase runoff velocity and quantity and concentrate runoff locations. Regular maintenance should be performed and additional sediment basins and silt fence structures and other BMPs as appropriate should be installed as the quarry operation develops and contours change.

Continued development of the quarry will require an expansion of the overburden storage area as discussed in Chapter 7, page 73. Expansion of the storage area will require a formal wetland jurisdictional determination from the Corps of Engineers and will most likely require a wetland development permit. Issues such as surface runoff and subsurface leaching will be required to be addressed before a permit will be issued. Based on the current level of information available, it does not appear that there is a significant direct surface hydraulic link between the overburden storage area and Indian River. The nature and impact of the subsurface connectivity is unknown, and additional site-specific studies will be required. Any runoff from the site can be adequately addressed with BMPs such as silt fences, sedimentation ponds and biofiltration. Future expansion of the quarry should develop and evaluate site-specific BMPs to ensure adequate control of surface runoff and other watershed impacts.

Regular monitoring and maintenance of the existing sediment trap devices is estimated to cost $3000/year. Development of an expanded overburden storage area is expected to cost between $30,000 and $50,000, and will be part of the operational costs for the quarry.

Abandoned Construction Debris Cleanup

There is significant quantity of construction debris remaining from historical sawmill and other construction operations along the banks of the Indian River as shown in Figure 10, page 75. Cleanup of this debris is justified based on safety issues. It is also possible that some degradation of the river water quality could occur as result of the continued decomposition of this material, although it is not expected to be a significant source of contamination.

Once again, for work in or along the river, the project timing and construction methods can have a significant impact of river water quality and habitat. Care should be taken to minimize disturbances outside of the areas designated for cleanup, and all operations should minimize surface disturbances. Proper storm water and runoff planning should take place well in advance of construction, and the timing of the work should be coordinated to avoid fish spawning and migration activities. Project planning should also include restoration of the wetland and riparian areas disturbed by the cleanup. As in the previously described CBS and SJ dam maintenance projects, permits may be required from the Corps of Engineers, the Alaska Department of Natural Resources, Office of Habitat Management and Permitting and the Department of Environmental Conservation. Other permits may also be required, including State Historical Preservation Office clearance if the site is deemed to have local historical significance.

The cleanup cost, including planning, investigation, design, and permitting is estimated to cost between $75,000 and $150,000.

Storm Drain Improvements

One of the effects of urban development is to reduce infiltration and concentrate and increase peak runoff. A properly designed and maintained storm drain system will promote infiltration and sediment removal and will function to decrease peak runoff velocities and volumes, promoting better habitat and water quality.

A storm drain system is currently in place in the existing residential subdivisions. Much of this storm water system exists as surface open channel flow, although there are underground culverts and drain inlets for road crossings. A series of detention basins has been constructed, and most of the runoff from the BIHA subdivisions is channeled into existing storm drain control devices. Many of the ditches are grass lined, and overall the

storm drain system is in very good condition. It appears that the normal storm runoff is not significantly impacting water quality or habitat in the primary study area.

While the existing settling basins and ditches are working well, they should be regularly monitored and maintained if necessary by removing accumulated sediment and debris and making sure the structures and ditches are intact. The drainage ditches in the subdivisions are generally in good condition; however they should also be kept clear of debris and checked regularly for erosion. Due to the steep nature of the upper subdivision areas, runoff velocities in the ditches could potentially erode some ditch sections, increasing the sediment load in the runoff. Rock check dams or plunge pools at culvert outlets should be considered if necessary to slow water and force sediment deposition. If velocities are too great, erosion of the ditch sides and bottoms could occur, and it may be necessary to consider small rip rap or rock lining. In the flatter reaches of the subdivision, the ditches should be grass lined to promote bio-filtration of sediment and to reduce the potential for erosion. Revegetation and riparian buffer zones as described in Chapter 10, page 109 are also appropriate improvements that could be considered.

The pond located between Peter Simpson Drive and Yaw Drive, designated as Kaelke Pond on Figure 6A, page 27, is part of the fish habitat in Reach 3, shown on Figure 12A, page 97. As such, it should not be used as a sedimentation basin, although it can function to buffer peak flows into Indian River during heavy runoff events as long as exit velocities don't cause erosion downstream. To prevent sedimentation in Kaelke pond, a settling basin should be installed on the upper inlet area on Yaw Drive. This location coincides with the natural drainage basin between Yaw Drive and Rudolph Walton Circle. Construction of the basin should be similar to the existing basins along Indian River Road, and should have an outlet control weir to buffer the pond from high volume and high velocity water.

The storm drain inlet near the intersection of Indian River Road and Naomi Kanosh Lane is not functioning correctly, as noted in Chapter 3, page 32. It is intended to convey water across Indian River Road, but the outlet on the east side of Indian River Road is in a small depression with no connection to a larger drainage area. This storm drain inlet and crossing can remain, but the ditch along Indian River Road should be re-graded from Benson Drive to Yaw Drive to convey and attenuate storm water runoff from the developed-areas.

The estimated costs for storm drain improvements are between $50,000 and $100,000. It is unlikely that permits will be required for this work, as the area involved is in either non-wetland areas or is small enough to be considered exempt from wetland permitting requirements. A wetlands jurisdictional confirmation should be requested from the Corps of Engineers Regulatory Division.

Unpaved Roads and Trails Improvements

Most of the road system within the primary study area is unpaved. While the current drainage ditches and storm drain system function well to trap and remove sediments, the surface of the roads can be eroded, releasing sediment into the runoff. Paving the roads with an impermeable surface will limit sediment contribution from the roads. However, paving the roads decreases permeability and increases surface flow velocities because of the smoother surface. This places more pressure on the drainage system, and if the roads are paved, the storm drain system must be well-maintained. On paved roads, and winter sanding should be done with coarser aggregate sand. Coarser-materials will more readily be trapped by storm water BMPs rather than be transported to the river. Paving also reduces airborne dust and particulates that may otherwise end up in surface runoff or cause other airborne health-related problems.

The Sitka Cross Trail is surfaced with gravel or other soil materials in the vicinity of Indian River. It is unlikely that the sediment from local trails is having any significant impact on water quality. However, it is possible to create erosion problems in steep areas due to flow along the trail. In this case, ditch protection or grass lined swales can be used to trap and filter sediment. Where the trail crosses natural drainages, culverts or depressed grade crossings can be installed to prevent runoff from damming behind the upstream side of the trail, and detention basins can be installed in steep sections to prevent ditch drainage sediment from reaching the streams.

The estimated costs for storm drain improvements are between $50,000 and $100,000. The estimated cost for asphalt paving for Indian River Road and the adjacent subdivisions is between $2M and $2.5M. It is unlikely that permits will be required for this work, as the area involved is in either non-wetland areas or is small enough to be considered exempt from wetland permitting requirements.

It was noted in Chapter 6, page 65, that new road development and upgrades to existing roads will also likely occur as the watershed develops. Of particular concern is the potential new Landclearing Landfill project, as described in Chapter 9, page 84. New roads will impact water quality and runoff volumes as surface flow is channeled and concentrated. It will be important to consider these impacts as roads are developed, and alternate routes may be needed to minimize adverse water quality and habitat problems.

Chapter 12: Future Management Guidelines

Introduction

This chapter will focus on developing strategies and guidelines to limit the impact of future proposed and potential development on water quality and fish habitat. The goals of the management guidelines are to prevent any degradation in water quality or fish habitat, and to maintain the current hydrological characteristics of the watershed, including peak runoff flows and sediment loads in the storm water.

Chapter 9 described a number of planned and potential projects that are in various stages of development and planning. The projects include:

- Residential Housing Subdivisions and Development
  - Sheldon Jackson College/Baranof Island Housing Authority residential housing.
  - City and Borough of Sitka residential housing.
  - Sitka Counseling and Prevention Services out-patient residential housing
- Commercial/Industrial Development
  - Alaska State Troopers Driver Training Facility
  - Land Clearing Landfill
- Infrastructure Improvements
  - Electrical Intertie
- Recreational Trail Improvements

These types of development will typically involve improvements that could potentially impact water quality and fish habitat in the watershed:

- Roads, streets and trails.
- New utility systems to support development, including water, sewer, electric and communications.
- Buildings, asphalt and gravel surfaced parking lots and other impervious areas.
- Site clearing and landscaping.

Each of these types of developments present challenges to maintaining water quality and habitat both during construction and for operation and maintenance after the projects are completed. Examples of problems include runoff concentrations from paved areas. As large areas are paved, rainfall can no longer infiltrate into the surface vegetation that acts as a natural buffer and filter. Runoff concentrates down gradient, increasing both water volume and velocity, and sediment loads are transported into receiving waters. Careful planning is important to minimize runoff impacts, including considering alternate access routes and locating paved areas far enough from natural drainages and streams to permit proper treatment and handling of runoff.

The following paragraphs describe some of the strategies than can be used to limit short-term and long-term impact to the watershed.

Best Management Practices

Best Management Practices (BMPs) are measures or practices that help control or prevent the introduction and transport of pollutants into the environment. BMPs are divided into two general categories, Structural and Nonstructural. Structural BMPs consist of physical structures that are constructed as part of the project and are either temporary during construction or become a permanent part of the project. Nonstructural BMPs include management guidelines, ordinances and other regulations, maintenance and operation guidelines and schedules, and water quality sampling, testing and reporting procedures among others.

BMPs during construction

The Clean Water Act established the National Pollutant Discharge Elimination System (NPDES) which mandates that construction activities on certain federally funded projects involving more than one acre, and smaller projects that are part of an overall phased development are required to prepare a storm water pollution prevention plan (SWPPP). All projects involving more than 5 acres must submit the SWPPP to the Alaska Department of Environmental Conservation (ADEC) for review. The SWPPP is intended to limit the introduction and transport of sediments and other pollutants during construction. A SWPPP includes both structural planning and management requirements and structural features that are to be put in place and maintained during construction. BMPs are the central component of the SWPPP.

The SWPPP takes into account the type of construction activity, the impacted area, topography, watershed runoff projections and other factors that influence the amount and type of pollutants that may enter the environment as a result of the construction activity. BMPs are developed as part of the SWPPP, and address the construction and environmental conditions specific to the project. A significant part of the SWPPP, the Hazardous Material Control Plan (HMCP), consists of nonstructural BMPs for the management of potential pollutants within the project limits such as oils, solvents and construction debris. The SWPPP also includes an inspection and maintenance schedule for structural BMPs, with specific actions that are required if sediment breakthrough or other pollution is observed. Structural BMPs may be temporary and others may remain as permanent features of the project.

SWPPPs and BMPs during construction are designed to safely handle runoff from storm events during the construction period before permanent structures are in place. BMPs can be used individually or in conjunction with other BMPs for complete project erosion and sediment control. The following examples include some of the most commonly used structural BMPs. A SWPPP must be tailored for a specific project type and duration, and not all of the BMPs listed below may be appropriate, and others not listed may be required. Some examples of construction-phase BMPs include:

- Interception and diversion ditches and berms – Constructed across a slope to intercept runoff and divert it to a stabilized area where it can be safely discharged at lower rates thereby promoting deposition of entrained sediment and reducing erosion and transport of new sediment.

- Slope Drains – Temporary conduits used to convey concentrated storm runoff safely down the face of a cut or fill slope without eroding the slope. Slope drains may be flexible tubing or rigid conduits. Slope drains typically require an inlet structure and outlet protection to contain runoff and to prevent scour.
- Storm water conveyance channel – A lined channel used to convey water from surface runoff to a receiving system. Channel linings may include riprap, vegetation, flexible geotextile barriers, or organic or synthetic manufactured channel linings such as porous plastic or jute mats. Channels may also include check dams to slow water velocities which prevent erosion and promote deposition of sediment loads.
- Mulching – Application of a uniform protective barrier of straw wood chips, fibers or other acceptable organic materials to prevent surface erosion in a revegetated area to provide immediate protection of the seed bed.
- Temporary sediment traps – A small temporary impoundment area with a controlled outlet used to slow water and collect sediment prior to discharge. Sediments traps may be formed by excavating below grade, berming above grade, or combination of the two.
- Vegetated buffer strip – Natural undisturbed area that is preserved along the perimeter of project that serves to filter sediment and to slow runoff velocities.
- Silt fence – Used to filter sediment loads from site runoff. Typically, they consist of vertical supports driven into the ground with a geotextile filter fabric stretched between them and keyed into the ground to prevent flow from running under the fence. The fabric filters the sediment and permit water to flow from the site. They are placed at points that sheet flow runoff will exit the project site.
- Straw bale barriers – Used to prevent erosion of soils during construction. They are placed to deflect and channel runoff and to filter sediment loads before discharge to receiving waters.
- Vehicle tracking area – A controlled entrance/exit to the project site consisting of a stabilized gravel pad or area that prevents transport of sediments and debris onto public access roads.

Both the Environmental Protection Agency (EPA) and the State of Alaska Department of Transportation and Public Facilities (DOT/PF) have developed guidelines for developing and implementing SWPPPs and BMPs. The EPA document, Storm Water Management for Construction Activities, may be found at:

http://www.epa.gov/npdes/pubs/contents_conguide.pdf.

ADOT/PF has developed the Alaska Storm Water Pollution Prevention Plan Guide, and Appendix F, Examples of Best Management Practices, of the may be found at: http://www.dot.state.ak.us/stwddes/dcsenviron/assets/pdf/swppp/english/eng_f.pdf.

Permanent BMPs

Long-term BMPs for managing and controlling runoff are necessary to minimize erosion and to prevent pollutants and sediments from reaching Indian River. Both structural and non-structural BMPs are necessary, and they must work together to provide complete and comprehensive watershed protection.

BMPs will include integrating watershed protection into the planning and design of new facilities. New impervious surfaces such as parking lots and paved streets will reduce infiltration and concentrate runoff, potentially causing downstream erosion and damage to existing runoff controls. Landscaping will change infiltrative surfaces and concentrate runoff as a byproduct of protecting houses and drives from flooding. Surface treatments, including lawn fertilizers and herbicides must be controlled to prevent biological pollutants from entering the river, and residential and industrial waste and debris such as oil, fuel and other fluids and solid wastes must be handled and disposed of appropriately to keep contaminants from entering the environment. Many of these potential watershed impacts can be handled with non-structural BMPs in the form of regulations, permits and development guidelines. However, for complete watershed protection, structural BMPs are essential.

Structural BMPs

The structural BMPs will become a permanent feature of the watershed. A comprehensive storm water collection, treatment and discharge system will include BMPs that are designed to collect and control runoff, prevent erosion, limit runoff sediment and pollutant loads and remove sediments and pollutants prior to discharge to Indian River. A storm drain system may include surface ditches and swales, controlled inlet and outlet devices, belowground piping and manholes, detention and settling basins, oil/water separators and other structures. The storm water system must also be capable of buffering runoff from storm events to prevent washout and removal of fish habitat in the river. Many of the temporary BMPs listed in the previous section can be adapted and converted to permanent features with careful advance planning.

New BMPs should also integrate effectively into the current storm water system in place in the area. Prior to designing any new BMPs, a detailed hydrographic and topographic survey should be performed and a watershed analysis performed for the specific proposed development. Natural drainages exist in the primary study area as shown on Figure 5, page 23. These drainages will need to be addressed in proposed drainage plans, and new structures will need to be integrated into the existing drainage improvements. In addition, existing drainage structures such as the detention basin/settling pond located on the east side of Indian River Road opposite Peter Simpson Road may need to be expanded to handle increased runoff. Intermediate ditches, swales, storm drain culverts and manholes may also need to be upgraded.

Examples of permanent BMP structures that may be appropriate in the Indian River watershed include:

- Swales and ditches – Permanent ditches and swales can be riprap lined or grass lined, but should be designed to limit erosion and provide sediment trapping. In steeper

areas, riprap linings will service to prevent erosion, and as slopes flatten out, grass lined swales will provide biofiltration and also promote infiltration.

- Settling/detention ponds/peak runoff buffers – These ponds and detention basins will act as sediment traps and will also provide storage capacity to buffer flows resulting from increased runoff as property develops and natural infiltration is reduced. Ponds can be excavated below existing grade or built up using berms. Weirs at the outlets of the ponds will serve to buffer peak storm events by controlling the rate of flow from the basins, evening out peak flows and preventing washouts of habitat and erosion downstream. Erosion control plunge pools may need to be established at the downstream sides of the weirs to help dissipate energy from stored water as it flows through the weirs.
- Infiltration trenches and basins – Infiltration basins and swales can be constructed to permit collected runoff to be reabsorbed into the subsurface soils. Use of these types of devices may be limited in the Indian River area, as near-surface rock and impermeable barriers may limit the ability of the soils to absorb water. Site specific subsurface explorations may be necessary before selecting this type of BMP.
- Revegetation/Biofiltration - -One of the most effective BMPs is revegetation of disturbed areas and planting grasses and shrubs as part of a development plan. Natural buffer zones can be established that have multiple uses such as recreational activities and are relatively easy to maintain. These areas can serve both to buffer sheet flow runoff and to provide filtration and sediment trapping. Wetland ecology principals can also help to select plants and grasses that area capable of treating and removing pollutants from the water in natural or constructed wetland applications.
- Riparian BMPs - BMPs are also available for riparian zones along the river as outlined in Chapter 10. The U.S. Forest Service Soil and Water Conservation Handbook, FSH2509.22 (accessible through the Forest Service website at http://www.fs.fed.us/r10/ro/policy-reports/bmp/index.shtml) lists a number of BMPs that should be considered for development activities in the riparian zone along the river. A more complete discussion of these BMPs as they apply to Indian River is located in Chapter 10, page 109, Recommendations for Habitat Protection. BMPs include erosion control measures along bridges such as detention basins to limit the amount of sediment entering the river from runoff flowing parallel to the trails, and sizing culverts to enable fish passage beneath roads and trails. Side slopes of roads and trails should also be designed to provide erosion control with seeding and vegetation. Establishing a riparian buffer zone along the river will also limit habitat degradation due to development and prevent sediment from reaching the water.

ADOT/PF has developed the Alaska Highway Drainage Manual as a guideline for designing and constructing drainage improvements on state-funded highways and roads. Most of these structures are applicable to the types of improvements under consideration for the Indian River watershed. Chapter 16, Erosion and Sediment Control, provides design information on drainage improvements for sediment and erosion control, and Appendix A illustrates BMPs for erosion control. The ADOT/PF information may be found at http://www.dot.state.ak.us/stwddes/dcspubs/manuals.shtml#, and includes links

to Chapter 16 and Appendix A of the Highway Drainage Manual. The BMPs listed in Appendix A are typical of the types of improvements that would be appropriate for development within the Indian River Watershed.

Non-structural BMPs

Non-structural BMPs have two primary purposes:

- To reduce or eliminate pollutants that impact water quality at their source, thus reducing the need for structural control requirements, such as the elimination or reduction of the introduction of oils, greases, fertilizers or pesticides into the storm water.
- To address water quality concerns that are not cost effectively handled by structural controls. It is not economically feasible to install structural BMPs for every possible contingency that may occur in a watershed. An effective monitoring and control system for determining illegal or uncontrolled discharges into the storm water collection system is desirable.

Non-structural BMPs are also intended to ensure that structural BMPs are established as needed and continue to perform as required to maintain watershed water quality and habitat. Non-structural BMPs include regulatory policies and guidelines, structural BMP maintenance activities and water quality monitoring to verify that the BMPs are performing as intended and that watershed water quality goals are being met.

Non-structural BMPs are similar to SWPPP requirements that are developed and implemented for construction projects, and include both pre-development and post-development BMPs. Pre-development BMPs are used to establish the type of post-development structural and non-structural BMPs that will be required for a specific development project. Examples of pre-development non-structural BMPs include planning and land use documents and regulatory permitting requirements.

Post-development non-structural BMPs include watershed stewardship education, urban housekeeping recommendations and requirements, street maintenance, snow removal and de-icing procedures, and water quality monitoring, testing and reporting. Examples of these types of non-structural BMPs include public works maintenance policies, procedures and schedules, homeowner and landowner hazardous and solid waste disposal requirements, permit stipulations, municipal codes and ordinances and other regulatory restrictions or requirements.

The American Society of Civil Engineers (ASCE) has developed a database of BMP performance data in a standardized format for roughly 200 BMP studies conducted over the past fifteen years. The Urban Water Resources Research Council (UWRRC) of ASCE developed the *International Stormwater Best Management Practices Database* under a cooperative agreement with the U.S. Environmental Protection Agency. It is available for review at http://www.bmpdatabase.org/index.htm. Additional resources for BMPs, both structural and non-structural, may be found through the Colorado Urban Drainage and Flood Control District website at http://www.udfcd.org.

Current Watershed Development Management Tools

Regulatory management tools are an essential part of maintaining water quality as the Indian River watershed develops. A number of different agencies and organizations are responsible for issuing the permits that may be required for development to occur within the watershed. Chapter 8, page 77, discusses some of the existing permits and relevant planning documents that are intended to guide development in the Indian River watershed. The following paragraphs summarize the management tools that each organization has available to them.

City and Borough of Sitka

The CBS Planning Commission establishes planning and zoning policies that are implemented and monitored by the CBS Planning Department. Zoning ordinances limit the types of development that can occur in the various land categories. Title 22 of the CBS Zoning Code includes regulations and requirements for development. A table summarizing the various types of zoning and the permitted uses for the property within the Indian River watershed is located in Chapter 8, Table 5, page 81. The CBS zoning ordinances also allow for Conditional Use Permits (CUP) that permit certain activities and developments that are otherwise restricted within a zoning area to occur. CUPs require a hearing and formal approval from the Planning Commission.

Sitka has also adopted a Comprehensive Plan that outlines the goals and objectives for development in Sitka and is the official policy for actions by the Sitka Assembly and the various staff, boards and commissions. The Planning Department is responsible for reviewing applications for new subdivisions and uses the Comprehensive Plan to determine if the proposed development is consistent with the plan and within current zoning ordinances. Chapter 8, page 77 describes the Sitka Comprehensive Plan. The zoning ordinances also restrict development within the 100-year flood plain. The 100 year-flood is defined as a flood event that has a 1% probability of being equaled or exceeded in any single year. The flood plain boundaries are determined based on historical flood and high water data. The flood plain boundaries for the Indian River watershed are shown on Figure 5, page 23.

The CBS Public Works department is responsible for reviewing and approving subdivision plans and issuing building permits. Subdivision developers are required to submit a drainage plan as part of a project development plan, and the City Engineer must approve the plan before a subdivision development is approved for construction. The Public Works department is also responsible for snow and ice removal, street sanding and storm drain system maintenance within the public right-of-way.

State of Alaska

A number of different State of Alaska agencies have regulatory oversight regarding development within the watershed. They include the Department of Environmental Conservation (ADEC), the Department of Natural Resources (DNR), the Department of Fish and Game (ADF&G), and the State Historical Preservation Office (SHPO). Other state agencies may also be involved with development for specific projects, such as the Department of Transportation and Public Facilities (DOT/PF) for roads and state building projects.

The Coastal Zone Management Plan, as described in Chapter 8, page 79, is a cooperative plan between DNR and the City and Borough of Sitka. The Plan contains guidelines and goals for development that have been established specifically for the City and Borough of Sitka. Development projects within the coastal zone are required to fill out and submit a questionnaire to DNR, which is responsible for determining the consistency of the development with the State Coastal Program. Other state and federal agencies will be asked for input in the process.

For the development of state-funded road and building projects, ADOT/PF will require the submittal and approval of a Storm Water Pollution Prevention Plan that will contain requirements for short-term storm water management BMPs. Permanent storm drainage management plans must also be consistent with the Alaska Highway Drainage Manual. ADEC will also review plans for consistency with surface runoff management and water quality regulations.

Projects that directly impact the river bed and riparian zone such as water intake improvements, dam maintenance and reconstruction, and trail and bridge crossings will require permits from DNR. Water quality and fish habitat issues will be identified and appropriate measures will be required to ensure that state regulations for development within river systems are followed.

Federal Agencies

The U.S. Army Corps of Engineers is responsible for issuing development permits on the waters of the U.S and related wetlands. Chapter 5, page 57, provides an in depth discussion of the wetland permitting requirements and processes. It is likely that wetland permits will be required for most development within the watershed, and a wetland jurisdictional determination should be made for any proposed development on Indian River or it's tributaries. Other state and federal agencies are often involved in the development of specific permit stipulations that become part of a wetland permit. Many projects can be permitted under a variety of nationwide general permits that have been issued for certain categories of projects. Other projects may require an individual specific wetland permit. The wetland permitting process usually involves public hearings prior to final issuance of the permit.

Proposed Management Improvements

The Indian River watershed is very well managed at the present time. Water quality remains high, and abundant fish habitat supports a variety of fish species. The amount of developable land remaining within the watershed is relatively small, and the existing review and permitting processes can be used to ensure that water quality and fish habitat goals are met. The existing management tools described in the preceding paragraphs should be adequate to ensure responsible development of new projects within the watershed. However, as development pressures increases, a few additional storm water management tools may help guide development to maintain the current water quality and fish habitat status.

Some specific recommendations for new management tools are:

1. A general Storm Water Management Plan (SWMP) for Indian River should be developed. The SWMP should describe the specific water quality and runoff volume goals, requiring that BMPs be in place that result in no net change in the water quality reaching Indian River, and no net change in the volume of water that reaches the river during storm or runoff events. It is suggested that the SWMP become part of the current Title 22 of the CBS Subdivision Zoning Code.
2. Project-specific SWMPs should be required to be submitted with all proposed subdivision improvement projects. The SWMP should include an analysis of the current hydrology in the project area and describe the measures that will be undertaken to ensure that the runoff quality and storm event runoff volume goals are met. Permits for development should not be issued unless the City Engineer has reviewed and approved the SWMP.
3. Develop a program of regular maintenance of existing storm water structures such as ditches, culverts, manholes and detention ponds, and establish a budget for funding the maintenance.
4. CBS should seek grants to develop a water quality monitoring program that provides for water quality sampling during storm events to verify that water quality and runoff volume goals are met. Program development should include institutionalizing a monitoring and sampling program. The water quality and quantity information obtained can be used to develop a list of recommended BMPs for the Indian River watershed that have a verifiable success rate in meeting storm water management goals. This program could develop into an essential part of the review process for SWMPs that are submitted for approval, comparing current BMP performance with the BMPs proposed for the new development.
5. Review and modify the above items 1, 2 and 3 as appropriate as data from item 4 gives insight to the efficacy of BMPs implemented in the Indian River Watershed.

Appendix A - Indian River Working Group Contact List

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Appendix B – Indian River Master Plan Source Documents

Appendix B - IRMP source document index - final

Doc. #	Doc. Type	Date	Subject/ Description	Obtained From	Agency
1	CD		city-key.dwy & city-key ownership.pdf	Planning Dept. Wells Williams	City and Borough of Sitka
2	CD		Indian River JPEG		City and Borough of Sitka
3	CD		NPS Topo- Sitka		National Parks Service
4	CD		Indian River PPT solidwaste		Sitka Tribe of Alaska
5	CD		Indian River		US Forest Service
6	CD		Indian River Aerials, watershed, Kaelke Pond Power Plant w/excel fish table	Phil Mooney	Alaska Dept. of Fish and Game
7	CD		Ashaak SD as-builts		
8	CD		Kaasda- Heen Shaak as-builts		
9	CD		sit.all.dwg		
10	CD	1-Jan	Preliminary.dwg		City of Sitka
11	Floppy Disk		Sitka- Landclearing Power Plant	Hugh Bevan	City of Sitka
12	Letter	12/6/2002	Letter of interest in creating Watershed Council in Sitka		
13	Memorandum	7/3/1984	Indian River		Commercial Fisheries
14	Survey	Nov-95	Aquatic Resource Survey: Indian River		U.S. Dept. of Agriculture
15	Study	Dec-87	Instream Flow Requirements		National Parks Service
16	Memorandum	12/3/1987	Indian River Adjudication		Habitat
17	Study	Oct.-2001	Origin of Chinook Salmon in Indian River		Sitka National Historical Park
18	Study	5/5/1980	Indian River Coho Population Study		
19	Assessment	Oct.-2002	Environmental assessment for addition to Sitka National Park		National Parks Service
20	Report	Sept.-2001	Fish recourse Report- Indian River		Sitka National Historical Park
21	Report	2003	Water Quality of Indian River		National Parks Service
22	Report	6/10/2002	2001 Watershed Control Report	website	City of Sitka
23	Report	Sept.-2002	Non-Motorized Transportation Plan	Lynne McGowan	City of Sitka
24	Booklet	Nov-98	General Management Plan		Sitka National Historical Park
25	Map	1998	Sitka: Official map and Guide		Sitka National Historical Park
26	leaflet	Oct.-2002	Taking Care of Streams		OSU, UI, WSU, UA
27	Summary	4/14/1984	Basin Wide Adjudication		Dept. of Natural Resources
28	Bulletin	Feb-66	Sitka Mining District		Juneau- Douglas Community College
29	Statement	5/15/2001	Indian River Water Rights	Greg Dudgeon	Sitka National Historical Park
30	Study	Jun-89	State Land Selections		Alaska Department of Natural Resources
31	Report	Oct.-2002	Northern Southeast Area Plan		Alaska Department of Natural Resources
32	Code Booklet	Sept.-03	Title 21 Subdivision Code	Wells Williams	City of Sitka
33	Map		Status Plat Maps	Marlene Campbell	City of Sitka
34	Drawings	4/24/1992	Project Development Drawings		Alaska State Troopers
35	Permit	5/12/2000	Core of Engineers permit	Greg Dudgeon	Sitka National Historical Park
36	Report	Aug-87	Instream Flow Investigation Indian River by USFWs	Greg Dudgeon	Sitka National Historical Park
37	Letters and Permits	2001-2002	Storm Water Pollution Prevention Plan Sheldon Jackson Indian River Quarry	Dan Jones	D.G. Jones Association
38	Letters, Reports, Permits	2001-2002	Sheldon Jackson Quarry COE Permit Modifications to Silver Bay 21 401 Permit	Dan Jones	D.G. Jones Association
39	Resolution & Meeting Minutes	1/22/2004	Cultural and Historical Values of Indian River	Jessica Perkins	Sitka Tribe of Alaska

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