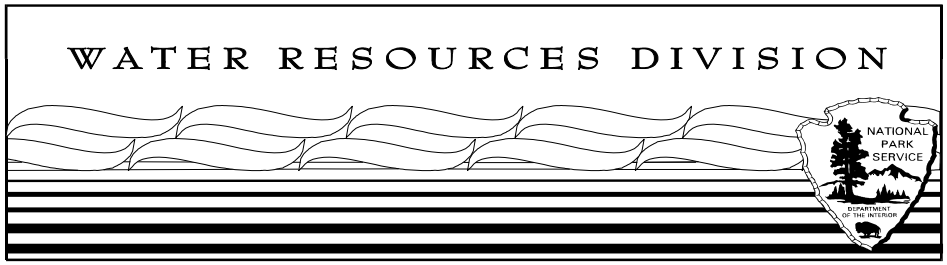
A CONCEPTUAL MODEL OF THE UPLAND AQUATIC & NEARSHORE MARINE HABITATS OF SAN JUAN ISLAND NATIONAL HISTORICAL PARK (WASHINGTON)

Mark D. Flora
Steven C. Fradkin

Technical Report NPS/NRWRD/NRTR-2004/318



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Technical Report NPS/NRWRD/NRTR-2003/XXX

February, 2004

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United States Department of the Interior
National Park Service

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SUMMARY

San Juan Island National Historical Park is a 1752-acre unit of the national park system located on San Juan Island along the Haro Strait in northwestern Washington. The park is comprised of two disjunctive units commemorating the sites of American and English military emplacements meant to protect their respective national interests prior to the final settlement of the Oregon Territory boundary dispute in 1871. Natural habitats of the park include secondary growth forest, grasslands, wetlands and six miles of shoreline and intertidal habitat (NPS, 2003a).

In 2000, the National Park Service initiated a program designed to monitor long-term change in key indicators of environmental health known as the "Vital Signs" Monitoring Program (NPS, 2001). An early requirement in the implementation of the "Vital Signs" Monitoring Program is the development of a conceptual model or models that will assist in the design of long-term monitoring protocols.

This technical report develops conceptual models applicable to the upland aquatic and nearshore marine habitats of San Juan Island National Historic Park. Patterned after modeling efforts suggested by Roman and Barrett (1999) and Cloern (2001), these conceptual models are ecosystem-based and issue-oriented. The ecosystem perspective recognizes the human activities and environmental processes that operate at various temporal and spatial scales. The issues-oriented perspective acknowledges those natural and human-induced threats to the ecosystem and the ecosystems responses to those threats.

Each of the models attempt to identify the linkages among "agents of change" (natural processes or human activities), "stressors" (problems emerging from or related to "agents of change"), and the "ecosystem responses" (detectable change in structure, function, or processes). Evaluation of these models lead to recommended monitoring strategies for both upland aquatic and nearshore marine habitats of San Juan Island National Historical Park and serve as an initial step in identifying the key "vital signs" which may serve as early warning indicators of changes that could impair ecosystem health.

ACKNOWLEDGEMENTS

The authors extend their thanks to a number of our colleagues who helped to develop this technical report. The information pertaining to many of the agents of change and stressors potentially affecting the upland aquatic and nearshore marine habitats of San Juan Island National Historical Park were identified and discussed with a number of our colleagues, all of whom participated in the San Juan Islands National Historical Park Vital Signs Workshop held in March, 2001 (see Appendix A).

Peer reviewers who provided many helpful suggestions regarding this technical report include John Gross, Natural Resource Information Division (NPS), Bryan Milstead, Northeast Coastal and Barrier Network (NPS), Greg Shriver, Northeast Temperate Network (NPS), Darcy Hu, Pacific Islands Network (NPS), Leigh Smith, San Juan Islands National Historical Park, and Roy Irwin and Don Weeks of the National Park Service Water Resources Division (NPS).

Graphics support from Craig Dalby of the Columbia Cascades Support Office (NPS) is also gratefully acknowledged.

Introduction

San Juan Island National Historical Park (SAJH) was established in 1966 to mark the events related to the peaceful settlement of the San Juan Boundary Dispute between Great Britain and the United States from 1853 – 1872, including the "Pig War" crisis of 1854 (NPS, 2003b). The National Historical Park consists of two separate units on San Juan Island, one of the many islands between Vancouver Island (Canada) and the State of Washington mainland (Figure 1). The English Camp Unit consists of 529 acres located on Garrison Bay and Westcott Bay along the northwestern shore of San Juan Island. The American Camp Unit contains 1,223 acres spanning the peninsula between Griffin Bay and the Haro Strait near the southeastern tip of the island. Though some streams exist on San Juan Island, water resources inside the park are limited to groundwater wells, small springs, pockets of wetlands, lagoons and other shoreline features. However limited, these features do support important historic, natural, and scientific resources within the National Historical Park (NPS, 1992).

Precipitation is remarkably variable on San Juan Island, which is only 10 miles in diameter. This variability is caused by rain shadow effects of the Olympic Mountains located just across the Strait of Juan de Fuca. The southern tip of the island, including American Camp, is the driest, averaging about 17 inches of precipitation annually. The higher elevations in the northern portion of the island average approximately 32 inches of precipitation a year. English Camp, located in the northwestern portion of the island, receives approximately 26-28 inches of precipitation each year. The winter months are significantly wetter than the summer months, though rainfall may occur during any time of the year. Winter precipitation occurs primarily as soaking rains, though a small amount of snow may fall each year. While a small percentage of the precipitation percolates into the shallow aquifer, the greatest percentage of precipitation is lost to runoff, evaporation, and evapotranspiration.

While surface freshwater resources are very limited, a few small springs do occur along the southern slopes in American Camp. Flow apparently surfaced here historically, as the location of these springs was one factor in locating the original American Camp. Riparian vegetation around these springs indicates their location clearly on aerial photographs (NPS, 1992).

Holmes (1998) mapped and classified, according to Cowardin et al. (1979), twenty six wetland areas in American Camp totaling 79.2 acres. Freshwater wetland resources in American Camp consisted of a total of 40.5 acres of palustrine forested wetlands, 8.5 acres of palustrine scrub shrub wetlands, 0.3 acres of palustrine aquatic bed wetlands, and 0.6 acres of palustrine unconsolidated bottom wetlands. The estuarine wetlands consisted of 10.1 acres of subtidal unconsolidated bottom wetlands, 9.7 acres of intertidal emergent wetlands, and 2.9 acres of intertidal unconsolidated shore.

The nearshore and marine features of American Camp are quite varied. The north shore of American Camp, along Griffin Bay, is a long beach of fine gravel with three tidal lagoons, Old Town Lagoon, Jakles Lagoon, and Third Lagoon. Temperate marine lagoons such as these are uncommon along the Pacific coast of the northwestern United States and are considered to be valuable resources. Jakles Lagoon is the largest and apparently the most biologically productive of these lagoons. It has regular circulation with the bay, and salinity data indicate the possibility of groundwater inflow from the slopes of Mt. Finlayson. The southern shore of American Camp along the Strait of Juan de Fuca, has rock outcrops and gravel beach. Swimming occurs on both the northern and southern beaches of the unit, even though the water is cool (NPS, 1992).

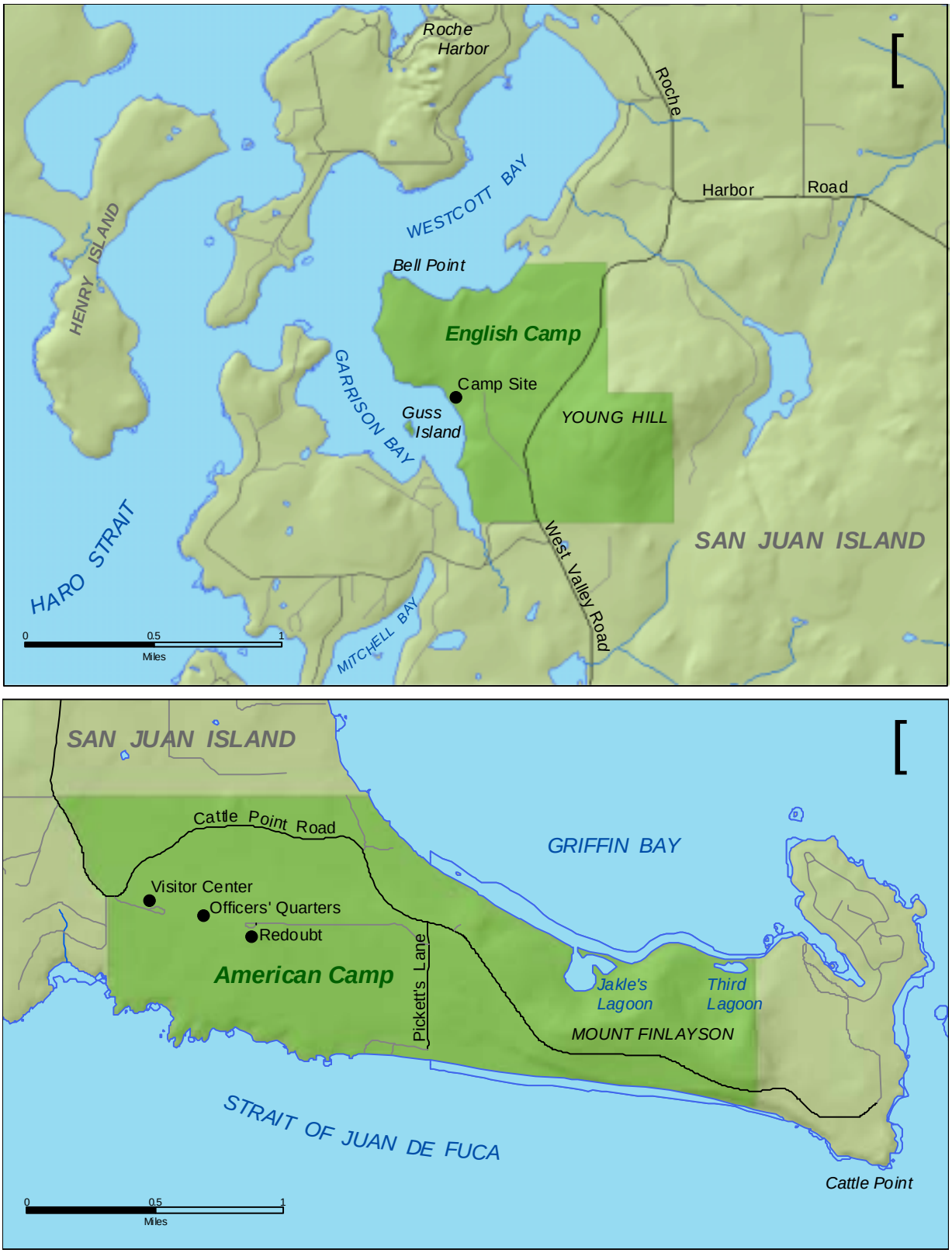


Figure 1: Vicinity map of the English Camp (above) and American Camp (below) units of San Juan Island National Historic Park

In addition, Holmes (1998) also mapped and classified nine wetland areas totaling 12.7 acres within the English Camp Unit. These were all freshwater wetlands and consisted of a total of 8 acres of palustrine forested wetlands, 0.3 acres of palustrine scrub shrub wetlands, and 4.4 acres of palustrine emergent wetlands.

The shore of English Camp lies in the low-energy, protected waters of Garrison Bay and Westcott Bay. As such, much of the intertidal zone consists of a productive mudflat, and recreational shellfishing is popular where it is allowed (north of the ferry dock and into Westcott Bay). San Juan County has identified the Westcott-Garrison Bay marine system as a sensitive marine area and has developed recommended strategies designed to protect this important resource (Larkin, 1999a; Larkin 1999b).

American Camp was originally a prairie and retains the appearance of a prairie today. It was overgrazed for many years and the timber surrounding the prairie was harvested. Livestock eliminated the perennial grasses and introduced rabbits appear to be at least partly responsible for keeping native bunchgrasses out of the prairie. Vegetation now consists of annuals and perennial exotics, with numerous bald spots that have been cleared by the rabbits. The park has plans to restore some of the native vegetation. From the hydrologic perspective, the disturbed vegetation at American Camp has probably increased runoff over natural conditions, but sheet erosion and gullying do not appear to be problems. Evapotranspiration has probably been reduced due to the loss of forest canopy and perennial grasses (NPS, 1992).

With the exception of the parade ground, and the forests being second or third growth, the vegetation and hydrology at English Camp is probably much as it was 1859.

Since surface waters are so limited, the park and most island residents must rely on groundwater as the source of domestic water supply. Like most island aquifers, the fresh water on San Juan Island is floating on top of salt water. If the fresh water is pumped faster than it is recharged, salt water will encroach. Once the aquifer increases in salinity from salt water encroachment, recovery as a potable water supply becomes a slow process. Preventing saltwater intrusion is, therefore, an important ongoing concern both for park management and for island residents. This is particularly true in areas on San Juan Island where some wells have already been affected.

There are residential developments around both units that rely on groundwater for their domestic supply. Residential development has been occurring east and west of American Camp for several years. The residents, State, and NPS officials are concerned about the adequacy of groundwater resources in this area.

NPS Park "Vital Signs" Monitoring

In 2000, the National Park Service initiated a program to monitor long-term change for key indicators of ecosystem health known as the "Vital Signs" Monitoring Program. Vital signs are measurable, early warning signals that indicate changes that could impair the long-term health of natural systems (NPS, 2001). The Vital Signs Monitoring Program is organized nationally around 32 monitoring networks including approximately 270 park units. San Juan Island National Historical Park is part of the North Coast and Cascades monitoring network which includes seven NPS units located in the Pacific Northwest.

In designing its "vital signs" monitoring program, each network seeks to identify a subset of monitoring attributes, known as indicators, that are indicative of the quality, health or integrity of the larger

ecosystem to which they belong. In the "Vital Signs" Monitoring Program, early development of a conceptual model or models that will assist in identifying indicators and defining the temporal and spatial scales of interest of the "vital signs" at an appropriate level of detail is encouraged (NPS, 2003c).

A generalized model of ecosystem change, modified after the approach presented by Cloern (2001), that will be applied to both upland aquatic and nearshore marine habitats in San Juan Island National Historical Park is shown in Figure 2. This modeling approach recognizes that agents of change lead to stressors that induce ecosystem responses through a complex set of system-specific linkages, resulting in emergent ecosystem impacts that influence the sustainability of both human and non-human populations.

Agents of change are mechanisms defined as natural processes and events, or human activities that precipitate change to ecosystem processes. They may operate within the range of natural variability and acceptable limits of change, or they may not. If not, agents of change become sources of stressors to ecosystem attributes.

Stressors are categories of physical, chemical, or biological perturbations to a system that are either foreign to that system or, if natural to that system, applied at an excessive (or deficient) level (Barrett et al., 1976). Stressors often act to change the magnitude, frequency, duration or distribution of processes that reflect themselves in attributes we associate with properly functioning ecosystem conditions.

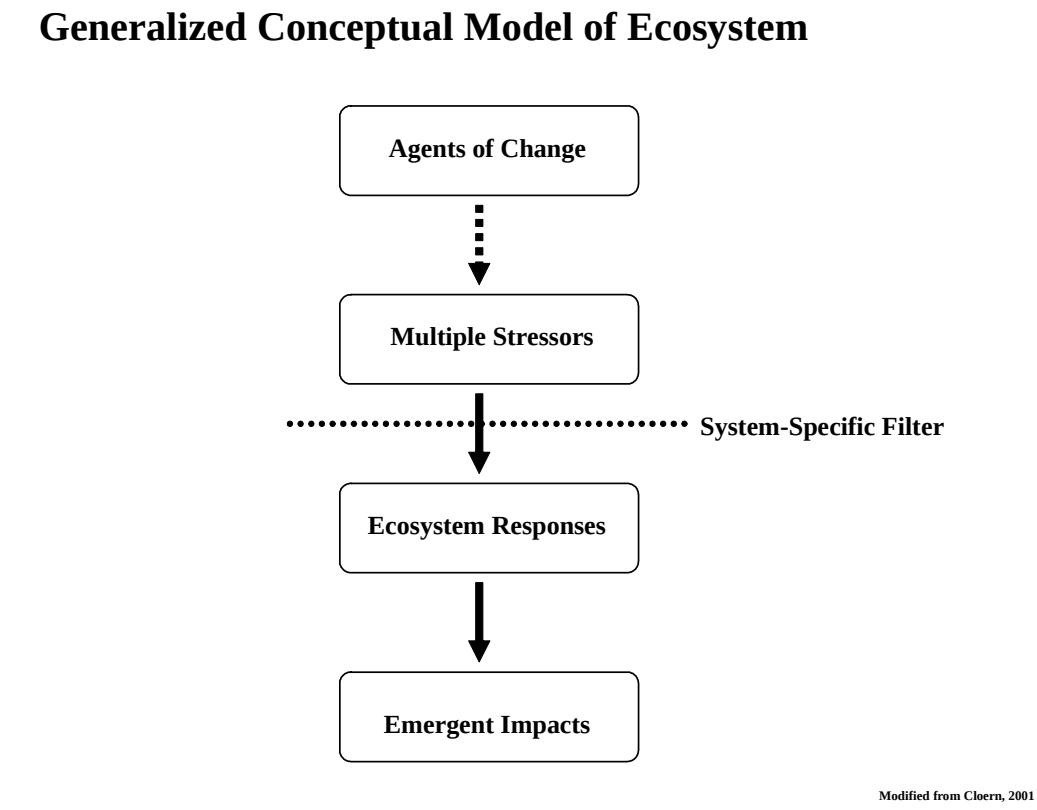
A key component of the modeling approach utilized by Cloern (2001) is the recognition that system-specific attributes may act as "filters" in modulating the response of an ecosystem to various stressors. For instance, some estuarine-coastal systems such as the Chesapeake Bay and the northern Gulf of Mexico appear to be very sensitive to changes in nutrient inputs (Cloern, 2001). Other estuarine-coastal systems such as San Francisco Bay appear to have system attributes that dampen direct responses to enrichment. Because the strength of the filter is a system-specific attribute, it is unrealistic to expect a general conceptual model to describe the ecosystem response to a stressor as a simple linear function. In the case of coastal eutrophication, Cloern (2001) identified system specific filters to include physical attributes such as tidal energy, presence of salinity gradients, residence time of water within coastal basins, and a set of optical properties that control light exposure to phytoplankton and submerged plants as well as biological attributes, such as the presence or absence of suspension feeders (Cloern, 2001).

While acknowledging the importance of system specific "filters" that could act to modulate the effects of various stressors on the upland and nearshore marine habitats of San Juan Islands National Historical Park, insufficient site specific information is currently available to integrate specific system specific filters into these initial attempts at conceptual model development.

Ecosystem responses may be defined as detectable changes or trends in any measurable attribute of the coastal ecosystem's structure, function, or process, that is considered indicative of an ecosystem's quality or integrity (Roman and Barrett, 1999).

Emergent impacts are those cumulative effects of ecosystem responses resulting in significant ecosystem change that ultimately impact socio-economic conditions, human health etc.

Figure 2. Generalized Conceptual Model of Ecosystem Change (modified from Cloern, 2001).



Upland Aquatic and Nearshore Monitoring Issues

In 1992, the National Park Service's Water Resources Division completed an overview of water-related issues pertinent to the management of San Juan Island National Historical Site (NPS, 1992). Issues identified and evaluated at that time included: 1) concerns about water supply and potential impacts of groundwater withdrawal, 2) the management of Jakles Lagoon, Old Town Lagoon, and Third Lagoon, 3) the need for oil spill contingency planning including inventory and monitoring requirements, and 4) jurisdictional and ownership issues concerning the shoreline of the park (NPS, 1992).

In March 2001, an Inventory & Monitoring Scoping session was held at San Juan Island NHS where an interdisciplinary team developed questions relating to long-term ecosystem monitoring and/or research needs at the park (Appendix A). Several of the questions identified during this scoping session related to upland aquatic and/or nearshore marine habitat issues, and were developed from those issues identified in 1992. More recent concerns, pertaining to shoreline erosion were also identified at that time as important long-term management issues for the park.

Upland Aquatic Habitats

Monitoring / Research Questions

The following were proposed in the March, 2001 scoping session as key monitoring questions pertaining to upland aquatic resources at San Juan Island National Historical Park:

- Are groundwater reserves of American Camp and English Camp being depleted from groundwater withdrawals (internal and adjacent water supplies), increased adjacent land development, or other human-induced agents of change? Is there a reasonable potential for future depletion related to changing patterns of land use?

- Is the specific conductance/salinity of low elevation springs, ponds, and wetlands increasing? If so, can the increase be correlated to human-induced influences such and/or regional water withdrawals?

- Are water quality conditions in the freshwater ecosystems changing? Can these changes be related to atmospheric deposition, hydrologic manipulation, nutrient enrichment, toxics contamination, or other human-induced agents of change?

Agents of Change / Stressors

The following is a list of potential agents of change likely to have an affect on upland aquatic habitats of San Juan Island National Historical Park and a listing of the stressors associated with each agent of change. These agents of change and stressors are incorporated into the upland aquatic conceptual model of ecosystem change shown in Figure 3:

Increased or existing land development (including residential/commercial development, roads/parking areas expansion, turf management/golf course management, abandoned landfills)

- potentially elevate nutrients, bacteria, metals and/or other contaminants
- increase stormwater runoff/alter freshwater input
- increase scouring/sediment loading/turbidity
- potentially alter habitat characteristics / enhance exotic species encroachment

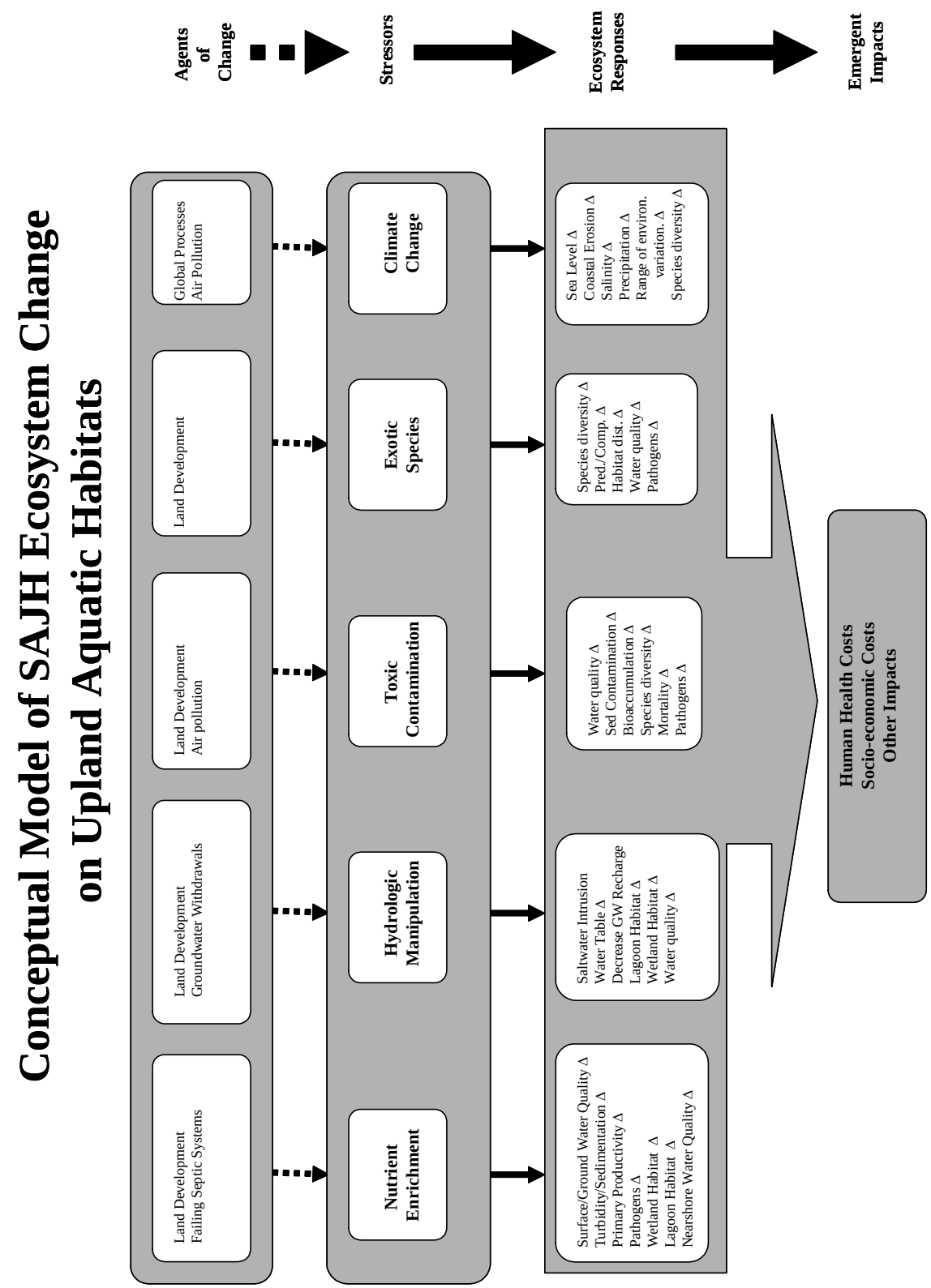
"Failing" on-site sewage systems (improper design, operation, and maintenance)

- elevate nutrients
- contribute fecal coliform bacteria
- potentially add toxics

Groundwater withdrawals (residential/commercial water supply)

- lower groundwater table
- increase potential for saltwater intrusion
- alter freshwater inputs to springs, seeps, ponds and wetlands
- potentially alter salinity regimes in nearshore lagoons
- potentially alter existing habitats

Figure 3. Conceptual model of SAJH ecosystem change on upland aquatic habitats.



Air pollution/ Long-range and Regional (cars, industrial)

- add toxics
- add nutrients
- increase atmospheric deposition and contaminant loading
- potentially alter habitat characteristics

Global Processes (natural and anthropogenic)

- increase ecosystem responses associated with natural processes and global climate change (sea level rise, changes in precipitation patterns / freshwater inputs, increased coastal erosion, resultant changes in species composition and diversity, etc.)

Recommended Monitoring Strategies

1. **Institute a program to monitor the long-term effects of groundwater withdrawal on groundwater levels and groundwater-dependent natural resources:** Many areas of San Juan Island, including those in the vicinity of American Camp and English Camp, are dependent upon groundwater withdrawals to meet growing water supply needs. With the population of San Juan County expanding rapidly (approximately 40 % increase between the 1990 and 2000 U.S. census figures), and the bulk of this growth dependent upon a limited groundwater supply, it is essential that the NPS implement monitoring to assure that the groundwater reserves are not being depleted or groundwater dependent natural resources are not being harmed from increased internal or adjacent groundwater withdrawals. It is recommended that aquatic resource specialists within the North Coast and Cascades network consult with the NPS Water Resources Division to design and develop a long-term groundwater monitoring program to address this issue. Components of this program could include some or all of the following activities: 1) measuring water level in all existing wells within and adjacent to the two units in order to produce seasonal potentiometric maps, and correlating this information to rainfall amounts and well pumping schedules; 2) installing a series of monitoring wells/piezometers in areas of special concern in order to regularly measure water levels and/or groundwater quality; 3) estimate potential yield and drawdown of the aquifer (i.e. slug test, pumping test, etc.); 4) using fixed reference points, photograph and survey ground water dependant vegetative resource parameters such as species composition, percent relative cover, etc.; 5) mapping the aerial extent of saturated soil in areas of concern and correlating this information with rainfall patterns and well pumping; 6) evaluating all existing aerial photographs and satellite imagery of the park units (possibly contracting periodic low-level color infrared photography) to identify possible changes in water dependent resources such as trends in soil moisture, plant vigor, community structure, etc.

2. **Update and evaluate on a periodic basis (3 - 5 year cycle) the San Juan Island National Historical Park "Level 1" Water Quality Inventory & Monitoring for surface and ground water resources**: A 1995 analysis of existing water quality information for San Juan Island National Historical Park (NPS, 1995) indicated that very little water quality data were available for the park. Based upon this assessment, the NPS contracted with the US Geological Survey to conduct a "Level 1" Water Quality Inventory and Monitoring synoptic study for San Juan Island

National Historical Park in 1999 – 2000. The purpose of this study was to collect water samples and to analyze for constituents that could indicate possible contamination. The sampling plan for this study included seasonal sampling (May, September, February) at five park locations including a drinking water well, a spring and a pond at American Camp and a drinking water well and intermittent stream at English Camp (USGS, 2000). While the overall quality of ground water and surface water in the study area were found to be good, there were some notable items. These included: 1) elevated specific conductance/chloride concentrations and an ammonia: nitrate ratio at the American camp well that may indicate increasing salt water intrusion; 2) the presence of *E.coli* bacteria and nitrate concentrations from the pond and spring sites at American Camp and the intermittent stream site at English Camp that could be an indication of sewage or organic waste contamination; and 3) a slightly elevated arsenic concentration at the American camp well (USGS, 2000). Based upon these findings, a periodic updating and evaluation of the "Level 1" water quality inventory and monitoring survey on a seasonal basis at a 3 – 5 year interval is warranted.

3. **Maintain and update on a periodic basis (10-year cycle) SAJH wetlands inventory:** In 1998, wetlands of SAJH were inventoried, mapped, and characterized utilizing the "routine onsite determination method" recommended by the Federal Interagency Committee for Wetland Determination. In this survey, Holmes (1998) mapped 26 wetlands units ranging in size from 0.06 acres to 22.98 acres in American Camp and nine wetland units ranging in size from 0.01 acres to 5.73 acres in English Camp. The outline and community types identified in this survey have been digitized and GIS coverage created in ARC/INFO and exported to ARCVIEW compatible files. Because potential "ecosystem responses" to the probable agents of change / stressors include the possible alteration and/or loss of wetlands habitats, it is strongly advised that similar survey efforts be conducted on at least a once per decade basis

4. **Maintain liaison with San Juan County Planning Department and other land use/regulatory planning agencies:** San Juan County views its wetland resources as one of the "County's most valuable resources because drinking water aquifers are recharged entirely through rainfall" (Larkin, 1999a). The County, through the San Juan County Planning Department has played an active role in delineating wetland resources outside of the park and in completing a watershed assessment report for the Westcott-Garrison Bay Watershed, which includes the English Camp (Larkin, 1999a). The County has recently drafted recommended management strategies for this watershed (Larkin, 1999b) with many of the objectives and recommended activities consistent with NPS management goals. San Juan Island National Historical Park is encouraged to maintain long-term liaison with the county efforts that nicely complement park needs.

Nearshore Marine Habitats

Monitoring/Research Questions

The following were proposed in the March, 2001 scoping session as key monitoring questions pertaining to nearshore marine resources at San Juan Island National Historical Park:

- What are the effects of "normal" human use (i.e. trampling, terrestrial runoff, dock building, aquaculture, etc.) on intertidal communities (i.e., soft bottom, sandy, gravel, and rocky)? Do

current levels of harvest on targeted species jeopardize populations and/or substantially alter community composition? Is the percent cover of eel grass beds declining?

- What are the effects of catastrophic events (e.g. oil/toxin spills) on intertidal communities? What are current background oil/toxin levels and how are remediation/restoration goals determined?

- How is the physical shoreline changing over time? Are anthropogenic effects (i.e. shoreline modification, global climate change) increasing the rate of change in a manner that jeopardizes biological communities, particular species of interest, and/or valued physical features (i.e. beaches, lagoons, etc.)?

Agents of Change / Stressors

The following is a list of potential agents of change likely to have an affect on nearshore marine habitats and a listing of the stressors associated with each agent of change. These agents of change and multiple stressors are incorporated into the nearshore marine conceptual model of ecosystem change shown in Figure 4:

Aquaculture (including oyster, clam and salmon culturing)

- increase nutrients / pathogens
- introduce exotic organisms
- increase turbidity

Boat Maintenance and Operation (including sewage discharge, boat hull maintenance, marine debris, and bilge water discharge)

- increase nutrients, pathogens, and chemical compounds associated with boat maintenance and operation
- introduce exotic organisms
- introduce toxic compounds to system

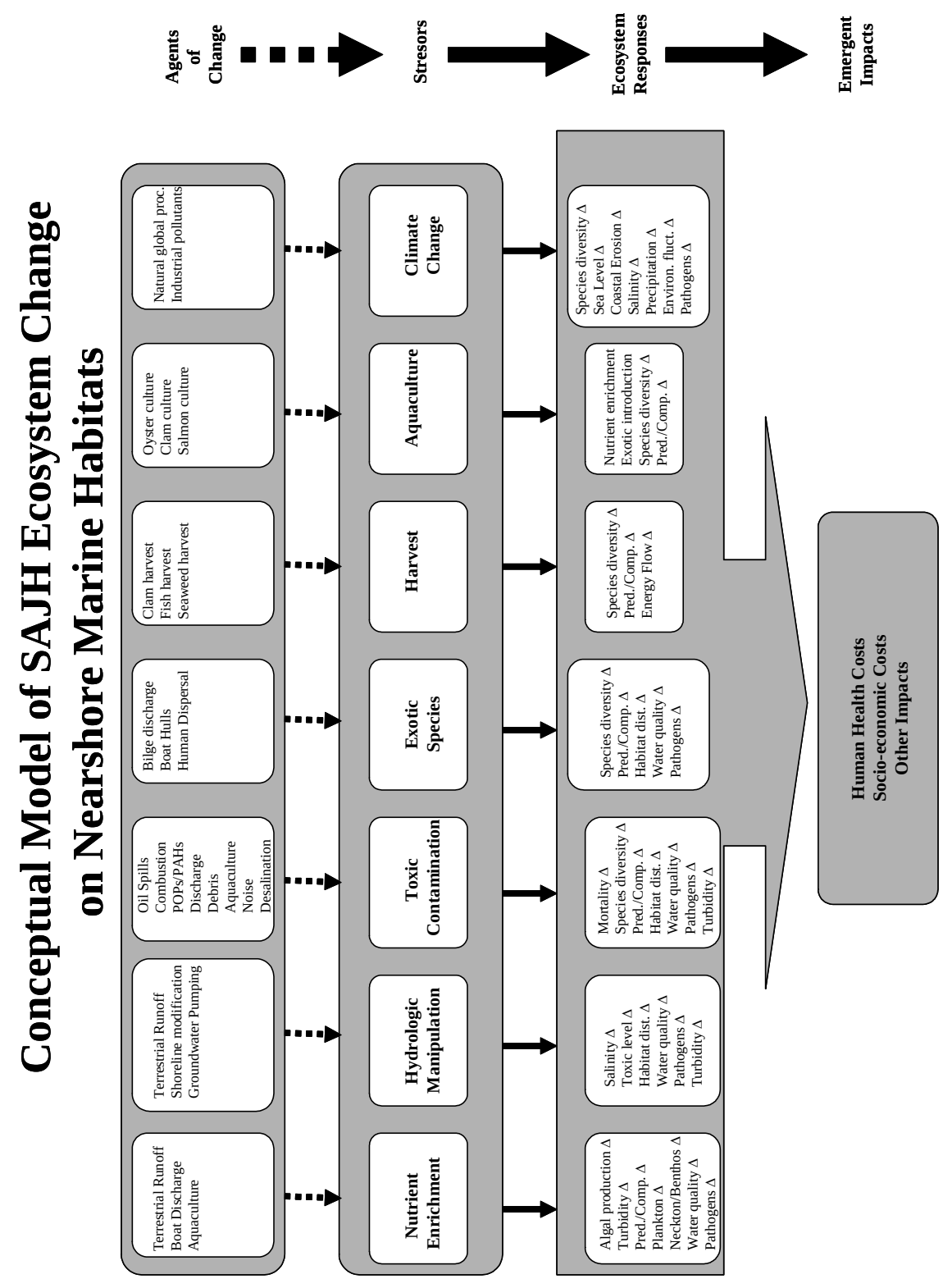
Shoreline modification

- Potentially intensify wave action and beach erosion due to bulkheads, docks, and jetties
- alter long-shore currents and sediment movement patterns

Terrestrial runoff

- increase nutrients
- introduce toxic compounds to system
- locally decrease salinity

Figure 4. Conceptual model of SAJH ecosystem change on nearshore marine habitats.



Species Harvest (including fish, clams, and seaweed)

- alter species diversity
- alter age/stage population structure

Oil and toxic substance spills and discharges (including spills, contamination from combustion products, etc.)

- Lethal and sub-lethal intoxication of native organisms

Recommended Monitoring Strategies

1) **Maintain liaison with Friends of San Juan (FOS), San Juan County (SJC), and Washington Department of Fish and Wildlife (WDFW):** These organizations have conducted long and short-term monitoring of bait-fish (FOS, WDFW), shoreline habitat (FOS, SJC), intertidal communities (FOS), water quality (SJC, WDFW), shell fish population dynamics (WDFW), exotic species introductions (WDFW, i.e. green crabs), and eel grass (WDFW). These organizations should be further cultivated to coordinate historical and future data transfer to San Juan Island National Historical Park, and to direct research and monitoring projects to address park issues. Contact with WDFW should be made to determine status of current work determining recreational clam harvest levels in the Park units.

2) **Maintain and strengthen liaison with University of Washington Friday Harbor Laboratories:** Friday Harbor Laboratories has a long history of conducting research in San Juan Island National Historical Park, particularly upon invertebrates, algae, and ecosystem processes. Ties with Friday Harbor Laboratories should be strengthened, and research conducted by faculty and students should be encouraged, particularly to accomplish park monitoring and research goals. The park research permitting process should be reviewed to encourage research.

3) **Institute a program to monitor shoreline erosion in American Camp:** Runoff from current roads and near-shore hydrology are rapidly eroding bluffs in American Camp. A formal monitoring program should be instituted to monitor the rate of erosion and causal factors. Dr. Rebecca Beavers of the NPS Geological Resources Division could provide assistance with the design and implementation of an appropriate monitoring program.

4) **Obtain and revise San Juan Island Geographic Response Plan:** Obtain the San Juan Island Geographic Response Plan (GRP) from the Washington Department of Ecology (WDOE). Review the San Juan Island National Historical Park incident command system and role in the GRP. Provide comments to WDOE for revision of the GRP. Current levels of petrochemicals (PAHs) and other toxins (i.e. Persistent Organic Pollutants) in nearshore sediments should be inventoried to determine baseline conditions for setting of restoration goals.

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Appendix A: **Participants in the San Juan Island National Historical Park Vital Signs Workshop held from March 20 – 22, 2001 in Friday Harbor, WA.**

Steve Acker, Pacific West Region, National Park Service
Sarah Allen, Point Reyes National Seashore
Ken Arzarian, San Juan Island National Historical Park
Rebecca Beavers, Geologic Resources Division, National Park Service
Marsha Davis, Columbia Cascades Support Office, National Park Service
Megan Dethier, Friday Harbor Marine Laboratories, University of Washington
Mark Flora, Water Resources Division, National Park Service
Steven Fradkin, Olympic National Park
Bruce Freet, North Cascades National Park
Erv Gasser, Columbia Cascades Support Office, National Park Service
Bill Gleason, San Juan Island National Historical Park
Shelley Hall, Olympic National Park
Thor Hansen, San Juan County Land Bank
Bob Higgins, Geologic Resources Division, National Park Service
Ron Holmes, North Cascades National Park
Kathy Jope, Columbia Cascades Support Office, National Park Service
Bob Kuntz, North Cascades National Park
Ken Mabry, Pacific West Region, National Park Service
Mike Martin, Water Resources Division, National Park Service
Cicely Muldoon, San Juan Island National Historical Park
Dave Peterson, Forest/Rangeland Ecosystem Center, US Geological Survey
Gina Rochefort, North Cascades National Park
Barbara Samora, Mount Rainier National Park
Leigh Smith, Ebey's Landing National Historical Reserve
Scott Stonum, Fort Clatsop National Monument
Darin Swinney, Mount Rainier National Park
Ken Till, Columbia Cascades Support Office, National Park Service
Darlene Wahl, San Juan Island National Historical Park

As the nation’s principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

NPS D-78, February 2004