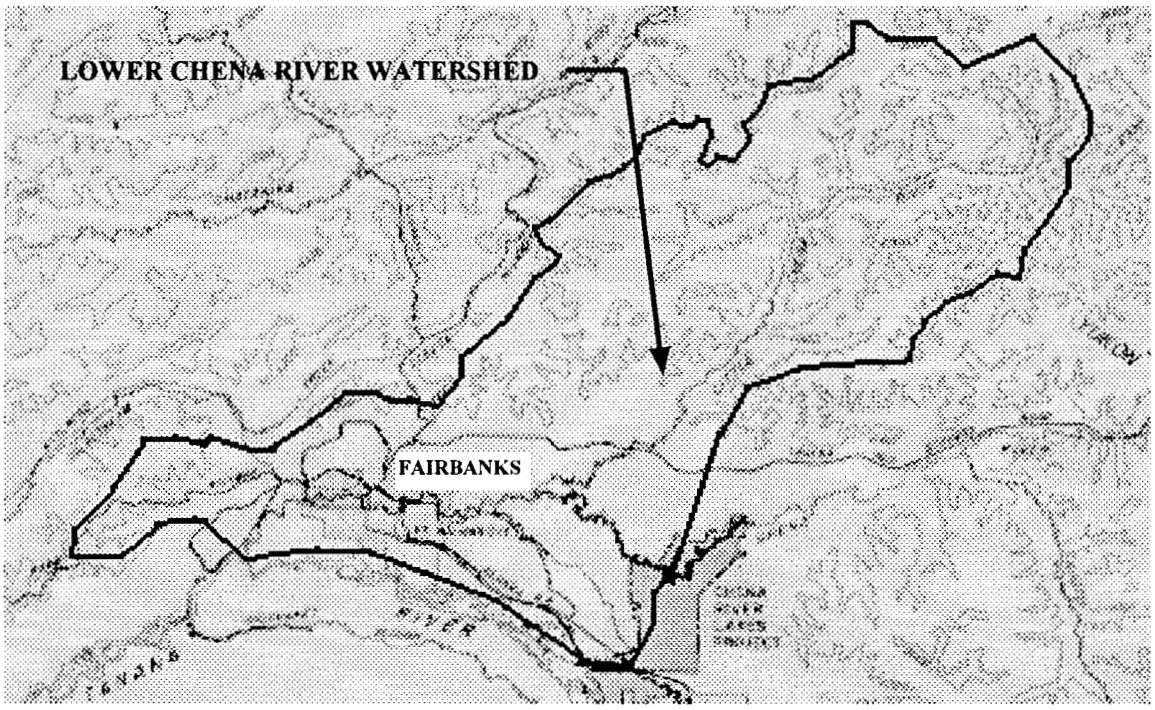
Technical Report No. 98-6

Lower Chena River Watershed Management Strategies and Information Needs

by Roger A. Post



June 1998

Alaska Department of Fish and Game

Habitat and Restoration Division

LOWER CHENA RIVER WATERSHED MANAGEMENT STRATEGIES AND INFORMATION NEEDS

Prepared for
U.S. Environmental Protection Agency
Region 10

Prepared by
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Technical Report No. 98-6

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INTRODUCTION

The Alaska Department of Fish and Game (ADF&G) has received cost-share funding from the "State and Tribal Wetland Protection Grant" program administered by the U.S. Environmental Protection Agency (EPA) under Section 104(b)(3) of the federal Clean Water Act to prepare a *Lower Chena River Watershed Management Plan*. The plan will provide an integrated and rational basis for management of wetlands and water quality in the 1,603 km^2 portion of the Chena River drainage between the Moose Creek Dam and the Chena's confluence with the Tanana River. Preparatory work for the planning process (Task 1) began in October 1995 and extended through May 1996. This work included obtaining multiagency consensus for proceeding with the project, developing guidelines for the planning process, and hosting a Public Forum to present the project to the local community, as well as to gather input on citizen concerns related to wetlands and water quality. A follow-up survey of Forum participants prioritized watershed issues, and many agencies provided written commitments to ADF&G to participate at some level in the project.

Participating agencies encouraged citizens to volunteer for membership on the Lower Chena River Watershed Management Planning Team and recruited 17 people at, or soon after, the Public Forum. The Planning Team also included representatives of participating agencies. Regular meetings of the full Planning Team (Task 2) began in June 1996 and extended through December 1997. During this time, the Team developed operating procedures for its meetings, developed watershed management strategies covering four major topics, and identified information needed to write a draft management plan based upon the Team's management strategies.

This report documents the work of the Lower Chena River Watershed Management Planning Team during Task 2 of the project. Components of the report include Team membership, procedures used to develop watershed management strategies, final management strategies crafted by the Team, and data/information needs identified by the Team as necessary precursors to preparation of a *Lower Chena River Watershed Management Plan*. This report represents the views of the Planning Team, who have reviewed and approved report contents.

THE PLANNING TEAM

Seventeen citizens (Table 1) initially volunteered to serve on the Lower Chena River Watershed Management Planning Team, along with representatives of participating state and federal agencies and local governments. Over the course of approximately 1.5 years, several citizen members formally withdrew from the Team for various reasons and several others ceased attending planning meetings but did not withdraw. Members not formally withdrawing from Team membership continued to receive meeting notes and retained the right to object, within a specified time limit, to Team decisions reached in their absence. Citizen-volunteer planners came from a variety of professions including mining (hard rock, gravel), teaching, hydrology, aquatic ecology, engineering, business (technical consulting, technical services, and recreation-related sales and services), environmental science, and government service. Several members of the Planning Team were retired and one was a graduate student.

Guidelines developed for the planning process specified that citizen-volunteer Team members were to represent themselves and not "interest groups" during Team deliberations. Nevertheless, citizen Team members were affiliated with various organizations and, to some extent, presumably held views similar to those that might be held by other members of their interest groups. Examples of groups with which Team members were affiliated include the Alaska Outdoor Council, Fairbanks Snow Travelers, Alaska Trappers Association, Alaska Miners Association, Chena Riverfront Commission, a volunteer fire department, a community association, and various professional organizations. Some citizen volunteers were landowners along the Chena River, in wetlands, or in areas subject to flooding.

Agency representatives (Table 2) participated in planning meetings to varying degrees. Several representatives attended most meetings, others just attended a few meetings or attended in response to requests for their expertise, and most chose to remain informed about progress of the Planning Team through twice-monthly meeting notes. The Alaska Department of Environmental Conservation; Alaska Department of Natural Resources, Division of Land; Alaska Department of Transportation and Public Facilities; U.S. Fish and Wildlife Service; U.S. Army Corps of Engineers, Regulatory Branch; U.S. Army Corps of Engineers, Civil Works Branch; and Natural Resources Conservation Service actively participated in deliberations of the Planning Team at a number of meetings, and some of these agencies made technical presentations, as well. The U.S. Geological Survey and Fairbanks North Star Borough also made invited technical presentations to the Team.

The ADF&G facilitated meetings of the Planning Team. In order to maintain neutrality, the ADF&G facilitator did not represent agency views during the planning process, and ADF&G was not otherwise represented on the Planning Team. The facilitator and a representative of ADF&G Sport Fish Division did make technical presentations on specific topics within their areas of expertise on several occasions. Such presentations were clearly differentiated from facilitated Team deliberations on watershed issues.

Table 1. Citizens participating (at various levels) in the Task 2 planning process conducted by the Lower Chena River Watershed Management Planning Team between June 1996 and December 1997. Some citizens withdrew during the course of this effort.

Citizen Volunteer			
Mr. John Abrams	Ms. Patricia Grabow	Ms. Christine McGehee	Mr. Fred Pankratz
Ms. Janet Brown	Mr. Michael Herbeck	Mr. Sterling Muth	Mr. Ken Rarick
Mr. Roger Burggraf	Ms. Laura Jacobs	Mr. Craig Nordgren	Ms. Judy Tolbert
Ms. Lou Davis	Ms. Karen Lidster	Mr. Jim O'Neil	Mr. Klaus Wuttig
Mr. Harold Gillam			

Table 2. Agency representatives participating (at various levels) in the Task 2 planning process conducted by the Lower Chena River Watershed Management Planning Team between June 1996 and December 1997. Some agency representatives were replaced during the course of this effort.

Agency Representative	Agency
Ms. Amy Ash, Mr. Paul Bateman	Alaska Department of Environmental Conservation
Ms. Ouina Rutledge, Mr. Robert Layne	Alaska Department of Natural Resources, Division of Lands
Mr. Pete Buist	Alaska Department of Natural Resources, Division of Forestry
Ms. Christine Storey, Mr. Mike Tinker	Alaska Department of Transportation and Public Facilities
Ms. Bartley Klevin, Ms. Jane Dale	City of Fairbanks
Mr. Paul Costello	Fairbanks North Star Borough, Land Management
Mr. Doug Sims	Fairbanks North Star Borough, Community Planning
Ms. Michele Hébert	Cooperative Extension Service
Mr. Jim Helm, Mr. Dan LaPlant	Natural Resources Conservation Service
Mr. Ed Chacho	U.S. Army Cold Regions Research and Engineering Laboratory
Mr. John Schaake	U.S. Army Corps of Engineers, Chena Flood Control Project
Mr. Roger Petkoff, Mr. Bill Keller	U.S. Army Corps of Engineers, Regulatory Branch
Mr. Steve Bredthauer, Ms. Brenda Kerr, Mr. John Burns, Mr. Clarke Hemphill	U.S. Army Corps of Engineers, Civil Works Branch
Mr. Ted Rockwell	U.S. Environmental Protection Agency
Mr. Larry Bright	U.S. Fish and Wildlife Service
Dr. Robert Burrows	U.S. Geological Survey
Dr. Larry Hinzman	University of Alaska, Water Research Center
Ms. Anne Morkill, Ms. Ruth Gronquist	Bureau of Land Management

THE PLANNING PROCESS

BACKGROUND

Participating agencies prepared specific guidance (Appendix A) for the planning process during Task 1 of the project. This guidance set bounds on the activities of the Lower Chena River Watershed Management Planning Team consistent with project goals, legal constraints, and ground rules for Team deliberations. The Planning Team first met on June 26, 1996, to exchange introductions and backgrounds, review planning guidelines, develop a meeting schedule, develop a "Policy and Procedure for Maintaining Agreement of Absent Members" (Appendix B), discuss internal team organization, and prioritize issues.

TEAM ORGANIZATION AND SCHEDULE

At its initial meeting, the Planning Team discussed the advisability of breaking into separate committees to address different topics but opted to remain a single body unless circumstances dictated otherwise. The Team never used the option to form committees because the number of members at any given working session never reached an unwieldy size for group deliberations. Early in the process, attendance approached 20 people but had declined to 5 to 10 people by completion of the watershed management strategies in December 1997.

The Planning Team agreed to meet on the first and third Mondays of each month from 5:30 p.m. to 7:30 p.m. In the spring of 1997, the Team agreed to extend meetings until 8:00 p.m., if necessary to complete productive discussion. On several occasions, extra meetings were held during months with five Mondays. The Team made adjustments for holidays and facilitator conflicts (field work and annual leave), including not meeting in July and September 1996, but completed thirty-three meetings between June 26, 1996, and December 1, 1997. Thus, Team members who attended all meetings spent about 75 meeting hours learning about issues and developing watershed management strategies to address those issues. Team members spent additional time between meetings reviewing notes and substantial background information provided by the facilitator.

WATERSHED MANAGEMENT TOPICS

At the completion of Task 1, participating agencies had hosted a Public Forum and invited the community to identify concerns related to wetlands and water quality in the Lower Chena River watershed. The ADF&G subsequently conducted a mail survey of persons attending the Forum, and additional persons that had previously requested to be on a project mailing list, and asked them to rank Forum issues in order of priority. The Planning Team used survey results (Figure 1) to group most of the issues into four major topics: water quality, channel problems, flooding and drainage, and wetland management. The Team did not address issues that were not related to wetlands or water quality (e.g., boating safety).

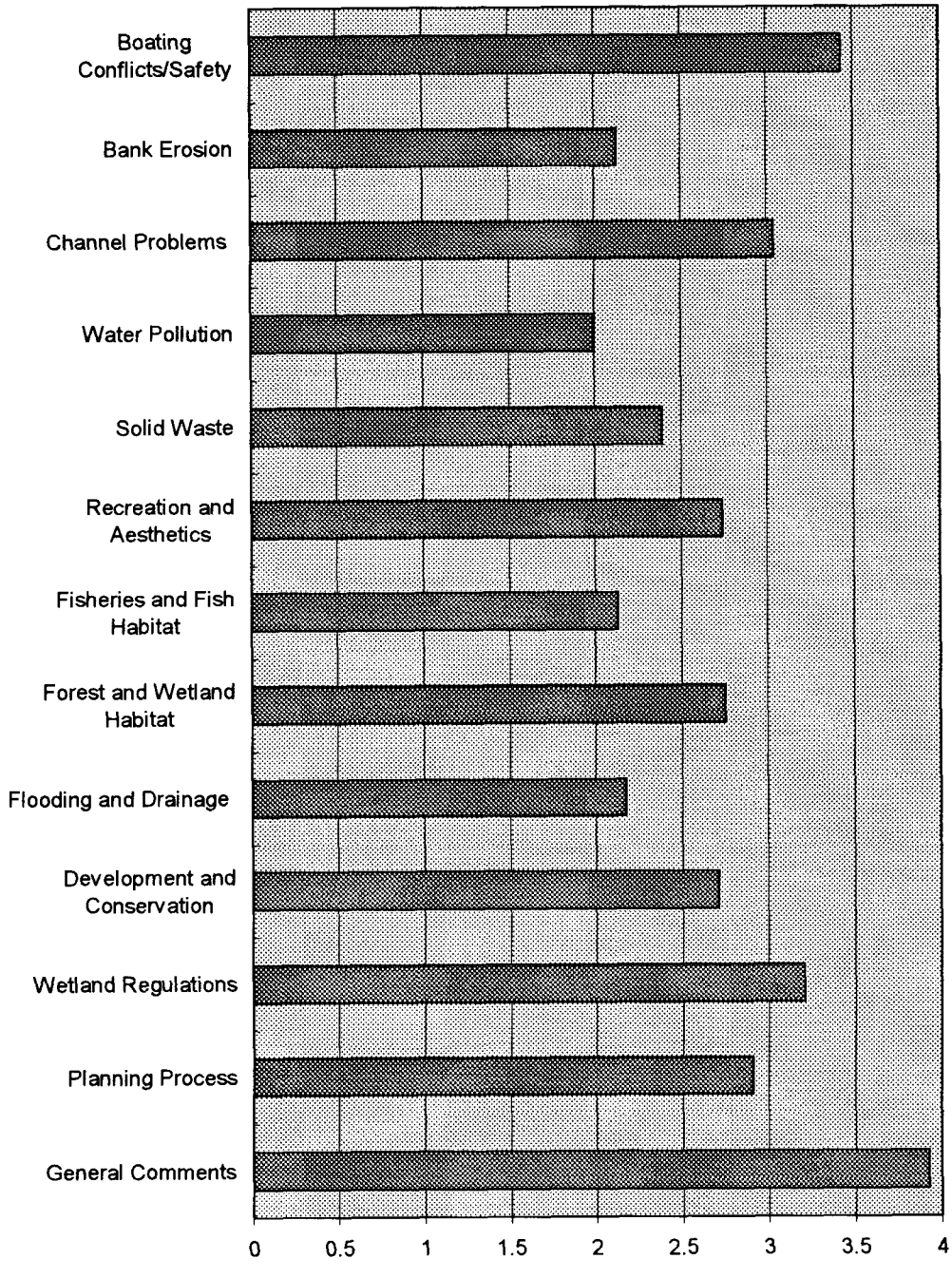

Figure 1. Survey of priorities for issues identified at Public Forum (1 = most important, 5 = least important).

Looking at water quality from a watershed perspective allows the public, local governments, and state and federal agencies to understand the relationships between pollutant sources in the watershed and to understand the combined effects of pollutant sources on water resources. This ability to look at "the big picture" is an important reason for watershed planning. The Planning Team initially focused on surface water quality (water pollution) but quickly added groundwater as a component of this issue because localized groundwater pollution is present in the watershed. In addition, groundwater flow patterns associated with the Tanana and Chena rivers potentially can transport groundwater pollutants to surface waters. The Lower Chena River Watershed Management Planning Team prepared a water quality management strategy that expresses community priorities with respect to management and protection of surface water and groundwater resources.

Concerns with the condition of the banks, bed, flow, and ecological condition of the Lower Chena River and its associated sloughs caused the Planning Team to develop a management strategy for channel problems. Channel problems relate primarily to water quality concerns and associated changes in streamside and aquatic environments. Alteration of river and slough flow within the watershed can influence water quality, as well. The channel problems management strategy addresses bank erosion and protection; solid waste in and along the river, including waste materials used as bank armor; past hydrological alteration of Chena Slough and the Chena River with effects related to channel morphology, navigation, and stream successional processes; inadequate drainage structures; and fisheries and fish habitat concerns. Although the Planning Team included many community concerns in one topic, the conditions and characteristics of river and slough channels provided a unifying theme. Substantial changes over the past several decades in the appearance, vegetation, and types of fish habitat present in Badger Slough received particular attention during strategy development.

Flooding and drainage was a straightforward issue mainly related to prevention of property damage, flood-related planning, and transfer of pertinent information to the community. Important linkages exist between wetlands, water quality, and problems associated with flooding and drainage. Wetland loss can increase some types of flooding, as has been shown for the Badger Road area. Drainage projects to reduce flooding can alter adjacent wetlands, if not carefully designed to maintain existing groundwater elevations. Flooding affects septic system operation and potentially pollutes surface water and groundwater. Although not directly a wetland or water quality concern, economic losses associated with inappropriate construction in flood-prone areas adversely affect individual families and businesses, as well as the community. The Planning Team developed a watershed management strategy for flooding and drainage to promote a sensible approach to development in flood-prone areas.

A primary emphasis of EPA's State and Tribal Wetland Protection Grant Program is to assist states to manage wetlands and water quality on a watershed basis. Communities can exercise a certain degree of influence in the federal wetland permit process because the U.S. Army Corps of Engineers, Regulatory Branch, will consider local or watershed

wetland plans when making permit decisions. Currently, there is no local or watershed plan to provide guidance to the federal agencies and pertinent State of Alaska agencies during review of wetland permit applications. The Planning Team developed a wetland management strategy to exercise the flexibility available under Corps regulations and policies by linking watershed planning with wetland permitting to achieve both permit streamlining and conservation of wetlands important to the community.

PLANNING PROCEDURES

The Planning Team sequentially addressed the four major watershed topics during the course of their bimonthly meetings. The Team began with water quality, ranked as the highest priority by concerned citizens (Figure 1), and ended with wetland management, generally ranked as a lower priority in the limited community survey. Techniques used to develop management strategies varied somewhat over the 1.5 years of meetings but for each topic generally included the facilitator and invited expert speakers providing background information, the Planning Team generating a list of problems and one or more concise problem statements, the facilitator leading a "cause and effect" analysis to explore ramifications of listed problems, the Planning Team establishing goals and objectives to rectify listed problems, the Planning Team brainstorming solutions to achieve objectives, and the Planning Team evaluating solutions for technical and socioeconomic feasibility.

Background information distributed to the Planning Team by invited speakers or by the facilitator typically included technical reports or articles; fact sheets and relevant news items; outlines of presented talks; and legislative, regulatory, or administrative rules or policies (Appendix C). Individual members of the Team often contributed similar materials, pertinent to their areas of expertise or interest, for distribution. Invited speakers presented technical, regulatory, community planning, economic, or commercial perspectives necessary to understand each topic (Appendix C).

The Planning Team developed a list of problems associated with each major topic (Tables 3-6) addressed by the Team. Team members identified problems based on their understanding of background material for each topic and on their personal experiences, beliefs, interests, or ideals with respect to each topic. The facilitator listed problems on a flip chart as the problems were identified. Between meetings, the facilitator sometimes edited problem lists to eliminate redundancies or improve clarity, subject to approval by the Planning Team.

The Planning Team, or the facilitator with Team approval, developed concise problem statements (Tables 3-5) to capture the essence of the problem lists for water quality, channel problems, and flooding and drainage. Problem statements helped the Planning Team focus on key concerns during subsequent deliberations, such as providing starting points for "backstep" or "cause and effect" analyses. The Team did not apply backstep analysis to the flooding and drainage or wetland management discussions and, for that reason, did not develop a problem statement for the latter topic.

Backstep analysis allowed the Planning Team to understand the causes and effects of problems summarized in concise problem statements for the water quality and channel problems topics (Appendix D). As the facilitator recorded progress on flip charts, the Team worked backward from problem statements through several levels of causes to identify root causes underlying the problems. Similarly, the Planning Team examined effects implied by problem statements, working forward through several levels of effects to identify ultimate outcomes associated with the problem statements. The facilitator presented completed backstep analyses in tabular form in meeting notes for Team modification or approval. The Planning Team chose not to conduct backstep analysis for the flooding and drainage and wetlands topics. By the time the Team addressed these topics, they had become familiar enough with the planning process to move directly from developing problem lists to establishing goals and objectives.

Setting goals and objectives for each of the four topics allowed the Planning Team to shift from problem analysis to problem solution. Goals and objectives also provided focus for the Planning Team's subsequent efforts to develop solutions for problems associated with each topic. The ADF&G project proposal and EPA's "State and Tribal Wetland Protection Grant" program, the major project funding source, provided the basis for two overall project goals: (1) to conserve natural resources and (2) to have continued economic growth. The Team identified their vision for an improved future by sequentially developing first additional goals and then objectives for each of the four topics. In each case, the facilitator recorded Team deliberations and edited and presented goals and objectives in tabular formats for Team approval. Final goals and objectives appear in the watershed management strategies presented in the next chapter of this report.

Goals and objectives provided the framework around which the Planning Team brainstormed potential solutions for each major topic. For each objective under a goal, the facilitator solicited ideas from the Team and recorded them on flip charts. The facilitator generally edited brainstormed ideas to remove redundancies and improve clarity, subject to approval by the Planning Team. The Team then evaluated the edited solutions for technical, economic, and political feasibility, to the extent possible in the time available. Solutions judged unacceptable were deleted by the Team. Remaining solutions (see next chapter) became part of the draft watershed management strategy for the topic under discussion. Watershed management strategies for water quality, channel problems, flooding and drainage, and wetland management comprised their respective goals, objectives, and solutions.

Each draft watershed management strategy was reviewed by the Planning Team for acceptability. The facilitator made revisions requested by the Team until the drafts were satisfactory as interim products. The Team specified, however, that it would revisit the draft strategies for a final review when all strategies were complete. During the final review, the Planning Team, with assistance from the facilitator, strove to make the strategies clear and concise.

Substantial revisions occurred during the final review, primarily in eliminating redundancies, but overall approaches used in the management strategies remained largely unchanged. Final watershed management strategies appear in the next chapter.

Table 3. Problem list and problem statements for the water quality topic.

Problems
• Little monitoring (surface and groundwater) - need research and testing for septic contamination.
• Well testing during house sales - need research and testing for septic contamination.
• Contaminated wells/septic system relation to slough and wells (public and private).
• Lack of treatment for urban runoff.
• Lack of a plan for drainage/hydrology in relation to homes, driveways, and septic systems.
• No water/sewer system in developing areas (solution could cost more in the future).
• Lack of uniformity between government "standards" (i.e., requirements, conditions, planning) and private standards for culverts/flow.
• Lack of information on historical industrial development/contaminants.
• Need aquifer data for the area.
• Need identification of sewer/water areas.
Concise Problem Statements
• We don't have enough information to know if surface water is polluted.
• We have groundwater pollution in the watershed, little information on locations and causes, and little planning to reduce future impacts.

Table 4. Problem list and problem statements for the channel problems topic.

Problems
• Regulation of the Chena River has reduced peak discharge, caused channel downcutting from reduced sediment loads at some locations with consequent reduced flow into Noyes Slough, possibly contributed to shallows that inhibit commercial navigation and may have adverse effects on the tourism/recreation industry at other locations, may have reduced groundwater flow in Badger Slough, may have reduced (but not eliminated) the amount of biologically important woody debris below the Chena Flood Control project, may have altered fish habitat, and may impede fish passage (through operational problems) despite a fish ladder at the Chena Flood Control Project.
• Dams at the heads of sloughs (e.g., Badger Slough) change their character, a condition compounded by cross-slough road fills with small or improperly installed culverts (in one case, causing overtopping of a road during snowmelt runoff), including increased occurrence of macrophytes and algae and altered fisheries habitat (for all species).
• There do not appear to be hydraulic models to predict the future condition of the Chena River and its sloughs under the influence of flow regulation (dams, dikes, etc.) and natural succession.
• Solid waste is present on the banks and bed of the river (Note: some solid waste may have historic value), but there is no mechanism for removal of solid waste on the riverbed, which is managed by the Alaska Department of Natural Resources, Division of Land.
• Bank erosion from boat wakes and other sources raises demands for bank protection, but uniform bank protection can have negative aesthetic impacts (Note: aesthetics is outside the mandate of the Team but bank protection methods are not); fill placement and other development on river and slough banks can constrict channel capacity, cause localized flooding, and alter fisheries habitat; riprap and dredging can produce off-site effects (i.e., may affect long reaches of stream by altering current direction or increasing local scour); and technology transfer to the public on bioengineering and funding sources for bank protection is in its infancy.
• A natural accumulation of logs at the confluence of Badger Slough and the Chena River has caused the Chena to backwater into Badger Slough during high-water events on the Chena since 1989, which has reduced downstream flow velocity in the Slough, accompanied by rapid sediment accumulation at this location (4'8" measured by local residents since 1989).
• There are concerns with the coverage of the permit process/criteria related to the Chena River and sloughs (e.g., cable crossings, culverts, fill) by agencies including the U.S. Army Corps of Engineers, the Alaska Department of Environmental Conservation, the Alaska Department of Fish and Game, and the Alaska Department of Natural Resources.
Concise Problem Statements
• Flow regulation of the Lower Chena River, first by exclusion of Tanana River water from Chena Slough by the Moose Creek Dike the early 1940s and later by construction of the Chena Flood Control Project, and bank protection have changed the hydrology, channel characteristics, and ecology of the river and its associated sloughs and will continue to do so in the future.
• There are gaps and inconsistencies in state, federal, and local government regulation of activities affecting the river and its associated sloughs, sometimes leaving citizens without means of implementing mechanisms for correcting natural or man-caused channel problems.

Table 5. Problem list and problem statements for the flooding and drainage topic.

Problems
Economics
• Flooding from snowmelt runoff (e.g., Badger Road watershed), groundwater (e.g., downstream of the Chena Dam floodway), and the Chena River (e.g., Steamboat Landing) causes economic losses to individuals, businesses, and governments (e.g., including bail-outs of affected individuals).
• Limitations on development in flood-prone areas decrease the tax base and impose economic impacts on individual homeowners required to modify water, wastewater, and fuel-storage systems.
• The private sector (e.g., banking, insurance) has contributed to deficiencies related to development of flood-prone areas.
• Economic analysis has not been used sufficiently to solve flooding and drainage problems.
Management
• A poor perception of government regulation contributes to gaps (at all levels) in regulation of development in areas with flooding and drainage problems; failure of government and others to continually examine (from a landscape perspective), or take responsibility for, cumulative impacts of development in these areas; and selective permitting, inconsistent enforcement, and too few cease and desist orders related to flooding and drainage.
• A lack of intergovernmental coordination (at all levels), coupled with a crisis-management approach to flooding and drainage problems, contributes to the failure to preserve natural drainage areas, prevent filling of drainage channels, require lot sizes sufficiently large to mitigate downgradient flooding, transfer information on the geotechnical conditions of land to consumers, and generally prevent and correct flooding and drainage problems.
• There is not enough land in private ownership to accommodate low-cost development in areas not subject to flooding.
• Although hydrologic models (surface water and groundwater) are becoming available for the watershed, some hydrologic estimates related to flooding and drainage have been faulty, and agencies and others have not implemented preventive measures for predicted impacts of development in flood-prone areas.
Habitat
• Drainage can affect wetland habitat.
Concise Problem Statement
• The public and private sectors have neither cooperatively applied comprehensive management of development in flood-prone areas (surface and groundwater) nor provided alternatives to such development in order to prevent or minimize economic losses (public and private) and loss of wetland habitat.

Table 6. Problem list for the wetland management topic. The Planning Team did not develop a concise problem statement for this topic.

Problems
• Agency responsibilities for wetlands and water quality are too diverse (i.e., too many agencies involved), there is no centralized place for applicants to get all permit requirements for all agencies, and the time required to obtain wetland permits is too long.
• The federal wetland program lacks balance, there are loopholes in wetland regulation, and agencies do not apply permit requirements consistently to all applicants.
• The public and public officials often lack knowledge, and sometimes have incorrect information, about wetland regulations, the location of wetlands in the watershed, land uses that might unintentionally create wetlands (e.g., abandoned gravel pits), and wetland functions upon which wetland value judgments are made.
• Studies of the functions (e.g., water storage, habitat) of wetlands in the watershed are lacking, as is application of methods to determine the true values held by the community with regard to those functions versus perceived values voiced by various interest groups.
• Although riverfront wetlands may have high economic value, some people perceive that property values decrease for many areas delineated as wetlands, and feasible development options of all types, from commercial fills to nature trails, are lacking for wetlands in the watershed.
• Continued loss of riparian wetlands and other riparian habitats will reduce their wildlife and recreational values.
• No restoration of wetlands filled before U.S. Army Corps of Engineers (USACE) regulations applied.
• Actions of one landowner can affect other property owners by ponding water, creating wetland conditions, etc.
• Public officials sometimes make decisions based on politics and economics that have unforeseen or unconsidered consequences with regard to wetlands.
• Economics prevents correcting wetland degradation problems.
• Development pressure threatens wetland functions that benefit everyone.
• Lack effective incentives to live with wetlands harmoniously.
• Methods for educating public about wetlands not adequate.
• Regulatory system not as effective as it could be for conserving wetland functions.

THE WATERSHED MANAGEMENT STRATEGIES

BACKGROUND

The Lower Chena River Watershed Management Planning Team prepared watershed management strategies for water quality, channel problems, flooding and drainage, and wetland management. The Planning Team's final strategies will form the core of the Lower Chena River Watershed Management Plan, which the ADF&G will prepare after necessary data collection and information synthesis. The draft plan will undergo public review before finalization and implementation through potential interagency agreements, permit streamlining, and administrative changes in agency policies.

The Planning Team has kept the four watershed management strategies separate so that citizens and governments can implement individual aspects of the future *Lower Chena River Watershed Management Plan* as opportunities arise. The Team believed that merging the strategies might hinder their use, should action on one or more of the topics be infeasible at the time of plan implementation. As a result, some repetition of key elements occurs in the management strategies. Integration of similar elements during implementation of the Management Plan should not be difficult, if circumstances permit action on all four strategies.

The Planning Team has followed a philosophy of avoiding increased government regulation in formulating these watershed management strategies. In most cases, better use of existing laws and regulations, private sector actions, and provision of more information to the public have been emphasized. Solutions presented under each management strategy goal are not prioritized, unless otherwise explicitly stated, and should not be taken out of context. In all cases, the reader should consider all the goals and objectives in a management strategy, and the balance between them, before focusing on a single goal or solution.

The Planning Team also has followed a philosophy of accommodating various, and sometimes competing, interests in its watershed management strategies. For example, references to trail development and use have, in most cases, been explicitly explained as including "joint motorized and unmotorized use." All references to trails in the management strategies should be interpreted according to the preceding multiuse definition.

Key aspects of the Water Quality Watershed Management Strategy include maintaining water quality, having achievable standards, planning infrastructure to minimize effects on water quality, consolidating water quality monitoring and data dissemination in a single agency, identifying known and potential contaminated sites, and educating the community about water quality issues.

The Channel Problems Watershed Management Strategy favors a cooperative approach for solving citizen problems with the Lower Chena River system. Objectives include

maintaining or restoring flows, planning a bank protection strategy, removing hindrances to commercial navigation, and closing loopholes in existing regulations, all with proper consideration of economics.

Key objectives of the Flooding and Drainage Watershed Management Strategy include encouraging financial incentives for maintenance of streamside vegetation and avoidance of inappropriate land uses in flood-prone areas, maintaining channel capacities for flood flows, using wetlands to store runoff, increasing availability of private land in areas of low flood risk, increasing property values, educating the community about flood risk and encouraging continued risk disclosure through maps and during property transactions, encouraging research, and supporting adequate drainage in flood-prone areas.

Finally, the Wetland Watershed Management Strategy primarily is centered on development of a wetland ranking system, based on wetland functions and community values, to be implemented by a general permit. Other objectives of the strategy include providing one-stop service for all wetland-related permit applications, supporting compatible economic and recreational uses of wetlands, promoting low-impact wetland construction techniques, maintaining wetland hydrology in high-value wetlands, educating the community about wetlands and wetland permitting, using financial incentives and nongovernmental organizations for wetland conservation, retaining high-value wetlands in public ownership, promoting planning that includes wetland uses, and promoting wetland research.

The following sections present the Planning Team's four management strategies for the Lower Chena River watershed.

WATER QUALITY MANAGEMENT STRATEGY

GOAL 1: TO CONSERVE NATURAL RESOURCES (PHYSICAL, CHEMICAL, AND BIOLOGICAL).

OBJECTIVE A: TO HAVE SURFACE WATER AND GROUNDWATER QUALITY MEET APPLICABLE ALASKA WATER QUALITY STANDARDS (18 AAC 70) AND ALASKA DRINKING WATER STANDARDS (18 AAC 80). (Note: the Lower Chena River Management Team is not suggesting that water in the watershed is, in general, out of compliance at this time)

Solutions

1. **Use an entire-watershed approach to manage water quality and control potential inputs of pollutants.**
2. **Consistently enforce existing water quality regulations using science-based monitoring data.**
3. **Use benthic sampling, biological monitoring, and surface water quality sampling at standard locations identified in *The Chena River: A Study Of A Subarctic Stream* (Frey et al. 1970) or, at a minimum, below point-source discharges (NPDES permits or ADEC wastewater permits), below areas of high population density, and at the mouth of the Chena River, on a minimum testing schedule determined by state drinking water standards.**
4. **Promote state and local programs that establish incentive-based "best available technology" and "best management practices" for pollution prevention.**
5. **Promote a public data base for all well-testing data from all sources (public and voluntary private well-testing results).**

GOAL 2. TO HAVE CONTINUED ECONOMIC GROWTH COMPATIBLE WITH EXISTING WATER QUALITY STANDARDS.

OBJECTIVE A: TO HAVE WATER QUALITY REGULATIONS AND PERMIT REQUIREMENTS THAT ARE ACHIEVABLE.

OBJECTIVE B: TO HAVE PLANNED INFRASTRUCTURE DEVELOPMENT.

Solutions

1. **Encourage government assistance to groups trying to deal with achievability problems by holding economic development conferences or forums to generate solutions, conducting research on Alaska conditions relevant to water quality impacts, and providing data to educate state and federal regulators.**
2. **Encourage transfer of pollution-control technologies to industries affected by achievability problems.**

3. **Encourage more extensive public involvement in review of draft regulations.**
4. **Support local ordinances that provide planning and zoning to direct infrastructure development to reduce water quality impacts.**
5. **Support computer modeling of the watershed (or similar technologies) to review existing infrastructure for potential improvements related to water quality and to predict the effects of planned infrastructure development on water quality.**
6. **Encourage more extensive citizen input to the local Planning Commission and Platting Board.**

GOAL 3: TO HAVE SUFFICIENT INFORMATION ON WATER QUALITY AVAILABLE FOR OBJECTIVE PUBLIC AND PRIVATE DECISION MAKING.

OBJECTIVE A: TO OBTAIN AN INTERAGENCY AGREEMENT TO MAKE A SINGLE AGENCY (SINGLE POINT OF CONTACT FOR THE PUBLIC) RESPONSIBLE FOR WATER QUALITY MONITORING AND DATA DISSEMINATION, WITH IMPLEMENTATION BY DECEMBER 1998.

OBJECTIVE B: TO COMPILE AN HISTORICAL DATA BASE ON GROUNDWATER AND SURFACE WATER CONTAMINATION AND TESTING.

Solutions

1. **Support the following actions in order of preference:**
    - **Request the governor to identify state and federal agencies that have water quality responsibilities and assemble them to come to agreement on a single point of contact (possibly including a "clearinghouse" for data dissemination supported by multiple agencies),**
    - **Request the governor to use Administrative Order 133 (revise as necessary) to designate and implement a state single point of contact, or**
    - **Request local representatives to the Alaska Legislature to introduce legislation to designate a state agency as the single point of contact.**
2. **Request the Fairbanks North Star Borough to provide an incentive grant of at least $100,000 to the agency that will accept the responsibility to establish and maintain a single-point-of-contact program.**
3. **Direct, through interagency agreement, administrative action, or legislation, the designated single point of contact to consolidate existing water quality information and data, historical land-use information potentially affecting groundwater or surface water quality, and all future water quality data collected in the watershed to apply quality assurance (categorize validity) and to disseminate the consolidated information to the public (including libraries) by print and electronic media, including publishing on the Internet.**
4. **Request the single point of contact to involve the University of Alaska (graduate student project) and the U.S. Geological Survey and to incorporate, at a minimum, ADEC's surface water (contaminated sites) data base and oil spill data base (Spill Prevention and Response program).**
5. **Support targeted funding for the designated single-point-of-contact agency.**

GOAL 4. TO DEVELOP COMMUNITY SUPPORT FOR FUNDING WATER QUALITY MONITORING, DATA DISSEMINATION, AND WATER QUALITY EDUCATION.

OBJECTIVE A: TO EDUCATE THE COMMUNITY AND OFFICIALS ABOUT WATER QUALITY.

Solutions

1. **Promote transfer of water quality information to the public by the following methods:**
   - **Incorporate water quality education in school curricula at all levels,**
   - **Develop library displays,**
   - **Establish recognition and award programs (e.g., Green Star),**
   - **Use print and electronic media (e.g., public-access cable TV channels, public TV and radio, and public service announcements),**
   - **Provide expert speakers to schools and other organizations, and**
   - **Develop grass roots programs and volunteer projects (e.g., "Clean Up Your Rivers") by local organizations (e.g., Boy Scouts, Subarctic Dive Club).**
2. **Promote formation of a public/citizen focus group to address water quality education.**
3. **Investigate and build on ideas used in other areas to gain support for water quality education.**
4. **Promote attendance at public meetings dealing with water quality, education funding, and school curricula.**

CHANNEL PROBLEMS MANAGEMENT STRATEGY

GOAL 1: TO CONSERVE NATURAL RESOURCES (PHYSICAL, CHEMICAL, AND BIOLOGICAL).

OBJECTIVE A: TO DEVELOP THE ABILITY TO INCREASE FLOWS (PRIMARILY IN BADGER SLOUGH BUT ALSO IN CHENA RIVER) IN A CONTROLLED MANNER.

OBJECTIVE B: TO DESIGN THE SIZE AND NUMBER OF DRAINAGE STRUCTURES IN SLOUGHS, AND TO INVESTIGATE REMOVAL OF OTHER IMPEDIMENTS TO FLOW, TO MAINTAIN OR RESTORE SLOUGH CHARACTERISTICS CONSISTENT WITH OBJECTIVE A.

OBJECTIVE C: TO LIMIT FILLS ON BADGER SLOUGH.

OBJECTIVE D: TO DEVELOP A PLANNED BANK PROTECTION STRATEGY FOR THE CHENA RIVER AND ASSOCIATED SLOUGHS.

Solutions

1. **Encourage studies on the hydrology and ecology of the Chena River and associated sloughs, including predictive modeling of the system to evaluate its evolution and to assess possible intervention strategies (e.g., corrective actions for channel problems).**
2. **Encourage use of U.S. Army Corps of Engineers Chena River Watershed Restoration Project funds (with nonfederal matching funds) to implement increased flows and to replace existing culverts on Badger Slough.**
3. **Support cooperative evaluation of potential methods for increasing flows, including the following, for technical and economic feasibility and implement one or more of those methods judged most feasible:**
    - **Divert Tanana River water into Badger Slough,**
    - **Divert Moose Creek water into Badger Slough using old channels through the Chena River Flood Control Project,**
    - **Create a flood pulse on the Little Chena River by releasing water from the Fort Knox mine freshwater reservoir,**
    - **Use groundwater pumping to create a flushing pulse through Badger Slough,**
    - **Redirect surface flow from the Badger Road watershed to Badger Slough,**
    - **Use Chena Lakes as a water source for increasing flow into Badger Slough,**
    - **Disturb the "seal" (cemented materials) on the bed of the Tanana River to increase groundwater seepage into Badger Slough, possibly getting the Army to do the work,**
    - **Direct some water from the flood pool of the Chena Flood control Project through Badger Slough,**
    - **Manage removal of ice dams on the Chena to create flood pulses in downstream sloughs (e.g., Noyes), and**
    - **Identify other potential water sources for increasing flow in Badger Slough.**

4. **Explore use of federal Department of Transportation "Intermodal Surface Transportation Efficiency Act" funds to increase drainage structure size to permit recreational boats to pass (e.g., a "canoe trail" concept).**
5. **Request government agencies that fund or construct drainage structures, or have permitting authority over construction of drainage structures or associated fill (e.g., Alaska Department of Transportation and Public Facilities, Alaska Department of Fish and Game, Alaska Department of Natural Resources, Alaska Department of Environmental Conservation, and U.S. Army Corps of Engineers Regulatory Branch), to incorporate community preferences for the physical, chemical, and biological characteristics of sloughs during design and permitting of drainage structures and associated fills and to work cooperatively to upgrade or replace existing structures that are inconsistent with such preferences.**
6. **Encourage local governments and state and federal agencies to use the Lower Chena River Watershed Management Plan as guidance for the regulation of fills in the Badger Slough area.**
7. **Encourage cooperative development and implementation of regulatory and nonregulatory mechanisms, including standards, recommended designs, and best management practices, to encourage use of effective bank protection practices that maintain or enhance natural resources and protect property values.**
8. **Encourage government agencies to widely publicize the availability of financial and technical assistance for private landowners and businesses to apply approved bank protection methods, including continued and expanded use of demonstration projects.**

GOAL 2: TO HAVE CONTINUED ECONOMIC GROWTH.

OBJECTIVE A: TO CONSIDER ECONOMICS DURING DEVELOPMENT OF SOLUTIONS.

OBJECTIVE B: TO DREDGE TWO SHALLOW BARS THAT HINDER COMMERCIAL NAVIGATION IN THE LOWER PORTION OF THE CHENA RIVER.

Solutions

1. **Encourage cooperative evaluation of solutions to meet channel problem objectives for their cost effectiveness, positive effects on economic growth of the community, and economic impacts on individuals and governments.**
2. **Encourage development of predictive modeling of the river and slough system to evaluate its evolution and to assess possible intervention strategies (e.g., corrective actions for channel problems) that foster economic growth.**
3. **Encourage cooperative investigation of the availability of previously appropriated federal funds for dredging in the Chena River and, if the funds are available, work for their expenditure for removal of the bars.**
4. **Encourage cooperative investigation of the possibility of privately funded removal of the shallow bars according to a design based on careful hydraulic analysis and consideration of natural resources present, possibly financed by sale of the removed material.**

GOAL 3: TO EFFECTIVELY IMPLEMENT THE MANAGEMENT PLAN STRATEGY FOR CHANNEL PROBLEMS.

OBJECTIVE A: ***TO WORK WITH LEGISLATORS, AGENCIES, AND OTHERS TO DEVELOP A COOPERATIVE PROGRAM OR EFFORT USING TEAMWORK FOR SOLVING CITIZEN PROBLEMS WITH THE CHENA RIVER AND ASSOCIATED SLOUGHS.***

OBJECTIVE B: ***TO IDENTIFY AND FILL LOOPHOLES IN REGULATIONS GOVERNING ACTIVITIES AFFECTING THE CHENA RIVER AND ASSOCIATED SLOUGHS.***

Solutions

1. **Encourage cooperative establishment of an interagency technical review group with mandated authority and responsibility to resolve citizen problems by focusing collective agency authorities on individual problems in a coordinated manner and to recommend appropriate legislation to establish regulatory and nonregulatory mechanisms to correct problems that fall outside the group's collective authority.**
2. **Encourage formation of citizen organizations to work toward resolution of citizen problems by proposing corrective legislation, exerting political force, providing nongovernmental solutions, and advising the interagency technical review group.**
3. **Encourage continued revitalization and expansion of Soil and Water Conservation District activities.**

FLOODING AND DRAINAGE MANAGEMENT STRATEGY

GOAL 1: TO CONSERVE NATURAL RESOURCES (PHYSICAL, CHEMICAL, AND BIOLOGICAL).

OBJECTIVE A: TO ENCOURAGE FINANCIAL INCENTIVES FOR PROPERTY OWNERS, INCLUDING USE OF CONSERVATION EASEMENTS, TO MAINTAIN RIPARIAN VEGETATION TO SLOW RUNOFF AND LIMIT FLOOD-INDUCED BANK DAMAGE.

OBJECTIVE B: TO ENCOURAGE FINANCIAL INCENTIVES FOR PROTECTION (I.E., LAND USES OTHER THAN COMMERCIAL AND RESIDENTIAL DEVELOPMENT) OF AREAS OF HIGH FLOOD RISK.

OBJECTIVE C: TO ELIMINATE SOLID WASTE DISPOSAL ON THE BEDS AND BANKS OF WATERBODIES TO MAINTAIN CHANNEL CAPACITY TO CARRY FLOOD FLOWS.

OBJECTIVE D: TO ENCOURAGE WETLAND CONSERVATION FOR STORAGE OF RUNOFF AND MODERATION OF FLOOD FLOWS.

Solutions

1. **Support financial incentives for property owners who maintain riparian greenbelts or maintain lands for storage of runoff using one or more of the following methods:**
    - **Grant a property tax exemption,**
    - **Use a negative property tax (payment or credit to property owner),**
    - **Explore potential linkages, such as the number of years a temporary conservation easement would be in effect, between easements and tax incentives, and**
    - **Encourage the Alaska Housing and Finance Corporation or other government agency to guarantee loans or reduce interest rates.**
2. **Encourage land management agencies to develop and implement mechanisms for property management that maintain riparian greenbelts and lands for storage of runoff using one or more of the following methods:**
    - **Exchange parcels of public property for parcels of private property,**
    - **Exchange flood-prone areas in FNSB ownership for areas of low flood risk in State ownership,**
    - **Review undisposed public lands for retention,**
    - **Support programs for setting aside private lands, and**
    - **Foster land uses such as fin-farming that could provide secondary flood storage.**
3. **Support designation of a public or private organization or institution as the centralized point of contact for brokering conservation easements to maintain or restore areas as riparian greenbelts in the Lower Chena River watershed, including developing draft language for conservation easements and seeking public and private sources of funding for their purchase.**
4. **Encourage use of public and private sources of technical assistance, plant materials, and funding to property owners for restoring riparian vegetation.**

5. **Support use of the zoning powers of the FNSB to foster appropriate uses such as agriculture and gravel pits in runoff-storage and flood-prone areas and to make such uses good riparian neighbors.**
6. **Support enforcement of existing federal regulation of fills and state regulation of waste disposal to prevent loss of channel flood capacity and development of state or local flood-capacity regulations for areas not covered by federal regulation (e.g., channel areas above ordinary high water).**
7. **Support development of a General Permit to replace Nationwide Permit 13 in the Lower Chena River watershed.**
8. **Encourage expansion of the concept of junk car removal (federal funds passed through to FNSB by the State) to include other solid waste that might otherwise be placed on the beds and banks of waterbodies.**

GOAL 2: TO HAVE CONTINUED ECONOMIC GROWTH COMPATIBLE WITH REDUCTION OF FLOOD DAMAGE (SURFACE AND GROUNDWATER).

OBJECTIVE A: TO ENCOURAGE RESIDENTIAL AND COMMERCIAL DEVELOPMENT IN AREAS OF LOW FLOOD RISK AS AN ALTERNATIVE TO SUCH DEVELOPMENT IN AREAS OF HIGH FLOOD RISK.

OBJECTIVE B: TO PLACE MORE LAND INTO PRIVATE OWNERSHIP IN AREAS OF LOW FLOOD RISK TO RELIEVE PRESSURE FOR COMMERCIAL AND RESIDENTIAL DEVELOPMENT IN AREAS OF HIGH FLOOD RISK.

OBJECTIVE C: TO ENCOURAGE SENSIBLE AND RESPONSIBLE DEVELOPMENT IN FLOOD-PRONE AREAS, INCLUDING RECREATIONAL DEVELOPMENT, AS AN ALTERNATIVE TO RESIDENTIAL AND COMMERCIAL DEVELOPMENT IN SUCH AREAS.

OBJECTIVE D: TO INCREASE PROPERTY VALUES THROUGH USE OF CENTRALIZED SEWER AND WATER, WHERE APPLICABLE, IN AREAS OF HIGH FLOOD RISK WITH EXISTING DEVELOPMENT.

Solutions

1. **Encourage development of better mapping, documentation, and dissemination of information on flood hazard areas.**
2. **Support zoning areas of low flood risk for residential and commercial development.**
3. **Support tax incentives or other inducements for industrial and residential development in areas of low flood risk and for development that is not subject to significant damage by flooding, such as land-extensive recreational uses of private lands, in areas of high flood risk.**
4. **Encourage financial institutions to make loans contingent upon sensible development.**

5. **Support elimination of government flood-relief payments or subsidies to property owners or businesses who build (new construction) in areas of high flood risk, and encourage existing residents and businesses in such areas to obtain flood insurance.**
6. **Encourage development of mechanisms for land trades between any combination of public and private owners to facilitate settlement of low flood-risk areas.**
7. **Encourage a process for disposal of public land that protects wetlands that function as flood storage areas and that facilitates settlement of low flood-risk areas.**
8. **Encourage development of transportation, communications, and utilities infrastructure in areas of low flood risk and discourage such development in areas of high flood risk.**
9. **Support partnerships between the FNSB and private interests to develop recreation facilities such as parks and campsites in areas of high flood risk on FNSB property, including mining peat and gravel to create well-designed recreational waterbodies.**
10. **Support sewer and water service using one or more of the following methods:**
    - **Developing a FNSB program to encourage the creation of sewer and water service districts,**
    - **Forming new municipalities to provide sewer and water service, and**
    - **Forming additional private utilities using existing private utilities as models.**

GOAL 3: TO PREVENT FLOOD DAMAGE (SURFACE AND GROUNDWATER) IN THE LOWER CHENA RIVER WATERSHED.

OBJECTIVE A: *TO EDUCATE AND INFORM THE PUBLIC ABOUT MECHANISMS OF FLOODING, ECONOMIC IMPACTS OF FLOODING ON THE PUBLIC, AND METHODS FOR FLOOD-DAMAGE PREVENTION.*

OBJECTIVE B: *TO ENCOURAGE FURTHER ACADEMIC AND AGENCY RESEARCH ON FLOOD HAZARDS, INCLUDING PREPARATION AND DISTRIBUTION OF FLOOD-RISK MAPS.*

OBJECTIVE C: *TO ENCOURAGE THE PRIVATE SECTOR (E.G., REALTORS, BANKS, INSURANCE COMPANIES) TO CONTINUE TO IMPLEMENT STANDARDS REQUIRING PROMINENT DISCLOSURE OF FLOOD HAZARD INFORMATION TO PURCHASERS OF PROPERTY.*

OBJECTIVE D: *TO ENCOURAGE ALASKA MILITARY COMMANDS TO THOROUGHLY INFORM MILITARY AND DEPARTMENT OF DEFENSE CIVILIAN PERSONNEL ARRIVING IN THE INTERIOR ABOUT FLOOD HAZARDS AND TO MAKE FLOOD-RISK MAPS AVAILABLE TO THESE PERSONNEL.*

OBJECTIVE E: *TO ACTIVELY SUPPORT ADEQUATE DRAINAGE FOR PREVENTION OF FLOOD DAMAGE IN FLOOD-PRONE AREAS.*

Solutions

1. **Encourage compilation of existing information on flood hazards, and make the information accessible to the public through a central clearing house such as the Chamber of Commerce or the Public Lands Information Center, as well as using press releases, newspaper columns, a section in libraries , public forums, television, and other media to disseminate the information.**
2. **Encourage participation in the curriculum development process for local schools to develop practical courses dealing with hydrology.**
3. **Encourage funding further research on flood hazards, economic impacts of flooding, and methods of flood-damage prevention, but require that an implementation program for action based on study results be part of research grants.**
4. **Support adding training in floodplain management to the certification requirements for professional engineers and for professional surveyors.**
5. **Support policies to require all publicly funded research on the Lower Chena River watershed to be available on the Web.**
6. **Encourage expanded disclosure practices by the private sector to include surface water (snowmelt) flooding outside the 100-year floodplain, groundwater flooding, and the nonavailability of flood insurance coverage for groundwater flooding.**
7. **Encourage the FNSB to provide maps of flood-prone areas and associated flood-hazard information to military Housing Referral offices and to Newcomers Orientation offices.**
8. **Encourage development of deed covenants requiring adequate ditches and culverts.**
9. **Support FNSB ordinances to require FNSB hydrologic review of drainage for all road construction, and encourage development of construction standards for roads that provide adequate drainage, including construction of depressed roads to serve as runoff conveyances where right-of-way widths are too narrow for adequate ditches (i.e., build roads at bottom of ditches spanning right-of-way widths).**
10. **Support policies to use ditches, curbs, and gutters to keep all storm drainage aboveground to avoid concentrating flows in piped storm drains.**

WETLAND MANAGEMENT STRATEGY

GOAL 1: TO CONSERVE NATURAL RESOURCES (PHYSICAL, CHEMICAL, AND BIOLOGICAL).

OBJECTIVE A: TO DEVELOP A WETLAND RANKING SYSTEM, LINKED WITH WETLAND CONSERVATION, BASED ON WETLAND FUNCTIONS AND COMMUNITY VALUES (E.G., THE COMMUNITY MIGHT RANK THE VALUE OF RIPARIAN AND HEADWATER WETLANDS THAT FUNCTION TO STORE RUNOFF AND MODERATE FLOOD FLOWS HIGHER THAN THE VALUE OF ISOLATED WETLANDS OR THOSE THAT HAVE RAPID RUNOFF CHARACTERISTICS).

OBJECTIVE B: TO MAINTAIN THE WETLAND HYDROLOGY THAT SUPPORTS HIGH-VALUE WETLANDS.

OBJECTIVE C: TO IMPLEMENT A PROGRAM OF PUBLIC INFORMATION AND EDUCATION ON WETLANDS.

OBJECTIVE D: TO PROMOTE ACQUISITION OF HIGH-VALUE WETLANDS BY NONGOVERNMENTAL ORGANIZATIONS (NGOS), INCLUDING LAND TRUSTS FORMED BY PRIVATE LANDOWNERS FOR WETLAND CONSERVATION.

OBJECTIVE E: TO PROMOTE TAX INCENTIVES FOR WETLAND CONSERVATION BY PRIVATE LANDOWNERS.

OBJECTIVE F: TO PROMOTE RETENTION OF HIGH-VALUE WETLANDS IN PUBLIC OWNERSHIP.

Solutions

1. **Support development and implementation of a wetland ranking system to encourage development of low-value wetlands as an alternative to development of high-value wetlands using a draft map of the watershed, based on National Wetlands Inventory maps, to show wetlands tentatively categorized as having high, medium, or low value by a red, yellow, and green color code, respectively.**
2. **Encourage use of the Hydrogeomorphic (HGM) Method of wetland functional assessment to identify degraded wetlands that the community might consider as having low value, to identify the effects of development on wetland functions for choosing among development options, and to mitigate development impacts on wetlands the community has identified as having high value.**
3. **Support use of public surveys to assess community values with respect to wetlands and conduct economic analyses of wetland management options including intangible (e.g., aesthetic) and nonmarket (e.g., contribution to global biogeochemical cycles) values of wetlands to assist wetland ranking.**
4. **Encourage all interested and responsible parties necessary to develop and implement a wetland ranking system to participate in its development.**
5. **Encourage use of a Geographic Information System (GIS) to incorporate data layers relevant to ranking wetlands based on community values (i.e., use a computer database and display system with information organized as maps).**

6. **Support establishment of baseline hydroperiods (i.e., the position of the water table over time) for high-value wetlands.**

7. **Support implementation of stormwater management to maintain natural hydroperiods for high-value wetlands.**

8. **Support implementation of controls such as zoning or buffers on land use surrounding high-value wetlands where necessary to maintain natural hydroperiods.**

9. **Encourage incorporation of wetland education in school curricula at all levels by developing practical courses dealing with hydrology and wetland issues for grades K-12, developing library displays, establishing recognition and award programs for students and teachers, using print and electronic media (e.g., public-access cable TV channels, public TV and radio, and public service announcements) to promote educational programs, providing expert speakers to schools and other organizations, and developing grass roots programs and volunteer projects by local organizations.**

10. **Encourage formation of a public/citizen focus group to address wetland education through attendance at public meetings dealing with wetlands, education funding, and school curricula.**

11. **Investigate and build on ideas used in other areas to gain support for wetland education.**

12. **Encourage development of a program that uses press releases, newspaper columns, library displays, the local Visitor's Guide, the Public Lands Information Center, the Fairbanks Visitor Center, the Chamber of Commerce, public forums, television, and other media to inform the public about wetlands.**

13. **Support the addition of training in wetland management to the certification requirements for professional engineers and for professional surveyors.**

14. **Encourage assessment of imminent threats to high-value wetlands to identify those most at risk of loss or degradation.**

15. **Encourage identification of NGOs and their particular interests with respect to wetland conservation.**

16. **Work with local and national NGOs, especially their individual members, using tours, videos, brochures, or other promotional methods to build grass roots support for acquisition of high-value wetlands.**

17. **Work with elected officials to promote tax incentives as good nonregulatory tools for conserving wetlands when linked to the wetland ranking system so that owners of high-value wetlands, including NGOs that acquire wetlands for conservation, receive the greatest tax break.**

18. **Through public involvement, work with state and local land-disposal processes to achieve objectives.**

GOAL 2: TO HAVE CONTINUED ECONOMIC GROWTH COMPATIBLE WITH WETLAND CONSERVATION.

OBJECTIVE A: TO DEVELOP A WETLAND RANKING SYSTEM, LINKED WITH ECONOMIC DEVELOPMENT, BASED ON WETLAND FUNCTIONS AND COMMUNITY VALUES.

OBJECTIVE B: TO PROMOTE RECREATIONAL AND AESTHETIC USES OF HIGH-VALUE WETLANDS.

OBJECTIVE C: TO PROMOTE LINKING URBAN AND DEMOGRAPHIC PLANNING WITH WATERSHED PLANNING AND WETLAND USES.

OBJECTIVE D: TO PROMOTE ECONOMIC USES OF WETLANDS THAT CAN OCCUR IN WINTER WITH LOW IMPACT.

OBJECTIVE E: TO PROMOTE USE OF LOW-IMPACT CONSTRUCTION TECHNIQUES (E.G., PILINGS) IN WETLANDS.

Solutions

1. **Support development and implementation of a wetland ranking system to encourage development of low-value wetlands as an alternative to development of high-value wetlands using a draft map of the watershed, based on National Wetlands Inventory maps, to show wetlands tentatively categorized as having high, medium, or low value by a red, yellow, and green color code, respectively.**
2. **Encourage use of the Hydrogeomorphic (HGM) Method of wetland functional assessment to identify degraded wetlands that the community might consider as having low value, to identify the effects of development on wetland functions for choosing among development options, and to mitigate development impacts on wetlands the community has identified as having high value.**
3. **Support use of public surveys to assess community values with respect to wetlands and conduct economic analyses of wetland management options including intangible (e.g., aesthetic) and nonmarket (e.g., contribution to global biogeochemical cycles) values of wetlands to assist wetland ranking.**
4. **Encourage all interested and responsible parties necessary to develop and implement a wetland ranking system to participate in its development.**
5. **Encourage use of a Geographic Information System (GIS) to incorporate data layers relevant to ranking wetlands based on community values (i.e., use a computer database and display system with information organized as maps).**
6. **Encourage coordination between public and private sectors, including user groups, to promote the following low-impact winter uses of wetlands:**
    - **Mark and develop multiuse (i.e., joint motorized and nonmotorized use) winter trails in or across high-value wetlands,**
    - **Establish facilities associated with winter trail systems;**
    - **Sponsor winter carnivals and sports events such as races (e.g., nordic skiing, biathlons, mushing, snowmachining), rallies, or tours; and**
    - **Conduct programs involving winter outdoor skills such as orienteering, trapping, camping, and survival.**

7. **Encourage advertisement of potential recreational and aesthetic uses of high-value wetlands to increase economic benefits from such uses.**
8. **Encourage public land managers and private real estate developers and homeowners associations to retain high-value wetlands included in land disposals or in commercial or residential development projects as "green belts" to provide economic benefits from tourism and increased property values for adjacent landowners.**
9. **Support tax incentives and liability releases for private owners of high-value wetlands who allow recreational and aesthetic uses of their property.**
10. **Encourage integration of wetland uses into governmental planning by considering:**
    - **Potential use of wetlands for stormwater treatment in stormwater management planning,**
    - **Recreational use of wetlands in community recreation planning (including trails),**
    - **Wetland values in the platting process,**
    - **Wetlands with cultural or historical values (e.g., mining ditches) in cultural and historic preservation planning,**
    - **Wetland values in the zoning process, and**
    - **Wetland roles for moderating flood flows in flood-zone planning and mapping.**
11. **Encourage pro-active governmental planning by establishing and updating plans at 5- to 10-year intervals.**
12. **Support development of "best management practices" (BMPs), such as winter clearing and winter roads for construction projects and temporary access, to minimize surface disturbance in wetlands, and transfer the BMPs to the public using the media and the Cooperative Extension Service, among other potential methods.**

GOAL 3: TO STREAMLINE THE WETLAND PERMITTING PROCESS.

OBJECTIVE A: TO DEVELOP A WETLAND RANKING SYSTEM, LINKED WITH PERMIT STREAMLINING, BASED ON WETLAND FUNCTIONS AND COMMUNITY VALUES.

OBJECTIVE B: TO DEVELOP FEDERAL SECTION 404 (DREDGE AND FILL) GENERAL PERMITS TO IMPLEMENT A WETLAND RANKING SYSTEM.

OBJECTIVE C: TO DEVELOP AND IMPLEMENT A CENTRAL "ONE-STOP" COUNTER FOR THE PUBLIC TO RECEIVE ALL PERMIT APPLICATIONS INVOLVING WETLANDS.

OBJECTIVE D: TO PROVIDE INFORMATION AND EDUCATION ON THE WETLAND PERMIT PROCESS.

OBJECTIVE E: TO PROMOTE UNIFORM APPLICATION OF WETLAND PERMIT REQUIREMENTS AND PERMIT ENFORCEMENT.

Solutions

1. **Support development and implementation of a wetland ranking system to encourage development of low-value wetlands as an alternative to development of high-value wetlands using a draft map of the watershed, based on National Wetlands Inventory maps, to show wetlands tentatively categorized as having high, medium, or low value by a red, yellow, and green color code, respectively.**
2. **Encourage use of the Hydrogeomorphic (HGM) Method of wetland functional assessment to identify degraded wetlands that the community might consider as having low value, to identify the effects of development on wetland functions for choosing among development options, and to mitigate development impacts on wetlands the community has identified as having high value.**
3. **Support use of public surveys to assess community values with respect to wetlands and conduct economic analyses of wetland management options including intangible (e.g., aesthetic) and nonmarket (e.g., contribution to global biogeochemical cycles) values of wetlands to assist wetland ranking.**
4. **Encourage all interested and responsible parties necessary to develop and implement a wetland ranking system to participate in its development.**
5. **Encourage use of a Geographic Information System (GIS) to incorporate data layers relevant to ranking wetlands based on community values (i.e., use a computer database and display system with information organized as maps).**
6. **Encourage the U.S. Army Corps of Engineers (USACE) to draw upon lessons learned from legal challenges to General Permits used to implement the Anchorage and Juneau wetland management plans and to apply a single General Permit to the entire Lower Chena River watershed, after identifying classes of activities to be covered by the General Permit and establishing different permit conditions for high-, medium-, and low-value wetlands.**
7. **Support review of the draft General Permit by the Lower Chena River Watershed Management Planning Team and all concerned agencies and their respective consent to the Permit's content prior to formal public notice.**
8. **Support development and distribution of an agency permit checklist, to be used by all agencies dealing with wetlands or water quality permitting, that identifies all potential permit requirements (i.e., all agencies potentially involved) for permit applicants and steps applicants need to take to obtain such permits and include the checklist in both the completed Lower Chena River Watershed Management Plan and an information booklet that contains the terms of the General Permit.**
9. **Encourage realtors and bankers to provide an agency permit checklist (described above) to new property owners during property transfers.**
10. **Encourage participating agencies to provide information on, and explain the benefits of, the wetland permitting process to landowners, interest groups, and schools by using the following methods:**
    - **Use regular presentations and display booths at public gatherings like fairs and home shows,**
    - **Place wetland permitting information on the Web,**
    - **Establish a telephone information line, and**
    - **Prepare "opinion" articles on the positive accomplishments and public service provided by the agencies and the benefits and ease of following the permit process to prevent violations of wetland regulations.**

11. **Encourage participating agencies to develop permit procedures that make it easier for the public to obtain proper authorization for wetland activities.**

12. **Encourage participating agencies to publicize voluntary actions by landowners and managers to mitigate wetland losses.**

13. **Encourage independent citizen review or audit of permit actions and subsequent enforcement using the following methods:**

    - **Establish a citizen-based group to review permitting and enforcement inequities, recommend corrective action, and monitor an interagency technical review group;**
    - **Establish an interagency technical review group to investigate permitting and enforcement problems identified by the citizen-based review group; and**
    - **Ensure that review groups work within existing regulatory time lines, where such time lines apply.**

GOAL 4: TO PROMOTE POSITIVE PUBLIC DIALOG, DISSEMINATION OF INFORMATION, AND PUBLIC EDUCATION ABOUT WETLANDS.

OBJECTIVE A: TO EXPLAIN WETLAND FUNCTIONS AND THE POTENTIAL (COMMUNITY-DETERMINED) VALUES ASSOCIATED WITH DIFFERENT TYPES OF WETLANDS (NOTE: THE PLANNING TEAM INTERPRETS THIS AS OCCURRING PRIOR TO COMMUNITY SURVEYS ON WETLAND VALUES AND DEVELOPMENT OF THE WETLAND RANKING SYSTEM).

OBJECTIVE B: TO PROMOTE RESEARCH ON WETLAND VALUES HELD BY THE COMMUNITY.

Solutions

1. **Support development of a list that clearly distinguishes the difference between wetland functions and wetland values for distribution to the community.**

2. **Support development of a "wetlands day" or "festival" for children and adults, including a "parade of wetlands" that provides examples of wetland functions and wetland values for guided tours or self-guided visits.**

3. **Encourage development of a program that uses press releases, newspaper columns, library displays, the local Visitor's Guide, the Public Lands Information Center, the Fairbanks Visitor Center, the Chamber of Commerce, public forums, television, and other media to inform the public about wetlands.**

4. **Encourage establishment of a World Wide Web site that provides a "virtual tour" of the "parade of wetlands" referenced above, including photographs and descriptions of wetland functions and their values to the community.**

5. **Encourage agencies to grant funds for community-wide surveys of wetland values and for research that reveals why people hold particular wetland values, and request the Fairbanks North Star Borough to incorporate those values in the FNSB Comprehensive Plan.**

GOAL 5: TO SUPPORT RESEARCH NECESSARY TO UNDERSTAND THE RELATIONSHIPS BETWEEN HYDROLOGY AND WETLANDS IN THE WATERSHED.

OBJECTIVE A: TO MAINTAIN CONTACT BETWEEN THE COMMUNITY AND THE UNIVERSITY OF ALASKA AND OTHER RESEARCH INSTITUTIONS TO DEVELOP RESEARCH FOCUS, IDENTIFY DATA GAPS, AND PROMOTE RESEARCH ON WETLAND HYDROLOGY.

OBJECTIVE B: TO EXPLORE POTENTIAL FUNDING SOURCES FOR RESEARCH IN THE WATERSHED.

OBJECTIVE C: TO WORK WITH SCHOOLS AND YOUTH GROUPS TO ASSIST DATA COLLECTION BY PROFESSIONALS OR TO COLLECT BASIC DATA UNDER PROFESSIONAL SUPERVISION.

Solutions

1. **Encourage the Water Research Center at the University of Alaska to present hydrological information related to wetlands as part of a community outreach program.**
2. **Encourage community input to research boards of funding agencies.**
3. **Work with the American Water Resources Association (AWRA) to promote studies of wetland hydrology.**
4. **Encourage a citizen-based group to work with research organizations and potential funding sources such as the following:**
    - **Alaska Department of Transportation and Public Facilities (ADOT/PF),**
    - **Federal Highway Administration,**
    - **Ducks Unlimited,**
    - **U.S. Geological Survey,**
    - **U.S. Environmental Protection Agency,**
    - **Society of Professional Hydrologists,**
    - **National Weather Service/university partnerships through the COMET program, and**
    - **Nontraditional funding sources, including private groups and foundations.**
5. **Support establishment of an "adopt-a-wetland" program in schools for long-term study of individual wetlands.**
6. **Encourage the FNSB School Board to accept wetland studies in the school system, and encourage schools to conduct wetland studies as particularly useful, nontraditional projects.**
7. **Encourage students to study individual wetlands near their homes and to bring information back to their classes.**
8. **Encourage youths and youth organizations to participate in wetland studies and projects.**
9. **Support development of a "science camp" to promote wetland studies.**

INFORMATION NEEDS

BACKGROUND

The Planning Team's management strategies will provide the core content for a draft *Lower Chena River Watershed Management Plan.* The ADF&G must supplement this core with additional information or data needed to prepare the watershed plan based on the strategies. Task 3 of the planning project provides for synthesis or collection of the necessary information or data.

PLANNING TEAM RECOMMENDATIONS

The Lower Chena River Watershed Management Planning Team reviewed its management strategies to determine information needs implied by proposed solutions to implement goals and objectives. This discussion occurred at the final meeting of the Planning Team and resulted in a list of necessary information keyed to selected goals and objectives from each management strategy (Tables 7-10). The ADF&G will supplement the Planning Team's list should the need for additional information become apparent during Task 3.

Table 7. Information needs for a draft *Lower Chena River Watershed Management Plan* with respect to the water quality management strategy.

Goals and Objectives	Information Needs
Goal 1, Objective A	Provide formal references to the Alaska Administrative Code where the Alaska Water Quality Standards and Alaska Drinking Water Standards appear when the management strategy appears in any document (e.g., description of strategy development, draft watershed plan).
Goal 3, Objective B	Develop a list of existing data sources for groundwater and surface water quality and for historical land use in the watershed that could be used to build a comprehensive water quality data base. One Team member suggested Alyeska Pipeline Service Company as a potential data source.

Table 8. Information needs for a draft *Lower Chena River Watershed Management Plan* with respect to the channel problems management strategy.

Goals and Objectives	Information Needs
Goal 1, Objectives A-D	Review U.S. Army Corps of Engineers reconnaissance study of restoration projects in the Chena River drainage for applicability to this management strategy.
Goal 1, Objective B	Inventory drainage structures on Badger Slough, and verify Alaska Department of Transportation and Public Facilities design criteria for those structures.
Goal 1, Objective D (Solution 7)	Compile available information on bank protection standards, methods, criteria, etc.
Goal 2, Objectives A-B	Investigate history of federal appropriations, if any, for dredging in the Chena River. Clarify the position of Discovery Riverboat Cruises regarding private financing of dredging in the Chena River.

Table 9. Information needs for a draft *Lower Chena River Watershed Management Plan* with respect to the flooding and drainage management strategy.

Goals and Objectives	Information Needs
Goal 1, Objectives A-D; Goal 2, Objectives A-D (Solution 3)	Inventory incentive programs and techniques used elsewhere to reduce flood losses. One Team member mentioned Florida coastal areas as an example where incentive programs may have been used.
Goal 1, Objectives A-D (Solution 3)	Identify potential organizations that could broker conservation easements.
Goal 1, Objectives A-D (Solution 4)	Compile a list of sources for technical assistance, plant materials, and funding.
Goal 1, Objectives A-D (Solution 8)	Investigate potential of solid waste removal with Fairbanks North Star Borough.
Goal 2, Objective C	List examples from other areas of the country. One Team member mentioned Austin, Texas as a possibility.
Goal 2, Objective D (Solution 10)	Investigate what counties in the Lower 48 do to provide community sewer and water service and potential for installing multiple utilities at one time (e.g., gas, water, etc.).
Goal 3, Objective A (Solution 1)	Compile a source index for flood hazard information.

Table 10. Information needs for a draft *Lower Chena River Watershed Management Plan* with respect to the wetland management strategy.

Goals and Objectives	Information Needs
Goal 1, Objectives A-D	Obtain National Wetlands Inventory maps for the Lower Chena River watershed, the U.S. Army Corps of Engineers 1987 wetland delineation manual, all information relevant to establishing a wetland ranking system, and aerial photography of the watershed. Inventory hydrogeomorphic wetland classes present in the watershed. Investigate the Alaska Department of Natural Resources, Division of Forestry, as a source of photography, maps, and a Geographic Information System (GIS). Identify nongovernmental organizations that could provide funding for community surveys on wetland values and that could help with wetland conservation efforts. Investigate sources of GIS capability and its potential use to assist the project. Develop a draft map of a small area with tentative wetland rankings to serve as an example of how a ranking system could work (one team member suggested land to be acquired by the Borough near Nordale Road as a suitable example location). Compile a tentative agency checklist of permit names and form numbers related to activities in wetlands.
Goal 4, Objectives A-B (Solution 1)	Develop a list of functions by wetland class in the Lower Chena River watershed and provide examples of "values" potentially associated with the wetland functions.
Goal 5, Objective A	Identify or validate data gaps discovered during collection of data/information (Project Task 3).
Goal 5, Objective B	Compile a contact list for research boards of funding organizations, and relate funding sources to types of projects they potentially fund. Combine this with similar items concerning funding sources.

APPENDIX A

LOWER CHENA RIVER WATERSHED MANAGEMENT PLAN: PROJECT DESCRIPTION AND GUIDELINES FOR THE PLANNING PROCESS

Introduction

The Alaska Department of Fish and Game has received initial funding from the U.S. Environmental Protection Agency to help citizens of the Fairbanks area, businesses, conservation groups, other interest groups, local governments, and state and federal agencies develop a **watershed** management plan for the Lower Chena River watershed. (Note: bold print words are defined in the Glossary at the end of this document.) The Lower Chena River watershed is the area drained by the Chena River below the Moose Creek Dam. This area generally includes the land in an arc from Ester Dome to Farmer's Loop to Chena Hot Springs Road and extends south to the Tanana River to include the communities of Fairbanks and North Pole.

Problem Statement

Wetlands and water quality issues identified by the public as important concerns in the Lower Chena River watershed include bank erosion, water pollution, **solid waste** in and along waterbodies, wetland and aquatic **habitat**, flooding, and wetland regulation. Resource managers and regulatory agencies currently make decisions on these issues on a case-by-case basis because there is no long-term local plan to guide their actions. Case-by-case management decisions pose the risk of being inconsistent and inefficient, failing to consider cumulative effects on the watershed, and being insensitive to community wishes for management of wetlands and water quality.

Goal

The goal of a watershed management plan for the Lower Chena River is to provide an integrated and rational basis for local management of wetlands and water quality that reflects community wishes, consistent with existing legal requirements. Meeting this goal will benefit the public through **streamlined permitting** and consistent, well-informed agency decisions about these resources.

Initial Task

Prior to developing a watershed management plan for the Lower Chena River, the community and resource management agencies need to reach agreement on a **management strategy** for wetlands and water quality and to identify information needed to prepare a plan based on the selected strategy. A watershed management strategy can involve **advanced identification** of high- and low-value wetlands, wetlands mapping, streamlined wetlands permitting for certain activities and areas, or other methods for accommodating community growth while maintaining important natural resource values. The selected strategy would form the basis for a watershed management plan to be completed as additional funding becomes available.

Plan Content

Based on wetlands and watershed planning done elsewhere, the Lower Chena River Watershed Management Plan might incorporate some or all of the following points:

- Watersheds can be treated as **ecosystems** or groups of ecosystems (e.g., wetlands, uplands, waterbodies) linked by **hydrologic** processes;
- Watersheds can be managed for **ecosystem integrity** while accommodating human land use and development;
- Watershed plans can address wetland protection and restoration, maintaining **biodiversity**, **habitat enhancement**, corridors and connections for wildlife and recreation, **riparian buffers**, and **impact mitigation**;
- Watershed plans can provide a vehicle for consideration of wetland development to support community growth, application of **best management practices**, evaluation of cumulative impacts, and formulation of a community vision for desired future conditions at a **landscape scale**;
- Watershed plans can refine application of existing regulations to fit local conditions and desired future conditions and enable predictable and streamlined wetland permitting in areas designated as suitable for development; and
- Watershed plans can incorporate measures to promote flood control, reduce public liabilities for unwise development, improve water quality, and support recreation, education, and research.

Planning Team Composition

Citizens willing to read background materials, attend planning meetings, engage in reasoned discussion with fellow team members, try to reach a common understanding of problems and opportunities related to wetlands and water quality in the Fairbanks area, and help select a watershed management strategy that will solve those problems and take advantage of those opportunities are welcome members of the planning team. Representatives of local governments, state and federal agencies, and institutions also will be team members and will supply technical information about their areas of expertise. The primary role of agency members is to provide support for the planning team as a whole and secondarily to express the objectives of their agencies.

Planning Process

The Lower Chena River Watershed Management Planning Team (citizen volunteers and agency personnel) will meet on a regular basis. Participating agencies view citizen participation as essential to plan development and implementation and will provide strong support and encouragement for independent decision making by the planning group. The planning team will use an "informed consent" process to develop a watershed management strategy that balances wetland protection and development, based on the local ecological and legal context, and addresses other water quality-related issues that the public has identified as priorities.

The Alaska Department of Fish and Game, with the assistance of other participating agencies, will provide staff support for the planning team. This support will include arranging for meeting rooms, providing background materials and agendas prior to meetings, serving as a neutral facilitator during meetings, and taking and distributing

meeting notes. The Department's role is neutral; the outcome of the planning process will be in the hands of the planning team. Agenda items will be developed by the planning team, with the proviso that agendas shall reflect project constraints and the need for orderly progress to accomplish the schedule and milestones outlined in these guidelines. Personal conduct during planning meetings shall adhere to the ground rules provided in these guidelines, unless modified by consensus of the planning team

Numerous conflict-resolution methods are available for bringing groups to substantial agreement. Fisher and Ury recommend using a process called Principled Negotiation or Negotiation on the Merits in their book *Getting to Yes: Negotiating Agreement Without Giving In*. The authors list the following key steps:

- "separate the people from the problem,"
- "focus on interests, not positions,"
- "generate a variety of possibilities before deciding what to do," and
- "insist that the result be based on some objective standard."

Techniques for achieving each of these steps are detailed in the referenced book. The Alaska Department of Fish and Game intends to use these steps to facilitate planning team discussions.

Procedures for Obtaining Public Participation on the Planning Team

The Alaska Department of Fish and Game, in collaboration with the U.S. Army Corps of Engineers, Civil Works Branch, and with assistance of participating agencies, has solicited citizen participation on a planning team for a Lower Chena River Watershed Management Plan. Participating agencies recommended that this effort begin with a media campaign and large-scale mailing prior to a community meeting, which was held on May 15, 1996. Mailing lists were assembled to reach businesses, interest groups, landowners, and citizens who have participated in other planning efforts. Media efforts included a half-hour segment of AKCES, a program hosted by the Alaska Cooperative Extension Service on public radio; a news story on a local television station; a press release; a news story on KUAC public radio; three days of newspaper advertising; and a follow-up story on public radio.

Schedule for Obtaining Public Participation on the Planning Team

- May 15, 1996: Held Lower Chena River Watershed Management Public Forum and signed up 14 citizen-volunteer planners and a volunteer facilitator. Six more citizens subsequently volunteered for the team and one inadvertent volunteer removed her name for a current total of 19 members.
- June 5, 1996: Mailed out compilation of issues identified at the Public Forum to attendees and persons responding to previous mailings. Requested that recipients prioritize issues identified at the Public Forum and reply by postage-paid return mail. Requested additional volunteers for the planning team.
- June 26, 1996: Initial meeting of complete team.

Constraints on the Selection of a Watershed Management Strategy by the Planning Team

Funding obtained to date is sufficient for the Alaska Department of Fish and Game to coordinate development of a watershed management strategy during a series of meetings by the citizen-volunteer planning team over the remainder of 1996, concluding by early 1997; to devote about one year to data collection and synthesis in support of the selected management strategy; and to initiate drafting a management plan. The management strategy must realistically address funding limitations of public agencies and private interests and should be geared for effective implementation in the next few years.

Existing legislation and regulations constrain selection of a watershed management strategy. In order to be implemented, the management strategy must be acceptable to the public and must be legal. Agencies will work with the citizen-volunteer planning team to explain these constraints and to identify flexibility to accommodate community wishes within the existing regulatory framework.

The planning team must prioritize its efforts within the constraints imposed by the funding source, the State and Tribal Wetland Protection Grant Program administered by the U.S. Environmental Protection Agency, which addresses issues related to wetlands and water quality. It is unlikely that the planning can deal with all the issues identified by the public as concerns in the Lower Chena River watershed, but the team can make brief recommendations to appropriate agencies or to other planning groups on issues that cannot be directly addressed within project constraints.

Tentative Schedule and Milestones for Planning Team Meetings During Development of a Management Strategy

- June 26, 1996: Hold first meeting of citizen-volunteer planning team. Team members develop schedule for future meetings.
- July 1996: Alaska Department of Fish and Game personnel unavailable due to field work on Hydrogeomorphic approach to wetland assessment.
- August 1996 - December 1996: Continue regular meetings as necessary to develop management strategy.
- December 31, 1996: Tentative selection of watershed management strategy.
- February 15, 1997: Tentative identification of information needs to write and implement a management plan.
- March 31, 1997: Planning team deliberations are complete.
- April 30, 1997: Draft report documenting strategy selection and identifying information needs is submitted to team by the Alaska Department of Fish and Game for review.
- May 31, 1997: Final report on strategy selection and identifying information needs is completed.

Additional planning team meetings will be required during subsequent project tasks as outlined in the Alaska Department of Fish and Game proposal to the U.S. Environmental Protection Agency.

Ground Rules for the Lower Chena River Watershed Management Planning Team

1. Team members have a variety of interests and values that must be respected by other members.
2. Discussion must be on a professional (not personal) level; therefore, comments must be depersonalized.
3. Each member has equal access to the floor upon recognition by the facilitator (i.e., no interrupting).
4. The group will try to reach informed consent on issues and potential solutions.
5. Members are individuals who bring their personal perspectives to the problems at hand, not just representatives of organizations.
6. No smoking in meeting rooms.

Glossary

Advanced Identification: a process permitted under federal regulations whereby wetland areas suitable for placement of fill are mapped and made known to the public; applications for wetland permits in areas mapped as suitable for fill generally would be granted, but applications in areas mapped as not suitable for fill would require substantial justification to be successful.

Best Management Practices: a set of techniques or procedures generally judged to be effective ways to accomplish some objective such as minimizing impacts on selected resources.

Biodiversity: "the variety of life forms, the ecological roles they perform, and the genetic diversity they contain" (Wilcox 1984:60 *in* Murphy 1988).

Ecosystem: the community of interacting plants and animals that occupy an area combined with the physical components (soil, water, climate) of the environment; ecosystems can be of any convenient size: a stream is an ecosystem but so is the entire watershed that supports the stream.

Ecosystem Integrity: the condition where interactions between parts of an ecosystem are maintained and the ecosystem works approximately the same way that it did prior to human disturbance; for example, loss of a salmon population in a riverine ecosystem can remove a nutrient source (salmon carcasses) for other organisms and thus adversely affect ecosystem integrity.

Habitat: areas containing the resources needed for the growth and reproduction of a species; for example, shrub thickets provide nesting and feeding habitats for certain birds.

Habitat Enhancement: modifying habitat to benefit selected species; enhancement for one species may be detrimental to another and thus involves tradeoffs or value judgments.

Hydrologic: having to do with water; its storage, flow, effects, and cycles.

Impact Mitigation: the process of minimizing, or compensating for, the adverse effects of some activity.

Landscape Scale: consideration of an entire area (e.g., Lower Chena River watershed) and how ecosystem processes, development, and other activities affect the area as a whole.

Management Strategy: concepts or ideas about how certain resources should be managed; a management strategy can provide the direction for writing a management plan.

Riparian Buffers: vegetated areas adjacent to streams or other waterbodies that serve to protect the waterbody from adverse impacts by minimizing erosion, removing sediment and nutrients from runoff, and providing habitat.

Solid Waste: trash, including old car bodies, tires, construction debris, drums, and other materials.

Streamlined Permitting: any procedure that speeds the process of obtaining a Section 404 permit from the U.S. Army Corps of Engineers, makes the outcome of the process more certain, or otherwise reduces the paperwork required to conduct regulated activities in wetlands; General Permits are one example of streamlined permitting.

Watershed: the entire area of land draining to a particular stream or river; watershed boundaries often fall on ridgelines or divides in hilly terrain.

Wetlands: under most definitions, areas wet enough to develop characteristic soils (called hydric soils) and to support characteristic plants (called hydrophytic vegetation); several weeks of saturation to the surface during the growing season may be sufficient to form a wetland.

APPENDIX B

POLICY AND PROCEDURE FOR MAINTAINING AGREEMENT OF ABSENT MEMBERS

1. The facilitator will prepare notes summarizing each Team meeting, including the attendance list. These notes will be distributed before the next meeting.
2. Members who are unable to attend a meeting should notify the facilitator in advance by voice (459-7287), fax (456-3091), or E-mail (rpost@fishgame.state.ak.us) to comment on agenda items and to ensure that they receive meeting notes before the next meeting (e.g., an alternate address of fax number if a member will be out of town).
3. The discussion portion of each planning meeting will begin with adoption of notes from the previous meeting. Members who missed the previous meeting can concur with, or object to, decisions reached at the previous meeting and can provide suggestions for resolving their concerns.
4. Members unable to attend a second meeting following an absence must provide objections to decisions reached at the first meeting. The facilitator will present the transmitted information to the Planning Team for discussion and resolution.
5. All objections to Team decisions will be resolved by the close of business of the following meeting.
6. Team members not complying with this policy and procedure lose their opportunity to object to past decisions later in the planning process.
7. Past decisions can be revisited to address changed conditions, new information, or for other reasons by agreement of the Planning Team.

APPENDIX C

BACKGROUND INFORMATION FOR DELIBERATIONS

Appendix C-1. Background information used by the Lower Chena River Watershed Management Planning Team in support of their deliberations on water quality.

Handouts	Speakers
• Alaska Water Quality Standards • State Executive Orders 132 and 133 • Six technical reports on the Chena River related to water quality, 1967 flood, embankment revegetation, and river ecology • List of chemical elements commonly found in water supplies and glossary of technical hydrological terms • Maps and fact sheets for Six-Mile Village and other nonfederal contaminated sites in the Fairbanks area • Maps for Fort Wainwright contaminated sites • Two technical reports on the impacts of the MUS power plant and water treatment plant on the Chena River • Technical article on stormwater management • Alaska watershed framework document • Record of Decision on Arctic Surplus Superfund site • Pamphlet on understanding the interaction between groundwater and surface water • EPA fact sheet on 1996 Safe Drinking Water Amendments • Citizen's Guide t Groundwater Protection • Draft EPA guidance for state source water assessment and protection programs • Meeting notice for Alaska nonpoint source pollution control strategy	• Dr. William Burrows, USGS: Role of USGS in water quality studies and monitoring • Mr. William Morgan, ADEC: Impaired waterbodies and water quality sampling or monitoring by ADEC, NPDES permits • Ms. Amy Ash, ADEC: Nonpoint source program within ADEC, NPDES permits • Dr. William Burrows, USGS: Groundwater flow patterns in the Lower Chena River watershed • Mr. Doug Bauer, ADEC: Nonfederal contaminated groundwater sites, including Six-Mile Village • Ms. Rielle Markey, ADEC: Federal contaminated sites, including Fort Wainwright

Appendix C-2. Background information used by the Lower Chena River Watershed Management Planning Team in support of their deliberations on channel problems.

Handouts	Speakers
• Six technical articles on turbidity-fisheries relationships • Technical handout on streambank erosion processes • Technical handout on erosion control using soil bioengineering practices • Technical hydrological report on Badger Slough • Flow data for Badger Slough • Handouts of figures for Doug Fleming's Chena grayling population presentation • Several technical articles on grayling habitat and distribution • Video of TV news footage on Badger Slough • Handout of USACE Nationwide Permit 13 requirements • 1925 map of Chena Slough • USACE trip report on Badger Slough restoration studies • USACE proposal to use an "image data acquisition system" to inventory the banks and adjacent riparian areas of the Chena • USACE navigability study of Chena River and Noyes Slough • Fact sheets on USFWS Partners for Wildlife program	• Dr. William Burrows, USGS: Noyes Slough, history of Chena (Badger) Slough, and effects of manmade river controls on channel characteristics in the Lower Chena River • Mr. Jim Binkley, Jr., Discovery Riverboat Cruises: Question and answer session with Planning Team regarding navigation problems, solid waste, and bank conditions • Ms. Ann Rippy, NRCS: Bank erosion causes and traditional solutions • Ms. Leslie Tose, USACE: Bioengineering methods for bank protection • Mr. Klaus Wuttig, UAF: Comparison of physical and water quality characteristics of Badger, Piledriver, and 23- Mile sloughs related to ecological successional processes and implications for fish habitat • Mr. Doug Fleming, ADF&G: Grayling populations of Badger Slough and the Chena River • Mr. Larry Bright, USFWS: Cost-sharing programs of the USFWS for bioengineering projects • Ms. Leslie Tose, USACE: Permitting requirements for bank protection and typical patterns of bank protection along the Chena River • Mr. John Burns, USACE: Briefing on progress of USACE reconnaissance-level study of potential restoration projects in the Chena River watershed

Appendix C-3. Background information used by the Lower Chena River Watershed Management Planning Team in support of their deliberations on flooding and drainage.

Handouts	Speakers
• Handout on NRCS program for flood assistance and watershed studies • NRCS Badger Road Watershed Summary Report • Handout explaining flood recurrence intervals and calculation of flood risk • FNSB Floodplain Permit Application Worksheet • FNSB Floodplain Permit Application • Draft letter from the Alaska Society of Professional Engineers, American Society of Civil Engineers, Alaska Society of Professional Land Surveyors, and Alaska Section of the American Water Resources Association to the FNSB on future flooding within the FNSB • Selected portions of technical report on a hydrogeological flow model for the Chena Flood Control Project • Technical report on groundwater effects below Moose Creek Dam • USGS proposal for a state-funded stream gaging network	• Mr. Jim Aldrich, Shannon & Wilson: Past flooding, existing physical conditions, current situation, and potential solutions related to snowmelt flooding in the Badger Road area • Mr. Ron Krogstad, NRCS: History of NRCS programs and involvement with Badger Road area • Mr. Rex Nutter, FNSB: History and current status of flooding and drainage problems in Lower Chena River watershed and past and present actions of the FNSB related to flooding and drainage • Ms. Joanne Trefethen, Denali State Bank: Mortgage loan policies and disclosures in areas subject to surface and groundwater flooding • Mr. Robert Fox, Robert Fox Realty: Disclosure practices and requirements followed by realtors in areas subject to surface and groundwater flooding

Appendix C-4. Background information used by the Lower Chena River Watershed Management Planning Team in support of their deliberations on wetland management.

Handouts	Speakers
• Outline for Roger Petkoff's talk • USACE form for requesting a wetland determination • Application for Department of the Army Permit • Description of USACE Nationwide Permits • USACE Nationwide Permit general and Alaska conditions • Large package of material on the USACE regulatory program from a USACE web site • Outline for Roger Post's talk • Three semi-technical articles on the hydrogeomorphic method of wetland functional assessment • Technical article on West Eugene, Oregon, wetlands program • Information on the Juneau Wetland Management program and associated USACE General Permit	• Mr. Roger Petkoff, USACE: Federal wetland permitting under the Clean Water Act and ways for citizens to influence wetland permitting in their communities • Mr. Roger Post, ADF&G: The hydrogeomorphic (HGM) method of wetland evaluation (functional assessment)

Appendix C-5. Background information used by the Lower Chena River Watershed Management Planning Team in support of the general planning process and potential for plan implementation.

Handouts	Speakers
• Video on ecosystem stewardship and partnering • Request for grant proposals for nonpoint-source pollution projects • Large package of material from an EPA web page on the American Heritage Rivers program • Several articles and letters opposing the American Heritage Rivers program • News article on the controversy over the American Heritage Rivers program • Information packet on incorporating biodiversity in NEPA analyses • Excerpts from "WaterTalk" on Anchorage Waterways Council • Brochure on Watersheds '97 Conference in Anchorage • Speech on watershed planning by L. Katherine Baril • Excerpts from a manual on public process planning techniques	• Ms. Janet Brown and Ms. Kelley Hegarty, Chena Riverfront Commission: Purpose and objectives of the Chena Riverfront Commission, status of Riverfront Plan, and where the Commission goes from here

APPENDIX D

BACKSTEP ANALYSES

Appendix D-1. Backstep analysis for the water quality topic using the following combined problem statements: "We don't have enough information to know if surface water is polluted; and we have groundwater pollution in the watershed, little information on locations and causes, and little planning to reduce future impacts." The planning team identified first level causes 1, 2, 3, 4, and 7 (bold italic text) as priorities to be addressed by the management plan.

First Level Causes	Second Level Causes	First Level Effects
I. Information is not consolidated	I.A. Incompatible data sources I.B. Lack of coordination on hardware and software I.C. Work in progress, draft data often not public	I. Citizen choice of area of residence hindered by lack of information
II. Funding for monitoring and sampling is not available		II. Public health questions unanswered
III. Sampling is not an agency priority	III.A. Priority not determined locally	III. Unknown effects of development on water quality
IV. Lack of agency accountability for solving problem [Note: applies only to surface water problem statement]	IV.A. Fragmented agency authority and conflicting goals IV.B. Turnover of personnel	IV. Possible impacts on biological natural resources
V. Failure to recognize problem	V.A. Turnover of personnel V.B. Human error	V. Unknown scale of water pollution problem
VI. Planning Team hasn't dug deep enough	VI.A. Team mission is not data collection (at this phase of the project)	VI. Prevents effective use of revenues, time, and energy
VII. Lack of community education/awareness	VII.A. New issue VII.B. Public priority is on earning a living VII.C. Fragmented agency authority and conflicting goals	VII. Poor government decisions and regulations
VIII. Pollution may only occur in isolated areas/pockets or water quality may be okay in most areas		VIII. Unknown effects on development and opportunities
IX. Lack of good historical data on land uses that might have contaminated settled areas [Note: applies only to groundwater problem statement]		IX. Prevents application of consistent, adequate monitoring program (also related to Causes)

Appendix D-2. Partial backstep analysis (causes and effects) for the channel problems topic using the following problem statement: "There are gaps and inconsistencies in state, federal, and local government regulation of activities affecting the river and its associated sloughs, sometimes leaving citizens without means of implementing mechanisms for correcting natural or man-caused channel problems."

First-Level Causes	First-Level Effects
I. Conflicting state and federal interests	I. Conflicting regulatory authorities in terms of enforcement and jurisdiction
II. Conflicting definitions (e.g., navigability) within agencies	II. Lack of authority (i.e., gaps) in terms of enforcement and jurisdiction
III. Conflicting public and private interests	III. Makes it difficult for the public to understand agency jurisdictions
	IV. Lack of an endpoint responsible party

Appendix D-3. Partial backstep analysis (causes only) for the channel problems topic using the following problem statement: "Flow regulation of the Lower Chena River, first by exclusion of Tanana River water from Chena Slough by the Moose Creek Dike the early 1940s and later by construction of the Chena Flood Control Project, and bank protection have changed the hydrology, channel characteristics, and ecology of the river and its associated sloughs and will continue to do so in the future."

First-Level Causes	Second-Level Causes	Third-Level Causes
I. Flooding concerns of residents	I.A. Settlement on floodplain	
II. Land use and development patterns	II.A. Population pressure	
III. Protection or increase of property and property value	III.A. Bank erosion	III.A.1. Boat wakes
		III.A.2 Natural processes
	III.B. Accretion of land	
	III.C. Aesthetics	

Appendix D-4. Partial backstep analysis (effects only) of the channel problems topic using the following problem statement: "Flow regulation of the Lower Chena River, first by exclusion of Tanana River water from Chena Slough by the Moose Creek Dike the early 1940s and later by construction of the Chena Flood Control Project, and bank protection have changed the hydrology, channel characteristics, and ecology of the river and its associated sloughs and will continue to do so in the future."

First-Level Effects	Second-Level Effects	Third-Level Effects	Fourth-Level Effects	Fifth-Level Effects
I. Reduced flow in Chena	I.A. Reduced sediment load during floods	I.A.1. Channel downcutting in Fairbanks	I.A.1.a. Reduced flow in Noyes Slough	I.A.1.a.i. Slough filling in
	I.B. River flow inadequate to remove shallow bars below Fairbanks	I.B.1. Reduced navigability	I.B.1.a. Impact on tourism and commercial navigation	
	I.C. Possibly reduced woody debris	I.C.1. Altered fish habitat		
II. Reduced flow (surface and groundwater) in Badger Slough	II.A. Slough filling in	II.A.1. Altered fish habitat	II.A.1.a. Economic impacts	
		II.A.2. Altered aesthetics	II.A.2.a. Economic impacts	
	II.B. Algae accumulation	II.B.1. Altered fish habitat	II.B.1.a. Economic impacts	
		II.B.2. Altered aesthetics	II.B.2.a. Economic impacts	
	II.C. Possibly reduced dissolved oxygen in winter from biological oxygen demand from decomposing organic matter	II.C.1. Altered fish habitat	II.C.1.a. Economic impacts	
		II.C.2. Altered aesthetics (odor)	II.C.2.a. Economic impacts	
III. Altered fish habitat	III.A. Altered species composition	III.A.1. Effects on commercial, sport, and subsistence users		
IV. Upstream and downstream hydraulic effects	IV.A. Potential economic effects on other people (i.e., could require them to protect their property)			
V. Channel restriction	V.A. Increased flood risk			
VI. Solid waste used as bank armor	VI.A. Decreased aesthetics	VI.A.1. Economic impacts to tourism and recreation		
VII. Loss of riparian vegetation	VII.A. Increased sediment input			
	V.B. Loss of wildlife habitat			
	V.C. Loss of fish habitat (cover)			