Sekokini Springs Natural Rearing Facility and Educational Center

Technical Master Plan

Flathead County, Montana

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Prepared for:

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ACKNOWLEDGEMENTS

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Field research and construction leadership were provided by Jeff Lammerding and John Wachsmuth of Montana Fish, Wildlife & Parks and Beth Burren and Fred Flint of the US Forest Service. A preliminary sensitive plant survey was conducted by Maria Mantas of the US Forest Service. Technical advice was provided by Brad Shepard, Mark Deleray, Scott Rumsey, Clint Muhlfeld, Rob Snyder, Gary Bertellotti, George Kirsch, Jim Peterson and Tom Weaver of Montana Fish, Wildlife & Parks.

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- Approval of this Master Plan
- Conduct an Environmental Assessment
- Resolve US Forest Service Special Use Permit issues for land expansion
- Completion of NWPPC three-step process for Artificial Propagation

Existing settling pond below the hatchery building

INTRODUCTION

This project is part of the Hungry Horse Mitigation Program funded by Bonneville Power Administration (BPA). In 1991, the *Fisheries Mitigation Plan for Losses Attributable to the Construction and Operation of Hungry Horse Dam* (Mitigation Plan) was prepared by Montana Fish, Wildlife, & Parks (MFWP) and the Confederated Salish and Kootenai Tribes (CSKT) (MFWP and CSKT 1991). This plan provided the Northwest Power Planning Council (NWPPC) with documentation of fisheries and habitat losses associated with construction and operation of Hungry Horse Dam (HHD) and a flexible strategy to mitigate those losses. It addressed six specific program measures identified in the 1987 Columbia Basin Fish and Wildlife Program and subsequent program amendments. NWPPC approved our loss statement, including annual fisheries losses of 250,000 juvenile bull trout (*Salvelinus confluentus*) and 65,000 juvenile westslope cutthroat trout (WCT, *Oncorhynchus clarki lewisi*). The Mitigation Plan also identified 124 km of critical, low gradient spawning and rearing habitat in streams that were inundated and lost when Hungry Horse Reservoir (HHR) filled.

The *Hungry Horse Dam Fisheries Mitigation Implementation Plan* (Implementation Plan) was developed by MFWP and CSKT, adopted by the NWPPC in 1993, and funded by Bonneville Power Administration (BPA). The Implementation Plan describes specific, measures to protect and enhance resident fish and aquatic habitat affected by Hungry Horse Dam that do not require changes in Hungry Horse Dam Operation. Additional measures requiring operational changes were addressed separately (Marotz et al. 1996 and 1999; Marotz and Muhlfeld 2000). The hatchery portion of the Hungry Horse mitigation program is in transition to experimental culture of native species as directed by the Hungry Horse Mitigation Plan and Implementation Plan. The Northwest Power Planning Council (NPPC) approved the plans and amended their Columbia Basin Fish and Wildlife Program (Measure 10.3A, NPPC 1995).

A decision tree in the Implementation Plan directs the cooperating agencies to experiment with artificial propagation of native species to facilitate species restoration and replace aquatic habitat affected by HHD. Work at the Sekokini Springs site addresses artificial propagation of westslope cutthroat trout and habitat restoration. The site offers a unique combination of a small hatchery facility and stream and pond habitats suitable for rearing native westslope cutthroat trout in a nearly natural environment.

BACKGROUND

Purpose and Scope

The purpose of the Sekokini Springs Natural Rearing Facility and this Master Plan is to aid in the recovery of westslope cutthroat trout (WCT) populations in the Flathead River drainage. Westslope cutthroat populations have declined due to loss of spawning and rearing habitat, hybridization with rainbow trout, genetic introgression with Yellowstone cutthroat trout and competition with introduced species (MFWP and CSKT 1991). The current distribution of westslope cutthroat trout has been reduced to less than 10 percent of its historic range (Liknes and Graham 1988). The species has been listed as a Fish Species of Special Concern in Montana and in 1997, westslope cutthroat trout was petitioned for listing under the ESA. The US Fish and Wildlife Service determined that listing is not warranted at this time. This project was designed to mitigate damages caused by the construction and operation of HHD and help eliminate the need to list westslope cutthroat trout under ESA in the future.

Seventy-eight miles of high quality, low gradient spawning and rearing habitat were lost due to inundation when Hungry Horse Reservoir filled (Zubik and Fraley 1987). Hungry Horse Dam is located on the South Fork Flathead River 5.3 miles above the confluence with the mainstem of the river. The dam was completed in September 1952, and is operated for flood control and power production. The dam eliminated access to about 42 percent of the traditional spawning grounds in the South Fork for westslope cutthroat and bull trout. Erratic flow releases further eliminated wetland habitat and left shorelines barren of vegetation.

In total, habitat degradation and fish passage barriers have eliminated nearly 60 percent of the habitat once available to native westslope cutthroat and bull trout in the Flathead watershed upstream of Flathead Lake (Fraley et al. 1989). The Hungry Horse mitigation program is striving to partially mitigate these habitat losses by protecting remaining habitat, and by restoring and reconnecting damaged habitats. In certain areas, there is a need to reestablish pure populations of westslope cutthroat trout in the restored habitat.

Nonnative species or environmental damage in some locations threatens remnant populations of genetically pure westslope cutthroat trout and there is a need to conserve the genetic diversity of the species. Genetic inventories of existing stocks of westslope cutthroat trout have revealed that hybridized/introgressed populations in headwater lakes are threatening pure populations downstream. Lake rehabilitation has been initiated to remove this threat to pure native stocks. Genetic introgression and competition with nonnative trout species has also been documented in tributaries to the Flathead River system. Although the states captive brood stock is available to reestablish westslope cutthroat trout in many areas, a source of genetically pure westslope cutthroat trout from "nearest neighbor" wild sources within the Flathead watershed is needed to replace certain populations locally.

The Sekokini Springs Natural Rearing Facility and Educational Center Project is planned as a multiphase project to promote the conservation of native westslope cutthroat trout. The goal of the project is to preserve the genetic integrity and "wild" behavioral traits of westslope cutthroat trout in the Flathead Drainage. The educational component of the project will promote the conservation of native species and provide the public with information on the overall mitigation program.

This Sekokini Springs site plan calls for habitat restoration to create streams and ponds for rearing westslope cutthroat trout in an experimental isolation facility. Juveniles and gametes from wild donor populations will be reared to maturity in restored natural habitat to preserve wild behavioral traits. Wild populations will be replicated to provide gametes or imprint fry for reestablishing naturally reproducing populations where native populations have been extirpated or hybridized. The site will also conserve remnant populations that are threatened by nonnative species or environmental damage. Rescued fish will be protected at the site and propagated for reintroduction to their aboriginal habitat after the threats are eliminated. Excess fish will be released in closed-basin lakes to provide angling opportunities as part of our offsite mitigation program.

The Sekokini Springs site was chosen for the native species recovery program because the site offers a unique combination of natural habitat for onsite restoration work and a small trout rearing facility (Appendix A). Four artesian springs of varying water temperatures and an isolated setting afford the opportunity for rearing native trout under natural habitat conditions. Up to four individual genetic strains of pure westslope cutthroat trout can be isolated, protected and replicated for reintroduction to aboriginal habitats. Experimentation on fish imprinting may be used to recapture adults attempting to

return to their natal waters at the site. Fish migrations to and from the site will continue to be restricted by passage barriers. In the future, it may become possible to obtain gametes from this alternative source (as opposed to remnant donor populations) for hatchery assisted recovery actions elsewhere in the Flathead watershed.

Authority

Through the Northwest Power and Conservation Act, BPA is required to mitigate fish and wildlife impacts of Federal hydroelectric developments. Consumers of hydroelectric power pay for the mitigation.

The US Bureau of Reclamation's (BOR) involvement in Sekokini Springs planning and design activities are authorized by Sec. 2 of the Reclamation Act of 1902 as amended and supplemented. BOR funding for this work comes from the Geographically Defined Program(GDP) under the general planning budget for the Upper Columbia Area Office (UCAO) and comes under the direction of the UCAO planning officer.

DESCRIPTION OF SPECIAL USE AREA AND FACILITIES

Location

The Sekokini Springs site is located in Flathead County about 10 miles northeast of Columbia Falls, Montana (T31N, R19W, S17, Hungry Horse, Montana, 7.5 minute Quadrangle). The site is accessed from the west by the North Fork and Blankenship Roads and from the east by State Highway 2 and Blankenship Road (Figure 1). A private road turns south, crosses an adjacent landowner's property for approximately 500 feet, and then enters the property owned by the US Forest Service (Forest) boundary. State Highway 2 is the primary route to Glacier National Park with upwards of one million people per year traveling through the area to the park.

MFWP has a recorded easement of the access road across the private property dated April 22, 1998 (Appendix B). The original fish hatchery permit holder constructed the private road with the permission of the landowner 40 years ago. Since that time the road has been used and maintained by the Special Use permittee.

Geology

Much of the spectacular scenery in the area such as sharp peaks and U-shaped valleys was formed by glaciers during the late-Pleistocene. The geologic units exposed at the site consist of a thin veneer of forest soil covering a shallow thickness of alluvium overlying a great thickness of glacial debris. The soil is composed of silty fines, fine sand, and organic matter. The alluvium is composed of an unconsolidated, heterogeneous mixture of hard subrounded to rounded sand, gravel, and cobbles deposited by the river. The alluvium was derived in part from reworked glacial debris and in places may be up to 50 feet thick (Johns 1963). The glacial debris is composed of a heterogeneous mixture to crudely layered clayey to silty, bouldery glacial till and thinly bedded, fine-grained lacustrine deposits. The thickness of the glacial debris could be several hundred feet thick at the site.

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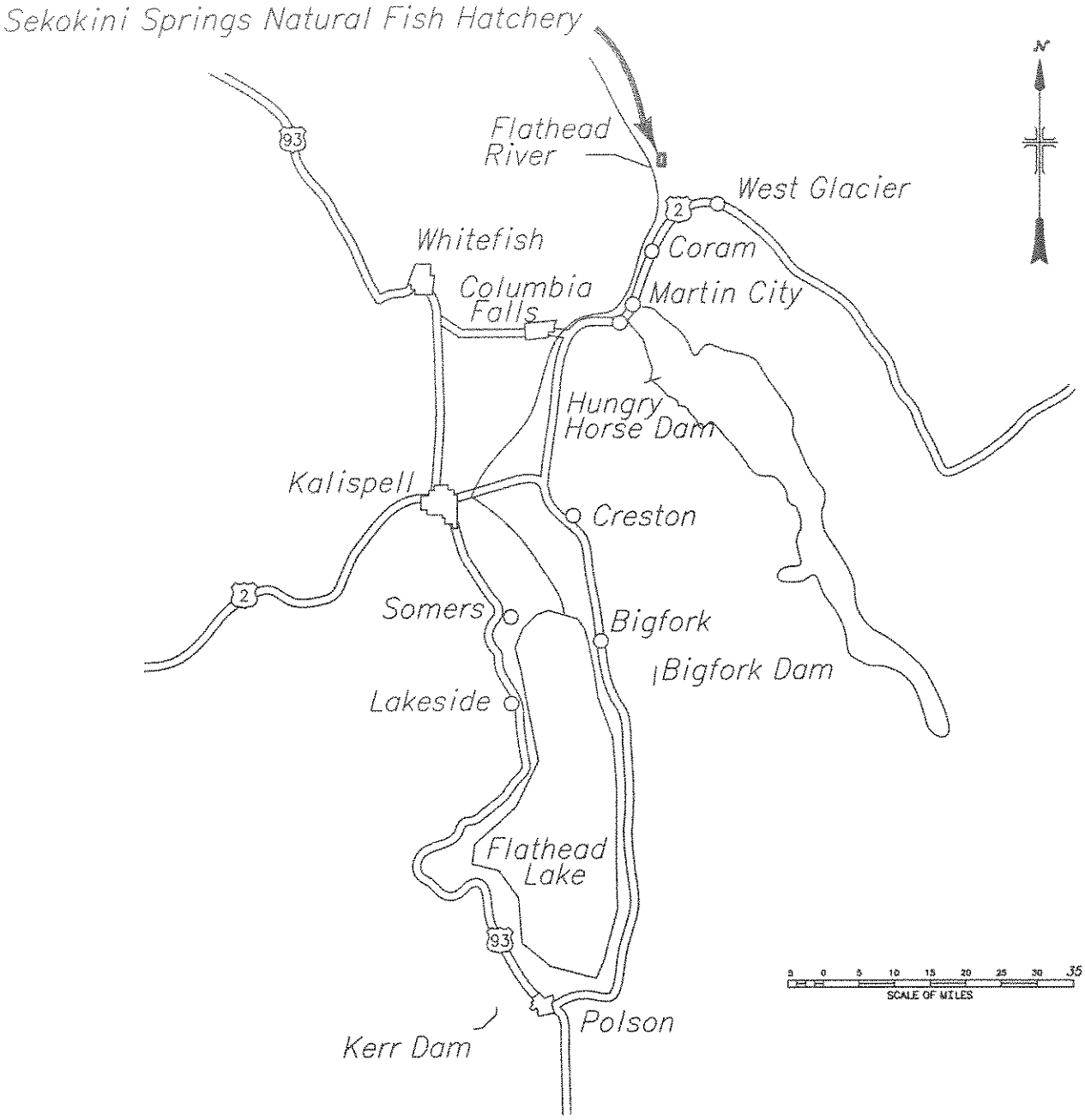
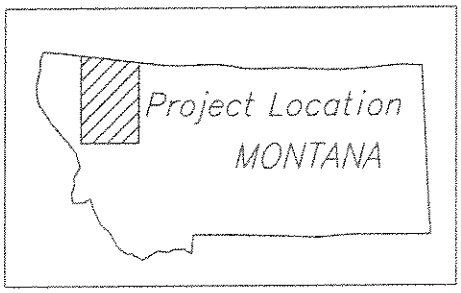


SITE LOCATION MAP



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ALWAYS THINK SAFETY

TECHNICAL MASTER PLAN
SITE LOCATION MAP

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Glacial deposits and associated lacustrine deposits refilled the lower valleys excavated by the earlier glaciation to depths of hundreds of feet (Johns 1963, Ross 1959). Streams fed by meltwater from the glaciers reworked the glacial debris and produced meanders, flood plains, and terraces along their channels. Slope angles on the site vary from 25 degrees to 50 degrees.

A BOR geologist conducted general site-specific geologic studies during the summer of 1999 and a short report was issued to FWP and others. That report indicates general acceptability of the site for the proposed work and is attached in Appendix C. The BOR and FWP personnel will complete additional studies including backhoe pits and laboratory analysis of samples in the spring of 2002.

Amerorchis rotundifolia

Topography and Vegetation

The topography of the site consists of a series of river terraces (benches) which have been cut into older glacial debris. Glacial features such as moraine ridges, kettle lakes, and pothole topography are located northeast and upslope from the site. The site is located about 80 to100 feet above the present river level on a large river terrace about three-quarters of a mile long and one-half mile wide. Slope

angles range from 25 to 50 degrees. A maximum slope height of 40 feet is reached along the upper ponds and along the river. Generally the slopes are stable.

The average annual precipitation is 30 to 40 inches per year. Snowfall averages about 150 inches annually.

Vegetation at the site was evaluated in June 2000 by Maria Mantas, USFS, in categories including forest, forest openings and riparian. The primary tree species is lodgepole pine, regenerated from fires in 1929. The Coram Experimental forest, located along the southeast side of the property, was missed by the 1929 fire and has a mature stand of western larch, Douglas fir, Engelmann spruce, and lodgepole pine. The creek area northeast of the hatchery building is high gradient, rocky stream bed with dense birch, alder and spruce forest. Creek bed species include *Cornus stolonifera, Urtica dioica, Heracleum lanatum* and *Angeleca arguta.* Rocks are moss covered. The forest east of the creek have some open canopy areas with understory saplings and dense shrub *Symphoricarpas albus* cover, *Acer glabrum, Rubus paniflons, Rosa woodsii, Snulacina stellata, Arnica latifolia* and *Linnaea borialis.* Riparian forest on the river floodplain contains large diameter birch and dense *Cornus stolonifera* and *Salix* shrub community with *Gymnocarpium dryopteris* and *Heracleum lanatum.* Along the the flood plain there are seep areas with high cover of *Equisetum arvense* and *Pea palustris.* On the bench containing the ponds, there is a large patch of skunk cabbage amid mid- to late-seral forest, *Thuja pucata* and Clintonia uniflora hit. There is some potential for threatened and endangered species in the riparian forest and on the forested hill sides (*Dryopteris cristata, Viola renifolia, Carex pupercula, Cypripedrum spp., Petasites frigidus and Botnychrum monarum*), so a second survey has been scheduled for spring 2002.

Hydrology

There are four springs of varying flows and temperatures that will be used for fish rearing activities at the site. Springs 1, 2 & 3 are located near the hatchery building and the fourth enters the northwest corner of the property. Springs 1-3 surface at approximately elevation 3200, and are most likely related to ground water movement from kettle lakes located northeast of the site at elevations 3265 to 3256 feet. Springs 1-3 have been captured into spring boxes, and plumbing from the springs to the hatchery building has been installed. The combined flows from springs 1-3 were measured in July and August of 1999 and vary seasonally between 0.75 and 2.5 cubic feet per second (cfs). Water quality samples taken on November 1, 2001, showed that all measured parameters are below levels known to be harmful to fish (Appendix D). The majority of the captured spring water is currently carried through a bypass channel to the settling pond, then through pipes to erosion channels leading toward the Flathead River. Spring 4 surfaces adjacent to the lower bench and flows southwest toward the old Ponds 9 & 10. This is a cold water spring that could be used to regulate summer water temperatures in the proposed restored stream reaches. The general flow of both ground and surface water is towards the Flathead River (southwest) from the kettle lakes located northeast of the site. Water temperature measurements are show in Appendix E.

Water rights at Sekokini Springs are held by the Department of Agriculture, dated February 14, 1955.

Fish

There are 12 gamefish species in the Flathead system of which 3 of the major species are native: westslope cutthroat, bull trout and mountain whitefish. The other nine species are introduced gamefish: lake trout, rainbow trout, lake whitefish, Yellowstone cutthroat trout, brook trout, northern pike, grayling, largemouth bass, and kokanee (Fraley et al. 1989). This plan is concerned with the improvement in numbers and habitat of genetically pure westslope cutthroat trout.
Westslope cutthroat trout are native to the Flathead drainage, which is one of the most important remaining strongholds for the species. In many of the headwater streams, cutthroat are the only fish present. Three life history strategies of westslope cutthroat trout exist: resident, fluvial, and adfluvial. Resident trout spend their entire life in the tributary streams. Fluvial and adfluvial fish spawn in the tributaries where the young live for up to three years before the fluvial fish migrate to the Flathead River and the adfluvial fish migrate to Flathead Lake. The migratory westslope cutthroat grow to maturity in the river or lake before returning to their natal streams to spawn (Liknes and Graham 1988; Fraley et al. 1989).

Resident and migratory westslope cutthroat trout spawn in May and June in small and intermediate-sized tributaries. Juvenile westslope cutthroat trout emerge from the spawning redds in June and July, depending on time of spawning and water temperature. Most of the migratory westslope cutthroat leave the tributaries as juveniles at two or three years of age, primarily during June and July. The Middle Fork of the Flathead River downstream from the wilderness boundary contains mostly adfluvial cutthroat. The Middle Fork upstream of the wilderness boundary and possibly the North Fork from Polebridge to the Canadian border contain primarily fluvial cutthroat (Fraley et al. 1989).

Performance standards that will be used to assertain the effectiveness of the Sekokini Springs project include: (1) Conservation of the genetic and life history diversity of westslope cutthroat trout in the Flathead Subbasin; (2) Restore and initiate viable, naturally spawning populations using reintroduction strategies; (3) Reintroduction of pure populations where hybridized/introgressed populations have been removed; (4) Provide harvest opportunities in closed-basin lakes to offset lost angling opportunity due to harvest restrictions or fishing bans designed to minimize adverse effects to wild populations; and (5) Create an interpretive area for public education on the benefits of native species and their recovery.

(1) Conservation of the genetic and life history diversity of westslope cutthroat trout in the Flathead Subbasin by replicating the donor stock held in natural habitat at Sekokini Springs.

Pre- and post-treatment inventories of the genetic makeup of the targeted fish populations are used to measure trends in genetic purity. Depending on the goals for each site, genetic sampling may involve protein electrophoresis, paired interspersed nuclear DNA element – PCR (or PINE marker) method or various mitochondrial DNA marker techniques, to differentiate westslope cutthroat trout from rainbow, yellowstone cutthroat or introgressed forms. Samples are analyzed by the Montana Wild Trout and Salmon Laboratory at the University of Montana, Missoula or suitable laboratory.

The diversity of life history strategies is related to total available habitat. For instance, assuring access to historic habitat by fluvial or adfluvial spawners, or by protecting resident forms by isolating headwater populations above barriers.

Removing gametes or fish from a donor population presents a risk to that population. Given this, we propose to capture wild juveniles for rearing at Sekokini Springs. Removal of juveniles is less likely to disrupt natural reproduction in the donor population. Capture of juveniles can be accomplished before or after spawning adults are present in the stream, thus eliminating risk to the spawning population. Incremental removal of a subset of the rearing population will provide a random selection from the available genetic material, while protecting the remaining wild juveniles. Numbers to be removed can be based on a percentage of the juvenile population. Our fish health specialist will allow transport of juveniles (as opposed to gametes or eyed eggs) to an isolation facility at Sekokini Springs from sources having a long history of disease free status. Subsequent disease testing can be accomplished before juvenile fish are released into the rearing habitat. Individuals to be reared at the facility will be individually marked and non-lethally inventoried for genetic purity. Only genetically pure populations will be used to produce family crosses of F1 progeny. This strategy was designed to reduce the risk to the donor population, disease transmission to the rearing habitat and protection/conservation of genetically pure stocks for restoration actions.

Alternatively, wild gametes may be collected from adult spawners throughout the spawning run. Allowing for escapement of a percentage of the wild population and techniques that partially spawn adults before releasing them to continue to spawn naturally can reduce risk to the spawning population. If only a few adults can be safely removed from the donor population, collections can be made over a series of years to assure that the resulting progeny represent the genetic diversity in the original population. In captivity, juveniles can be reared to maturity and allow cross-fertilization between year classes. The donor population can be monitored to assure that gamete collection does not impact the wild stock.

We anticipate that up to 1,000 individual juveniles will be removed from a given donor population each year (based on a percentage of the population estimated through electrofishing estimates, not to exceed 25 percent of the donor population). Sixty individuals from each lot will be sacrificed from each lot for disease testing before the fish are moved from the isolation facility to the natural rearing habitat. Fish will be reared to maturity to produce approximately 300 spawning adults within each of the four rearing ponds. Progeny from crosses will be held separately through the fry stage and released to targeted recovery streams at a density not to exceed the density of wild trout in a comparable stream by stream order, gradient and flow range.
Sekokini Springs will not be a traditional broodstock facility. Instead, eyed eggs from wild spawners or juveniles will be held until maturity to provide a source of F1 gametes or fry for use in imprint planting experiments. Once a spawning run is established in the restored or reopened habitat, the captive population will be released into a closed-basin lake to provide a recreational fishery and to make space available for another experimental stock. The number of fish to be reared at Sekokini Springs will vary depending on annual needs for specific genetic stocks and genetic makeup of each stock. The facility will allow for out-door rearing of up to four isolated genetic stocks. Rearing in nearly natural habitat is intended to maintain wild behavioral traits.

(2) Restore and initiate viable, naturally spawning populations using reintroduction strategies.

The Hungry Horse Mitigation and Implementation Plans list individual streams to be targeted for habitat enhancement and fish passage improvements. Although our primary objective of the habitat component of the Mitigation program is to encourage natural recolonization and recruitment, suitable stocks are not always available to reoccupy the treatment sites. Where appropriate, we will use

Sekokini Springs to provide pure westslope cutthroat for restoration activities elsewhere in the watershed. Experimental imprint planting of eyed eggs or fry will be used to initiate spawning runs in restored or reconnected habitats. Experimentation will be used to assess the effectiveness and cost of various techniques for restoring wild spawning runs (e.g. RSIs, inprint fry plants and release timing). Documentation of the results of these experiments will expand our knowledge of cutthroat restoration techniques.

Successful restoration of wild spawning runs of genetically pure westslope cutthroat trout in tributaries to the Flathead River can be assessed by migrant trapping, redd surveys, population estimation and genetic inventory, before and after habitat restoration or reconnection. In earlier mitigation projects, runs of native fish had been extirpated prior to habitat restoration or fish passage improvements. Assessment of experimental imprint plants of marked eyed eggs or fry has shown that fish survive and rear in test streams through emigration (smolt stage). After such treatments, redd surveys revealed that a spawning run had been reestablished. Our goal was to assess whether imprint plants of eggs or fry return to spawn as adults. Unfortunately, the origin of the spawning adults could not be determined using technology available at the time (e.g. tags or tetracycline marking did not persist through adult returns or was only detectable through lethal methods and thus counter-productive). We are now assessing tools to determine spawner origin and to assess the effectiveness of various techniques for establishing runs. Non-lethal sampling techniques such as microprobe spectrometry of the protein matrix in scales will be tested. Experiments using batch marking to cold-mark otoliths in trout fry are ongoing, but require lethal sampling (otolith removal) to assess the presence of a mark.

(3) Reintroduce pure populations where hybridized/introgressed populations have been removed. The The westslope cutthroat population in the Flathead subbasin will benefit by increasing the number of wild, genetically pure spawning populations and by reducing the threat to pure populations from nonnative species and hybridized/introgressed populations. The success of chemical rehabilitation is assessed through pre- and post-treatment inventory using gill nets, electrofishing and/or U/W visual inspection. Late fall treatment of closed-basin lakes has produced total eradication of the target fish species in several case studies. Pure populations are reintroduced and monitored as described in 4 below.

(4) Provide harvest in closed-basin lakes to offset lost angling opportunity due to harvest restrictions or fishing bans designed to minimize adverse effects to wild populations.

Offsite lakes receiving yearlings and spawners from the facility will provide opportunities for harvest, partially offsetting restrictive regulations elsewhere in the Flathead River system. The offsite lakes program is monitored through periodic gill net surveys, angler interviews and the annual statewide angler creel census. Stocking rates are established to a large degree by trial and error, then refined to optimize post-stocking survival and growth. Gill netting provides data on species relative abundance, growth rates and fish condition factor. Angler surveys are qualitative indicators of catch rates, angler satisfaction and rough estimates of harvest. Although rigorous quantitative analyses of CPUE, survival and total harvest are possible, the number of lakes involved makes this level of monitoring economically impractical. Remaining wild populations of westslope cutthroat trout are benefited by providing alternative opportunities for angler harvest. Natural westslope cutthroat trout populations are protected by restrictive harvest regulations.

(5) Create an interpretive area for public education on the benefits of native species and their recovery.

Public awareness of the importance of native fish species conservation and hydropower mitigation will benefit recovery actions through increased public support for the program. This aspect could be measured in terms of visitor days, school groups instructed or patron satisfaction indices.

Onsite and offsite mitigation projects will use the Sekokini Springs facility as a source of genetically compatible westslope cutthroat trout to expand the existing range of the species where native populations have been extirpated or to protect threatened populations. Our goal is to inform the public about the need to protect aboriginal stocks or reestablish native trout where they have been extirpated. Genetic inventories have documented problem areas and we need public support for programs to reduce or eliminate existing risks to the integrity of pure native stocks.

Land Ownership

The Sekokini Springs site is located on 11.4 acres of Forest Service owned land in the northern part of Flathead County between Bad Rock Canyon just east of Columbia Falls and the town of West Glacier. The site included in the special use permit does not have frontage on the Flathead River. The Flathead National Forest retains ownership of the strip of land between the river and the site acreage. The highest elevation on the property, 3200 feet, is located along the access road into the facility and along the highest terrace above the hatchery building. The developed pond series is on the lower terrace at elevation 3120 feet, just above the Flathead River at approximately 3080 feet.

In general, land ownership in the area is equally divided, 50 percent public holdings and 50 percent private holdings. Most of the private lands are near the communities of Hungry Horse, Martin City, Coram, Lake Five area, and West Glacier and are accessed via Highway 2.

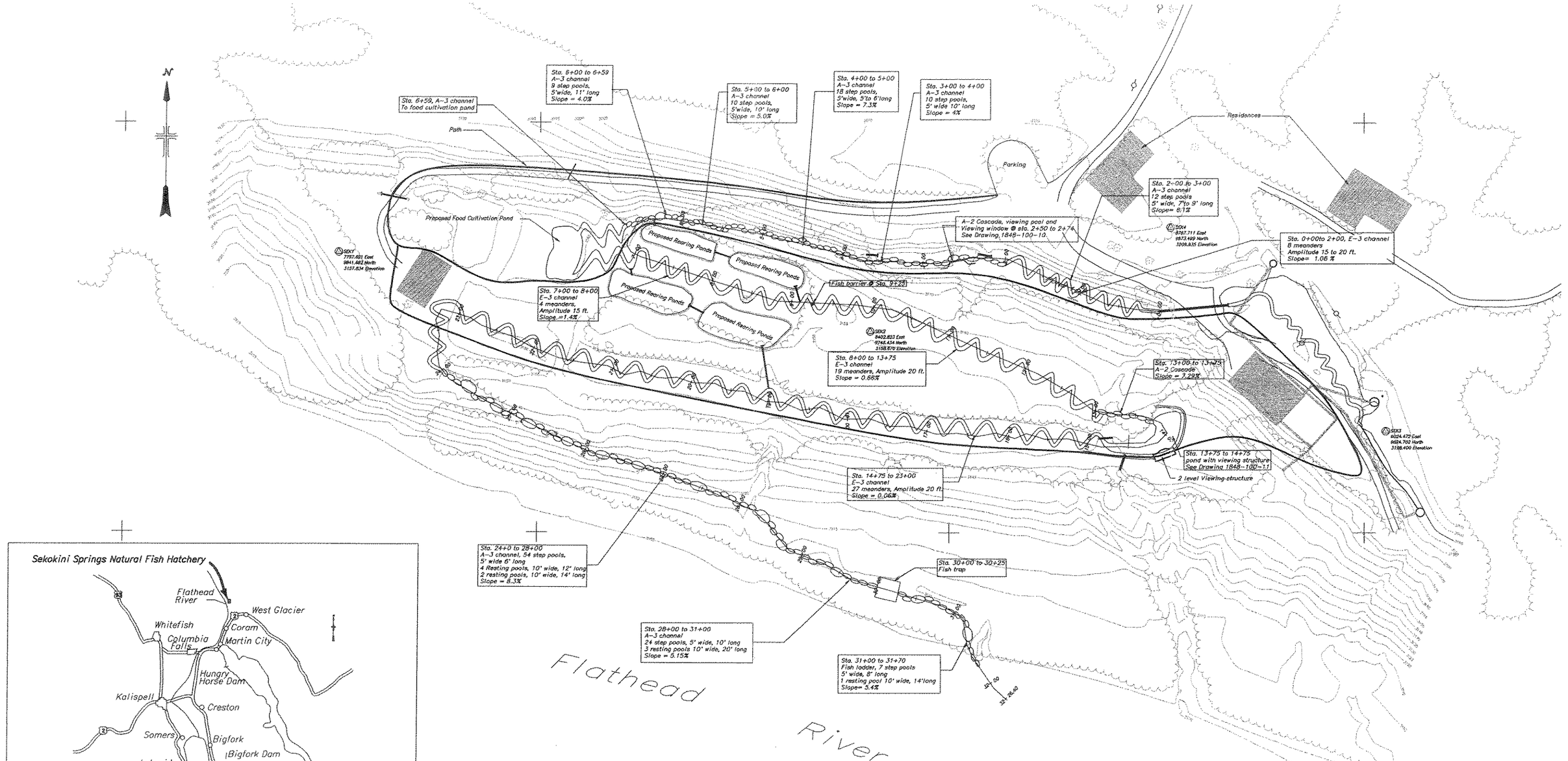
In general, the 11.4 acres covered by the special use permit are bordered on the south and east by additional USFS lands and on the north and west by private lands.

The river corridor is protected as a wild and scenic river under Federal Law. There are three levels of protection for rivers under the law. Rivers or sections of river may be designated as wild, scenic, or recreational areas. This particular reach of the river is protected as a recreational river corridor, which affords protections but still allows for site improvements etc to be made.

Site Improvements

Site improvements consist of a steel building with hatchery facilities and living quarters that can be converted to office space, one open sided wood storage shed (recently collapsed and removed), four cement fish tanks (recently removed), nine natural earth trout ponds, and two sediment ponds (Figure 2). The pond system has not been fully utilized in recent years. Several of the existing ponds are presently drained and have been invaded by terrestrial vegetation. Some ponds have apparently partially filled with sediment over time. Most of the ponds have crude outlet structures using wood planks for control of water levels. All these structures are in poor condition or have failed. The sediment ponds are fitted with concrete outlet controls and piping to eroded channels above the Flathead River. Most of the ponds have screens over the culverts leading to other ponds.

The steel building is 42 feet by 60 feet with 16 foot walls and a concrete floor. The building was built in 1979. The back 40 feet is used as a hatchery and has a 12 foot by 12 foot fiberglass overhead door



SITE PLAN

SITE LOCATION MAP

ALWAYS THINK SAFETY

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SEKOKINI SPRINGS – MONTANA
MONTANA WATER MANAGEMENT ASSISTANCE PROGRAM

SEKOKINI SPRINGS NATURAL FISH HATCHERY REARING STREAM & VIEWING STRUCTURES

APPRAISAL DESIGN
LOCATION MAP AND SITE PLAN

DESIGNED M. Montague — TECH. APPR.
DRAWN J. Ward — SUBMITTED
CHECKED — APPROVED
PROGRAM MANAGER

CADD SYSTEM	CADD FILENAME	DATE AND TIME PLOTTED
AutoCAD Rel. 15.05	1848-100-5.DWG	DECEMBER 7, 2001 15:19
BOISE, IDAHO	JULY 2001	1848-100-5

and one standard steel door for access. The interior walls are unfinished and contain seven tinted plastic windows on the north and south for light. This area is fully wired, but not to code, and plumbed. On each side of the overhead door are two metal sheds, with concrete floors attached to the main structure. Both sheds are 10 by 15 feet with a ceiling height of about 10 feet. The shed on the northeast corner is accessed from the main building and was used as an incubation room. The shed on the southeast corner is accessed by a steel door on the outside and is used for storage.

The front 20 feet of the building was set up for living quarters. The upstairs contained three bedrooms. The lower level is was an open area containing kitchen and living-dining room areas and one bathroom. Walls are were finished with sheetrock or plywood and painted and floors were carpeted and tiled. The area was heated with a wood stove. We plan to install a propane heating system and improve the office area with energy efficient insulation and a passive solar sunroom.

The state hatchery division has donated fourteen fiberglass tanks and associated plumbing to replace the original four cement fish tanks that were pre-fabricated septic tanks with outlets on the bottom for drainage. The tanks were plumbed to allow mixing the flow from the three spring sources so that water temperatures can be controlled inside the hatchery building.

The condition of these site improvements was poor. The steel building was structurally sound, but in need of new steel siding and insulation. The living area had water damage and was infested with rodents and insects. The office area was dismantled down to the original framing and is being rebuilt to accommodate new wiring.

TECHNICAL MASTER PLAN

Components Of The Technical Master Plan

This project is to be funded and constructed over a period of 5 years. Annual phases are described below. Phased efforts have been programmed based upon the priority of need and available funding for MFWP to successfully complete the mission of the project. Should funding be accelerated, higher prioritized elements of the project may be completed sooner than scheduled.

2001

Until this Master Plan is approved by the US Forest Service and NWPPC, experimental culture of trout at Sekokini Springs can only proceed as previously performed under the existing Special Use Permit. Future artificial propagation at the site will follow the three-step artificial production review and Hatchery Genetics Management Plan (HGMP). The draft HGMP is undergoing internal peer review and has been submitted to a few external reviewers in preparation for the final draft that will be sent to the NWPPC for formal review at a later date.

In the interim, we are completing work in previously disturbed areas within the existing "footprint" of the former trout farm (Figure 3). We are improving the hatchery building and restoring habitat associated with the recently capped spring sources.

The hatchery building will be repaired to seal the structure from rodents and flooding caused by snow melt. New steel sheeting will replace the original material that had been cut to accommodate the

Figure 3. Replacement of the culvert leading from the former head pond to the lower stream reaches.

original plumbing and where original sheeting had been damaged. We plan to extend the eves so that snow will no longer accumulate against the exterior walls. Flashing will be installed to prevent leakage onto the concrete floor. A new garage door was installed and the back room rebuilt.

The three springs on the upper bench were capped using pre-cast concrete collectors with valves and overflow pipes in April, 2001 (Figure 4). At the same time, 6-inch diameter pipes were run from the collectors to the outside edge of the building. Use of the collectors helps prevent possible diseases that could arise through the use of open springs and also allows better control and mixing of flows.

The 6-inch diameter inflow pipes from the capped spring sources have been extended into the building to a valve box. The extension of the pipes into the building was completed in July, 2001. Since then plumbing has been added to allow control of water temperature in the rearing facility by mixing flows from the three spring caps. The 12-inch diameter return flow pipe was also extended into the building for future use also in July 2001.

2002

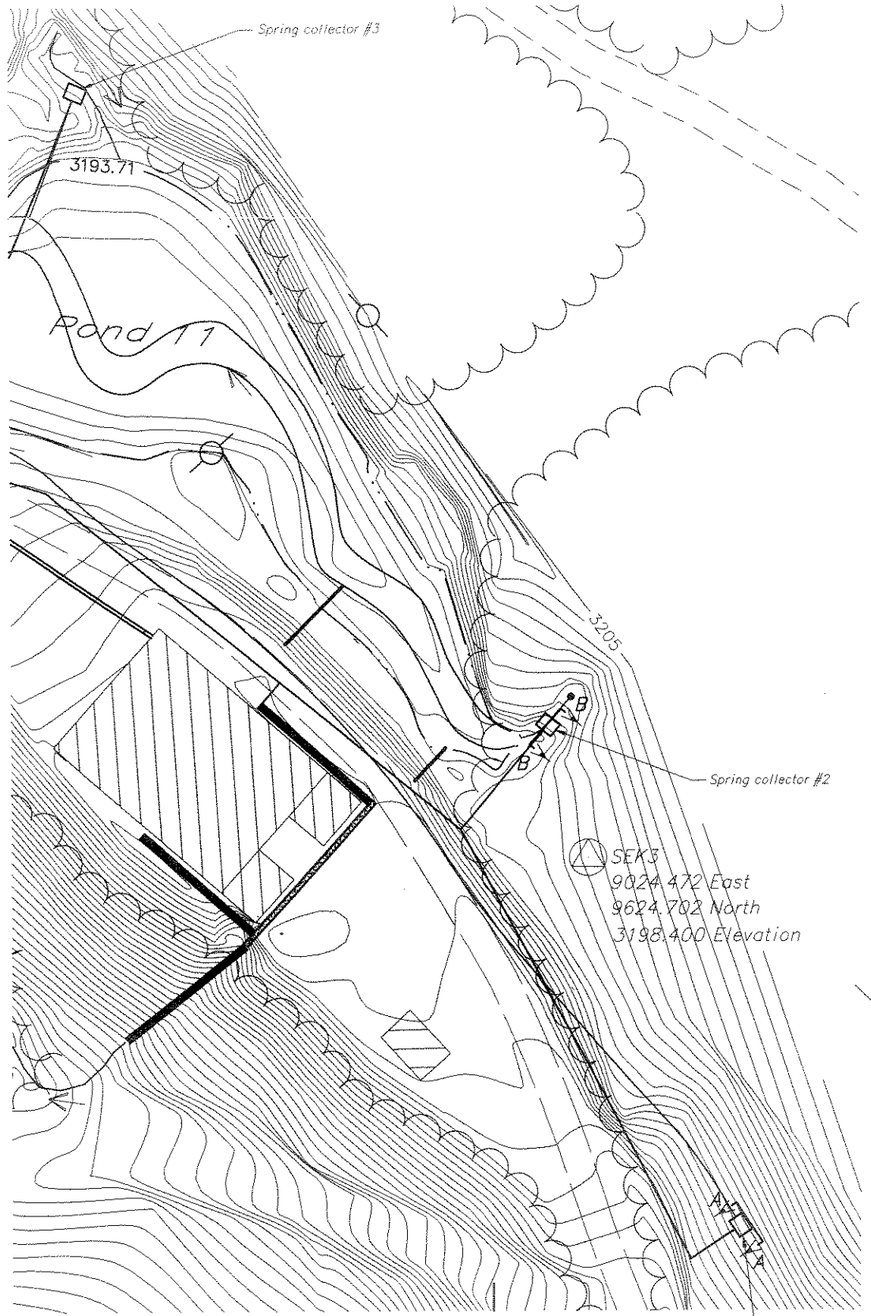
The streambed within the former head pond will be stabilized within its existing meander pattern and planted with native riparian vegetation. Water is presently flowing through a channel that was apparently constructed by the previous owner to allow water to bypass the series of ponds that extend from the hatchery to the bench below. This will allow reconstruction of the stream channel under dry conditions. We plan to restore the linear ponds on the slope to a natural looking, Rosgen type E stream course with a type A cascade (Figure 5).

The exterior walls of the hatchery building will be insulated and internal moisture will be drained to the outside. Once insulated, we can begin to repair the internal walls in the office space. Three offices will be rewired to code and equipped with phone, FAX, intercom and computer jacks. A wet lab, small kitchen and lavatory will be stubbed in, pending approval of a proposed septic lift station, tank, and drainfield. These improvements will allow use of the facility during preparation of the site.

A cursory sensitive plant survey was conducted at the site in 2000 and no sensitive plants were found in the areas disturbed when the springs were capped. However, the US Forest Service requires a detailed survey where new stream channels are proposed. This survey has been scheduled for June 2002. The locations of new channels have been positioned on the high-resolution topographic map of the site. The staked design will follow the sensitive plant survey to assure that no sensitive plants are disturbed during stream restoration.

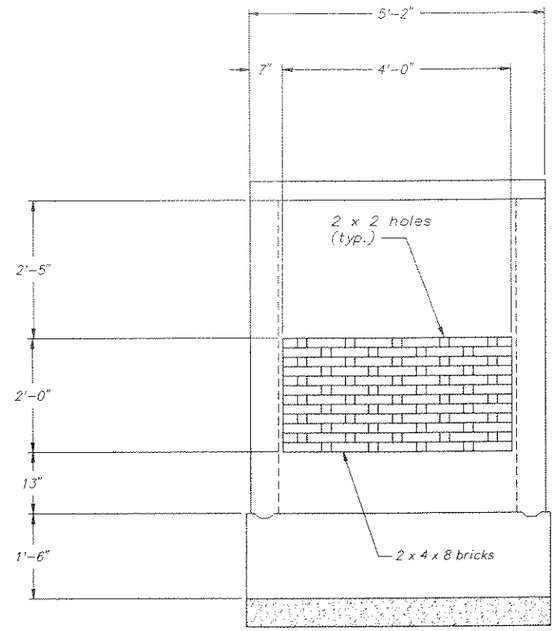
A detailed noxious weed management plan will be prepared by MFWP in cooperation with the USFS and others after completion of the sensitive plant survey. Noxious weeds are present in heavy numbers in previously disturbed areas around the ponds and buildings. Some sort of control program is anticipated at least for a few years after approval of the master plan and the noxious weed management plan. Once populations of noxious weeds are greatly reduced or eliminated, good management of the site should make control of noxious weeds a minor issue.

Two existing ponds that currently hold water will be converted into four ponds. The drainage will be designed to allow the surface elevation of each of the four ponds to be controlled independently in the future. The four rearing ponds will be completed and stabilized with vegetation. A new, Rosgen type E



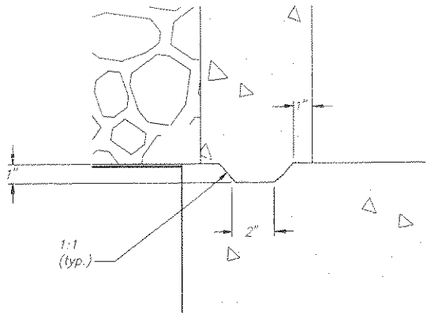
PLAN

SCALE OF FEET



SECTION A-A

SCALE OF FEET

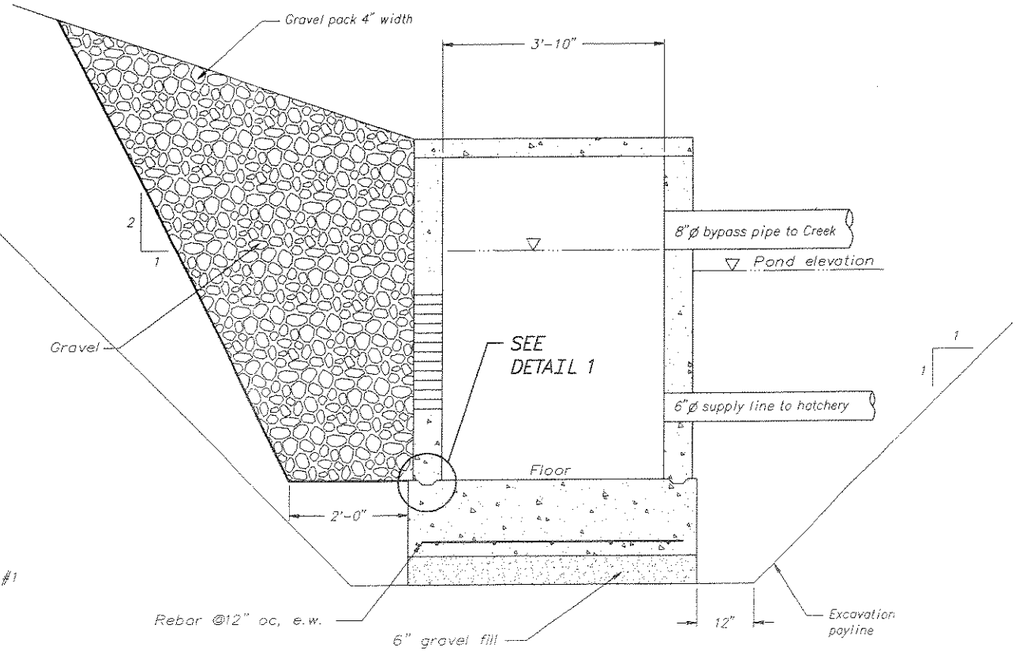


DETAIL 1

SCALE OF INCHES

NOTES:

1. Lifting eyes shall be attached to all parts of the collector structure to allow each piece to placed properly in the field.
2. Blockouts for pipes shall be a minimum of 2" in diameter greater than the stated pipe size.
3. Section B-B as shown for spring collectors #2 & 3. No 8"ø pipe on spring collector #1.



SECTION B-B

ALWAYS THINK SAFETY

UNITED STATES
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BUREAU OF RECLAMATION

SEKOKINI SPRINGS - MONTANA FISH WILDLIFE AND PARKS - MONTANA
FISH PASSAGE AND PROTECTIVE FACILITIES

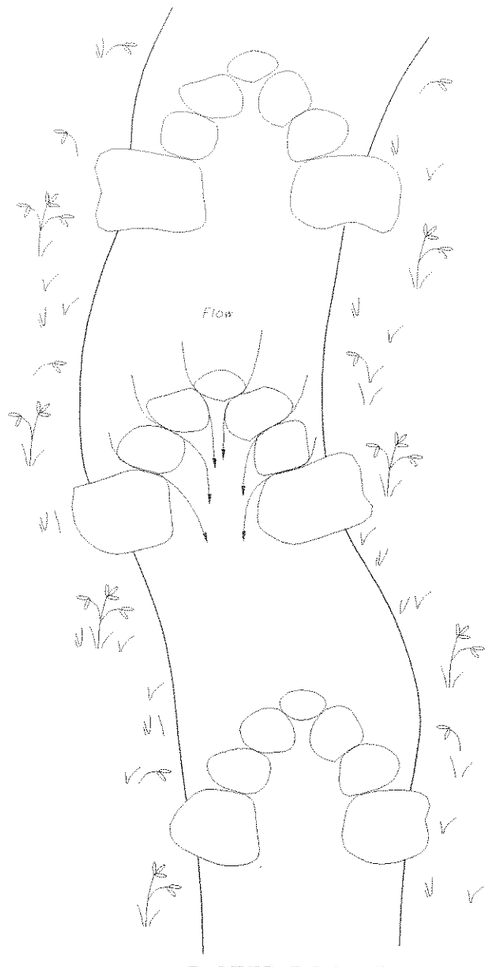
SEKOKINI SPRINGS

SPRING COLLECTOR STRUCTURES

PLAN, SECTIONS AND DETAIL

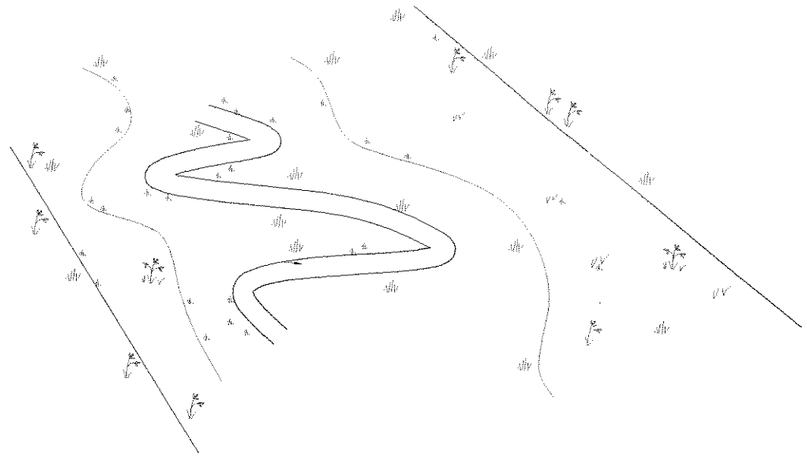
DESIGNED	CHECKED
DRAWN DRAFTER	TECH. APPROVAL
	PROGRAM MANAGER

CADD SYSTEM AutoCAD Rel. 15.05	CADD FILENAME 447-100-158.DWG	DATE AND TIME PLOTTED NOVEMBER 16, 2001 09:35
BOISE, IDAHO JUNE, 2000		447-100-158



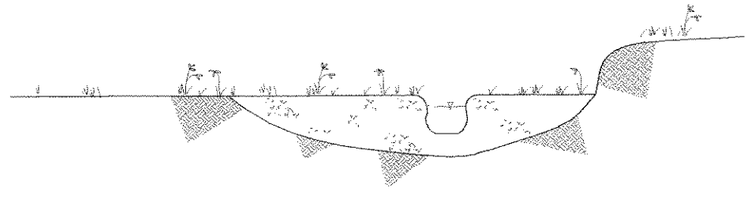
A-3 STEP POOL PLAN

SCALE OF FEET



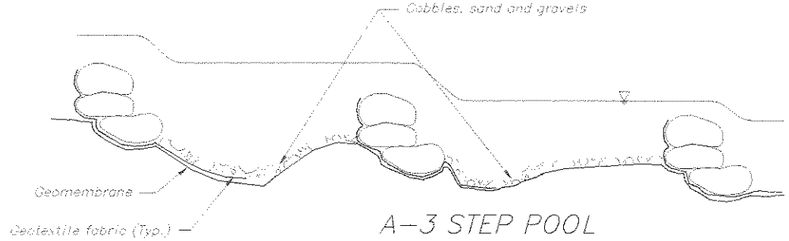
E-3 CHANNEL - PLAN

SCALE OF FEET



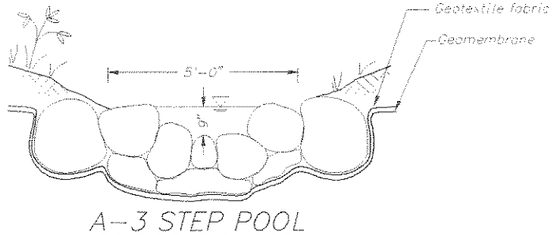
E-3 CHANNEL CROSS SECTION

SCALE OF FEET



A-3 STEP POOL CENTERLINE PROFILE

SCALE OF FEET



A-3 STEP POOL CROSS SECTION

SCALE OF FEET

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BUREAU OF RECLAMATION
SEKOKINI SPRINGS - MONTANA
MONTANA WATER MANAGEMENT ASSISTANCE PROGRAM

SEKOKINI SPRINGS NATURAL FISH HATCHERY REARING STREAM & VIEWING STRUCTURES

APPRAISAL DESIGN

A-3 STEP POOLS AND E-3 CHANNEL PLAN AND SECTIONS

DESIGNED M. Montague	TECH. APPR.
DRAWN J. Ward	SUBMITTED
CHECKED	APPROVED PROGRAM MANAGER
CADD SYSTEM AutoCAD Rel. 14.0A BOISE, IDAHO	CADD FILENAME 1848-100-9.DWG AUGUST 15, 2001

1848-100-9

channel will be constructed under dry conditions to connect the four ponds to the sediment pond directly downslope from the building. Siting of the new channel will follow the sensitive plant survey. Upon completion of this phase, water will be diverted from the bypass channel into the upper portion of the "living stream", passed through the four rearing ponds and new E channel to the existing sediment pond.

The linear ponds extending down the slope from the upper bench will be restored, under dry conditions, into a natural looking, Rosgen type B channel with and type A cascade above the proposed fish-viewing site # 1. The channel will continue downslope to connect to the four rearing ponds. An unstable bank along the stream course must be stabilized before water can flow in the restored channel. This could be accomplished with a concrete wall, providing a convenient site for the fish-viewing window #1.

An existing trail along the stream channel provides equipment access for stream restoration and will be improved incrementally as the channel is being restored. As soon as the channel has been positioned, the hatchery return flow pipe will be extended to join the channel. The end of the pipe will be imbedded in cobble to appear like a natural spring along the stream course.

Planning for the proposed septic system and lift station will begin. All permits will be completed.

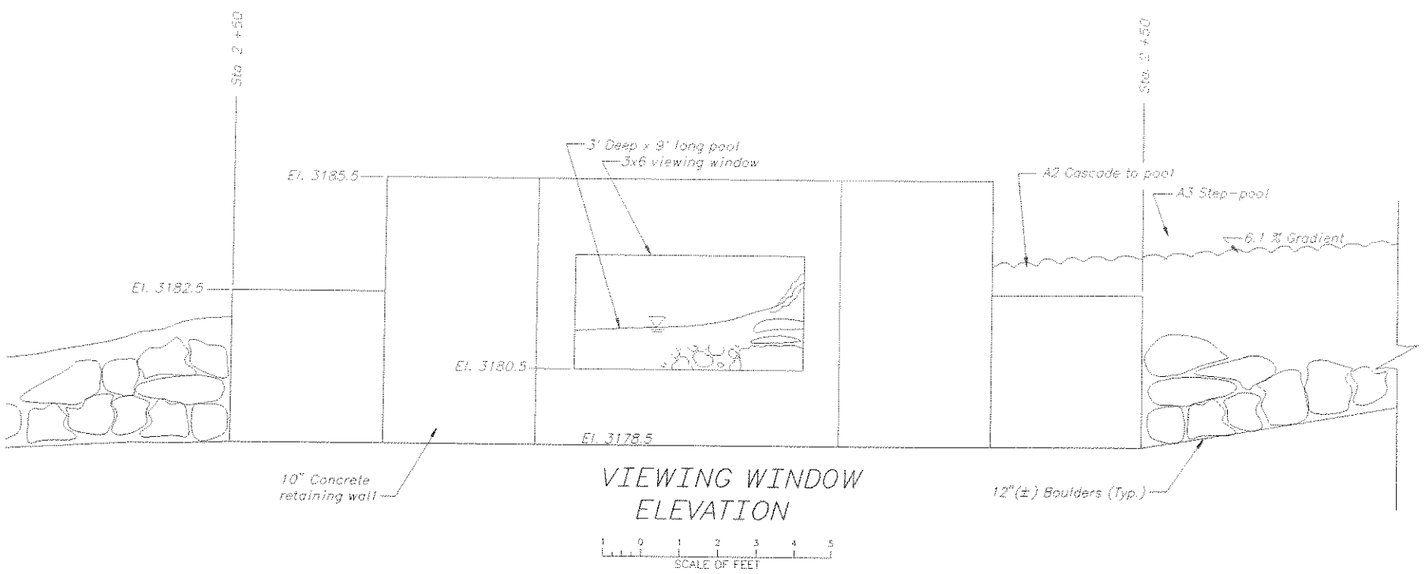
2003

We will amend the special use permit to include the slope downstream of the ponds to the Flathead River. We will then design the stream channels within the existing linear ponds on the bench and the new channel to the Flathead River.
The fish-viewing widow #1 will be completed (Figure 6). The window will be placed in a large pool at the foot of the type A cascade (Figure 7).
Habitat restoration in the sediment pond and adjacent linear ponds will begin. The sediment pond will be dredged to create a deep pool in the bend of the channel where the fish-viewing site #2 is proposed (Figure 8). The viewing area will have two levels to allow viewing fish from above and below water level. A type E channel will be constructed inside the existing linear ponds (Figure 9) in preparation for connection with the proposed type A channel to the Flathead River. Until this phase is complete, water will flow through the existing pipe structures in the sediment pond.

Assuming all proper permits have been secured and any other approvals required, the A type channel will be constructed from the last of the existing E-channel down the slope to connect to the Flathead River. This section of the stream channel will include a concrete and steel trapping facility to control and monitor the types and sizes of fish accessing the stream from the river.

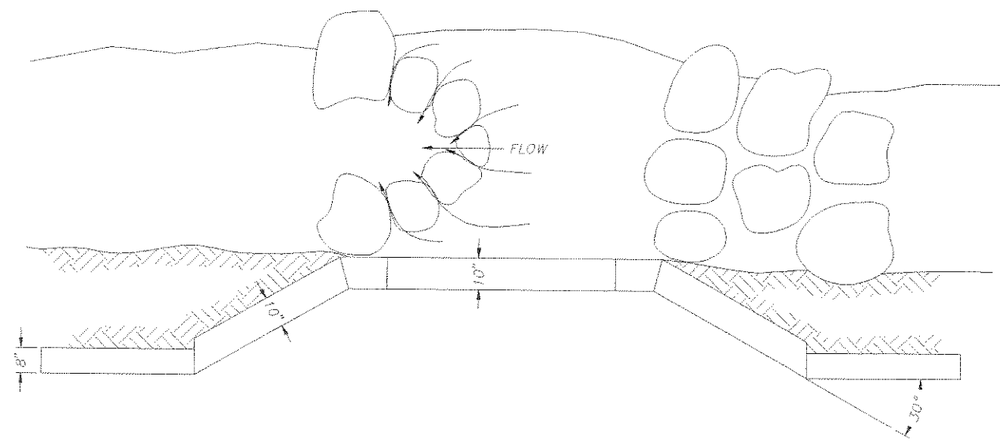
Construct waste water disposal features for the office and proposed residence for the hatchery manager. A drinking water well will be drilled and water piping installed to the residence site and the hatchery building. If necessary, electrical service will be upgraded and a new pole, meter, and disconnect provided at the residence site.

Existing trails will be improved to allow foot access to the streams and ponds. Most work will be accomplished as the stream course is restored. Interpretive signs and exhibits will be added incrementally as the trails are improved to allow wheel chair access and educational opportunities to all ages of people.



VIEWING WINDOW ELEVATION

1 0 1 2 3 4 5
SCALE OF FEET



VIEWING WINDOW PLAN

1 0 1 2 3 4 5
SCALE OF FEET

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SEKOKINI SPRINGS — MONTANA
MONTANA WATER MANAGEMENT ASSISTANCE PROGRAM

SEKOKINI SPRINGS NATURAL FISH HATCHERY REARING STREAM & VIEWING STRUCTURES

APPRAISAL DESIGN

UPPER STREAM VIEWING STRUCTURE PLAN AND ELEVATION

DESIGNED M. Montague	TECH. APPR.		
DRAWN R. Ropczyk	SUBMITTED		
CHECKED	APPROVED		
		PROGRAM MANAGER	
CADD SYSTEM AutoCAD Rel. 13.05 BOISE, IDAHO	CADD FILENAME 1848-100-10.DWG		
	JULY 26, 2001	1848-100-10	

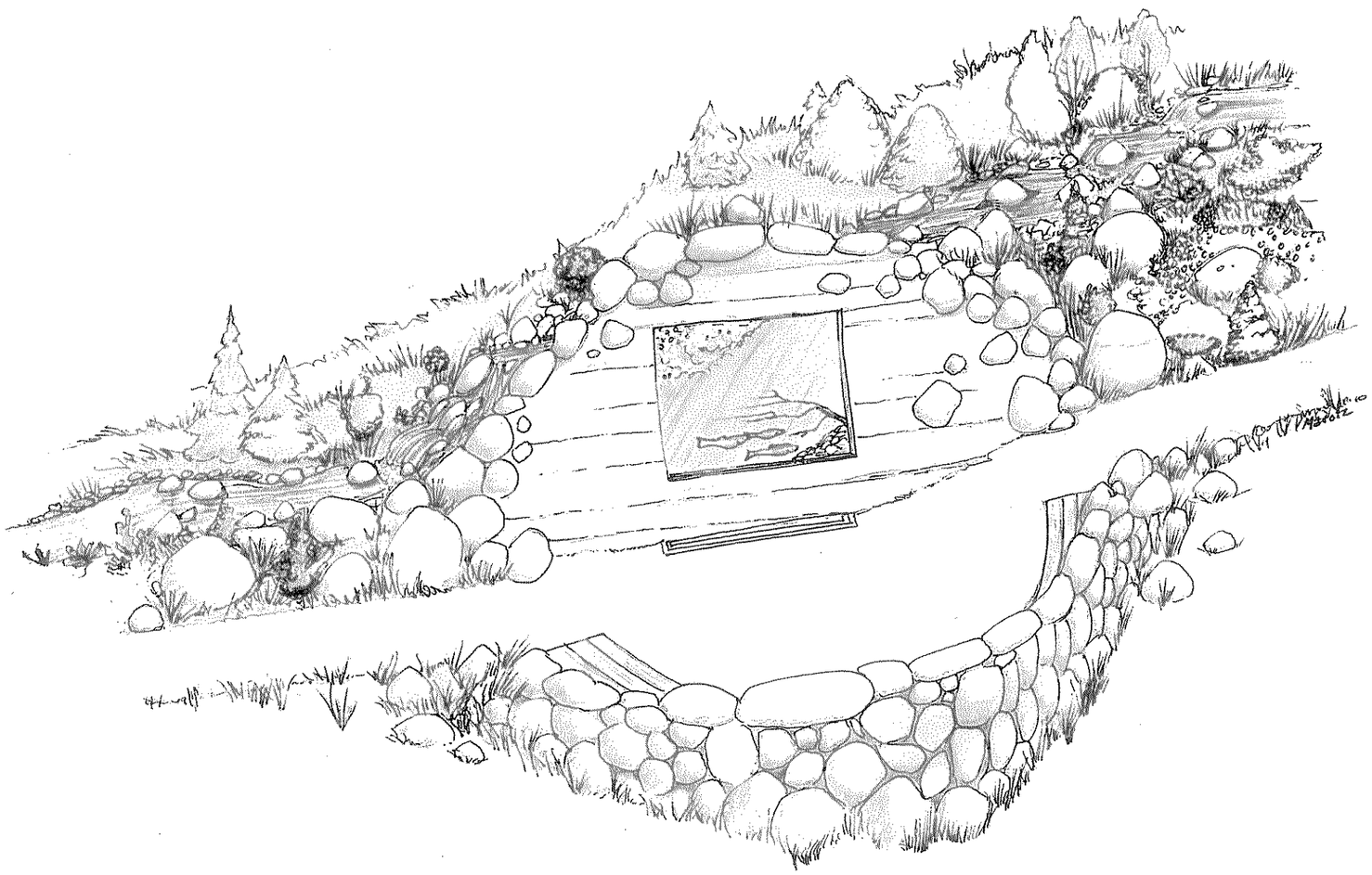
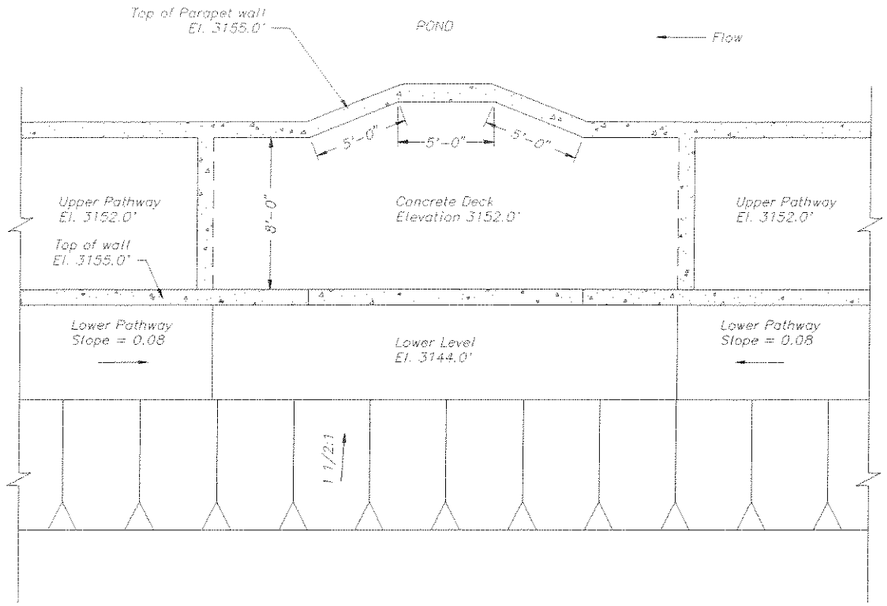
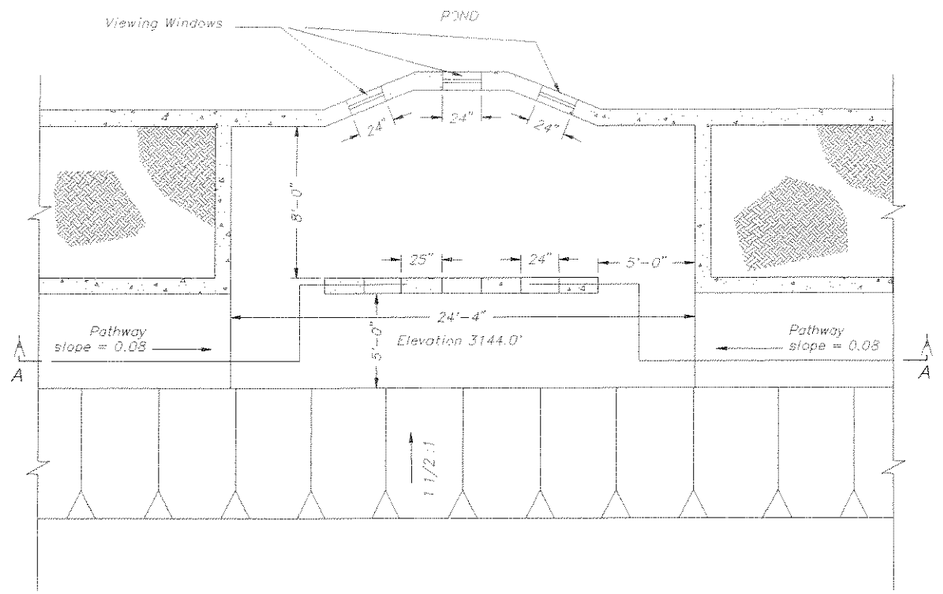


Figure 7. Artist's conception of fish viewing site #1 revealing the large pool beneath a stream type A2 cascade. Native vegetation and round rocks are placed to blend the viewing window with the surrounding landscape.



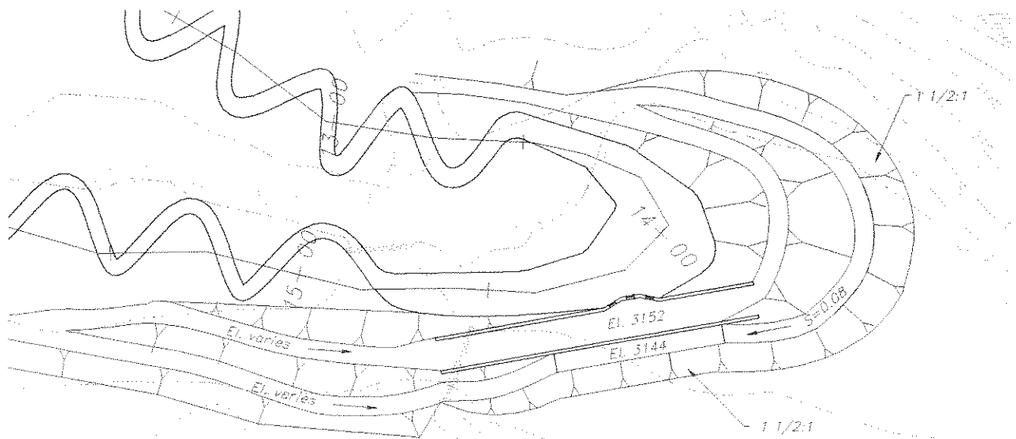
UPPER LEVEL PLAN

1 0 5 10 15
SCALE OF FEET



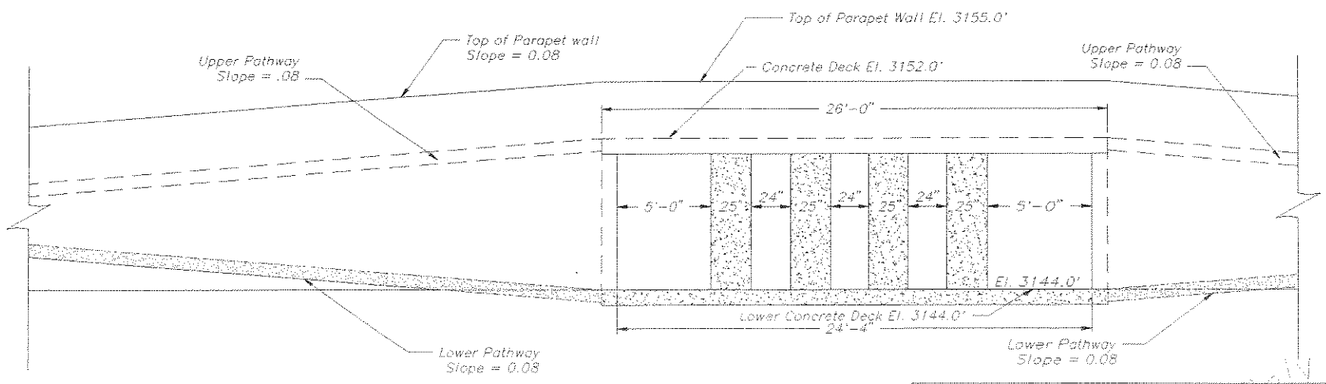
LOWER LEVEL PLAN

1 0 5 10 15
SCALE OF FEET



GENERAL PLAN

20 0 20 40 60
SCALE OF FEET



SECTION A–A

1 0 5 10 15
SCALE OF FEET

NOTE: All concrete walls are 10 inches thick.

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UNITED STATES
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SEKOKINI SPRINGS – MONTANA
MONTANA WATER MANAGEMENT ASSISTANCE PROGRAM

SEKOKINI SPRINGS NATURAL FISH HATCHERY REARING STREAM & VIEWING STRUCTURES

APPRAISAL DESIGN

LOWER END POND VIEWING STRUCTURE PLANS

DESIGNED M. Montoya	TECH. APP.
DRAWN J.Ward	SUBMITTED
CHECKED	APPROVED PROGRAM MANAGER
CADD SYSTEM AutoCAD Rel. 15.05 BOISE, IDAHO	CADD FILENAME 1848-100-6.DWG
	JULY 25, 2011

1848-100-11

igure 9. Existing linear pond that will become a type E channel extending downstream to type A cascade at the fish viewing window #1. Stream restoration will be accomplished under dry onditions by routing water through a bypass channel that was constructed by the previous owner.

2004

Erosion gullies created by past blowouts of ponds etc will be repaired and rehabilitated to natural conditions.

Complete interpretive exhibits featuring water conservation, native fish recovery, wildlife and botanical features at the site.

Develop parking, restrooms and classroom for arranged site tours by school groups and the public.

2005

Construct/install two residences on-site for the hatchery operator and assistant. The structure will be designed to blend with the scenery and include the latest energy saving technology. At the same time, a storage facility will also be constructed to provide both lockable, secure storage and outdoor storage for maintenance equipment etc.

Planning Process

The previous sections describe the projected end results for each calendar year through 2005. These projected actions are the result of a long term planning, design, permitting, and public involvement processes that might require a year or more prior to commencement of the construction activity. Certain planning activities related to the master plan document and designs of the spring collectors and associated piping have been ongoing for the last three years and will continue throughout the life of the project.

MFWP will continue to lead the planning effort for the long term operations and general layout of the facilities at the site. They will also continue to refine biological goals and needs at the site. As funding permits, BOR will continue to offer technical assistance including engineering, drafting, geology, and cost estimates for MFWP at the Sekokini site. All construction activities at the site will be funded by MFWP through a variety of funding sources including the BPA. All facilities will be owned and operated by MFWP as per the special use permit with the Forest.

In general, final designs for all construction activities will be completed the year before so that construction contracts can be issued and permits applied for with adequate lead times. General planning activities and predesign efforts will typically be completed two years prior to construction. Data collection is underway at this time and will continue throughout the life of the project as will public involvement efforts and fund raising efforts.

NEPA/MEPA

MFWP will be responsible for completing NEPA/MEPA documents for building improvements and habitat enhancements (Rosgen stream construction, viewing windows, visitor facilities including toilets, parking, trails) including WSR access, 404 permit, ESA, Clean Water Act permitting.

MFWP will work with the US Forest Service to update the existing Special Use Permit to include actions in this Master Plan. Additional coordination with the Forest Service will be needed relative to specific T&E species and cultural resources.

An Environmental Assessment (EA) was prepared in 1998 for the Sekokini Springs Natural Fish Rearing Project (appendix A). The EA covered administrative transfer of the Special Use Permit and purchase of improvements on the Forest Service land (Appendix G). This action completed the first phase of the planning process.
A separate Categorical Exclusion (CE) was issued in spring 2001 for installation of three spring collectors and associated piping into the hatchery/rearing building. This work was accomplished in early April 2001 with additional work in July 2001 (Figures 10 and 11).

The purpose of an Environmental Assessment (EA) associated with this Master Plan is for planning and decision making. The hatchery is located on lands leased from the Flathead National Forest. An EA will be prepared for all actions except those covered by a categorical exclusion or covered by earlier environmental documents.

The EA would likely include brief discussions of the need for additional proposed actions, any associated environmental impacts of the proposed actions, and a listing of agencies and persons consulted. The level of detail and depth of impact analysis will be limited to that needed to determine whether there are significant environmental effects. Alternatives would likely be No Action and Plan. Since most of the proposed work will be carried out within the existing, previously disturbed "footprint" of the original private trout farm, we anticipate that the EA will focus on additional stream channels, interpretive trails and exhibits, water quality and increased use by project personnel and the public. Nearly all proposed work, including the "living stream", was designed to repair past impacts and associated erosion channels. The project was designed to be a net benefit to the environment.

The EA may be prepared in any format useful to the planning process and decisionmaking. The EA may be combined with other planning documents but should be clearly and separately identified and not spread throughout or interwoven into other sections of the document. At a minimum the components of this EA should address: Cultural Resources, accessibility, T&E species, WSR issues, and any clean water act components. The purpose of the ESA is to provide protection for sensitive animal and plant species. The US Fish and Wildlife Service (USFWS) has established a system of informal and formal consultation procedures. The EA will describe what actions or project features are included to enhance, mitigate, or reduce adverse impacts to T&E species. A description of the informal consultation with the USFWS may be included if appropriate.

Endangered, threatened, or candidate species occur in the project area. The Sekokini Springs site is used at certain times by grizzly bears which are listed under the Federal Endangered Species Act of 1973 (P.L. 93-205, 87 Stat. 884), as amended. Bald eagles also frequent the site. No ESA listed fish species occur at the site. A preliminary sensitive plant survey was completed in 2000 and no sensitive plants were found in the vicinity of the actions implemented to date. A more intensive survey has been scheduled for June 2002 in the areas proposed for stream channel restoration or reconstruction.

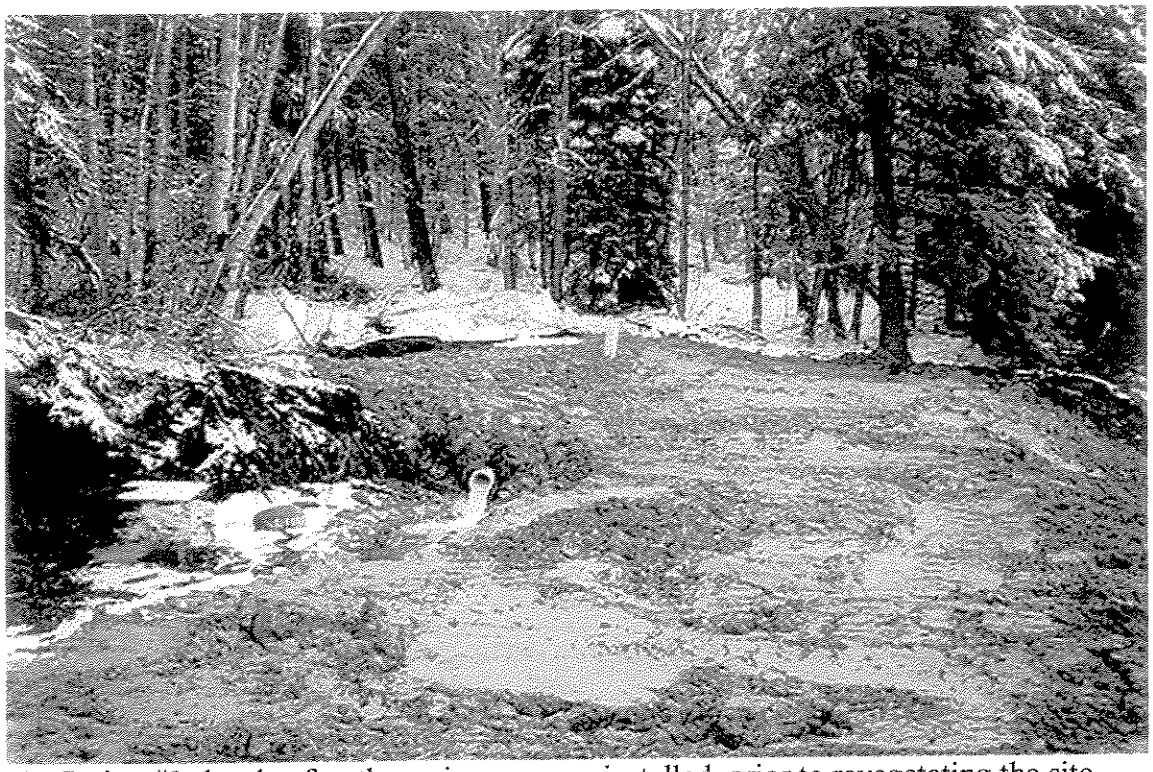

Figure 10. Spring #2 shortly after the spring cap was installed, prior to revegetating the site.

Figure 11. Spring #2 after preliminary revegetation to stabilize the site. Additional vegetation will be added after the stream channel is restored.

Accessibility

Accessibility to facilities and programs for persons with visual, hearing, mobility, and mental impairments, appropriate to the nature of the facilities and programs, and consistent with sound safety practices, feasibility, and its obligation to conserve natural resources and preserve the quality of the recreation experience for all participants shall be provided as required in accordance with the Architectural Barriers Act of 1968 (82 Stat. 718), as amended (42 U.S.C. 4151 et seq.); Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794); and Title II of the Americans with Disabilities Act of 1990 (104 Stat. 327) as amended (42 U.S.C. 12101 et seq.).

Permits required:

- State of Montana "124" Permit;
- 3A water quality permit for temporary variance during restoration of the water course;
- Army Corps of Engineers 404 Permit will be required for any work below the high water line of the Flathead River.

TECHNICAL DESIGNS AND SUPPORTING INFORMATION

Stream Channels And Viewing Windows

Basic Parameters and Elements

The primary design parameters are:

- Flow data from captured springs 1, 2 and 3, with a flow rate of 0.75 to 2.5 cubic feet per second;
- Site survey and preliminary stream path layout;
- Geologic data.

The design elements include:

- A constructed stream with a natural appearance, starting near the existing hatchery building and ending at the Flathead River. The alignment will minimize site disturbance and the stream bed will be lined with an impermeable material to prevent seepage loss;
- Two viewing structures, an accessible one on an upper stream riffle pool section and a two level viewing gallery and overlook on the lower stream at an oxbow bend;
- A fish ladder connecting the stream to the Flathead River. The ladder will have a natural step-pool appearance.

Stream Design

Stream channel appraisal design process employed the principles and practices of "Applied River Morphology," by Dave Rosgen, Wildland Hydrology, (1996). In simplistic terms, the Rosgen method emphasizes stream classification into 8 categories from "A" to "G" based on channel slope, shape and patterns, with further subclassifications of "1" to "6" being determined by width to depth ratio, entrenchment ratio, sinuosity, channel slope and proportions and sizes of materials making up the channel. Further classification can be made by evaluating the state and stability of an existing stream

channel. For the purpose of this Plan, only the first two levels of classification were employed; as we are creating a new stream channel, state and stability do not apply. Once classification has been established, the Rosgen design method requires that the stream channel be compatible with local terrain and materials. Rosgen designs use naturally occurring materials of stone and woody debris for channel configuration, stream bank protection, hydraulic control and habitat creation. Standard principles and practices of hydraulic design were also used in developing the stream channel.

The Rosgen channel types chosen for Sekokini Springs are A-3 for steeper gradients, E-3 for the broad meanders and shallow slope requirements of the flatter areas on the site, B-3 for intermediate slopes and two A-2 cascade sections. (See Appendix B for typical A-2, A-3 and E-3 configurations and Drawing 1848-100-9 of Appendix F for typical plans and sections.)

A3 and E3 stream types were chosen because of locally available materials for streambed composition (most available are river cobbles and glacial till) and to mimic local streambed composition. The A-3 channels on the steeper slopes have a slight meandering pattern, and will have a step-pool configuration, with a pool occupying each step down. In a step-pool arrangement, pool length is proportional to pool width, based on the steepness of the channel slope. Each pool will have a weir-like rock structure on the downstream end which will control the water level in the pool. The rock structures will be placed on geotextile fabric to provide cushioning and to help control flow through the structures. Stream sections with high gradients between the fish trap and the Flathead River have resting pools. The resting pools have been designed to be twice the size of other pools in a section.

The E-3 channels on the flatter slopes are typified by broad meanders, typically traversing a belt width of 15 to 20 feet on slopes from 0.6% to 1.4%. Water will move more slowly through these sections, and it may be desirable during final design to add boulder control structures for aeration and to add depth.

The substrate type of "3" for both channels was chosen based on the Geology Report, composition of other streams in the area, and economics. The Geology Report listed river deposits and glacial till as the predominate materials at Sekokini Springs, so type 3 channels which have a high proportion of cobble sized material to other constituents would mimic existing terrain. In the Rosgen method, degraded streams are restored to a state similar to others in the area. While the Sekokini Springs stream will be newly created, mimicking local streams will help to create a natural appearance and provide appropriate habitat. Finally, most of the streambed materials will have to be excavated elsewhere and hauled to the site. Costs from a local gravel company showed higher rates for sand and small gravels than for cobbles.

There are two cascade sections in the stream, occurring just upstream from the riffle pool and viewing gallery and platform structures. They are Rosgen type A-2 channels, with the "A" type signifying a steep slope, and the "2" indicating stream materials composed predominately of boulders, with a lower proportion of cobbles and smaller materials than the other A-3 sections. The cascade reaches will present barriers to upstream fish movement. If barriers are not desirable, the A-2 cascades should be altered during final design. Stream bed materials for this appraisal were assumed to be 1' deep.

The stream channel for Sekokini Springs has been located along a path which incorporates former rearing ponds and a roadbed. The proposed stream path has been surveyed, and that alignment was used to design the stream (Figure 2). The valley length (length of stream without meanders, or "fall

line") of the channel is 3170 linear feet, starting at the point where the flow from the spring boxes passes through a culvert near the hatchery building and ending at the Flathead River. The vertical drop from Station 0+00 at the culvert to 31+70 at the river is 85.5 feet. The entire length of the proposed stream including meanders and ponds is approximately 4860 feet; 3370 feet of E-3 channel and pond, 1400 feet of type A-3, and 90 feet of A-2 cascade. Excavation for streambed construction is estimated to be 6800 cubic yards, and fill to be 3054 cubic yards for the layout shown in the drawings in Appendix F. Excess materials will be about 3746 cubic yards. Any excess stream bed excavation materials that are stockpiled will need to have areas designated for that use and comply with NEPA guidelines.

Slopes in the steeper sections of the proposed stream path varied from 4% to 7.9%. The "A" type channel was chosen for this appraisal design due to steepness of slopes encountered along the proposed stream path and because of the lower width to depth ratio. At seasonal low flows, of 0.75 cfs, a low width to depth ratio in needed if there is to be enough water depth to support fish in the stream. The streambed compositions are listed in Appendix B. Two A-2 cascade sections are proposed just upstream from both viewing structures to provide aeration.

The entrance to the river must be constructed to discourage spawning by nonnative rainbow trout from the Flathead River. Because of the Wild and Scenic Recreational River Designation, only native materials will be used to create a natural stream outlet to the river. No concrete, metal, or other artificial structures are allowed. The channel will be constructed of river rocks and other local materials and will be built during low water to a point at about the normal high water line during August/September. Maintenance of this site will be difficult since the stream will be placed on the point of access. At least 4 to 6 feet of path needs to be left next to the constructed stream to allow both foot access to the river entrance. After floods etc, a certain amount of hand maintenance will likely be required at the mouth of the stream. Due to a large amount of raft traffic on the river, the entrance to the stream should not impede or endanger rafters in any way.

Rearing Ponds

Water supply for the four rearing ponds will be removed from the stream at or near the barrier and it may be possible to use some sort of diversion dam as the barrier. The water supply for the four ponds will be a series operation (ie. each pond gets fresh water from the creek), however, additional piping to provide parallel operation (ie water flows from one pond to another, etc) will be added for use when fewer than four genetic strains are reared. Water flow required for each pond will depend on temperature, oxygen level, and numbers and size of fish in each pond. The flow available from the upper three springs totals about 2.5 CFS but varies seasonally by about 20 percent. It might be necessary at times to use all the water from the upper springs to adequately supply the rearing ponds. This could be accomplished by would reducing or stopping the flow to the hatchery building once fish are transferred to the outdoor rearing area. The total headloss through the ponds can probably be held to 1 or 2 feet. The fourth spring is at the same level as the rearing ponds and can be routed either into the ponds or into the stream with the return water. The fourth spring is the coldest water available and will be beneficial to the to control water temperature in the "living stream".

The four rearing ponds will not be concrete construction but may be lined. Level control will be required on each of the ponds for normal operations. Most of the pond area will be "natural fish habitat" with natural or artificial woody debris, large rocks for cover, etc. A portion of the pond,

roughly 25%, will be deeper and devoid of obstacles. When it is required that fish be removed from the ponds, the level will be drawn down forcing the fish into the deeper area where the lack of cover will allow them to be netted or otherwise captured for use in restoration actions.

Arrangements are required at each pond to provide supplemental feeding of fish. Although pellets may be used it is also possible that other natural foods may be used, in particular Macroinvertebrates and insects could be grown in the fishless wetland pond or purchased. A certain amount of natural food would be grown in the stream above the ponds and in the ponds themselves. Operations of the site will encourage the maximum production of food in these areas both to reduce the cost of feeding fish but also to provide fish that are as close to wild as possible. Because of the grizzly bears that frequent the area, all food storage must be in sealed containers and in a locked building.

Spring Collectors and Associated Piping

The three spring collectors installed in April 2001 consist of 4-foot diameter precast concrete sections similar to sewage manholes. The average height of the structures is about 6 feet. They have a 4" thick concrete lid with a steel manhole cover and ring for access and cleanout. The spring water is collected by a series of 3/4 inch holes in the side of the structure. There are a total of about 80 holes to collect the spring flow. The outflow leaves through two pipes. The first is located about 18 inches off the floor and is 6-inches in diameter. The 6-inch diameter pipe supplies flow to the hatchery building and will be used intermittently. There is an AWWA certified gate valve about 3 feet from the collectors with a plastic pipe to allow operation of the valve. The second outlet is located about 4 feet off the floor of the structure and is 8-inches in diameter. This pipe is only about 15 feet in length on average and delivers all flow not required by the hatchery back to the existing channel created by the original spring. A drawing of the spring collector is in the appendix.

The piping from the spring collectors to the hatchery building ranges in length from about 40 feet to almost 200 feet in length. All the pipe is 6-inch diameter schedule 40 PVC. Several bends were used on the longer pipe runs. All three pipes are buried at a depth of 4 feet to allow winter operations and go under the foundation of the building and come up through the floor near the northeast corner of the building. Appendix F shows the layout of the spring collector piping and the approximate lengths.

Fish Trapping Facility

The fish trapping facility will be relatively simple but will have a concrete foundation and a structural steel frame. Details of the structure are not available at this time. The location of the structure will be as near as possible to the Flathead River so that no portion of the constructed stream has uncontrolled access to fish species The trap will be located near the bottom of the proposed type A channel leading from the bench to the Flathead River. The structure will be located behind a screen of trees so that it is not visible from the main stem Flathead River to comply with the Wild and Scenic River designation.

The fish trapping facility will be relatively simple, consisting of a concrete foundation and a structural steel frame. The primary purpose of the trap is to control and monitor upstream migration of adults from the river. In particular, the trap is envisioned as a control to prevent unwanted spawning of non-native Rainbow Trout in the stream sections constructed. The primary component of the trap will be a trap box and v-notch weir. The trap box will be large enough to hold fish for about 24 to 48 hours of the projected fish run and will be checked regularly by MFWP personnel. No building or support

facilities will be necessary at the site and the facility itself should occupy less that a 20'x 20' area straddling the constructed stream. The trapping facility will be designed to comply with the Wild and Scenic River designation for that stretch of the Flathead River.

Trails and Public Access Facilities

Public access is an important component of the facility and it is expected that nearly all areas of the site will be available to the public at some point. The "footprint" for the proposed trail system and interpretive sites already exists. The trails will follow existing roads and berms along the linear ponds that will be transformed into streams. Two trail loops are proposed to provide short and long tours of the site. The paths will be constructed of packed, crushed gravel or roadmix to allow all weather access. The high slope of most of the site will make handicapped access to all the site difficult, however, a large portion of the facility will be made available to all the public in accordance with ADA and other pertinent regulations mentioned elsewhere in this master plan. The trails will begin at the parking area, descend the access road to the lower bench near the four ponds where the trails diverge. One loop will cross a wooden foot bridge over a rearing pond and ascend to the upper stream reach past fish viewing site #1. The other will follow the lower stream to fish viewing site #2 and continue behind the hatchery building and back to the parking area along the existing road. Many of these same trails will provide maintenance access to the various stream sections. Interpretive signs an informational materials will be spaced around the site feature various topics such as the westslope recovery program, lifecycle of fish, habitat restoration, water conservation, and other topics such as noxious weeds, geology, and the characteristics of streams.

Development of public facilities will follow behind the development of the hatchery building and the constructed streams by one or two years. Prior to construction of the trails systems, specific plans will be made available to the Forest Service for review and comment. Designs for trails and other handicapped facilities will be done under the supervision of or reviewed by accessibility specialists at BOR or by others on contract to MFWP.

Education facilities will be provided in a proposed second floor in the hatchery building, above the fish rearing room. In the future we anticipate the addition of an attached, rustic room or visitor centers to be constructed on the front of the hatchery building. This addition will face the parking area and present an attractive facade of stripped log construction and glass with a cathedral sealing. Public restrooms will be provided in the extension of the existing hatchery building. No public restrooms are planned for the lower elevations of site. Portable facilities would be an option for busy times of the year such as late summer. Other infrastructure will be developed for public access at the same time as the education and restrooms such as an adequate parking lot, outdoor lighting around the building, and signage at the site and on the main access roads.

Residence(s), Office Space, and Maintenance Buildings

Office space will be incorporated into the remodel of the existing hatchery building. Up to four separate offices may be included at the site. The total number will depend on the extent and type of work going on in the hatchery building that throughout the site.

We propose two residences, each at least 1500 sq. ft., for hatchery personnel for security and site maintenance. One is proposed along the access driveway adjacent to the parking area, on the wide flat

area north of spring #1. The second would be accessed by an existing road and positioned to overlook the hatchery building. Both would be placed on land included in the existing special use permit and are far enough from surface waters for placement of septic systems. We propose two identical chalet-style wood frame construction on concrete foundations. The residences will be sided with rustic earth tones with asphalt shingles and to blend with the natural surroundings and nature preserve theme. The homes will be heated with propane and constructed to incorporate passive solar technology. The locations were selected for security at the site and visual distance from the river corridor. The hatchery building will be repaired to accommodate office space and sleeping quarters for temporary use by visiting scientists or personnel. Septic service from the hatchery building will be a list station, terminating at the residence adjacent to the access driveway.

Maintenance and storage facilities are required at the site. Current plans call for some storage at the hatchery building and additional storage and maintenance areas at a building on the lower level near the rearing ponds. All storage areas will be designed for bear proof food storage. The maintenance portion of the building will likely be a pole type structure for storage of vehicles, lawn mowers, and bulky spare parts.

Material Quantities

The creation of the streambed from the existing sloughs will require a great deal of fill material. Fortunately, some adequate fill material will be generated on site and can be stockpiled in designated areas for later use or placed directly where required. This material should be typical of that used for construction of embankments, roadbeds, etc. No particles should be larger than 3 inches in diameter. Cohesive clays should be minimal but there should be a minimum of 5 to 10% fines (passing a 200 sieve). The fill material should be free of organic debris. Top treatment can consist of agricultural loams as well as silty sands or sandysilts. The existing sloughs need to have all deposited sediments and organics removed prior to placement of fill materials. This material will be used to top treat disturbed areas and stabilized with vegetation. River rock and bedding gravel required for construction of the streambed above the liner will be purchased from local suppliers.

The NEPA process will require that all materials be stockpiled in designated areas and that all equipment be staged only in designated areas. All stockpile and staging areas must be cleared for archeological sites, endangered plants, and safety.

Cost Estimates

A cost estimate for construction of the stream sections and viewing windows is detailed in Table 1. The cost estimate for construction of the viewing windows and all channel sections is $811,744. This cost can be reduced by using MFWP equipment and labor where possible.

Repairs to the hatchery building have mostly been accomplished using MFWP labor. Additional costs for replacement of the steel skin of the building, extension of eves, and construction of eve supports and residences for the facility manager and fish culturist total $167,800. A detailed budget is provided in Table 2.

TABLE 1.

Sekokini Springs
Natural Fish Rearing Facility
APPRAISAL LEVEL DESIGN
Stream and Appurtenances
Flathead County, Montana

2001, Qtr 3, City Cost Index: Kalispell Mt.

Qty	Description	Daily Output	Labor Hours	Unit	Bare Mat.	Bare Labor	Bare Equip.	Total	Total Incl. O&P	Note
Mobilization and preparation:										
	Not exceed 5% of the Total for Schedule							5%	$38,654.48	
Diversion of spring during construction:										
				LumpSum					$5,000.00	
Removing existing Features:										
175	Site dml, pipe removal, sewer/water, no excavation, 12" dia	175	0.137	L.F.	$0.00	$572.25	$171.50	$743.75	$1,076.25	
Clearing and Grubbing										
3	Clear & grub, cut & chip light trees to 6" dia	1	48	Acre	$0.00	$3,375.00	$3,000.00	$6,375.00	$8,550.00	
33	Test pits, loader-backhoe, heavy soil	20	0.800	C.Y.	$0.00	$676.50	$359.70	$1,036.20	$1,419.00	
2,400	Stripping, topsoil & stockpiling, sandy loam, 200 HP dozer, adverse condtn	1,150	0.010	C.Y.	$0.00	$672.00	$1,464.00	$2,136.00	$2,616.00	
								SUBTOTAL		$12,585.00
Excavation for channel shaping:										
6,800	Ripping, till, boulder clay/hardpan, soft, adverse conditions	1,325	0.009	C.Y.	$0.00	$1,632.00	$3,604.00	$5,236.00	$6,596.00	
4,647	Excavating, bulk, dozer, 300 HP, 150' haul, common earth	800	0.015	C.Y.	$0.00	$1,905.27	$5,669.34	$7,574.61	$9,154.59	
								Subtotal		$15,750.59
Placing compacted backfill:										
400	Stream channel base, gravel, bank run, compacted, 6" deep	835	0.048	C.Y.	$7,360.00	$480.00	$1,200.00	$9,040.00	$10,000.00	
Constructing embankments:										
18,278	Compaction, riding, sheepsfoot or wobbly whl rlr, 6" lifts, 3 passes	1,725	0.007	C.Y.	$0.00	$3,290.04	$6,214.52	$9,504.56	$11,880.70	
18,278	Borrow, bank measure, sel gran fill, FE loader, wheel mtd, 5 CY bucket	2,850	0.004	C.Y.	$102,356.80	$2,193.36	$5,117.84	$109,668.00	$121,548.70	
								Subtotal		$133,429.40
Furnishing and placing geotextile for channel:										
2,317	Soil stabilization, woven geotextile cushion, A-3 Step pools and weirs	2,500	0.006	S.Y.	$1,989.00	$255.00	$0.00	$2,244.00	$2,567.00	

Qty	Description	Daily Output	Labor Hours	Unit	Bare Mat.	Bare Labor	Bare Equip.	Total	Total Incl. O&P	Note
Furnishing and placing geomembrane for channel:										
75,000	Membrane lining, Sta. 0+00 to 31+70, 60 mil thick	1,600	0.015	S.F.	$44,250.00	$22,500.00	$0.00	$66,750.00	$84,000.00	
Furnishing and placing stream channel materials										
	Delivered sand and gravel from local supplier's estimate			CY	$5,850.00				$5,850.00	
1,024	Place sand & gravel-6" Deep	28	0.857	CY		$22,284.29		$43,870.21	$73,612.43	
	Delivered cobbles from local supplier estimate			CY	$8,277.00				$8,277.00	
1,024	Machine placed	62	0.258	CY	$12,697.60	$7,999.49	$9,650.18	$30,347.26	$37,023.66	
1,030	Delilvered 2'-3' habitat enhancement boulders from local supplier estimate			Ea.				$41.00	$42,230.00	
	Machine placed			Ea.				$35.95	$37,028.50	
30	Furnish from site clearing and place root wads for habitat			Ea.					$3,000.00	
								Subtotal		$207,021.59
Furnishing and placing concrete viewing structures:										
150	Excavating, bulk, dozer, 105 HP, 300' haul, sand & gravel	140	0.086	C.Y.	$0.00	$346.50	$408.00	$754.50	$982.50	
15	Dewatering, 4" diaphragm pump used for eight hours	4	3	Day	$0.00	$1,200.00	$330.00	$1,530.00	$2,205.00	
40	Upper stream viewing window structure	27	3.074	LF	$68.20	$100.44	$18.54	$187.18	$219.00	
8	Upper stream viewing window structure 4' high sections	32	2.594	LF	$4,216.00	$6,795.20	$1,254.88	$12,266.08	$14,351.31	
200	Viewing window concrete slab exposed aggregate	545	0.044	SF	$48.04	$47.39		$95.43	$111.65	
1	Viewing window waterproofing &window specialty install								$2,500.00	
80	Stone wall, concrete footing, retaining wall, random stone, mortar set	50	0.320	S.F.	$844.00	$580.00	$0.00	$1,424.00	$1,840.00	
26	Backfill, structural, 75 H.P., 150' haul, common earth	490	0.024	C.Y.	$0.00	$17.16	$13.52	$30.68	$41.08	
26	Compaction,struct. or trench,walk behind, vib. plate 18" wide, 6" lifts	200	0.040	C.Y.	$0.00	$22.88	$8.06	$30.94	$44.72	
								Subtotal		$22,295.27
1,556	Excavating, bulk, dozer, 105 HP, 300' haul, sand & gravel	140	0.086	C.Y.	$0.00	$3,594.36	$4,232.32	$7,826.68	$10,191.80	
45	Dewatering, 4" diaphragm pump used for eight hours	4	3	Day	$0.00	$3,600.00	$990.00	$4,590.00	$6,615.00	
60	Concrete in place, grade walls, 15" thick, 18' high	49	4.094	C.Y.	$7,140.00	$5,220.00	$723.00	$13,083.00	$16,860.00	
276	Concrete in place, lift slab abv fndn w/forms/reinf/conc/cols,max	1,500	0.139	S.F.	$1,835.40	$816.96	$107.64	$2,760.00	$3,519.00	
170	Parapet walls	32	2.594	LF	$2,738.14	$125,881.08	$23,246.65	$151,865.88	$177,683.07	
120	Concrete in place, retaining wall, gravity, 10' high	125	1.600	C.Y.	$9,960.00	$4,080.00	$565.20	$14,605.20	$18,360.00	
3	Viewing window waterproofing &window specialty install								$7,500.00	
1,482	Backfill, structural, 75 H.P., 150' haul, common earth	490	0.024	C.Y.	$0.00	$978.12	$770.64	$1,748.76	$2,341.56	
1,482	Compaction,struct. or trench,walk behind, vib. plate 18" wide, 6" lifts	200	0.040	C.Y.	$0.00	$1,304.16	$459.42	$1,763.58	$2,549.04	
								Subtotal		$245,619.47
Erosion Control:										
500	Erosion control, jute mesh, 100 SY per roll, 4' wide, stapled	2,400	0.010	S.Y.	$215.00	$110.00	$40.00	$365.00	$450.00	
500	Erosion control, silt fence, polypropylene, 3' high, ideal conditions	1,600	0.010	L.F.	$110.00	$110.00	$0.00	$220.00	$295.00	
								Subtotal		$745.00
Furnish and Install Fish Trap:										
				LumpSum					$20,000.00	
Revegetation:										
2				Acre					$13,000.00	
						Subtotal			$773,089.57	
						TOTAL FOR SCHEDULE			**$811,744.05**	

2. SEKOKINI SPRINGS NATURAL REARING FACILITY

SUPPORT FACILITY COST ESTIMATE

	UNIT	COST	TOTAL	NOTES
Q FT RESIDENCE-MODULAR	sq ft	$ 45.00	$ 54,000.00	includes setup and delivery
Q FT RESIDENCE-MODULAR	sq ft	$ 45.00	$ 54,000.00	includes setup and delivery
lift station for hatchery building	lump sum	$10,000.00	$ 10,000.00	duplex system with floats
ıiping from hatchery building ıfield (about 400 feet).	ft	$ 12.00	$ 4,800.00	includes excavation and backfill
e septic tank and drainfield for y building and residences	lump sum	$ 8,500.00	$ 8,500.00	includes excavation, backfill, and drain box
‹, carport, and utilities ɜic foundations	lump sum	$ 9,000.00	$ 9,000.00	
ı water well and water piping ıery building	lump sum	$ 7,000.00	$ 7,000.00	
n and plumbing in hatchery building	lump sum	$ 4,000.00	$ 4,000.00	
n and drainfield at rearing ponds		$ 8,500.00	$ 8,500.00	
ɜurfacing for parking areas and y building area		$ 8,000.00	$ 8,000.00	3 inches compacted roadmix
		total	$167,800.00	

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APPENDIX A

Environmental Assessment and state action filed
to purchase the Sekokini Springs Hatchery
and associated improvements to produce
westslope cutthroat trout for the
Hungry Horse Mitigation Program.

MEPA/NEPA/HB495 GENERIC CHECKLIST

PART I. PROPOSED ACTION DESCRIPTION

1. **Type of Proposed State Action** Purchase the Sekokini Springs Trout Farm hatchery building and improvements and assume US Forest Service Special Use Permit for Department use of the facility to produce westslope cutthroat trout for the Hungry Horse Mitigation Program.

2. **Agency Authority for the Proposed Action**_MCA 87-1-611 to -615 authorize FWP to enter into fish and wildlife mitigation agreements MCA 87-1-611 to -615 authorize FWP to enter into fish and wildlife mitigation agreements. Funds provided to the department under a mitigation agreement generally must be spent in accordance with the agreement for fish and wildlife mitigation or enhancement purposes 87-1-612. Any agreement with an agency under which the funds in this case are provided should address a fishery mitigation or enhancement purpose. The department also has the authority to acquire land and water under 87-1-209(1)(a) for fish hatcheries and nursery ponds. Under 87-1-222, the department may locate, lay out, construct and maintain nurseries and rearing ponds where fry can be planted, propagated, and reared to be distributed in the waters of the state.

3. **Name of Project** Sekokini Springs Natural Fish Rearing Project

4. **Name, Address and Phone Number of Project Sponsor (if other than the agency)**
This project is funded by Bonneville Power Administration:
P.O. Box 3621
Portland, OR 97208

5. **If Applicable:**

Estimated Construction/Commencement Date N/A - existing facility
Estimated Completion Date ___
Current Status of Project Design (% complete) ___

6. **Location Affected by Proposed Action (county, range and township)**
Flathead County, Montana
Township 31 North, Range 19 West, Section 17, PMM
Building and improvements on 11.4 acres in NE 1/4.
Property of US Forest Service

7. **Project Size: Estimate the number of acres that would be directly affected that are currently:**

(a) Developed:
residential .... 0.25 acres
industrial .... 0.5 acres

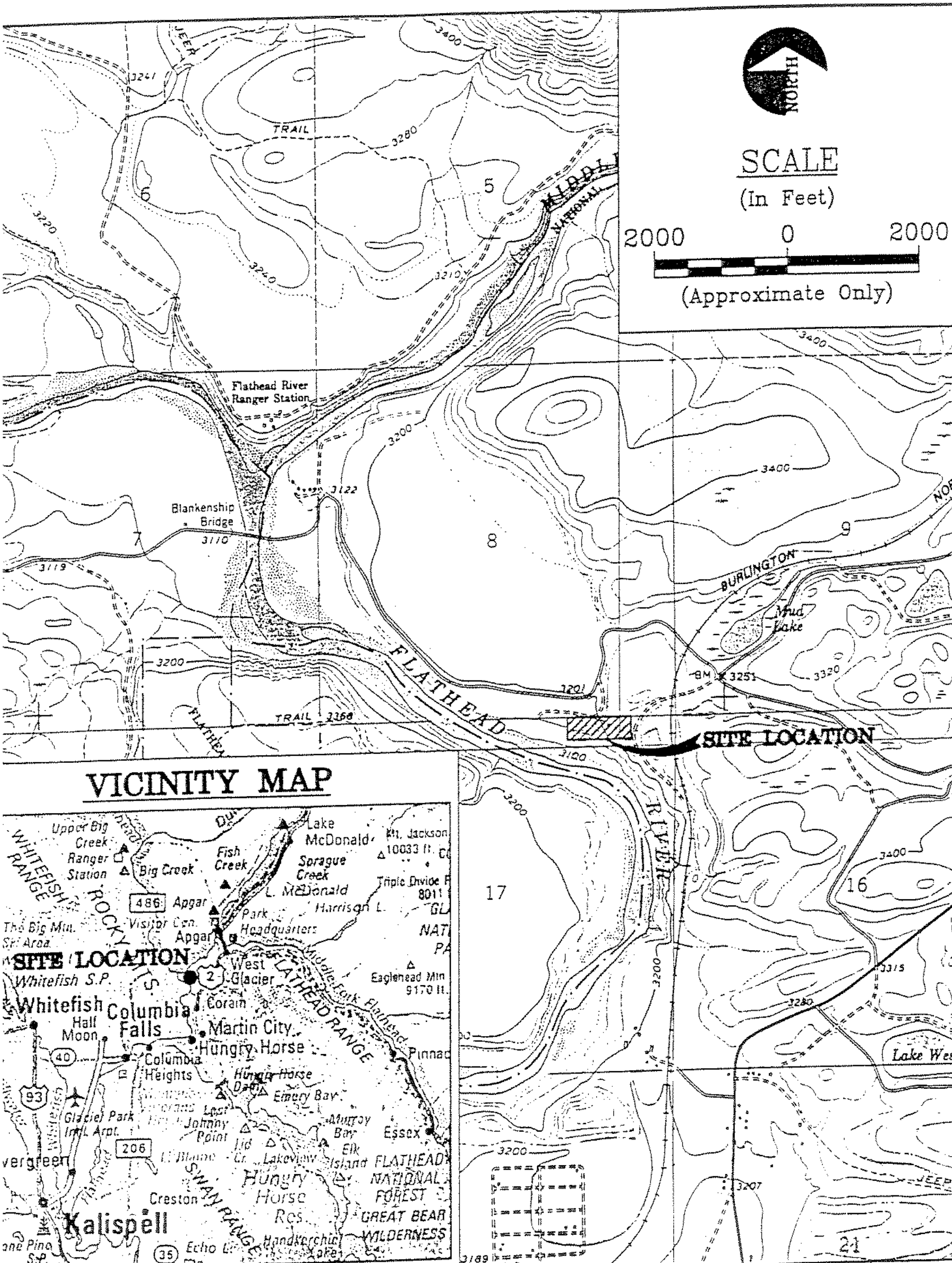
(b) Open Space/Woodlands/
Recreation ..... 0 acres

(c) Wetlands/Riparian
Areas ..... 11.4 acres

(d) Floodplain . . . . . 0 acres

(e) Productive:
irrigated cropland . . . . . 0 acres
dry cropland . . . . . 0 acres
forestry . . . . . 0 acres
rangeland . . . . . 0 acres
other (fish ponds/streams) 6.0 acres

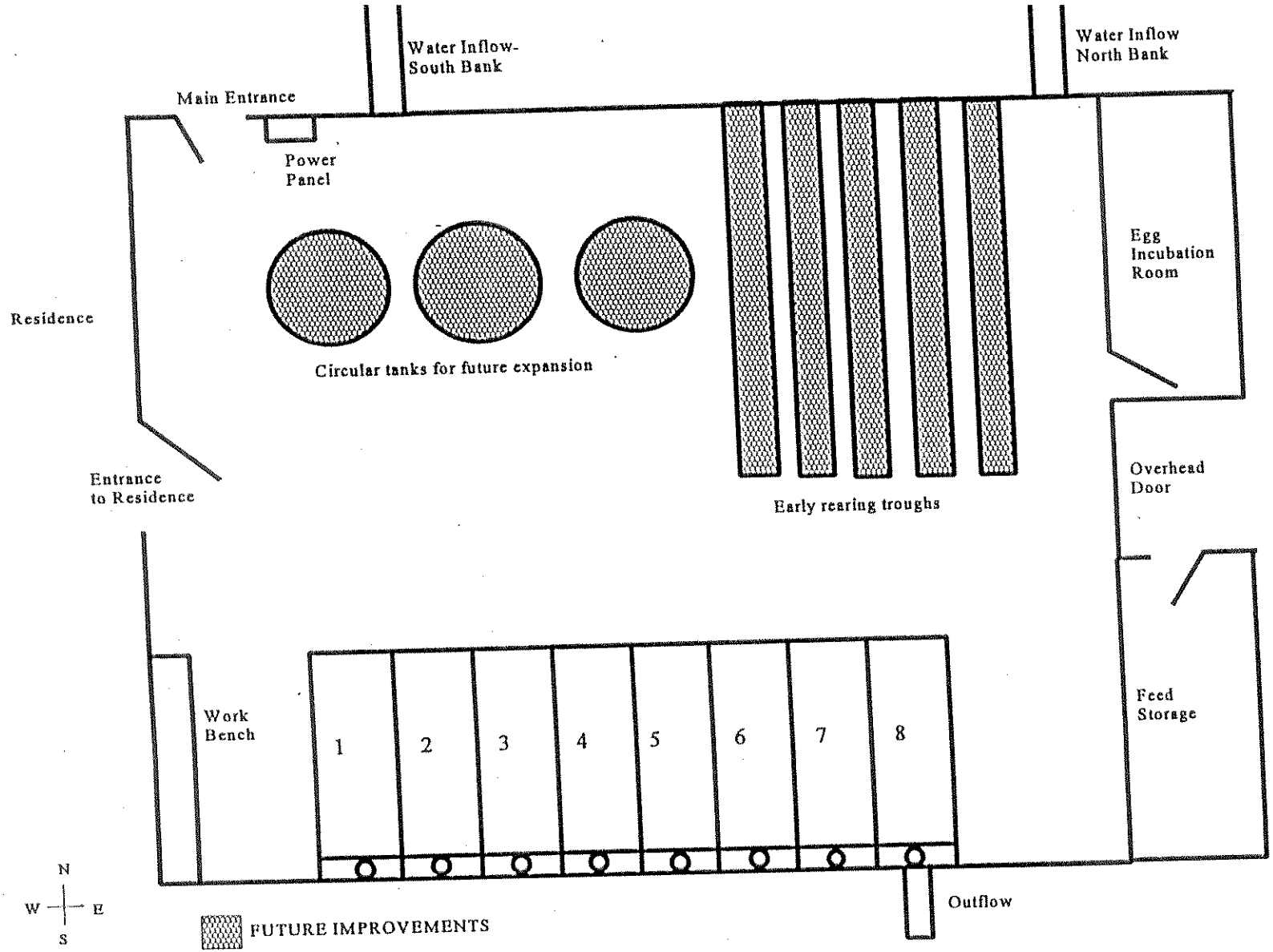
8. **Map/site plan: attach an original 8 1/2" x 11" or larger section of the most recent USGS 7.5' series topographic map showing the location and boundaries of the area that would be affected by the proposed action. A different map scale may be substituted if more appropriate or if required by agency rule. If available, a site plan should also be attached.**



EKOKINI SPRINGS HATCHERY PROPERTY PHASE I ENVIRONMENTAL ASSESSMENT	SITE LOCATION AND VICINITY MAP	FIGURE 1

ATE TIME: 1:00PM
\ 0864\065\0072\HEL\012198\J:\STORAGE\86498A01.DWG

Hydrometrics, Inc. Consulting Scientists, Engineers and Contractors



SEKOKINI SPRINGS HATCHERY BUILDING

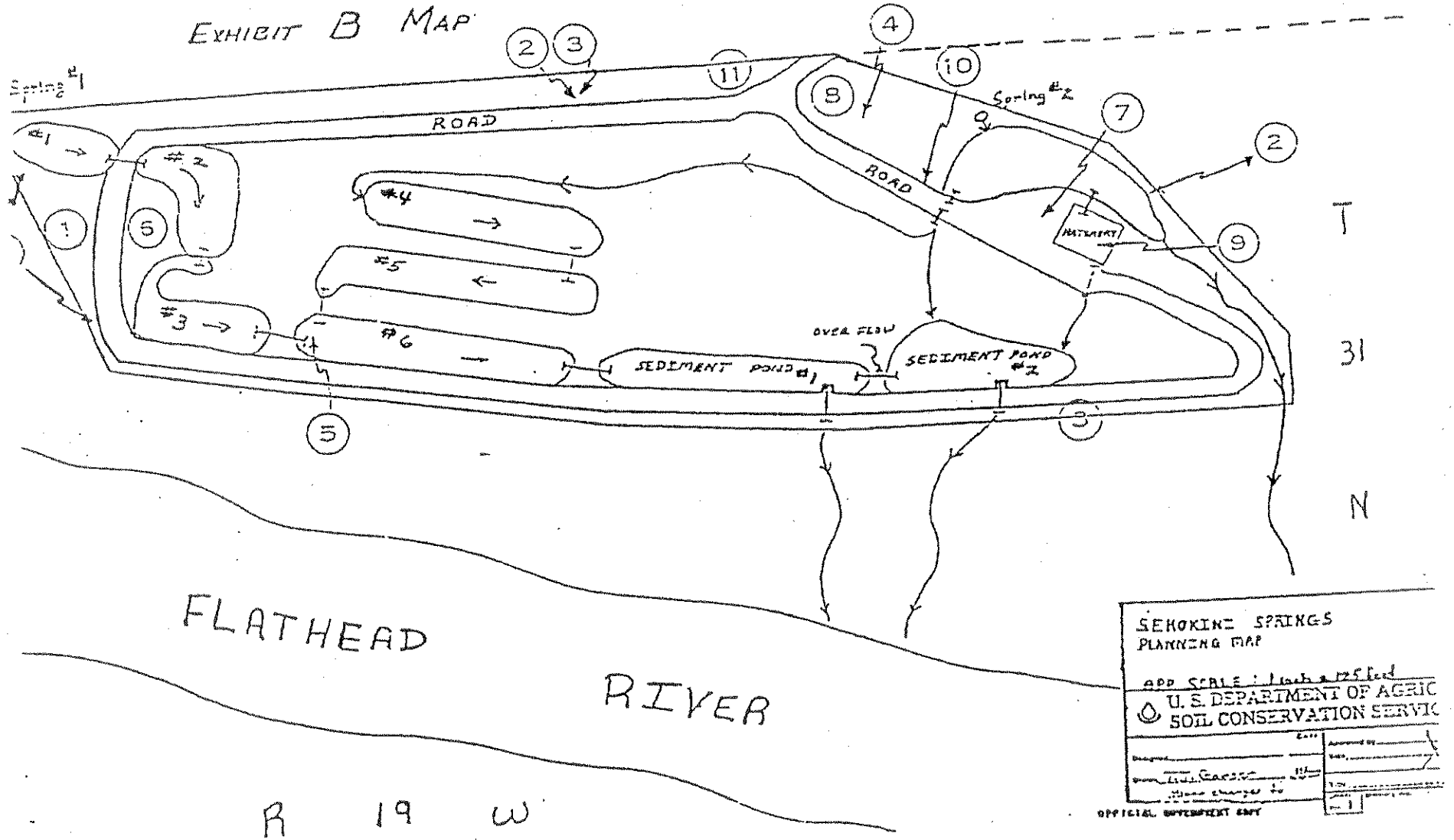


EXHIBIT B MAP
Spring #1
ROAD
#1
#2
#3
#4
#5
#6
1
2
3
4
5
7
8
9
10
11
Spring #2
ROAD
HAYSHED
OVER FLOW
SEDIMENT POND #1
SEDIMENT POND #2
T
31
N
FLATHEAD
RIVER
R 19 W
SEKOKINE SPRINGS
PLANNING MAP
U. S. DEPARTMENT OF AGRIC
SOIL CONSERVATION SERVIC

9. **Narrative Summary of the Proposed Action or Project including the Benefits and Purpose of the Proposed Action.**

The hatchery portion of the Hungry Horse Mitigation program is presently in transition to experimental culture of native species as directed by the Hungry Horse Mitigation Plan (MFWP and CSKT 1991) and Implementation Plan (1993). The Northwest Power Planning Council (NPPC) approved the plans and amended their Columbia Basin Fish ans Wildlife Program (Measure 10.3A, NPPC 1995).

The privately owned Sekokini Springs Trout Farm has potential to become a primary focus of our native species recovery program. The site offers a unique combination of natural habitat for onsite restoration work and a small trout rearing facility. Four natural springs of varying water temperatures and the isolated setting provide an opportunity for small scale, experimental rearing of native species under natural habitat conditions.

We plan to assume the Special Use Permit for the land and purchase existing improvements at the site. The existing improvements are privately owned on land belonging to the U.S. Forest Service (Forest). For two generations (40 years), the private trout farm has existed through a lease agreement with the Forest. The facility is presently owned and operated by the founder's son, Mr. Cary King of 5850 Rabe Road, Columbia Falls, MT 59912. Mr. King has offered to sell the improvements on the Forest special use permit for $78,000.

In the interim, FWP and Mr. King have cosigned a personal services contract for $600 per month (Jan. through Mar.) and $1200 per month (Apr. through June) to allow the Hungry Horse Mitigation Implementation Group (IG) to rear westslope cutthroat for our Hungry Horse Mitigation Program. The US Fish and Wildlife Service is presently operating the Sekokini Springs facility as a cooperator under the direction of the IG. The Hungry Horse Mitigation Program funds a 1.0 FTE federal hatchery person and supplies, including fish food and enclosed hatching area. Approximately 83,000 trout eggs were transferred to the site in July 1997 for hatching and rearing after a thorough disease inspection by the FWP Fish Health Specialist. The site tested negative to fish diseases. The existing personal services contract expires in June 1998 to allow the IG to rear westslope cutthroat at the site until environmental conditions are suitable for out planting. Fish presently reared at the site are M012 westslope cutthroat trout from Washo Park State Hatchery. All M012 are slated for small closed-basin lakes and will not be used for restoration stocking in the contiguous Flathead River system to initiate spawning runs. The personal services agreement provided time to complete purchase arrangements. Optimally, roughly half of the fish presently at the site would be reared beyond June 1998, contingent on the purchase of the facility, to be outplanted as age II and III in offsite, closed-basin lakes. In the future, restoration plans require a source of wild westslope cutthroat eggs for use in remote site incubators for restoration of runs (this aspect is beyond the scope of this EA and will be addressed in a future NEPA/MEPA document).

The improvements consist of a steel building with hatchery facilities in the back and living quarters in the front. The facility also has one open sided wood storage shed, four cement fish tanks, approximately nine earthen trout ponds and two sediment ponds. The pond system has not been fully utilized in recent years. Most of the ponds have wooden planks at the outlets to control water levels and screens over the culverts leading to other ponds. Water has been routed through the complex to achieve the most direct drainage path to the Flathead River. The two sediment ponds are fitted with concrete outlet controls and piping to the Flathead River. Water exits the facility through two screened outlet culverts in each of the two sediment ponds and small vegetated seeps located north and south of the ponds.

The steel building, built in 1979, is 42 by 60 feet with 16 foot walls and a concrete floor. The hatchery portion is approximately 40 by 42 feet, with a 12 by 12 foot fiberglass overhead door and a standard steel door for access. The interior walls are unfinished and contain 7 tinted windows on the north and south for light. This area is fully wired and plumbed, but not to modern code. Four cement fish tanks are 6'6" x 12 feet in dimension and 3 feet deep, pre-made septic tanks with outlets on the bottom for drainage. The tanks were installed in 1981. On each side of the overhead door are two metal sheds attached to the main structure. The shed on the northeast corner can be directly accessed through the steel building and has been used as an incubation room. The shed on the southeast corner is accessed by a steel door on the outside and is used for storage. The front 20 feet is utilized for living quarters. The upstairs contains three bedrooms and one bathroom. The lower level is an open area containing a kitchen and living-dining room and one bathroom. This area is finished with sheetrock and painted and the floors are carpeted and tiled. The home is heated by a large wood burning

stove. This area could be used as office space for personnel operating the facility.

The open-sided shed is approximately 12 by 12 feet, 12 feet high in the front and sloping to 8 feet high in the rear. Rough pine and 2 x 4's were used for the sides and metal sheeting serves as the roof. This covered area can be used for equipment storage.

Initially, our Phase I goal is to negotiate a long-term Special Use Permit with the Forest and purchase the improvements for FWP use . Non-native rainbow trout held at the facility are believed to have escaped to the Flathead River over time due to pond overflow, and absent or improperly maintained outlet screens. Fish escapement is possible even at state-of-the-art facilities. During the period the trout farm was in operation, rainbow trout became established in the Flathead River. A wild, self-sustaining population presently exists. The highest concentration of rainbow trout reside in the reach from Sekokini Springs downstream to Eleanor Island, approximately 24 km. Non-native rainbow can hybridize with native westslope cutthroat. Although the rainbow spawning run (early April) typically begins nearly a month earlier than westslope cutthroat (May), the two species may hybridize. Juveniles of both species rear in their natal tributaries for 1 to 4 years. Some direct, intra-specific competition is likely where native and non-native species rear in the same habitat. The established population in the Flathead River poses a threat to the genetic integrity of cutthroat in the watershed. By assuming the Special Use Permit and obtaining the facility, fisheries managers can assure that species held at the facility are genetically compatible with native species in the Flathead River. Also, by purchasing the facility, rather than contracting with a private entity, cooperators on the Hungry Horse mitigation team can launch the habitat aspect of the project (Phase II and III) in direct cooperation with the Forest Service.

It is extemely important to secure the facility's water source and prevent fish diseases from contaminating the site. The outdoor component, because of the earthen pond and stream system, would be virtually impossible to sterilize if a fish pathogen infected the area used for propagation. The State Fish Health Specialist has and will continue to supervise the transfer of fish products to the site.

Contingent on Phase I, future plans (with future NEPA/MEPA documentation) are to modernize the small propagation facility and improve the habitat at the site to establish a wild run of westslope cutthroat from the Flathead River to the site. The habitat portion will require a separate Special Use Permit from the Forest Service. The goal is to develop a locally compatible source of wild westslope cutthroat for restoration purposes and create additional habitat for wild westslope cutthroat. This will be accomplished in cooperation with Washo Park State Hatchery, the State Fish Health Specialist and the MSU genetics laboratory. A protocol for maintaining the genetic diversity of the local stock(s) will be established in cooperation with the MSU genetics lab. Once a wild run can be established in the natural rearing portion of the site, surplus spawners can be used as an alternate source of eggs to alleviate the need to take gametes from the weak but recoverable, wild cutthroat stocks. Returning spawners will have demonstrated their ability to survive to adult age in the Flathead system, so their gametes and progeny should prove to be acceptable for restoration programs. Habitat improvement projects being completed under the Hungry Horse Mitigation program will aid in the recovery of the species using non-propagation techniques.

A master plan for future improvements (Phase II and III), including cost-benefit evaluations is under development. Funding from BPA is subject to several levels of technical and policy evaluation. Projects are prioritized and selected for funding by regional fisheries managers who form the Columbia Basin Fish and Wildlife Authority. The scientific merit of projects is reviewed by the Independent Science Advisory Board (comprised of experts throughout the Columbia Basin). Policy direction is provided by the Northwest Power Planning Council as per their Columbia Basin Fish and Wildlife Program, and the Council approved Hungry Horse Mitigation and Implementation Plans. Contract proposals and funding contracts are administered by Bonneville Power Administration.

10. Listing of any other Local, State or Federal agency that has overlapping or additional jurisdiction.

(a) Permits:

Agency Name	Permit	Date Filed/#
US Forest Service	Special Use Permit	Current Owner 1/1/98

(b) Funding:

Agency Name	Funding Amount
Bonneville Power Administration	$78,000.00 via USFWS Mitigation Budget

Funding will transfer ownership of improvements to Montana Fish Wildlife & Parks The Service contract contains a 1.0 FTE hatchery person and funding for supplies, including fish food and an enclosed hatching area.

(c) Other Overlapping or Additional Jurisdictional Responsibilities:

Agency Name	Type of Responsibility
US Fish and Wildlife Service	Care of hatchery and fish products

11. **List of Agencies Consulted During Preparation of the EA:**
US Forest Service
Montana Fish Wildlife & Parks Hatchery Division
US Fish and Wildlife Service
Confederated Salish and Kootenai Tribes
Bonneville Power Administration
Columbia Basin Fish and Wildlife Authority
Northwest Power Planning Council
Hydrometrics, Inc.

RT II. ENVIRONMENTAL REVIEW

Evaluation of the Impacts of the Proposed Action Including Secondary and Cumulative Impacts on the Physical and Human ironment:

(SICAL ENVIRONMENT

LAND RESOURCES ll the proposed action result in:	IMPACTS				Can Impacts Be Mitigated*	Comment Index
	Unknown*	None	Minor*	Potentially Significant*		
Soil instability or changes in geologic substructure?		X				
Disruption, displacement, erosion, compaction, moisture loss, over-covering of soil which would reduce productivity or tility?		X				
Destruction, covering or modification of any unique geologic or ysical features?		X				
Changes in siltation, deposition or erosion patterns that may dify the channel of a river or stream or the bed or shore of a e?		X				
Other: This EA includes the administrative change the special use permit and purchase of provements only		X				

clude an attachment with a narrative explanation describing the scope and level of impact. If the impact is unknown, explain why the unknown impac not or cannot be evaluated.

ive Description and Evaluation of the Cumulative and Secondary Effects on Land Resources (Attach additional pages of narrative if needed):

obtaining the special use permit and purchasing the improvements, the Hungry Horse Mitigation Program will pursue habitat improvements at the site. actions will necessitate additional NEPA/MEPA documentation.

SICAL ENVIRONMENT

AIR ll the proposed action result in:	IMPACTS				Can Impacts Be Mitigated*	Comment Index
	Unknown*	None	Minor*	Potentially Significant*		
mission of air pollutants or deterioration of ambient air quality?		X				
Creation of objectionable odors?		X				
Alteration of air movement, moisture or temperature patterns, or change in climate, either locally or regionally?		X				
Adverse effects on vegetation, including crops, due to increased issions of pollutants?		X				
Other:						

itive Description and Evaluation of the Cumulative and Secondary Effects on Air Resources (Attach additional pages of narrative if needed):

lude an attachment with a narrative explanation describing the scope and level of impact. If the impact is unknown, explain why the unknown impac not or cannot be evaluated.

ICAL ENVIRONMENT (continued)

WATER I the proposed action result in:	IMPACTS				Can Impacts Be Mitigated*	Comment Index
	Unknown*	None	Minor*	Potentially Significant*		
ischarge into surface water or any alteration of ace water quality including but not limited to perature, dissolved oxygen, turbidity or pathogens?			X		Yes	Hatchery Fish will use Oxygen and release nutrients
Changes in drainage patterns or the rate and amount urface runoff?		X				
Alteration of the course or magnitude of flood water or er flows?		X				
Changes in the amount of surface water in any water ly or creation of a new water body?		X				
Exposure of people or property to water related ards such as flooding?		X				
Changes in the quality of groundwater?		X				
Changes in the quantity of groundwater?		X				
Increase in the risk of contamination of surface or undwater?		X				
Violation of the Montana Non Degradation Statute?		X				
Effects on any existing water right or reservation?		X				
Effects on other water users as a result of any eration in surface or groundwater quality?		X				
Effects on other users as a result of any alteration in rface or groundwater quantity?		X				
Other:						

ative Description and Evaluation of the Cumulative and Secondary Effects on Air Resources (Attach additional pages of narrative if needed):

r flow through the facility will not change from current or past practices at the existing Trout Farm Facility. Experimental culture of westslope cutthroat occur at low densities. Nutrient bi-products from the fish will be treated biologically within the stream and pond habitat. The existing facility has two ment ponds dedicated to this purpose.

clude an attachment with a narrative explanation describing the scope and level of impact. If the impact is unknown, explain why the unknown impac not or cannot be evaluated.

SICAL ENVIRONMENT (continued)

VEGETATION I the proposed action result in:	IMPACT				Can Impacts Be Mitigated*	Comment Index
	Unknown*	None	Minor*	Potentially Significant*		
hanges in the diversity, productivity or abundance of plant cies (including trees, shrubs, grass, crops, and aquatic plants)?			X			Pond operation
lteration of a plant community?		X				
dverse effects on any unique, rare, threatened, or endangered t species?		X				
leduction in acreage or productivity of any agricultural land?		X				
stablishment or spread of noxious weeds?		X				
ther:						

tive Description and Evaluation of the Cumulative and Secondary Effects on Vegetation Resources (Attach additional pages of narrative if needed):

ation of pond elevations may flood terrestrial vegetation on the pond margins and increase the range of aquatic vegetation and riparian vegetation. This t a change from current or past operation of the facility.

SICAL ENVIRONMENT

FISH/WILDLIFE ill the proposed action result in:	IMPACT				Can Impact Be Mitigated*	Comment Index
	Unknown*	None	Minor*	Potentially Significant*		
eterioration of critical fish or wildlife habitat?		X				
hanges in the diversity or abundance of game animals or bird species?			X			Change to native fish species (WCT)
hanges in the diversity or abundance of nongame species?		X				
ntroduction of new species into an area?		X				
reation of a barrier to the migration or movement of animals?		X				
dverse effects on any unique, rare, threatened, or endangered species?		X				
ncrease in conditions that stress wildlife populations or limit abundance cluding harassment, legal or illegal harvest or other human activity)?		X				
Other:						

ative Description and Evaluation of the Cumulative and Secondary Effects on Land Resources (Attach additional pages of narrative if needed):

toration of native westslope cutthroat trout at the site was beneficial to native populations downstream of the facility. Historically, non-native rainbow t were able to escape to the Flathead River where they could potentially hybridize with native cutthroat.

clude an attachment with a narrative explanation describing the scope and level of impact. If the impact is unknown, explain why the unknown impac not or cannot be evaluated.

AN ENVIRONMENT

NOISE/ELECTRICAL EFFECTS

l the proposed action result in:	IMPACT				Can Impact Be Mitigated*	Comment Index
	Unknown*	None	Minor*	Potentially Significant*		
reases in existing noise levels?		X				
posure of people to serve or nuisance noise levels?		X				
eation of electrostatic or electromagnetic effects that could be nental to human health or property?		X				
erference with radio or television reception and operation?		X				
her: ___						

ve Description and Evaluation of the Cumulative and Secondary Effects on Land Resources (Attach additional pages of narrative if needed):

IAN ENVIRONMENT

LAND USE

ll the proposed action result in:	IMPACT				Can Impact Be Mitigated*	Comment Index
	Unknown*	None	Minor*	Potentially Significant*		
lteration of or interference with the productivity or profitability of existing land use of an area?			X			Building will Change from private ownership
onflicted with a designated natural area or area of unusual ntific or educational importance?		X				Improved educational resource
onflict with any existing land use whose presence would constrain otentially prohibit the proposed action?		X				
dverse effects on or relocation of residences?			X			Shift from private domicile to office space
)ther: ___						

ive Description and Evaluation of the Cumulative and Secondary Effects on Land Resources (Attach additional pages of narrative if needed):

will remain US Forest Service property. Improvements will transfer from private to FWP property. The private owner will move to a nearby property. c use of the site will likely increase. Future plans for the site include educational interpretation site for native species restoration in the Flathead River orm.

MAN ENVIRONMENT

RISK/HEALTH HAZARDS

ill the proposed action result in:	IMPACT*				Can Impact Be Mitigated*	Comment Index
	Unknown*	None	Minor*	Potentially Significant*		

lude an attachment with a narrative explanation describing the scope and level of impact. If the impact is unknown, explain why the unknown impac not or cannot be evaluated.

of an explosion or release of hazardous substances (including, t limited to oil, pesticides, chemicals, or radiation) in the event of ident or other forms of disruption?			X		yes	Hatchery disease treatment chemicals
ect an existing emergency response or emergency evacuation r create a need for a new plan?		X				
ation of any human health hazard or potential hazard?		X				
ner: ___						

a Description and Evaluation of the Cumulative and Secondary Effects on Land Resources (Attach additional pages of narrative if needed):

e of chemicals to treat or prevent fish diseases is occasionally required in hatchery settings. The Sekokini Springs site is currently free of fish diseases s extremely important that no diseases are transported to the facility. State law requires the approval of the State Fish Health Specialist for transfer products to the facility. Imported eggs can be treated before introduction to the facility. Even though no fish diseases have been identified at the site, and formulin may be used in low concentrations during hatching and early rearing as a preventative measure. Chemicals, if used, will be applied at n concentrations in compliance with state regulation.

lude an attachment with a narrative explanation describing the scope and level of impact. If the impact is unknown, explain why the unknown impact not or cannot be evaluated.

N ENVIRONMENT

OMMUNITY IMPACT

the proposed action result in:	IMPACT* Unknown*	None	Minor*	Potentially Significant*	Can Impact Be Mitigated*	Comment Index
eration of the location, distribution, density, or growth rate of the n population of an area?			X		yes	Family will move to nearby homesite
eration of the social structure of a community?		X				
eration of the level or distribution of employment or community or nal income?		X				
anges in industrial or commercial activity?		X				
reased traffic hazards or effects on existing transportation ies or patterns of movement of people and goods?			X		yes	Public viewing of the facility may increase
her: ___						

e Description and Evaluation of the Cumulative and Secondary Effects on Land Resources (Attach additional pages of narrative if needed):

rivate residence on the Forest Lease will be converted to office space for daily visits by hatchery personnel. Future plans for an educational interpretive /ill likely increase public viewing of the facility (A separate MEPA document will be filed for any future improvements at the site).

AN ENVIRONMENT

PUBLIC SERVICES/TAXES/UTILITIES

the proposed action result in:	IMPACT* Unknown*	None	Minor*	Potentially Significant*	Can Impact Be Mitigated*	Comment Index
ave an effect upon or result in a need for new or altered rnmental services in any of the following areas: fire or police ection, schools, parks/recreational facilities, roads or other public ntenance, water supply, sewer or septic systems, solid waste osal, health, or other governmental services? If any, specify:			X			Administrative change only
lave an effect upon the local or state tax base and revenues?			X			State will no longer pay rent for use of the site
lesult in a need for new facilities or substantial alterations of any of following utilities: electric power, natural gas, other fuel supply or ribution systems, or communications?		X				
Result in increased used of any energy source?			X			Heat source will be needed in the Hatchery Building
Other: ___						

tive Description and Evaluation of the Cumulative and Secondary Effects on Land Resources (Attach additional pages of narrative if needed):

he USFWS is currently operating the facility as cooperator under the Hungry Horse Mitigation Program. This involves daily visits by one hatchery employee er than infrequent visits by mitigation personnel for maintenance, cleaning and minor improvements, the existing arrangement for government services ot expected to change.

he state is currently paying $600 to $1200 per month to hatch and rear westslope cutthroat at the site. Federal dollars will be used to purchase the rovements for the state so that rent will no longer be required. Hungry Horse Mitigation funding will pay for operation and maintenance.

he hatchery building is currently unheated. When a heat source is added and operated, additional energy (i.e. gas, oil or electricity) will be used

lude an attachment with a narrative explanation describing the scope and level of impact. If the impact is unknown, explain why the unknown impac not or cannot be evaluated.

N ENVIRONMENT

AESTHETICS/RECREATION the proposed action result in:	IMPACT*				Can Impact Be Mitigated*	Comment Index
	Unknown*	None	Minor*	Potentially Significant*		
eration of any scenic vista or creation of an aesthetically ive site or effect that is open to public view?		X				Site will be improved by removing junk etc.
eration of the aesthetic character of a community or borhood?		X				
eration of the quality or quantity of recreational/tourism tunities and settings? (Attach Tourism Report)		X				
her: __						

e Description and Evaluation of the Cumulative and Secondary Effects on Land Resources (Attach additional pages of narrative if needed):

AN ENVIRONMENT (continued)

CULTURAL/HISTORICAL RESOURCES the proposed action result in:	IMPACT				Can Impacts Be Mitigated*	Comment Index
	Unknown*	None	Minor*	Potentially Significant*		
estruction or alteration of any site, structure or object of istoric, historic, or paleontological importance?		X				
nysical change that would affect unique cultural or historic values?		X				
ffects on existing religious or sacred uses of a site or area?		X				
ther: __						

tive Description and Evaluation of the Cumulative and Secondary Effects on Cultural/Historical Resources (Attach additional pages of narrative if needed):

EA covers ownership change and operation of the site as it has been operated historically. A change from non-native rainbow to native westslope roat trout rearing is a positive change.

NIFICANCE CRITERIA

SUMMARY EVALUATION OF SIGNIFICANCE l the proposed action, considered as a whole:	IMPACT				Can Impacts Be Mitigated*	Comment Index
	Unknown*	None	Minor*	Potentially Significant*		
lave impacts that are individually limited, but cumulatively considerable? (A ect or program may result in impacts on two or more separate resources ch create a significant effect when considered together or in total.)		X				
nvolve potential risks or adverse effects which are uncertain but extremely ardous if they were to occur?		X				
otentially conflict with the substantive requirements of any local, state, or eral law, regulation, standard or formal plan?		X				
stablish a precedent or likelihood that future actions with significant ironmental impacts will be proposed?		X				
enerate substantial debate or controversy about the nature of the impacts t would be created?		X				

ude an attachment with a narrative explanation describing the scope and level of impact. If the impact is unknown, explain why the unknown impac not or cannot be evaluated.

ıer:						

ive Description and Evaluation of the Cumulative and Secondary Effects on Cultural/Historical Resources (Attach additional pages of narrative if needed):

er to state ownership will allow for the investment of Hungry Horse Mitigation funding to protect and restore natural features at the site. Any future s must be addressed in additional or supplemental MEPA/NEPA documents. All future actions are contingent on the the purchase of these improvements ıe successful negotiation of the Forest Service Lease and Special Use Permit.

RT II. ENVIRONMENTAL REVIEW (Continued)

ıption and analysis of reasonable alternatives (including the no action alternative) to the proposed action whenever alternatives are reasonably ıble and prudent to consider and a discussion of how the alternatives would be implemented:

ıative 1. No action. FWP will not purchase the improvements and the site will be put on the market for purchase by another willing buyer. s case, FWP would not be able to invest Hungry Horse Mitigation dollars for habitat restoration and low density rearing of wild westslope ːoat trout.

native 2. Purchase improvements and lease the land. This would protect future investments and allow FWP to create natural habitat for ıing and rearing of wild cutthroat by connecting access to the Flathead River. Wild genetic stocks could be reared in natural habitat as an egg e for mitigation activities throughout the Flathead System. Once a naturalized run is established at the site, surplus migrating wild fish can ed as an egg source. Alternative egg sources eliminate the need to obtain gametes from wild spawners that we are trying to protect and enhance habitat enhancement and fish passage improvements. The site offers a unique setting for a state-of-the-art combination of new hatchery iques and habitat restoration.

ıation and listing of mitigation, stipulation, or other control measures enforceable by the agency or another government agency:

r quality assessments must pass inspection by FWP and DEQ. Fish health inspections must pass the State Fish Health Specialist. Genetic g will be completed by FWP and MSU genetics lab.

l on the significance criteria evaluated in this EA, is an EIS required? YES / NO If an EIS is not required, explain why the EA is the ɔpriate level of analysis for this proposed action:

This is an administrative change only.

ribe the level of public involvement for this project if any and, given the complexity and the seriousness of the environmental issues associated the proposed action, is the level of public involvement appropriate under the circumstances?

project has undergone public review via news paper announcement, review by the Columbia Basin Fish and Wildlife Authority, project review ss and review by the Northwest Power Planning Council. The overall direction of the project was discussed via phone or in person with: Rob nt, American Wildlands; Tom Anacher and Bruce Farling, Trout Unlimited; Beth Buren and Earl Applecamp, US Forest Service; Thurston on and Gary Berteletti, FWP Hatchery Division; Jim Peterson, Fish Health Specialist and Charlie Decker, Fish and Game Commissioner.

ic involvement has been appropriately completed for this phase of the project. Additional public scoping with a longer review period should r for future improvements at the site.

ıtion of comment period if any:

lays

ıe, title, address and phone number of the Person(s) Responsible for Preparing the EA:

ı Marotz
tana Fish Wildlife & Parks
North Meridian
ɜpell, MT 59901
) 751-4546

RT III. NARRATIVE EVALUATION AND COMMENT

roject complements management and mitigation actions being carried out by Montana Fish, Wildlife & Parks. At a minimum, if the FWP ased the improvements, Special Use Permit and Forest Service lease and took no further actions, native fish in the Flathead Basin would be ced by eliminating a source of non-native rainbow trout that could hybridize with cutthroat or compete with other trout species.

comments focused on the need for an additional westslope cutthroat hatchery. There was concern that the state would mitigate for the loss tural habitat by increasing cutthroat stocking programs. This is not the intent of the Sekokini Springs Project. Rather, the Hungry Horse ation Implementation Group is using habitat enhancement and fish passage improvement projects to improve wild spawning and rearing in on-reams. Our goal is to initiate or protect wild spawning runs. Unfortunately, the number of surviving adults returning to natural habitat may ufficient to seed all available habitat. If pure strain westslope cutthroat trout reclaim newly reopened habitat or habitat improvement areas, ther action will be required. However, if hybridized cutthroat or non-native species attempt to pioneer the new habitat, it will be more desirable d the habitat with native cutthroat using remote site incubators or imprint plants of fingerlings. Research is ongoing to evaluate the relative of remote site incubation and imprint planting strategies. Sekokini Springs could be used as a source of wild reared fingerlings and eyed eggs ese purposes. This project is not intended to become a production facility for large plants of cutthroat trout to replace lost habitat. The project owever, grow fish for fishing opportunities in offsite, small closed-basin lakes and genetic reserve lakes. The unique nature of the outdoor, al rearing habitat at Sekokini Springs, makes the site quite different than traditional hatcheries.

RT IV. EA CONCLUSION SECTION

d on the public interest in this project, it was clear that additional comments will be forthcoming regarding the future use of the facility to assure vild westslope cutthroat trout benefit from actions taken at the site. Most comments focused on the need for habitat improvements in the Flathead system and cautioned great care when using hatchery products where wild stocks exist. We share those concerns and feel that public concerns e met by using wild stock from the Flathead system, and by improving the existing habitat at the site. These issues reflect ongoing debates in sheries profession and were anticipated. However, these concerns extend to areas beyond the scope of this EA which is intended to cover only dministrative transfer of the Special Use Permit and purchase of improvements on the Forest Service land. We have concluded that the purchase kokini Springs should be pursued, pending final approval of the Montana Fish and Game Commission. This action will secure the water source ture use and allow the FWP to rear westslope cutthroat under nearly natural conditions for use in the Hungry Horse Mitigation Program. Public lvement will be important as the next phase of the project is planned and implemented. It is imperative that NEPA/MEPA documents for osed, future improvements at the site be available for comment for at least 30 days.

2/94
A.GEN

APPENDIX B

Recorded easement to access the
Sekokini Springs site.

19981520935O

(7)

ROAD EASEMENT

THIS GRANT OF EASEMENT, made the 22nd day of April, 1998, by and between Belton Mercantile, Inc., a Montana corporation, of 200 Going to the Sun Road, West Glacier, Montana 59936, hereafter called the Grantor, and the Montana Department of Fish, Wildlife and Parks, 1420 East Sixth Avenue, P O Box 200701, Helena, Montana 59620-0701, hereafter called the Grantee.

WITNESSETH

That the Grantor for and in consideration of the sum of One and no/100 Dollars ($1.00) and other good and valuable consideration, the receipt of which is hereby acknowledged, does hereby grant and convey unto the Grantee,and Grantee's guests, lessees, licensees, and visitors, a perpetual, non-exclusive easement upon, over and along an existing road, together with the right to enter upon the described road easement to maintain and repair the road and to travel upon and use the same for all lawful purposes, including but not limited to residential and commercial uses, over and across the land described as follows:

The road easement shall consist of a thirty (30) foot right-of-way across the Grantor's land in the SE1/4 of Section 8, T31N, R19W, PMM, Flathead County, Montana, running south from Blankenship Road to the boundary with Grantee's leasehold interest in Section 17, T31N, R19W, PMM, Flathead County, Montana.

The easement is shown and depicted on Exhibit "A" attached hereto and incorporated herein by this reference.

This easement shall be and is appurtenant to the Grantee's 11.4 acre leasehold interest located in the NE1/4 of Section 17, T. 31 N., R. 19 W., Flathead County, Montana. This leasehold interest is in land owned by the United States Forest Service and may be modified, renewed, transferred, or reissued from time to time. Any such modification, renewal, transfer, or reissue of the leasehold interest shall not affect this road easement. This grant of easement shall run with the land and shall be binding upon and inure to the benefit of the parties to this easement, their respective successors and assigns, provided that Grantee does not have the right, power or authority to assign this easement. Furthermore, if Grantee ever abandons or ceases to retain the leasehold interest, this easement will automatically terminate.

The Grantee agrees to hold harmless, indemnify and defend the Grantor and its employees, agents and contractors from and against all liabilities, penalties, costs, losses, damages, expenses, causes of action, claims, demands or judgments, including without limitation, reasonable attorneys' fees, arising from or in any way connected with injury to or the death of any person or physical damage to any property, resulting from any action, omission, condition or other matter related to or occurring on or about the easement area, as a result of the Department's exercise of its rights granted under this easement, unless due to the negligence or willful misconduct of the Grantor or its agents, employees or contractors.

1998152 09350

The Grantee by this grant will not acquire any interest in or to the land described above belonging to the Grantor save and except the right to maintain and use a road for access purposes.

To have and to hold the easement unto the Grantee and its successors forever.

IN WITNESS WHEREOF, the Grantor executes and conveys this road easement on the day and year first above written.

Belton Mercantile, Inc.

By: Dan H. Lundgren
President

ATTEST: Everett M. Lundgren
Secretary-Treasurer

STATE OF MONTANA)
:ss.
County of Flathead)

This instrument was acknowledged before me on April 22, 1998 by Dan H. Lundgren and Everett M. Lundgren as president, and secretary-treasurer, respectively, of Belton Mercantile, Inc.

(SEAL)

LuAnne Olmsted
Notary Public for the State of Montana
Residing at Coram, Mt
My Commission Expires 4-30-98

LUANNE OLMSTED NOTARY PUBLIC STATE OF MONTANA

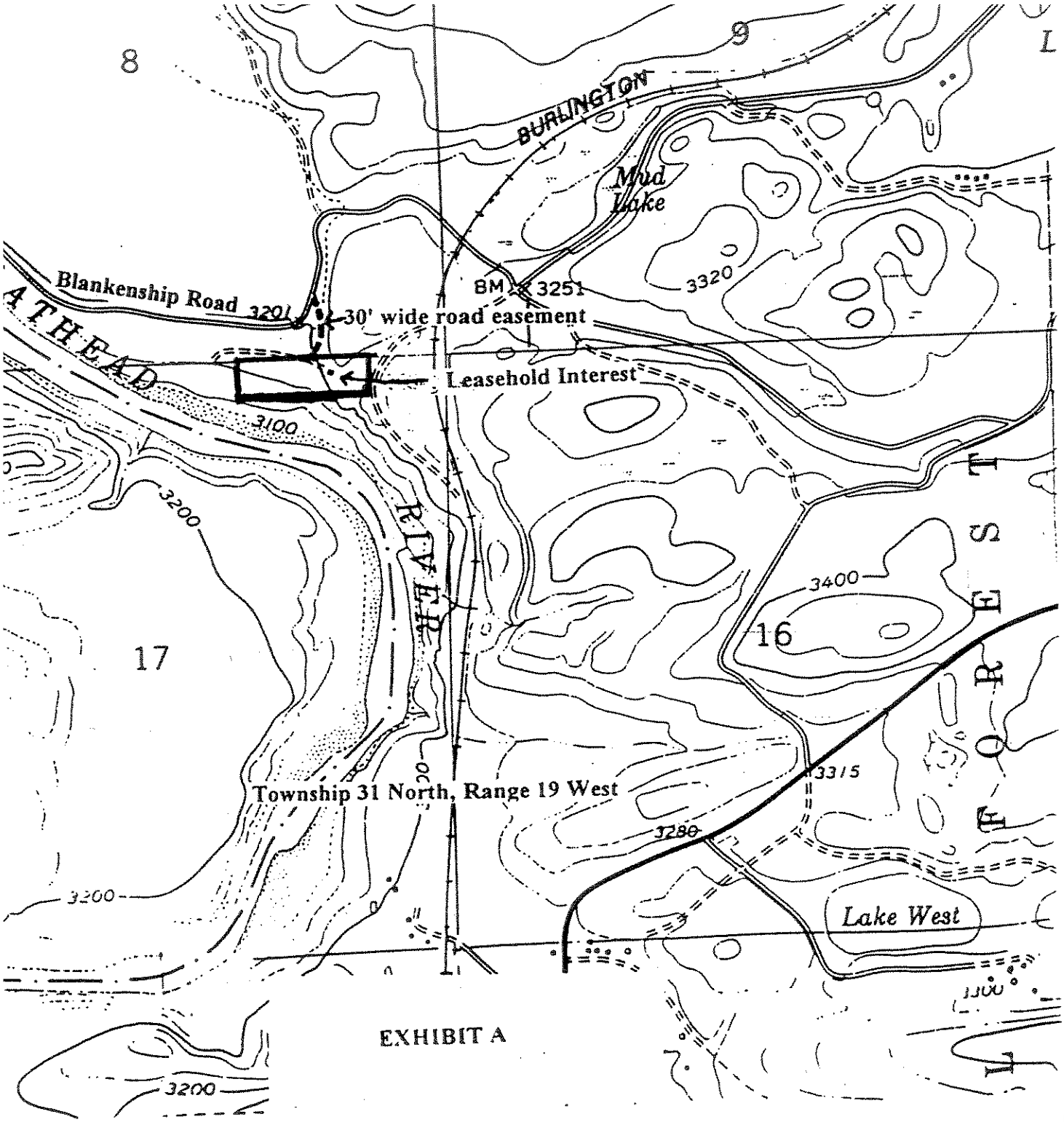


EXHIBIT A

STATE OF MONTANA, } ss
County of Flathead

Recorded at the request of FWP

this 1 day of June, 19 98 at 9:35 o'clock A M and recorded in the records of Flathead County, State of Montana.

Fee $ 18- Pd.

RECEPTION NO. 19981520935O

RETURN TO FWP, Attn: Debbi King Box 200701 Helena MT 59620-0701

Susan K. Hansen-Reed
(Flathead County Clerk and Recorder)

Deborah J. Hueyta
(Deputy)

Trippet's Printing

Clerk&R-RecS

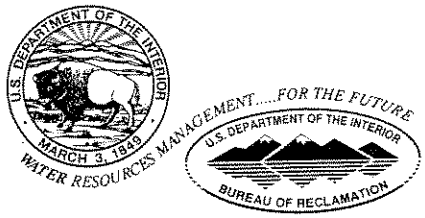
APPENDIX C

Geologic report for the
Sekokini Springs site.

Geologic Report for
Sekokanee Springs Experimental Hatchery
and Educational Center
Northwestern Montana

Regional Resource & Technical Services
Geology, Exploration & Instrumentation Group

U.S. Department of Interior
Bureau of Reclamation
Pacific Northwest Regional Office
Boise, Idaho



June 1999

Department of the Interior
Bureau of Reclamation
Pacific Northwest Region

Geologic Report
for
Sekokanee Springs Experimental Hatchery
and Educational Center
Northwestern Montana

Regional Resource & Technical Services Office
Geology, Exploration & Instrumentation Group
Boise, Idaho

June 1999

Report prepared by
Allen C. Lockhart, Geologist
under general supervision of
Brent H. Carter
Regional Geologist

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SUMMARY AND CONCLUSIONS

Sekokanee Springs has existed as a private fish hatchery/rearing site for over 40 years under a special uses permit on land managed by the Flathead National Forest. The site is approximately 12 acres in size and is adjacent to the North Fork Flathead River. The Sekokanee Springs site is located in Flathead County about 10 miles northeast of Columbia Falls, Montana.

The Montana Department of Fish and Wildlife (MDFW) hopes to develop the site, which contains four existing springs, into an experimental fish hatchery and educational center for bull and cutthroat trout. They have requested assistance from Reclamation under the States Assistance Program for the construction of the center.

The major structures required at the site are a moderate-sized residence for the site manager and a medium-size fish hatchery building (existing structure may be upgraded). Also needed are spring capture boxes, head gates, weirs, pipelines, habitat viewing windows, walking paths, and a fish separating platform at the river. A parking lot with restrooms will be constructed near the access road to the site. Some of the existing ponds will be enhanced and used and others will be filled and sloped to make stream channels for fish habitat.

The surficial geologic units exposed at the site consist of a thin veneer of forest soil covering a shallow thickness of alluvium overlying a great thickness of glacial debris. The soil is composed of silty fines, fine sand, and organic matter. The alluvium is composed of an unconsolidated, heterogeneous mixture of hard subrounded to rounded sand, gravel, and cobbles deposited by the Flathead River. The alluvium was derived in part from reworked glacial debris. Thickness of the alluvium is highly variable in the area with a maximum thickness of 50 feet reported by regional researchers. The glacial debris is composed of a heterogeneous mixture of crudely layered clayey to silty, bouldery glacial till and thinly bedded, fine-grained lacustrine deposits. The glacial debris could be several hundred feet thick at the site.

The various slopes around the site in the alluvium and glacial debris are highly variable in slope angles and heights. The slope angles vary from 2H:1V (25 degrees) to 3/4H:1V (50 degrees). The height of the slopes vary with the maximum height being about 30 feet along the upper ponds and along the river. The condition of the slopes is generally stable. Vegetation in the form of grass, shrubs, and trees covers most of the slopes. Minor slope failures have occurred at the site in areas where water has overtopped the ponds and washed a ravine into the glacial slope.

The four springs at the site should supply the water needed to operate the hatchery and maintain the streams. This is based on the fact that a private hatchery operated for over 30 years at the site. By capturing the springs and running them through a control structure, the water can be directed to various stream channels, ponds, and hatchery sites or over a wasteway to the river.

To assist with the site preparation for the hatchery, geologic mapping and site explorations should be conducted at the site. The explorations can be conducted with a backhoe to determine the engineering properties of the glacial till and lacustrine sediments to support the slopes and structure that will be constructed at the site.

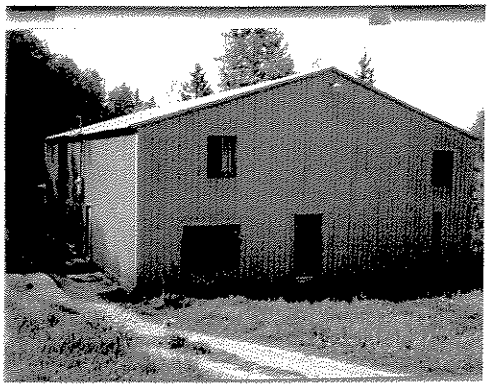
Topography and/or aerial photography of the site should be prepared to assist with the site layout for stream channels, ponds and other structures.

Removal and replacement of existing structures at the site will require moderately deep (up to 25 feet) excavations into the glacial till and associated materials. These temporary cutslopes should be laid back to 1 1/2H:1V for safety.

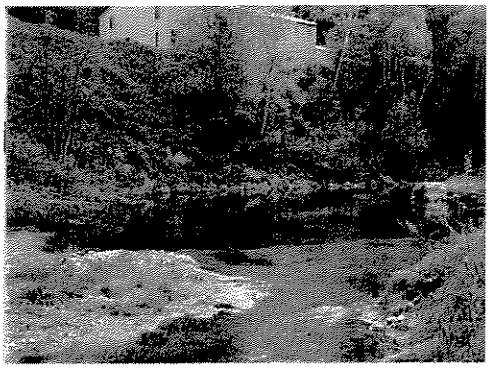
INTRODUCTION

Background and Purpose

Sekokanee Springs has existed as a private fish rearing site for over 40 years under a special uses permit on land managed by the Flathead National Forest. The site is approximately 12 acres in size and is adjacent to the North Fork Flathead River. The existing site consists of a metal hatchery shed, approximately 60 feet by 30 feet in size, seven shallow ponds, and shallow channels connecting the ponds (Photographs 99-1 and -2). The ponds were developed around three springs that flow directly into the ponds. Access around the site is by narrow dirt roads that are overgrown with shrubs and small trees (Photographs 99-3 and -4).



Photograph 99-1: View of the existing hatchery building at the Sekokanee Springs site. The building will require major modification. Photograph by A.C. Lockhart, 5-28-99.



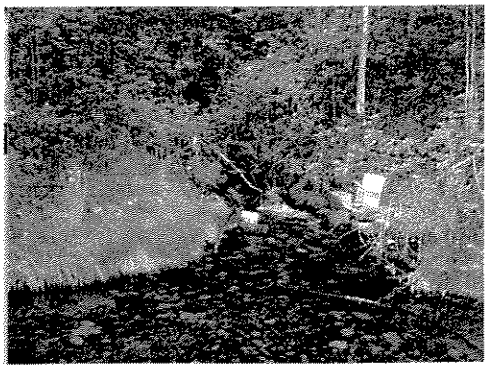
Photograph 99-2: View of a lower pond at the Sekokanee Springs site. Note the steep (about 50 degrees) slope from the building to the pond. The slope is about 40 feet in height. Photograph by A.C. Lockhart, 5-28-99.

Photograph 99-3: View of a channel that connects ponds at the Sekokanee Springs site. Note the steep (about 40 degrees) slope above the channel. The slope is about 20 feet in height. Photograph by A.C. Lockhart, 5-28-99.

Photograph 99-4: View of a lower pond at the Sekokanee Springs site. Note the narrow trail along the ponds. Photograph by A.C. Lockhart, 5-28-99.

The Montana Department of Fish and Wildlife (MDFW) hopes to develop the site into an experimental fish hatchery and educational center for bull and cutthroat trout. They envision the development of a natural stream-type habitat for the fish with underwater viewing windows, walkways, and informational signs to educate the visiting public. The hatchery building will be replaced or upgraded from its present deteriorated condition, a residence for the site manager will be constructed, and a parking lot with restrooms will be added to the site. MDFW has requested assistance from Reclamation under the Western Montana Water Conservation Program for the construction of the center.

A one-day site visit was conducted on May 28, 1999 with MDFW officials and representatives from the Bureau of Reclamation, Pacific Northwest Regional Office. The work is planned to start during the summer and fall of 1999 and the project should be completed by 2002. The first phase of the project will be to capture the four onsite springs into flow control structures; and replace or upgrade the hatchery building (Photographs 99-5 and -6). During the summer and fall of 2000 through 2002, ponds and channels, viewing and fish handling areas, a manager's residence, and parking area will be constructed.

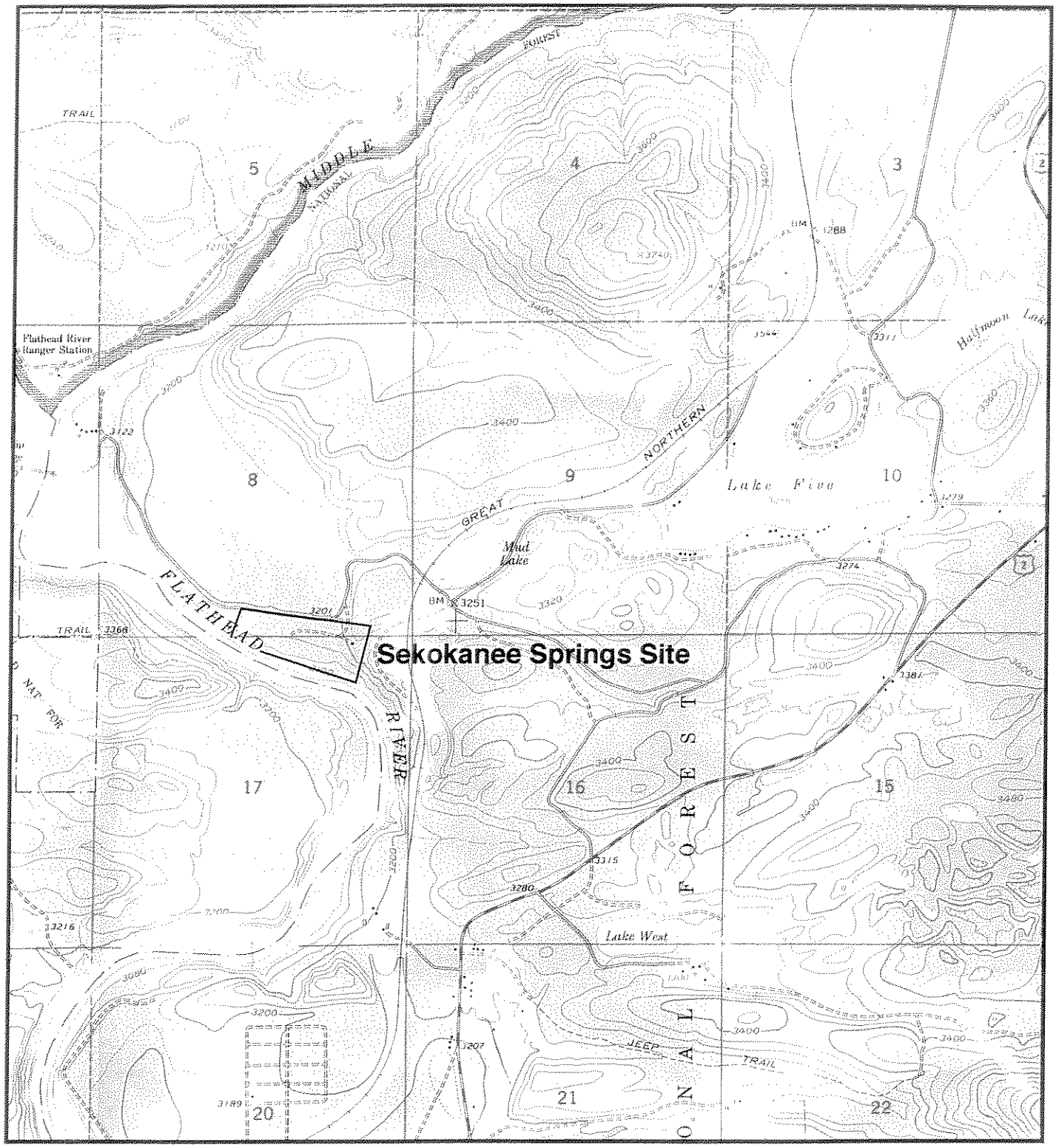


Photograph 99-5: View of one of the eastern springs that feeds the ponds at the Sekokanee Springs site. The estimated flow of the spring is between 1 and 2 cfs. Photograph by A.C. Lockhart, 5-28-99.

Photograph 99-6: View of the westernmost spring at the Sekokanee Springs site. Approximately 50 percent of the flow from the spring is directed to the ponds. Photograph by A.C. Lockhart, 5-28-99.

Location

The Sekokanee Springs site is located in Section 17, T.31N., R.19W., on the Hungry Horse, Montana 7.5-minute Quadrangle. The site is located in Flathead County about 10 miles Northeast of Columbia Falls, Montana. The site is accessible from the west by the North Fork and Blankenship Roads and from the east by State Highway 2 and Blankenship Road (Figure 1).



General Location Map

Sekokanee Springs Site
Northwest Mantana

Taken form USGS Hungry Horse, Montana 7.5 minute Quadrangle.

Figure 1

Proposed Features

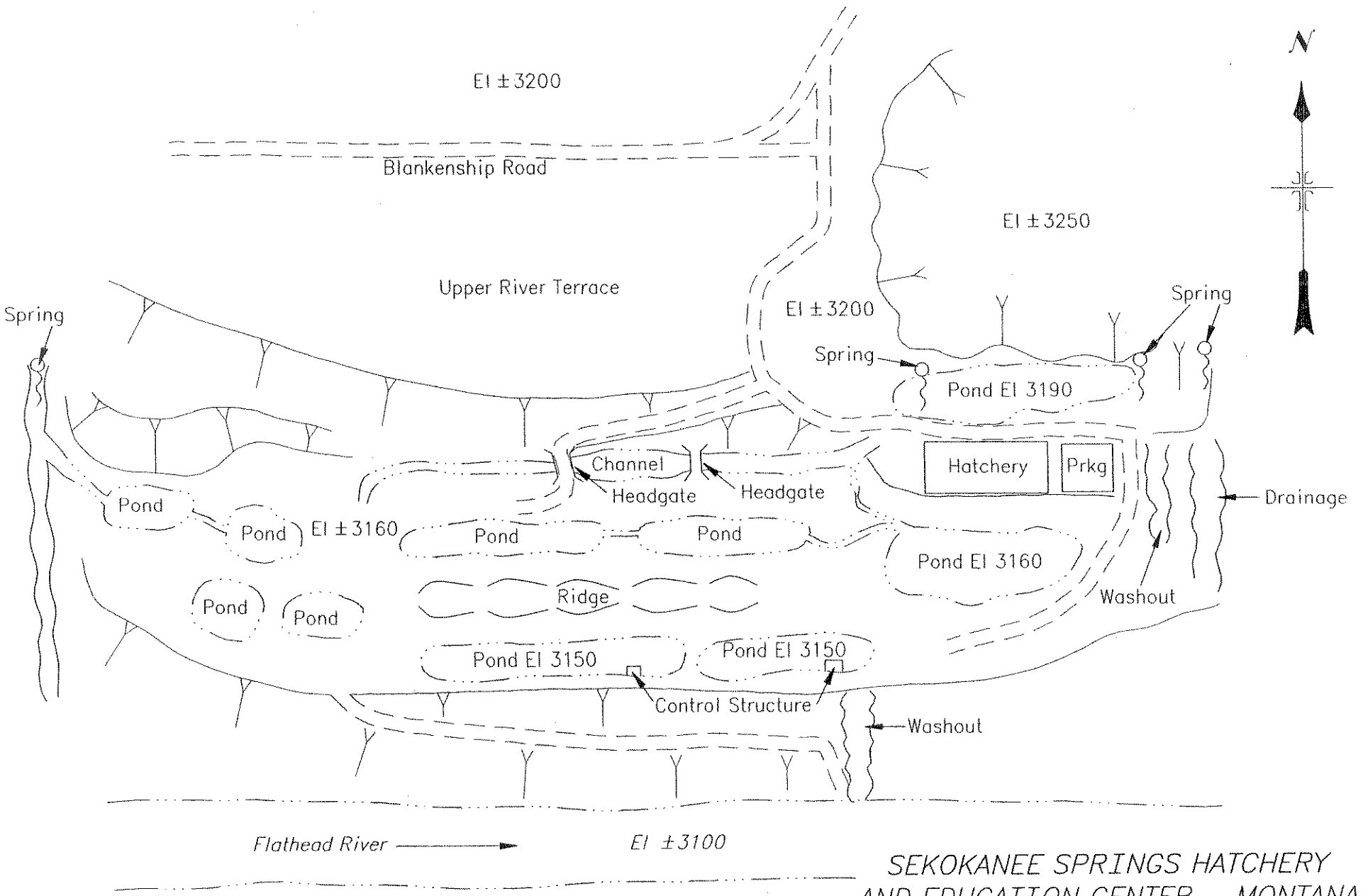
The major structure at the site will consist of a moderate-size residence for the site manager and a medium-size fish rearing building. Minor structures will consist of concrete spring capture boxes, head gates, weirs, pipelines, habitat viewing windows, walking paths, and a fish separating platform at the river. A parking lot with restrooms will be constructed near the access road to the site.

Some of the existing ponds will be enhanced and used and others will be filled in to make stream channels for habitat (Figure 2). Water will be moved to the river down an existing road that will be converted to a stream channel.

LOCAL GEOLOGY

The site is located in the eastern portion of the Northern Rocky Mountains physiographic province (Ross, 1959). The main structural features near the site are the southern end of the northwest-trending North Fork Valley to the west and the northwest-trending Apgar Mountains to the east. The North Fork Valley is a long trough that extends well into British Columbia and lies along the western margin of Glacier National Park (Johns, 1963). The Apgar Mountains are considered a part of the mountain ranges forming Glacier National Park (Ross, 1959). The rocks forming the rugged mountain ranges in and around Glacier National Park are units of the Precambrian Belt Series (Ross, 1959). The Belt Series rocks dip to the east leaving steep rock faces to the west (Ross, 1959). The rocks are shallow sea bed deposits of fine sand, silt, and clays that have undergone metamorphism to form shales, argillites, quatzites, and limestone. Mud cracks, ripple marks, banding, and early fossils are common features in the rock units.

The local area around the site was covered with glacial ice leaving only the highest mountain peaks exposed above the ice sheet (Johns, 1963). Much of the spectacular scenery in the area, such as sharp peaks and U-shaped valleys, was formed by the glacial activity. During late-Pleistocene, glacial deposits and associated lacustrine deposits refilled the lower valleys excavated by the earlier glaciation to depths of hundreds of feet (Johns, 1963). Streams, first fed by meltwater from the glaciers, reworked the glacial debris and produced meanders, flood plains, and terraces along their channels (Johns,1963). Recent alluvial gravels up to 50 feet thick cover many of the older glacial deposits near the major streams (Johns, 1963).



SEKOKANEE SPRINGS HATCHERY AND EDUCATION CENTER – MONTANA
SITE PLAN

Not to Scale

FIGURE 2

SITE GEOLOGY

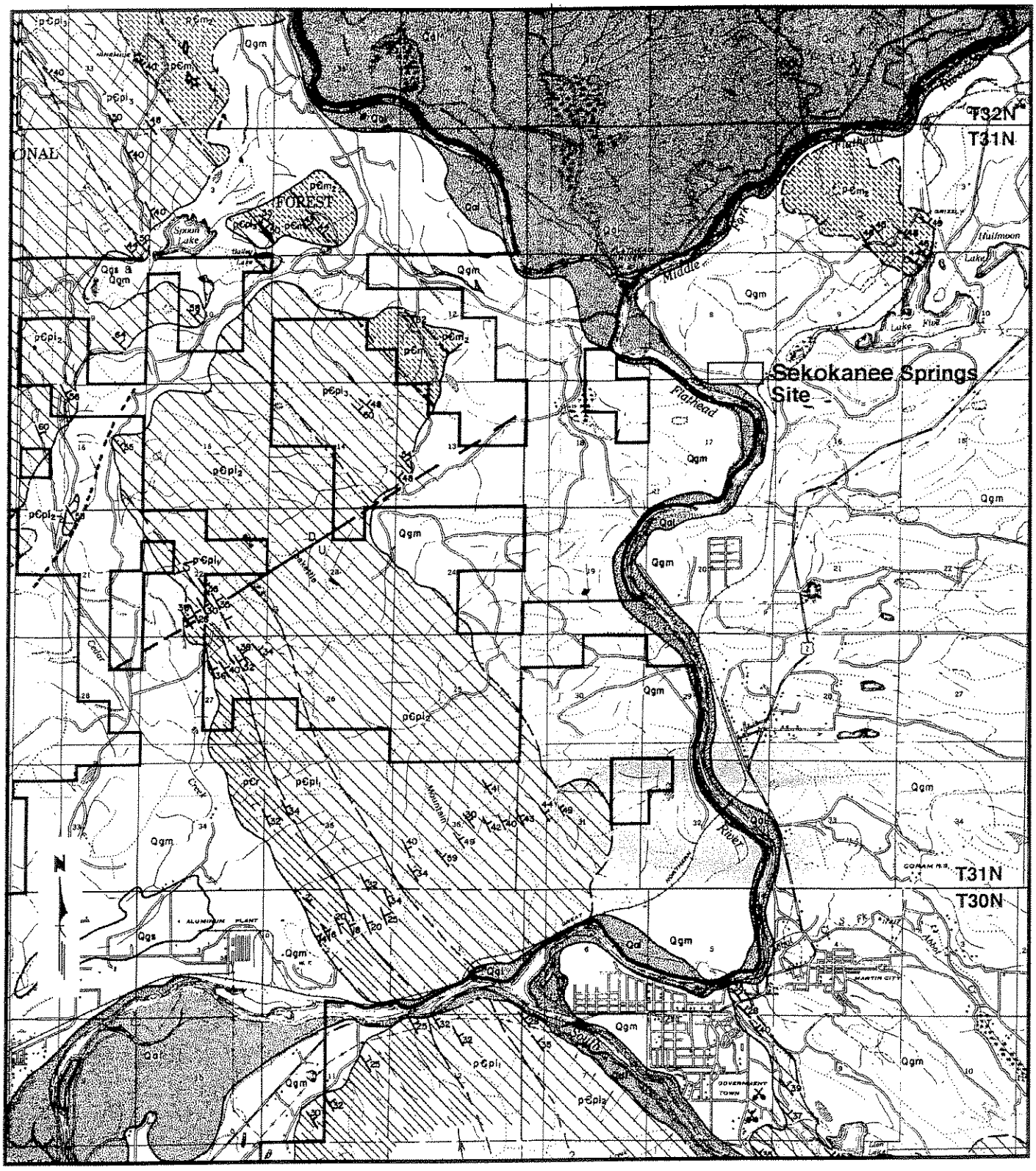
Topography, Geomorphology, and Drainage

A detailed geologic study of the site has not been conducted and the geologic summary presented below was developed from one-day of field observations and a library search of regional mapping. The topography of the Sekokanee Springs site consists of a elongated, mostly flat, river terrace eroded into older glacial debris located just east of the confluence of the North Fork and Middle Fork of the Flathead River (Figure 1). The proposed site is at the southern end of the river terrace, which is about 80 to 100 feet above the present river level. The large river terrace is about three-quarters of a mile long and one-half mile wide (Figure1). Glacial features such as morainal ridges, kettle lakes, and pothole topography are located northeast and upslope from the site (Figures 1 and 3). The nearest exposed, *in situ* rock to the site is located about one mile northeast at the northern end of Lake Five. The rock units are meta-sediments of the Belt Series (Figure 3).

The general trend of both ground and surface water is to the southwest from the kettle lakes located northeast of the site at elevation 3265 to 3256 feet, to the Flathead River located along the southwest side of the site at elevation 3100 feet. The four springs that daylight along the northeast side of the site at about elevation 3200 feet are most likely related to the ground-water movement from the kettle lakes (Figure 3). Another indicator that the springs are associated with the kettle lakes is documented by MDFW. In the past, MDFW had poisoned the lakes to remove trash fish. The poison was carried underground, about one mile over several days, to the existing hatchery ponds where the fish were killed. Three of the springs at the site are directed by ditches into the existing site ponds. The fourth spring located along the east side of the site flows down slope through a small, naturally armored, channel to the river.

Geologic Units

The surficial geologic units exposed at the site consist of a thin veneer of forest soil covering a shallow thickness of alluvium overlying a great thickness of glacial debris. The soil is composed of silty fines, fine sand, and organic matter. The alluvium is composed of an unconsolidated, heterogeneous mixture of hard subrounded to rounded sand, gravel, and cobbles deposited by the Flathead River. The alluvium was derived in part from reworked glacial debris. Thickness of the alluvium is highly variable in the area with a maximum thickness of 50 feet reported by regional mappers. The glacial debris is composed of a heterogeneous mixture to crudely layered clayey to silty, bouldery glacial till and thinly bedded, fine-grained lacustrine deposits. The thickness of the glacial debris could be several hundred feet thick at the site.



Explanation

Qal = Alluvium: Recent gravel, sand, and silt. Some Pleistocene outwash.
Qgs = Glacial Silt: Lacustrine silt and clay.
Qgm = Glacial Moraine: Drift, gravel, and some alluvial fan material.
pCpi, pCm, and pCr = Precambrian Belt Series rock units

D
U
Fault

Sekokanee Springs Site
Local Geology

Taken form Johns, 1963

Figure 3

Visual classification of hand-collected samples of the glacial debris from the site consists of Silty Sand with Gravel and Cobbles (SM)gc to Silty Gravel with Sand and Cobbles (GM)sc. The percent of fines in the samples ranged from 15 to 30 percent. The reworked glacial debris and outwash deposits in the glacial debris could have less fines. Scattered boulders to over three feet in diameter were noted around the site.

Observations made at several localized washouts at the site that have eroded small channels into the terrace reveal a weathered, red to brown, lacustrine clay layers in the glacial till (Photograph 99-7). The thickness and lateral extent of the clay layers are unknown.

Photograph 99-7: View of an eroded channel in the glacial debris at the Sekokanee Springs site. The channel was eroded when water overtopped a pond as a result of a beaver blocking an outlet structure. Photograph by A.C. Lockhart, 5-28-99.

Slopes

The various slopes around the site in the alluvium and glacial debris are highly variable in slope angles and heights (Photographs 99-2 and -3). The slope angles vary from 2H:1V (25 degrees) to 3/4H:1V (50 degrees). The height of the slopes is varied with maximum height of 30 feet along the upper ponds and along the river. The condition of the slopes is generally stable. Vegetation in the form of grass, shrubs, and trees is covering the slopes. The only slope failures observed at the site are in areas where water has overtopped the ponds and washed a rugged ravine into the slope (Photograph 99-6).

FINDINGS

Sekokanee Springs Hatchery site is located on a large, mostly flat, river terrace about 80 to 100 feet above the Flathead River. The large river terrace was eroded through the glacial debris that mantles most of the local area. The hatchery site is located toward the southern end of the large terrace where several narrow, lower river cut terraces were formed as the river erodes down through the glacial debris.

The site was selected because four springs daylight at the site, which was previously a private hatchery. Montana Fish and Wildlife officials would like to enhance the site by making natural stream channels and ponds for rearing bull and cutthroat trout. Several buildings, viewing windows, walking paths, and a parking lot with restrooms will be added to the site. Concrete headworks and a control structure will be installed at each pond and along channels between ponds.

The terraces where the hatchery site is located were formed by the river eroding into the glacial material composed of silty to clayey, bouldery till, and lacustrine sediments. These materials should form a stable foundation for the structures at the site. The existing slopes at the site have had some localized instabilities in the past. These failures are in areas where water has overtopped the existing dikes and embankments causing extensive erosion into the till. The majority of the slopes are remaining stable at slope angles ranging from 20 to 50 degrees with heights up to 30 feet.

The four springs should supply the water needed to operate the hatchery and the stream system at the site. This judgement is corroborated by the operation of a private hatchery at the site for over 30 years. By capturing the springs and running them through a control structure, the water can be directed to various stream channels, ponds, and hatchery sites or over a wasteway to the river.

RECOMMENDATIONS

To assist with the site preparation for the hatchery, geologic mapping and site explorations should be conducted at the site. The explorations can be conducted with a backhoe to determine the engineering properties of the glacial till and lacustrine sediments to support the slopes and structure that will be constructed at the site. In areas where low density lacustrine sediments are encountered under a structure, the footing area should be overexcavated and backfilled with a suitable material.

Topography and/or aerial photographs of the site should be prepared to assist with the site layout for stream channels, ponds, and other structures.

Removal or replacement of some existing structures at the site will be required. These excavations will be moderately deep excavations (up to 25 feet) into the glacial till and associated materials. These temporary cutslopes should be laid back to 1 1/2H:1V for safety.

REFERENCES

Johns, W.M., and others, 1963, Geologic Investigations in the Kootenai-Flathead area, Northwest Montana, Montana Bureau of Mines and Geology, Butte, Montana.

Ross, C.P., 1959, Geology of Glacier National Park and the Flathead Region - Northwestern Montana, *U.S. Geological Survey Professional Paper 296*, United States Government Printing Office, Washington D.C.

APPENDIX D

Results of water quality testing of the
Sekokini Springs water source.

Department of Public Health and Human Services

ENVIRONMENTAL LABORATORY

Cogswell Building, Rm B219, 1400 Broadway, PO BOX 4369, Helena MT 59604 Phone 444-2642

- RESULTS OF < INORGANIC > CHEMICAL ANALYSIS -

DON SKAAR
FISH WILDLIFE AND PARKS
1420 E 6TH AVE
HELENA. MT 59620

Acct #: B0000075
PWSID #: B0000075
Report Date: 07-Dec-01

Collected: 11/1/01
Time: 15:00
By: DON SKAAR

b#: C0111-4050

nple ID: FISH WILDLIFE AND PARKS/ SEKOKANI SPRING

IALYTE		**RESULTS**	**UNITS**	**METHOD**	**DATE**	**ANALYST**
ORGANIC PARAMETERS						
al Ammonia as N	<	0.01	mg/L	EPA 350.1	11/8/01	ljh
oride in Water		1.90	mg/L	EPA 300.0	11/2/01	ljh
rate plus Nitrite as N		0.20	mg/L	EPA 300.0	11/2/01	ljh
fate		3.15	mg/L	EPA 300.0	11/2/01	ljh
AN FOR METALS BY ICP				EPA 200.7	11/15/01	gal
minum	<	0.02	mg/L	EPA 200.7	11/15/01	gal
enic	<	0.05	mg/L	EPA 200.7	11/15/01	gal
on	<	0.10	mg/L	EPA 200.7	11/15/01	gal
ium		0.275	mg/L	EPA 200.7	11/15/01	gal
yllium	<	0.002	mg/L	EPA 200.7	11/15/01	gal
cium		47.6	mg/L	EPA 200.7	11/15/01	gal
dmium	<	0.002	mg/L	EPA 200.7	11/15/01	gal
balt	<	0.01	mg/L	EPA 200.7	11/15/01	gal
omium	<	0.002	mg/L	EPA 200.7	11/15/01	gal
pper	<	0.002	mg/L	EPA 200.7	11/15/01	gal
n	<	0.01	mg/L	EPA 200.7	11/15/01	gal
assium	<	1.00	mg/L	EPA 200.7	11/15/01	gal
gnesium		14.5	mg/L	EPA 200.7	11/15/01	gal
nganese	<	0.005	mg/L	EPA 200.7	11/15/01	gal
lybdenum	<	0.01	mg/L	EPA 200.7	11/15/01	gal
lium		2.70	mg/L	EPA 200.7	11/15/01	gal
kel	<	0.01	mg/L	EPA 200.7	11/15/01	gal
ıd	<	0.02	mg/L	EPA 200.7	11/15/01	gal
timony	<	0.10	mg/L	EPA 200.7	11/15/01	gal
enium	<	0.05	mg/L	EPA 200.7	11/15/01	gal
ontium		0.06	mg/L	EPA 200.7	11/15/01	gal
anium	<	0.005	mg/L	EPA 200.7	11/15/01	gal
nadium	<	0.005	mg/L	EPA 200.7	11/15/01	gal
c	<	0.005	mg/L	EPA 200.7	11/15/01	gal
al Hardness as CaCO3		179	mg/L	EPA 200.7	11/15/01	gal
dness, Grains / Gallon		10.4	gr/gal	EPA 200.7	11/15/01	gal
alinity in Water		240	mg/L	EPA 310.2	11/16/01	jhf

proved by:

FLAGS: < = less-than
> = greater-than

Department of Public Health and Human Services

ENVIRONMENTAL LABORATORY

Cogswell Building, Rm B219, 1400 Broadway, PO BOX 4369, Helena MT 59604 Phone 444-2642

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By: DON SKAAR

o#: C0111-4050

nple ID: FISH WILDLIFE AND PARKS/ SEKOKANI SPRING

ALYTE	RESULTS	UNITS	METHOD	DATE	ANALYST
ORGANIC PARAMETERS					
	7.96	units	EPA 150.1	11/16/01	jhf

proved by:

FLAGS: < = less-than
> = greater-than

Department of Public Health and Human Services

ENVIRONMENTAL LABORATORY

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By: DON SKAAR

)#: C0111-4050

nple ID: FISH WILDLIFE AND PARKS/ SEKOKANI SPRING

ALYTE		RESULTS	UNITS	METHOD	DATE	ANALYST
GANIC PARAMETERS						
.ORINATED PESTICIDES				EPA 508	11/13/01	WS
ıphene	<	1.00	ug/L	EPA 508	11/13/01	WS
›rdane	<	.200	ug/L	EPA 508	11/13/01	WS
drin	<	0.020	ug/L	EPA 508	11/13/01	WS
chlorinated biphenyl screen	<	0.500	ug/L	EPA 508	11/13/01	WS
ITHETIC ORGANIC COMPOUNDS				EPA 525.2	11/13/01	WS
-ethylhexyl) phthalate	<	0.600	ug/L	EPA 525.2	11/13/01	WS
-ethylhexyl) adipate	<	0.600	ug/L	EPA 525.2	11/13/01	WS
zo(A)pyrene	<	0.020	ug/L	EPA 525.2	11/13/01	WS
ıachlor	<	0.100	ug/L	EPA 525.2	11/13/01	WS
ıibuzin	<	0.100	ug/L	EPA 525.2	11/13/01	WS
ıchlor	<	0.100	ug/L	EPA 525.2	11/13/01	WS
›lachlor	<	0.100	ug/L	EPA 525.2	11/13/01	WS
achlorobenzene	<	0.100	ug/L	EPA 525.2	11/13/01	WS
achlorocyclopentadiene	<	0.100	ug/L	EPA 525.2	11/13/01	WS
zine	<	0.100	ug/L	EPA 525.2	11/13/01	WS
ıhlor	<	0.200	ug/L	EPA 525.2	11/13/01	WS
ıin	<	0.010	ug/L	EPA 525.2	11/13/01	WS
tachlor	<	0.040	ug/L	EPA 525.2	11/13/01	WS
tachlor Epoxide	<	0.020	ug/L	EPA 525.2	11/13/01	WS
lane (g-BHC)	<	0.020	ug/L	EPA 525.2	11/13/01	WS
ıoxychlor	<	0.100	ug/L	EPA 525.2	11/13/01	WS
ızine	<	0.070	ug/L	EPA 525.2	11/13/01	WS
in	<	0.100	ug/L	EPA 525.2	11/13/01	WS
? - STATE MONITORED				EPA 524.2	11/5/01	ws
Dichloropropene	<	0.50	ug/L	EPA 524.2	11/5/01	ws
,3-Dichloropropene	<	0.50	ug/L	EPA 524.2	11/5/01	ws
; 1,3-Dichloropropene	<	0.50	ug/L	EPA 524.2	11/5/01	ws
Dichlorobenzene	<	0.50	ug/L	EPA 524.2	11/5/01	ws
ılorotoluene	<	0.50	ug/L	EPA 524.2	11/5/01	ws

proved by: _____

FLAGS: < = less-than
> = greater-than

Department of Public Health and Human Services

ENVIRONMENTAL LABORATORY

Cogswell Building, Rm B219, 1400 Broadway, PO BOX 4369, Helena MT 59604 Phone 444-2642

- RESULTS OF < ORGANIC > CHEMICAL ANALYSIS -

DON SKAAR
FISH WILDLIFE AND PARKS
1420 E 6TH AVE
HELENA. MT 59620

Acct #: B0000075
PWSID #: B0000075
Report Date: 07-Dec-01

Collected: 11/1/01
Time: 15:00
By: DON SKAAR

o#: C0111-4050

nple ID: FISH WILDLIFE AND PARKS/ SEKOKANI SPRING

ALYTE		RESULTS	UNITS	METHOD	DATE	ANALYST
GANIC PARAMETERS						
ılorotoluene	<	0.50	ug/L	EPA 524.2	11/5/01	ws
nobenzene	<	0.50	ug/L	EPA 524.2	11/5/01	ws
,2-Tetrachloroethane	<	0.50	ug/L	EPA 524.2	11/5/01	ws
',2-Tetrachloroethane	<	0.50	ug/L	EPA 524.2	11/5/01	ws
Dichloroethane	<	0.50	ug/L	EPA 524.2	11/5/01	ws
roethane	<	0.50	ug/L	EPA 524.2	11/5/01	ws
nomethane	<	0.50	ug/L	EPA 524.2	11/5/01	ws
romethane	<	0.50	ug/L	EPA 524.2	11/5/01	ws
omomethane	<	0.50	ug/L	EPA 524.2	11/5/01	ws
-Trichloropropane	<	0.50	ug/L	EPA 524.2	11/5/01	ws
Dichloropropane	<	0.50	ug/L	EPA 524.2	11/5/01	ws
Dichloropropane	<	0.50	ug/L	EPA 524.2	11/5/01	ws
yl Tert Butyl Ether	<	1.50	ug/L	EPA 524.2	11/5/01	ws
HALOMETHANES				EPA 524.2	11/5/01	ws
roform	<	0.50	ug/L	EPA 524.2	11/5/01	ws
nodichloromethane	<	0.50	ug/L	EPA 524.2	11/5/01	ws
omochloromethane	<	0.50	ug/L	EPA 524.2	11/5/01	ws
noform	<	0.50	ug/L	EPA 524.2	11/5/01	ws
l Trihalomethanes	<	2.00	ug/L	EPA 524.2	11/5/01	ws
- REGULATED				EPA 524.2	11/5/01	ws
ene	<	0.50	ug/L	EPA 524.2	11/5/01	ws
lbenzene	<	0.50	ug/L	EPA 524.2	11/5/01	ws
ene	<	0.50	ug/L	EPA 524.2	11/5/01	ws
Xylene	<	0.50	ug/L	EPA 524.2	11/5/01	ws
plus para Xylene	<	0.50	ug/L	EPA 524.2	11/5/01	ws
Xylenes	<	2.00	ug/L	EPA 524.2	11/5/01	ws
BTEX	<	2.00	ug/L	EPA 524.2	11/5/01	ws
-Trichlorobenzene	<	0.50	ug/L	EPA 524.2	11/5/01	ws
Dichlorobenzene	<	0.50	ug/L	EPA 524.2	11/5/01	ws
Dichlorbenzene	<	0.50	ug/L	EPA 524.2	11/5/01	ws

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FLAGS: < = less-than
> = greater-than

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FISH WILDLIFE AND PARKS
1420 E 6TH AVE
HELENA. MT 59620

Acct #: B0000075
PWSID #: B0000075
Report Date: 07-Dec-01

Collected: 11/1/01
Time: 15:00
By: DON SKAAR

o#: C0111-4050

nple ID: FISH WILDLIFE AND PARKS/ SEKOKANI SPRING

ALYTE		RESULTS	UNITS	METHOD	DATE	ANALYST
GANIC PARAMETERS						
robenzene	<	0.50	ug/L	EPA 524.2	11/5/01	ws
on Tetrachloride	<	0.50	ug/L	EPA 524.2	11/5/01	ws
1-Trichloroethane	<	0.50	ug/L	EPA 524.2	11/5/01	ws
2-Trichlorethane	<	0.50	ug/L	EPA 524.2	11/5/01	ws
Dichloroethane	<	0.50	ug/L	EPA 524.2	11/5/01	ws
Dichloroethene	<	0.50	ug/L	EPA 524.2	11/5/01	ws
,2-Dichloroethene	<	0.50	ug/L	EPA 524.2	11/5/01	ws
1,2-Dichloroethene	<	0.50	ug/L	EPA 524.2	11/5/01	ws
hylene Chloride	<	2.00	ug/L	EPA 524.2	11/5/01	ws
Dichloropropane	<	0.50	ug/L	EPA 524.2	11/5/01	ws
achloroethene	<	0.50	ug/L	EPA 524.2	11/5/01	ws
hloroethene	<	0.50	ug/L	EPA 524.2	11/5/01	ws
l Chloride	<	0.50	ug/L	EPA 524.2	11/5/01	ws
Dibromo-3-Chloropropane	<	1.00	ug/L	EPA 524.2	11/5/01	ws
ene	<	0.50	ug/L	EPA 524.2	11/5/01	ws
- UNREGULATED				EPA 524.2	11/5/01	ws
3-Trichlorobenzene	<	0.50	ug/L	EPA 524.2	11/5/01	ws
4-Trimethylbenzene	<	0.50	ug/L	EPA 524.2	11/5/01	ws
5-Trimethylbenzene	<	0.50	ug/L	EPA 524.2	11/5/01	ws
utylbenzene	<	0.50	ug/L	EPA 524.2	11/5/01	ws
ropylbenzene	<	0.50	ug/L	EPA 524.2	11/5/01	ws
Butylbenzene	<	0.50	ug/L	EPA 524.2	11/5/01	ws
lorodifluoromethane	<	0.50	ug/L	EPA 524.2	11/5/01	ws
Dibromoethane	<	0.50	ug/L	EPA 524.2	11/5/01	ws
achlorobutadiene	<	0.50	ug/L	EPA 524.2	11/5/01	ws
ropylbenzene	<	0.50	ug/L	EPA 524.2	11/5/01	ws
opropyltoluene	<	0.50	ug/L	EPA 524.2	11/5/01	ws
nochloromethane	<	0.50	ug/L	EPA 524.2	11/5/01	ws
hthalene	<	0.50	ug/L	EPA 524.2	11/5/01	ws
Butylbenzene	<	0.50	ug/L	EPA 524.2	11/5/01	ws

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FLAGS: < = less-than
> = greater-than

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- RESULTS OF < ORGANIC > CHEMICAL ANALYSIS -

DON SKAAR
FISH WILDLIFE AND PARKS
1420 E 6TH AVE
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Acct #: B0000075
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Report Date: 07-Dec-01

Collected: 11/1/01
Time: 15:00
By: DON SKAAR

)#: C0111-4050

nple ID: FISH WILDLIFE AND PARKS/ SEKOKANI SPRING

ALYTE		RESULTS	UNITS	METHOD	DATE	ANALYST
GANIC PARAMETERS						
ılorofluoromethane	<	0.50	ug/L	EPA 524.2	11/5/01	ws
OROPHENOXY HERBICIDES				EPA 515.3	11/19/01	JC
pon	<	1.00	ug/L	EPA 515.3	11/19/01	JC
ıchlorophenol	<	0.040	ug/L	EPA 515.3	11/19/01	JC
)	<	0.100	ug/L	EPA 515.3	11/19/01	JC
seb	<	0.200	ug/L	EPA 515.3	11/19/01	JC
ram (Tordon)	<	0.100	ug/L	EPA 515.3	11/19/01	JC
-TP (Silvex)	<	0.200	ug/L	EPA 515.3	11/19/01	JC
mba	<	1.00	ug/L	EPA 515.3	11/19/01	JC
uorfen	<	0.100	ug/L	EPA 515.3	11/19/01	JC

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FLAGS: < = less-than
> = greater-than

APPENDIX E

Water temperature monitoring of the
hatchery spring source

Water Temperature and Temperature Units, Sekokini Springs Natural Fish-Rearing Project (Progress Report: July 23, 1997 - March 31, 1998)

Introduction

Water flowing into the fish-rearing ponds at Sekokini Springs, MT, comes from three main springs and one spring complex. Little is known, however, about the springs' sources, connectedness, and temperatures. In July 1997, the USFWS began a 1-year project to describe water temperature patterns in the three main springs and the spring complex. This report summarizes data collected between July 23, 1997, and March 31, 1998 (days 1-252).

Study Area and Methods

In each of the three main springs and the spring complex (Figure 1), water temperatures were measured to the nearest 0.1°C with an Onset Optic StowAway submersible thermometer programmed to record temperatures every 2 hours. Data were downloaded and converted to °F with Onset Logbook 2.04+ software (OCC 1997) and summarized statistically and graphically with NCSS 6.0.1 (Hintze 1995) and Grapher 1.25 (Golden Software 1994) software.

Results and Discussion

Upper Pond

Water flows into the Upper Pond from the Upper Spring and the Spring Complex (Figure 1). In the Upper Spring (Tables 1 and 2, Figure 2, and Appendix Table 1), mean daily temperatures were in the high 50s°F from late July through mid-September, gradually decreased to the low 40s°F by early February, and remained in the low 40s°F through March. For the period July 23-March 31 (252 days), mean daily temperature averaged 51°F (range, 43-59°F), and temperature units averaged 18.6 per day (total, 4,679).

In the Spring Complex (Tables 1 and 2, Figure 3, Appendix Table 2), the Optic StowAway thermometer functioned properly only from July 28 through March 12 (228 days). Mean daily temperatures in the Spring Complex were in the low-to-mid 60s°F from late July through late September, dropped to the low 40s°F by early February, and stayed in the low 40s°F through mid-March. For the 228-day period, mean daily temperature averaged 53°F (range, 43-65°F), and temperature units averaged 20.7 per day (total, 4,725).

Egg Trough Spring

In Egg Trough Spring (Tables 1 and 2, Figure 4, Appendix Table 3), mean daily temperatures were in the low 50s°F from late July through early October and then slowly and steadily decreased to the mid-40s°F by the end of March. For the period July 23-March 31 (252 days), mean daily temperature averaged 48°F (range, 44-53°F), and temperature units averaged 16.3 per day (total, 4,115).

Cold Spring

In Cold Spring (Tables 1 and 2, Figure 5, Appendix Table 4), mean daily temperatures were consistently in the low-to-mid 40s°F from July 23 through March 31. During the 252-day period, mean daily temperature averaged 44°F (range, 42-45°F), and temperature units averaged 11.5 per day (total, 2,902).

References

Golden Software. 1994. Grapher 1.25 for Windows. Golden Software, Inc., Golden, Colorado.

Hintze, J. 1995. NCSS 6.0.1 for Windows. Number Cruncher Statistical Systems, Kaysville, Utah.

OCC (Onset Computer Corporation). 1997. Logbook 2.04+ for Windows. Onset Computer Corporation, Pocasset, Massachusetts.

Daniel Carty
USFWS
Creston Fish and Wildlife Center
780 Creston Hatchery Road
Kalispell, MT 59901

sekokrpt2.wpd, wp7, 4/08/98, dc

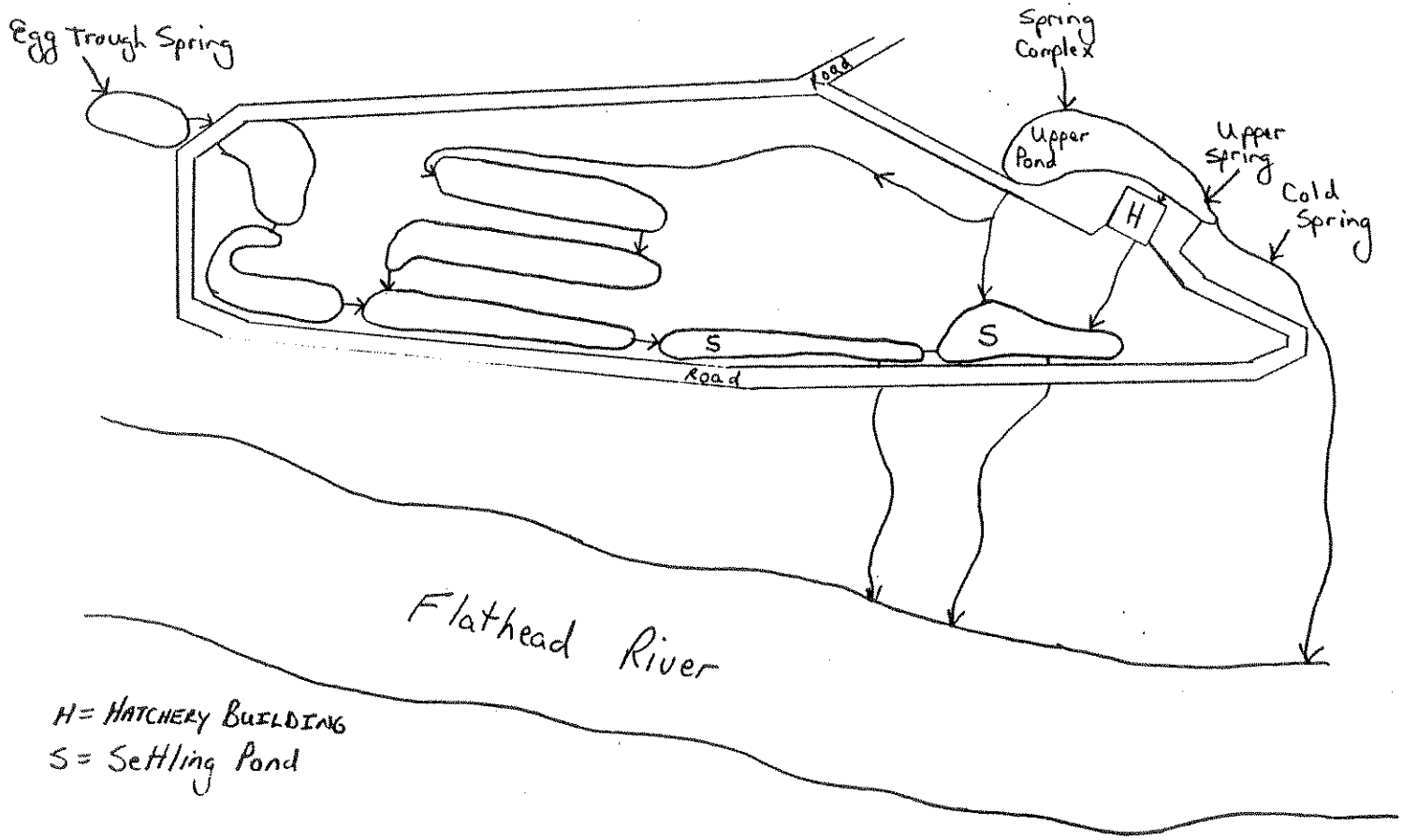


Figure 1.—Sekokini Springs Fish Hatchery, showing ponds, the three main springs, and the one spring complex.

Table 1.—Summary of water temperatures (°F) measured in the three main springs and the one spring complex, Sekokini Springs, MT, July 23, 1997-March 31, 1998.[a]

Spring	Dates	Days	Mean	SD	Min	Max	Range
Upper Pond-Upper Spring	Jul 23, 1997 - Mar 31, 1998	252	50.6	6.0	42.7	59.1	16.4
Upper Pond-Spring Complex[b]	Jul 28, 1997 - Mar 12, 1998	228	52.7	7.8	42.6	64.8	22.2
Egg Trough Spring	Jul 23, 1997 - Mar 31, 1998	252	48.3	2.2	44.3	52.5	8.2
Cold Spring	Jul 23, 1997 - Mar 31, 1998	252	43.5	0.56	41.5	44.6	3.1

[a] For each site, statistics were derived from the analysis of mean daily temperatures.

[b] The thermometer in the Upper Pond-Spring Complex malfunctioned on March 13; consequently, no temperatures were recorded at that site between March 13 and March 31, 1998.

Table 2.—Summary of temperature units for the three main springs and the one spring complex, Sekokini Springs, MT, July 23, 1997-March 31, 1998.[a]

Spring	Dates	Days	Mean	SD	Min	Max	Range
Upper Pond-Upper Spring	Jul 23, 1997 - Mar 31, 1998	252	18.6	6.0	10.7	27.1	16.4
Upper Pond-Spring Complex[b]	Jul 28, 1997 - Mar 12, 1998	228	20.7	7.8	10.6	32.8	22.2
Egg Trough Spring	Jul 23, 1997 - Mar 31, 1998	252	16.3	2.2	12.3	20.5	8.2
Cold Spring	Jul 23, 1997 - Mar 31, 1998	252	11.5	0.6	9.5	12.6	3.1

[a] For each site, statistics are based on daily temperature units, which were calculated as: Daily TUs = (Mean daily temperature-32).

[b] The thermometer in the Upper Pond-Spring Complex malfunctioned on March 13; consequently, no temperatures were recorded at that site between March 13 and March 31, 1998.

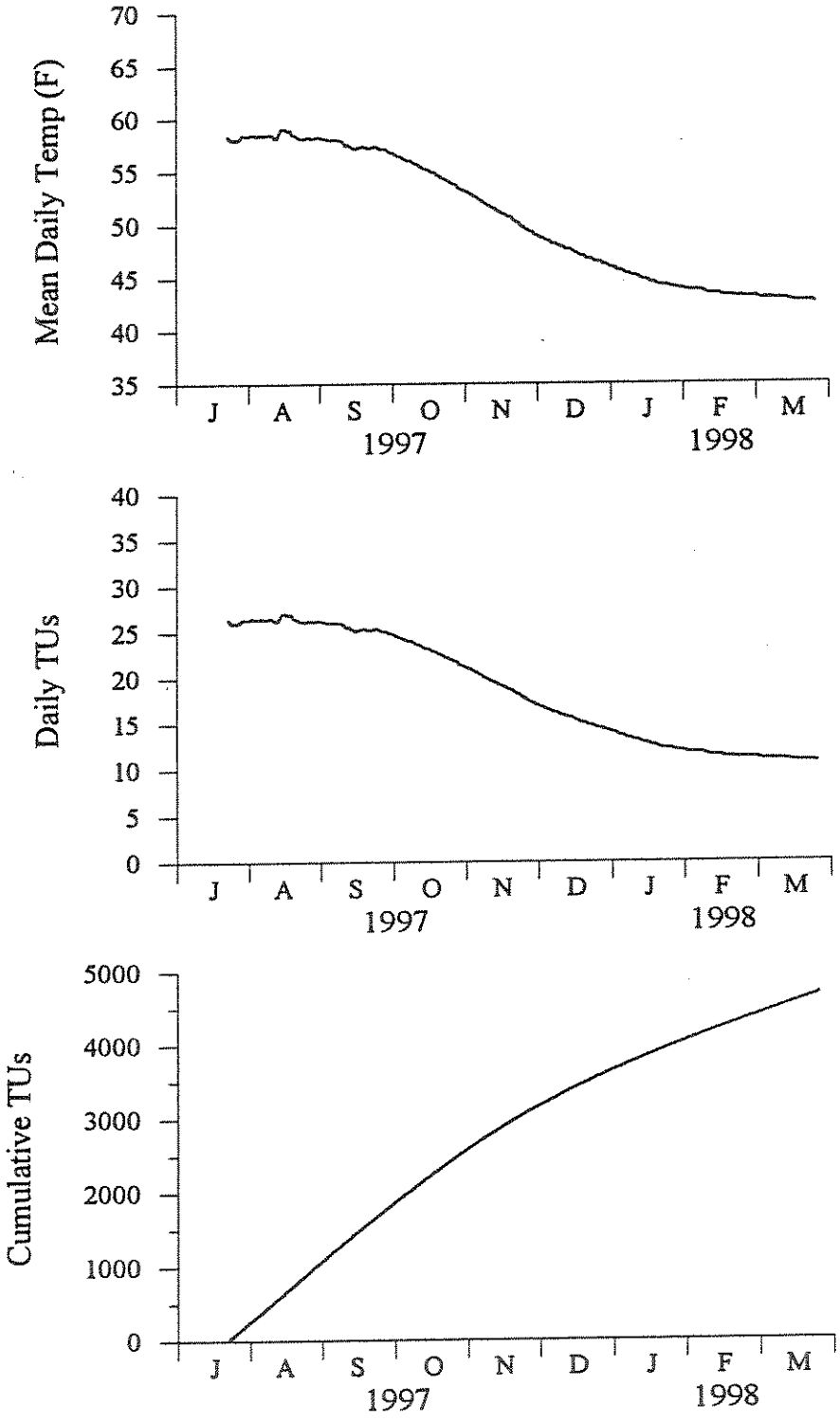


Figure 2.—Mean daily water temperature, daily temperature units, and cumulative temperature units for Upper Pond- Upper Spring, Sekokini Springs, MT, July 23, 1997 to March 31, 1998 (252 days).

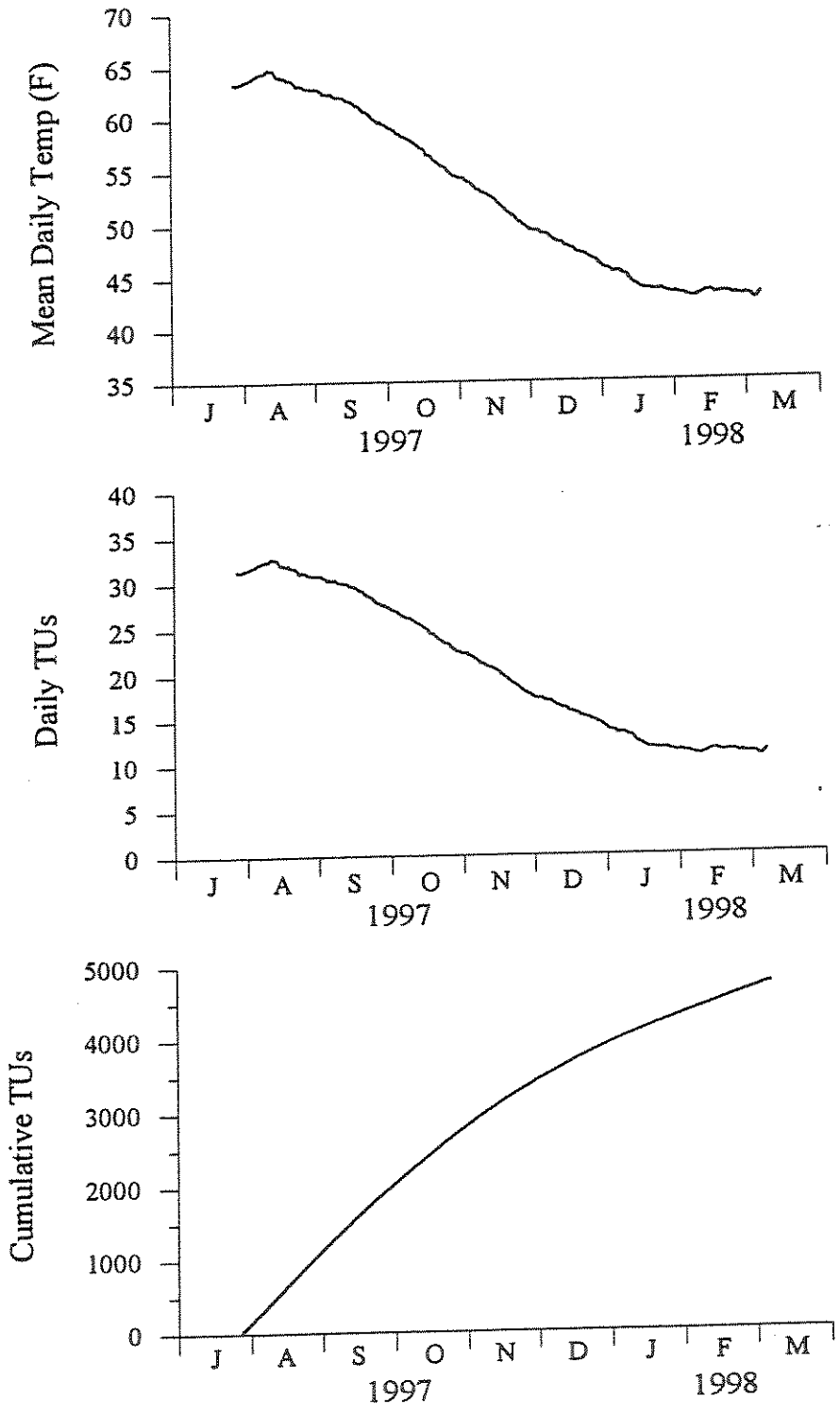


Figure 3.—Mean daily water temperature, daily temperature units, and cumulative temperature units for Upper Pond-Spring Complex, Sekokini Springs, MT, July 28, 1997 to March 12, 1998 (228 days).

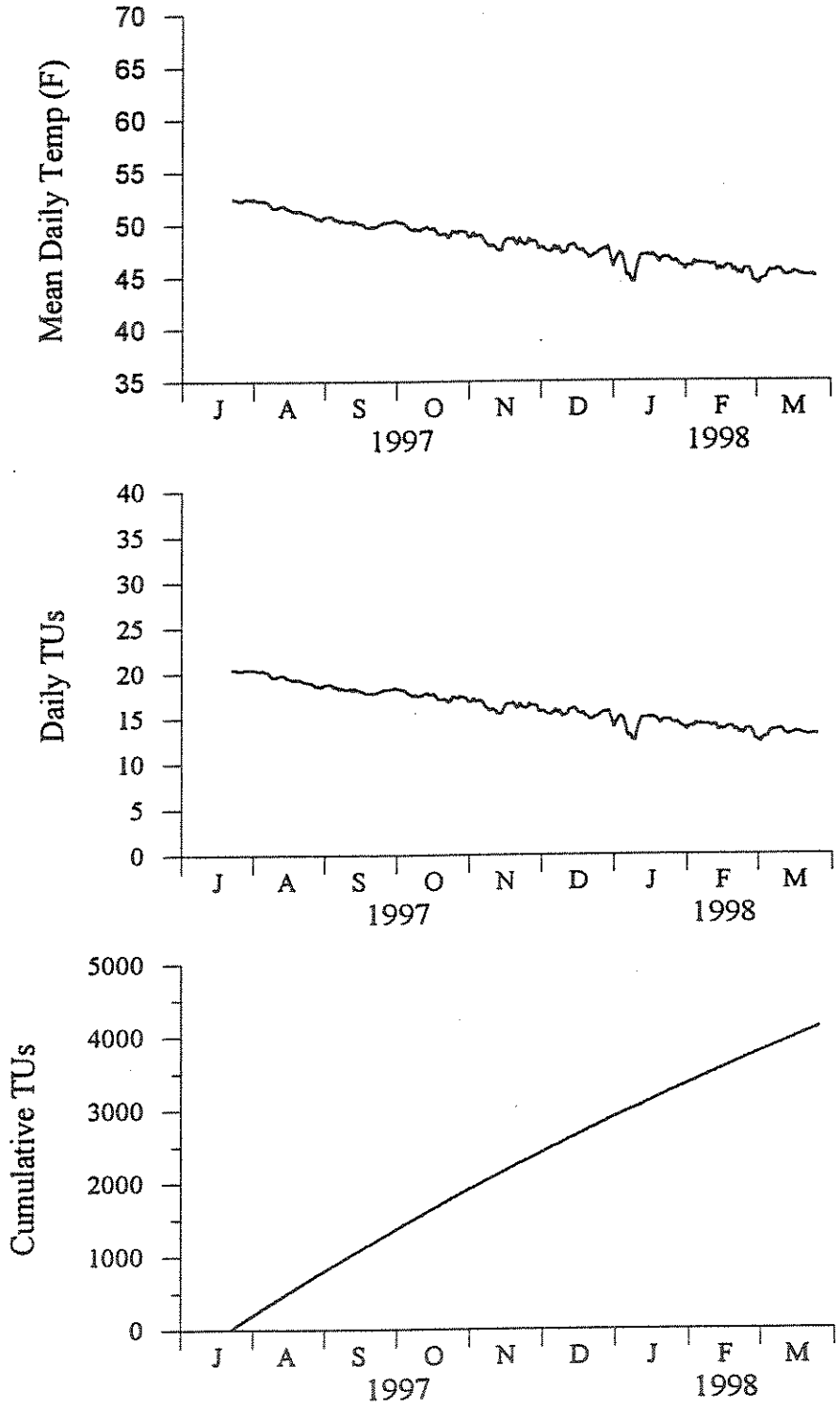


Figure 4.—Mean daily water temperature, daily temperature units, and cumulative temperature units for Egg Trough Spring, Sekokini Springs, MT, July 23, 1997 to March 31, 1998 (252 days).

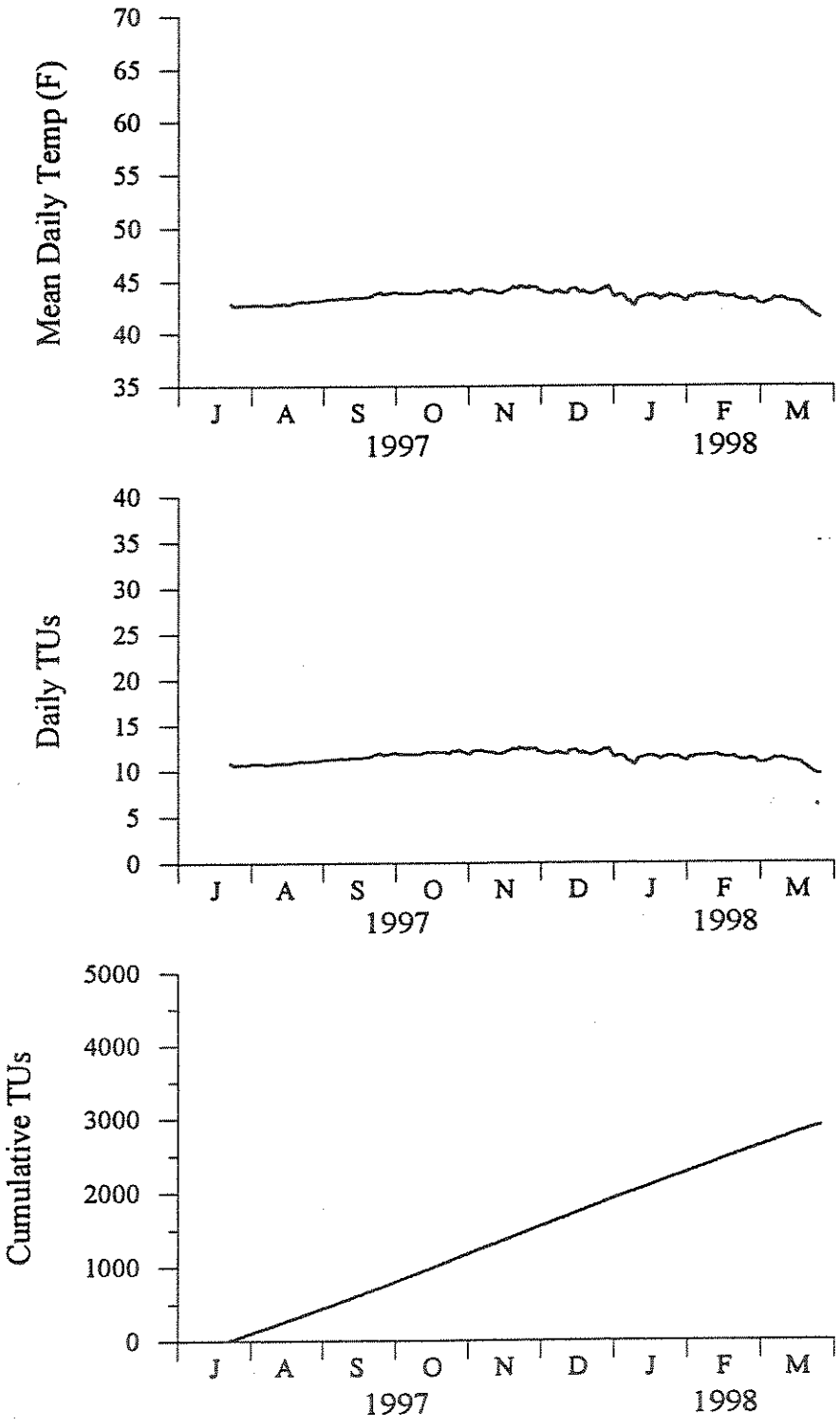


Figure 5.—Mean daily water temperature, daily temperature units, and cumulative temperature units for Cold Spring, Sekokini Springs, MT, July 23, 1997 to March 31, 1998 (252 days).

Appendix Table 1.—Water temperatures (F) and temperature units for Upper Pond-Upper Spring @ Sekokini Springs, MT (July 23, 1997 to March 31, 1998).

Date	Julian day	N	Mean	SD	SE	Min	Max	Range	TUs	Cum TUs
970723	204	4	58.4	0.49	0.24	58.0	59.1	1.1	26.4	0026
970724	205	12	58.1	0.33	0.09	58.0	59.1	1.1	26.1	0053
970725	206	12	58.0	0.25	0.07	58.0	58.8	0.9	26.0	0079
970726	207	12	58.1	0.22	0.06	57.7	58.5	0.8	26.1	0105
970727	208	12	58.0	0.25	0.07	58.0	58.8	0.9	26.0	0131
970728	209	12	58.2	0.60	0.17	57.7	59.4	1.7	26.2	0157
970729	210	12	58.5	0.11	0.03	58.2	58.5	0.3	26.5	0183
970730	211	12	58.5	0.24	0.07	58.2	59.1	0.9	26.5	0210
970731	212	12	58.4	0.25	0.07	58.2	59.1	0.9	26.4	0236
970801	213	12	58.4	0.18	0.05	58.2	58.8	0.6	26.4	0263
970802	214	12	58.6	0.33	0.10	58.5	59.7	1.1	26.6	0289
970803	215	12	58.5	0.42	0.12	58.2	59.7	1.4	26.5	0316
970804	216	12	58.5	0.32	0.09	58.2	59.4	1.1	26.5	0342
970805	217	12	58.4	0.25	0.07	58.2	59.1	0.9	26.4	0369
970806	218	12	58.6	0.41	0.12	58.5	60.0	1.4	26.6	0395
970807	219	12	58.4	0.15	0.04	58.2	58.5	0.3	26.4	0422
970808	220	12	58.5	0.13	0.04	58.2	58.5	0.3	26.5	0448
970809	221	12	58.5	0.15	0.04	58.2	58.8	0.6	26.5	0475
970810	222	12	58.6	0.37	0.11	58.2	59.7	1.4	26.6	0501
970811	223	12	58.5	0.40	0.12	58.2	59.7	1.4	26.5	0528
970812	224	12	58.3	0.25	0.07	58.2	59.1	0.9	26.3	0554
970813	225	12	58.2	0.00	0.00	58.2	58.2	0.0	26.2	0580
970814	226	11	58.6	0.65	0.20	58.0	59.4	1.4	26.6	0607
970815	227	12	59.1	0.08	0.02	59.1	59.4	0.3	27.1	0634
970816	228	12	59.1	0.00	0.00	59.1	59.1	0.0	27.1	0661
970817	229	12	59.1	0.30	0.09	58.8	60.0	1.1	27.1	0688
970818	230	12	58.9	0.14	0.04	58.8	59.1	0.3	26.9	0715
970819	231	12	59.0	0.25	0.07	58.8	59.7	0.9	27.0	0742
970820	232	12	58.6	0.19	0.06	58.5	59.1	0.6	26.6	0769
970821	233	12	58.5	0.00	0.00	58.5	58.5	0.0	26.5	0795
970822	234	12	58.4	0.19	0.06	58.2	58.8	0.6	26.4	0822
970823	235	12	58.2	0.00	0.00	58.2	58.2	0.0	26.2	0848
970824	236	12	58.2	0.16	0.05	58.0	58.5	0.6	26.2	0874
970825	237	12	58.1	0.18	0.05	58.0	58.5	0.6	26.1	0900
970826	238	12	58.3	0.20	0.06	58.0	58.8	0.9	26.3	0926
970827	239	12	58.3	0.08	0.02	58.2	58.5	0.3	26.3	0953
970828	240	12	58.2	0.14	0.04	58.0	58.5	0.6	26.2	0979
970829	241	12	58.2	0.00	0.00	58.2	58.2	0.0	26.2	1005
970830	242	12	58.3	0.08	0.02	58.2	58.5	0.3	26.3	1031
970831	243	12	58.3	0.08	0.02	58.2	58.5	0.3	26.3	1058
970901	244	12	58.3	0.08	0.02	58.2	58.5	0.3	26.3	1084
970902	245	12	58.2	0.08	0.02	58.0	58.2	0.3	26.2	1110
970903	246	12	58.1	0.15	0.04	58.0	58.2	0.3	26.1	1136

Appendix Table 1.—Water temperatures (F) and temperature units for Upper Pond-Upper Spring @ Sekokini Springs, MT (July 23, 1997 to March 31, 1998).

Date	Julian day	N	Mean	SD	SE	Min	Max	Range	TUs	Cum TUs
970904	247	12	58.1	0.19	0.05	58.0	58.5	0.6	26.1	1162
970905	248	12	58.0	0.13	0.04	58.0	58.2	0.3	26.0	1188
970906	249	12	58.0	0.13	0.04	58.0	58.2	0.3	26.0	1214
970907	250	12	58.1	0.14	0.04	58.0	58.2	0.3	26.1	1240
970908	251	12	58.1	0.14	0.04	58.0	58.2	0.3	26.1	1266
970909	252	12	58.0	0.11	0.03	58.0	58.2	0.3	26.0	1292
970910	253	12	58.0	0.00	0.00	58.0	58.0	0.0	26.0	1318
970911	254	12	57.8	0.24	0.07	57.4	58.0	0.6	25.8	1344
970912	255	12	57.5	0.15	0.04	57.4	57.7	0.3	25.5	1370
970913	256	12	57.6	0.14	0.04	57.4	57.7	0.3	25.6	1395
970914	257	12	57.4	0.11	0.03	57.1	57.4	0.3	25.4	1421
970915	258	12	57.3	0.19	0.05	56.8	57.4	0.6	25.3	1446
970916	259	12	57.1	0.08	0.02	57.1	57.4	0.3	25.1	1471
970917	260	12	57.3	0.14	0.04	57.1	57.4	0.3	25.3	1496
970918	261	12	57.3	0.15	0.04	57.1	57.4	0.3	25.3	1522
970919	262	12	57.4	0.00	0.00	57.4	57.4	0.0	25.4	1547
970920	263	12	57.4	0.00	0.00	57.4	57.4	0.0	25.4	1572
970921	264	12	57.3	0.15	0.04	57.1	57.4	0.3	25.3	1598
970922	265	12	57.2	0.11	0.03	57.1	57.4	0.3	25.2	1623
970923	266	12	57.3	0.21	0.06	57.1	57.7	0.6	25.3	1648
970924	267	12	57.4	0.08	0.02	57.4	57.7	0.3	25.4	1674
970925	268	12	57.4	0.08	0.02	57.1	57.4	0.3	25.4	1699
970926	269	12	57.2	0.13	0.04	57.1	57.4	0.3	25.2	1724
970927	270	12	57.1	0.00	0.00	57.1	57.1	0.0	25.1	1749
970928	271	12	57.1	0.00	0.00	57.1	57.1	0.0	25.1	1774
970929	272	12	57.1	0.11	0.03	56.8	57.1	0.3	25.1	1799
970930	273	12	56.9	0.11	0.03	56.8	57.1	0.3	24.9	1824
971001	274	12	56.8	0.00	0.00	56.8	56.8	0.0	24.8	1849
971002	275	12	56.8	0.13	0.04	56.6	56.8	0.3	24.8	1874
971003	276	12	56.6	0.00	0.00	56.6	56.6	0.0	24.6	1899
971004	277	12	56.5	0.13	0.04	56.3	56.6	0.3	24.5	1923
971005	278	12	56.4	0.14	0.04	56.3	56.6	0.3	24.4	1947
971006	279	12	56.3	0.00	0.00	56.3	56.3	0.0	24.3	1972
971007	280	12	56.2	0.14	0.04	56.0	56.3	0.3	24.2	1996
971008	281	12	56.0	0.00	0.00	56.0	56.0	0.0	24.0	2020
971009	282	12	56.0	0.00	0.00	56.0	56.0	0.0	24.0	2044
971010	283	12	56.0	0.08	0.02	55.7	56.0	0.3	24.0	2068
971011	284	12	55.8	0.08	0.02	55.7	56.0	0.3	23.8	2092
971012	285	12	55.7	0.00	0.00	55.7	55.7	0.0	23.7	2115
971013	286	12	55.6	0.14	0.04	55.5	55.7	0.3	23.6	2139
971014	287	12	55.5	0.00	0.00	55.5	55.5	0.0	23.5	2162
971015	288	12	55.3	0.18	0.05	55.2	55.7	0.6	23.3	2186
971016	289	12	55.2	0.16	0.05	55.2	55.7	0.6	23.2	2209

Appendix Table 1.—Water temperatures (F) and temperature units for Upper Pond-Upper Spring @ Sekokini Springs, MT (July 23, 1997 to March 31, 1998).

Date	Julian day	N	Mean	SD	SE	Min	Max	Range	TUs	Cum TUs
971017	290	12	55.2	0.12	0.03	54.9	55.5	0.6	23.2	2232
971018	291	12	55.0	0.19	0.05	54.9	55.5	0.6	23.0	2255
971019	292	12	54.9	0.08	0.02	54.9	55.2	0.3	22.9	2278
971020	293	12	54.9	0.16	0.05	54.6	55.2	0.6	22.9	2301
971021	294	12	54.6	0.00	0.00	54.6	54.6	0.0	22.6	2324
971022	295	12	54.6	0.13	0.04	54.3	54.6	0.3	22.6	2346
971023	296	12	54.4	0.11	0.03	54.3	54.6	0.3	22.4	2368
971024	297	12	54.3	0.11	0.03	54.1	54.3	0.3	22.3	2391
971025	298	12	54.2	0.14	0.04	54.1	54.3	0.3	22.2	2413
971026	299	12	54.1	0.00	0.00	54.1	54.1	0.0	22.1	2435
971027	300	12	54.0	0.13	0.04	53.8	54.1	0.3	22.0	2457
971028	301	12	53.8	0.11	0.03	53.8	54.1	0.3	21.8	2479
971029	302	12	53.8	0.08	0.02	53.5	53.8	0.3	21.8	2501
971030	303	12	53.5	0.08	0.02	53.5	53.8	0.3	21.5	2522
971031	304	12	53.4	0.13	0.04	53.2	53.5	0.3	21.4	2543
971101	305	12	53.3	0.11	0.03	53.2	53.5	0.3	21.3	2565
971102	306	12	53.2	0.00	0.00	53.2	53.2	0.0	21.2	2586
971103	307	12	53.1	0.15	0.04	52.9	53.2	0.3	21.1	2607
971104	308	12	53.0	0.11	0.03	52.9	53.2	0.3	21.0	2628
971105	309	12	52.8	0.15	0.04	52.7	52.9	0.3	20.8	2649
971106	310	12	52.7	0.11	0.03	52.7	52.9	0.3	20.7	2670
971107	311	12	52.6	0.12	0.04	52.4	52.7	0.3	20.6	2690
971108	312	12	52.4	0.00	0.00	52.4	52.4	0.0	20.4	2711
971109	313	12	52.3	0.14	0.04	52.1	52.4	0.3	20.3	2731
971110	314	12	52.1	0.00	0.00	52.1	52.1	0.0	20.1	2751
971111	315	12	52.0	0.13	0.04	51.8	52.1	0.3	20.0	2771
971112	316	12	51.8	0.00	0.00	51.8	51.8	0.0	19.8	2791
971113	317	12	51.7	0.14	0.04	51.6	51.8	0.3	19.7	2810
971114	318	13	51.6	0.20	0.05	51.0	51.8	0.8	19.6	2830
971115	319	12	51.5	0.08	0.02	51.3	51.6	0.3	19.5	2849
971116	320	12	51.3	0.11	0.03	51.3	51.6	0.3	19.3	2868
971117	321	12	51.2	0.11	0.03	51.0	51.3	0.3	19.2	2888
971118	322	12	51.0	0.00	0.00	51.0	51.0	0.0	19.0	2907
971119	323	12	51.0	0.00	0.00	51.0	51.0	0.0	19.0	2926
971120	324	12	50.8	0.14	0.04	50.7	51.0	0.3	18.8	2944
971121	325	12	50.7	0.00	0.00	50.7	50.7	0.0	18.7	2963
971122	326	12	50.7	0.13	0.04	50.4	50.7	0.3	18.7	2982
971123	327	12	50.4	0.00	0.00	50.4	50.4	0.0	18.4	3000
971124	328	12	50.3	0.14	0.04	50.2	50.4	0.3	18.3	3019
971125	329	12	50.2	0.00	0.00	50.2	50.2	0.0	18.2	3037
971126	330	12	49.9	0.11	0.03	49.9	50.2	0.3	17.9	3055
971127	331	12	49.8	0.13	0.04	49.6	49.9	0.3	17.8	3072
971128	332	12	49.6	0.11	0.03	49.6	49.9	0.3	17.6	3090

Appendix Table 1.—Water temperatures (F) and temperature units for Upper Pond-Upper Spring @ Sekokini Springs, MT (July 23, 1997 to March 31, 1998).

Date	Julian day	N	Mean	SD	SE	Min	Max	Range	TUs	Cum TUs
971129	333	12	49.5	0.13	0.04	49.3	49.6	0.3	17.5	3108
971130	334	12	49.3	0.08	0.02	49.3	49.6	0.3	17.3	3125
971201	335	12	49.3	0.11	0.03	49.0	49.3	0.3	17.3	3142
971202	336	12	49.0	0.00	0.00	49.0	49.0	0.0	17.0	3159
971203	337	12	49.0	0.11	0.03	48.8	49.0	0.3	17.0	3176
971204	338	12	48.8	0.00	0.00	48.8	48.8	0.0	16.8	3193
971205	339	12	48.8	0.00	0.00	48.8	48.8	0.0	16.8	3210
971206	340	12	48.6	0.14	0.04	48.5	48.8	0.3	16.6	3226
971207	341	12	48.5	0.00	0.00	48.5	48.5	0.0	16.5	3243
971208	342	12	48.5	0.00	0.00	48.5	48.5	0.0	16.5	3259
971209	343	12	48.2	0.08	0.02	48.2	48.5	0.3	16.2	3276
971210	344	12	48.2	0.00	0.00	48.2	48.2	0.0	16.2	3292
971211	345	12	48.2	0.00	0.00	48.2	48.2	0.0	16.2	3308
971212	346	12	48.0	0.14	0.04	47.9	48.2	0.3	16.0	3324
971213	347	12	47.9	0.00	0.00	47.9	47.9	0.0	15.9	3340
971214	348	12	47.9	0.00	0.00	47.9	47.9	0.0	15.9	3356
971215	349	12	47.7	0.11	0.03	47.7	47.9	0.3	15.7	3371
971216	350	12	47.7	0.00	0.00	47.7	47.7	0.0	15.7	3387
971217	351	12	47.7	0.00	0.00	47.7	47.7	0.0	15.7	3403
971218	352	12	47.5	0.14	0.04	47.4	47.7	0.3	15.5	3418
971219	353	12	47.4	0.00	0.00	47.4	47.4	0.0	15.4	3434
971220	354	12	47.3	0.11	0.03	47.1	47.4	0.3	15.3	3449
971221	355	12	47.1	0.08	0.02	47.1	47.4	0.3	15.1	3464
971222	356	12	47.1	0.00	0.00	47.1	47.1	0.0	15.1	3479
971223	357	12	47.1	0.08	0.02	46.8	47.1	0.3	15.1	3494
971224	358	12	46.8	0.08	0.02	46.8	47.1	0.3	14.8	3509
971225	359	12	46.8	0.00	0.00	46.8	46.8	0.0	14.8	3524
971226	360	12	46.8	0.13	0.04	46.5	46.8	0.3	14.8	3539
971227	361	12	46.6	0.11	0.03	46.5	46.8	0.3	14.6	3553
971228	362	12	46.5	0.00	0.00	46.5	46.5	0.0	14.5	3568
971229	363	12	46.5	0.00	0.00	46.5	46.5	0.0	14.5	3582
971230	364	12	46.5	0.13	0.04	46.3	46.5	0.3	14.5	3597
971231	365	12	46.3	0.00	0.00	46.3	46.3	0.0	14.3	3611
980101	1	12	46.3	0.00	0.00	46.3	46.3	0.0	14.3	3625
980102	2	12	46.2	0.14	0.04	46.0	46.3	0.3	14.2	3639
980103	3	12	46.0	0.00	0.00	46.0	46.0	0.0	14.0	3653
980104	4	12	46.0	0.00	0.00	46.0	46.0	0.0	14.0	3667
980105	5	12	46.0	0.00	0.00	46.0	46.0	0.0	14.0	3681
980106	6	12	45.7	0.08	0.00	45.7	46.0	0.3	13.7	3695
980107	7	12	45.7	0.00	0.00	45.7	45.7	0.0	13.7	3709
980108	8	12	45.7	0.11	0.03	45.4	45.7	0.3	13.7	3723
980109	9	12	45.5	0.11	0.03	45.4	45.7	0.3	13.5	3736
980110	10	12	45.4	0.00	0.00	45.4	45.4	0.0	13.4	3749

Appendix Table 1.—Water temperatures (F) and temperature units for Upper Pond-Upper Spring @ Sekokini Springs, MT (July 23, 1997 to March 31, 1998).

Date	Julian day	N	Mean	SD	SE	Min	Max	Range	TUs	Cum TUs
980111	11	12	45.4	0.13	0.04	45.2	45.4	0.3	13.4	3763
980112	12	12	45.2	0.08	0.02	45.2	45.4	0.3	13.2	3776
980113	13	12	45.2	0.00	0.00	45.2	45.2	0.0	13.2	3789
980114	14	12	45.2	0.00	0.00	45.2	45.2	0.0	13.2	3802
980115	15	12	45.1	0.12	0.04	44.9	45.2	0.3	13.1	3815
980116	16	12	44.9	0.08	0.02	44.9	45.2	0.3	12.9	3828
980117	17	12	44.9	0.00	0.00	44.9	44.9	0.0	12.9	3841
980118	18	12	44.9	0.00	0.00	44.9	44.9	0.0	12.9	3854
980119	19	12	44.8	0.13	0.04	44.6	44.9	0.3	12.8	3867
980120	20	12	44.6	0.11	0.03	44.6	44.9	0.3	12.6	3879
980121	21	12	44.6	0.00	0.00	44.6	44.6	0.0	12.6	3892
980122	22	12	44.6	0.00	0.00	44.6	44.6	0.0	12.6	3905
980123	23	12	44.4	0.14	0.04	44.3	44.6	0.3	12.4	3917
980124	24	12	44.3	0.08	0.02	44.3	44.6	0.3	12.3	3929
980125	25	12	44.3	0.00	0.00	44.3	44.3	0.0	12.3	3942
980126	26	12	44.3	0.00	0.00	44.3	44.3	0.0	12.3	3954
980127	27	12	44.3	0.00	0.00	44.3	44.3	0.0	12.3	3966
980128	28	12	44.3	0.00	0.00	44.3	44.3	0.0	12.3	3979
980129	29	12	44.2	0.14	0.04	44.0	44.3	0.3	12.2	3991
980130	30	12	44.1	0.13	0.04	44.0	44.3	0.3	12.1	4003
980131	31	12	44.1	0.11	0.03	44.0	44.3	0.3	12.1	4015
980201	32	12	44.0	0.00	0.00	44.0	44.0	0.0	12.0	4027
980202	33	12	44.0	0.00	0.00	44.0	44.0	0.0	12.0	4039
980203	34	12	44.0	0.08	0.02	43.8	44.0	0.3	12.0	4051
980204	35	12	43.9	0.14	0.04	43.8	44.0	0.3	11.9	4063
980205	36	12	43.8	0.13	0.04	43.8	44.0	0.3	11.8	4075
980206	37	12	43.8	0.13	0.04	43.8	44.0	0.3	11.8	4087
980207	38	12	43.8	0.00	0.00	43.8	43.8	0.0	11.8	4098
980208	39	12	43.8	0.00	0.00	43.8	43.8	0.0	11.8	4110
980209	40	12	43.8	0.00	0.00	43.8	43.8	0.0	11.8	4122
980210	41	12	43.8	0.00	0.00	43.8	43.8	0.0	11.8	4134
980211	42	12	43.8	0.00	0.00	43.8	43.8	0.0	11.8	4146
980212	43	12	43.7	0.13	0.04	43.5	43.8	0.3	11.7	4157
980213	44	12	43.6	0.14	0.04	43.5	43.8	0.3	11.6	4169
980214	45	12	43.5	0.11	0.03	43.5	43.8	0.3	11.5	4180
980215	46	12	43.5	0.08	0.02	43.5	43.8	0.3	11.5	4192
980216	47	12	43.5	0.08	0.02	43.5	43.8	0.3	11.5	4203
980217	48	12	43.5	0.08	0.02	43.5	43.8	0.3	11.5	4215
980218	49	12	43.5	0.00	0.00	43.5	43.5	0.0	11.5	4226
980219	50	12	43.5	0.12	0.03	43.2	43.8	0.6	11.5	4238
980220	51	12	43.3	0.14	0.04	43.2	43.5	0.3	11.3	4249
980221	52	12	43.3	0.14	0.04	43.2	43.5	0.3	11.3	4260
980222	53	12	43.3	0.13	0.04	43.2	43.5	0.3	11.3	4272

Appendix Table 1.—Water temperatures (F) and temperature units for Upper Pond-Upper Spring @ Sekokini Springs, MT (July 23, 1997 to March 31, 1998).

Date	Julian day	N	Mean	SD	SE	Min	Max	Range	TUs	Cum TUs
980223	54	12	43.3	0.25	0.07	43.2	44.0	0.8	11.3	4283
980224	55	12	43.3	0.13	0.04	43.2	43.5	0.3	11.3	4294
980225	56	12	43.3	0.13	0.04	43.2	43.5	0.3	11.3	4306
980226	57	12	43.2	0.11	0.03	43.2	43.5	0.3	11.2	4317
980227	58	12	43.3	0.25	0.07	43.2	44.0	0.8	11.3	4328
980228	59	12	43.3	0.25	0.07	43.2	44.0	0.8	11.3	4339
980301	60	12	43.2	0.11	0.03	43.2	43.5	0.3	11.2	4351
980302	61	12	43.2	0.00	0.00	43.2	43.2	0.0	11.2	4362
980303	62	12	43.2	0.00	0.00	43.2	43.2	0.0	11.2	4373
980304	63	12	43.2	0.11	0.03	43.2	43.5	0.3	11.2	4384
980305	64	12	43.2	0.00	0.00	43.2	43.2	0.0	11.2	4395
980306	65	12	43.3	0.24	0.07	43.2	44.0	0.8	11.3	4407
980307	66	12	43.1	0.19	0.05	42.9	43.5	0.6	11.1	4418
980308	67	12	43.0	0.14	0.04	42.9	43.2	0.3	11.0	4429
980309	68	12	43.0	0.14	0.04	42.9	43.2	0.3	11.0	4440
980310	69	12	43.1	0.33	0.09	42.9	44.0	1.1	11.1	4451
980311	70	12	43.0	0.14	0.04	42.9	43.2	0.3	11.0	4462
980312	71	12	43.1	0.25	0.07	42.9	43.8	0.8	11.1	4473
980313	72	12	43.0	0.13	0.04	42.9	43.2	0.3	11.0	4484
980314	73	12	43.0	0.18	0.05	42.9	43.5	0.6	11.0	4495
980315	74	12	43.0	0.11	0.03	42.9	43.2	0.3	11.0	4506
980316	75	12	43.0	0.32	0.09	42.9	44.0	1.1	11.0	4517
980317	76	12	43.0	0.17	0.05	42.9	43.5	0.6	11.0	4528
980318	77	12	43.0	0.11	0.03	42.9	43.2	0.3	11.0	4539
980319	78	12	43.0	0.24	0.07	42.9	43.8	0.8	11.0	4550
980320	79	12	42.9	0.11	0.03	42.6	42.9	0.3	10.9	4561
980321	80	12	42.9	0.11	0.03	42.6	42.9	0.3	10.9	4572
980322	81	12	42.8	0.14	0.04	42.6	42.9	0.3	10.8	4582
980323	82	12	42.8	0.14	0.04	42.6	42.9	0.3	10.8	4593
980324	83	12	42.8	0.15	0.04	42.6	42.9	0.3	10.8	4604
980325	84	12	42.8	0.14	0.04	42.6	42.9	0.3	10.8	4615
980326	85	12	42.8	0.14	0.04	42.6	42.9	0.3	10.8	4626
980327	86	12	42.8	0.15	0.04	42.6	42.9	0.3	10.8	4636
980328	87	12	42.8	0.25	0.07	42.6	43.5	0.8	10.8	4647
980329	88	12	42.8	0.25	0.07	42.6	43.5	0.8	10.8	4658
980330	89	12	42.8	0.25	0.07	42.6	43.5	0.8	10.8	4669
980331	90	6	42.7	0.14	0.06	42.6	42.9	0.3	10.7	4679

Appendix Table 2.—Water temperatures (F) and temperature units for Upper Pond-Spring Complex @ Sekokini Springs, MT (July 28, 1997 to March 31, 1998)[a].

Date	Julian day	N	Mean	SD	SE	Min	Max	Range	TUs	Cum TUs
					No data collected at this site from July 23-27					
970728	209	5	63.4	0.00	0.00	63.4	63.4	0.0	31.4	0031
970729	210	12	63.3	0.11	0.03	63.1	63.4	0.3	31.3	0063
970730	211	12	63.4	0.08	0.02	63.4	63.6	0.3	31.4	0094
970731	212	12	63.5	0.14	0.04	63.4	63.6	0.3	31.5	0125
970801	213	12	63.6	0.13	0.04	63.4	63.6	0.3	31.6	0157
970802	214	12	63.7	0.08	0.02	63.6	63.9	0.3	31.7	0189
970803	215	12	63.8	0.15	0.04	63.6	63.9	0.3	31.8	0221
970804	216	12	63.9	0.00	0.00	63.9	63.9	0.0	31.9	0252
970805	217	12	64.0	0.13	0.04	63.9	64.2	0.3	32.0	0284
970806	218	12	64.2	0.12	0.04	63.9	64.5	0.6	32.2	0317
970807	219	12	64.3	0.11	0.03	64.2	64.5	0.3	32.3	0349
970808	220	12	64.4	0.14	0.04	64.2	64.5	0.3	32.4	0381
970809	221	12	64.5	0.00	0.00	64.5	64.5	0.0	32.5	0414
970810	222	12	64.4	0.18	0.05	64.2	64.8	0.6	32.4	0446
970811	223	12	64.7	0.18	0.05	64.5	65.1	0.6	32.7	0479
970812	224	12	64.8	0.17	0.05	64.5	65.1	0.6	32.8	0512
970813	225	12	64.7	0.18	0.05	64.5	65.1	0.6	32.7	0544
970814	226	11	64.7	0.59	0.18	64.2	66.0	1.8	32.7	0577
970815	227	12	64.3	0.45	0.13	63.9	65.7	1.7	32.3	0609
970816	228	12	64.0	0.17	0.05	63.9	64.5	0.6	32.0	0641
970817	229	12	64.1	0.53	0.15	63.6	65.4	1.7	32.1	0673
970818	230	12	63.9	0.21	0.06	63.6	64.5	0.9	31.9	0705
970819	231	12	64.0	0.47	0.14	63.6	65.4	1.7	32.0	0737
970820	232	12	63.8	0.42	0.12	63.6	65.1	1.5	31.8	0769
970821	233	12	63.7	0.39	0.11	63.4	64.8	1.4	31.7	0801
970822	234	12	63.7	0.61	0.18	63.4	65.1	1.7	31.7	0833
970823	235	12	63.4	0.45	0.13	63.1	64.5	1.4	31.4	0864
970824	236	12	63.1	0.00	0.00	63.1	63.1	0.0	31.1	0895
970825	237	12	63.2	0.47	0.13	62.8	64.2	1.4	31.2	0926
970826	238	12	63.2	0.54	0.16	62.8	64.5	1.7	31.2	0958
970827	239	12	63.1	0.59	0.17	62.8	64.5	1.7	31.1	0989
970828	240	12	62.9	0.14	0.04	62.8	63.1	0.3	30.9	1020
970829	241	12	62.9	0.42	0.12	62.8	64.2	1.4	30.9	1050
970830	242	12	62.9	0.36	0.10	62.8	63.9	1.2	30.9	1081
970831	243	12	62.8	0.18	0.05	62.8	63.4	0.6	30.8	1112
970901	244	12	62.9	0.40	0.11	62.8	63.9	1.2	30.9	1143
970902	245	12	62.9	0.40	0.11	62.8	63.9	1.2	30.9	1174
970903	246	12	62.7	0.19	0.05	62.5	63.1	0.6	30.7	1205

Appendix Table 2.—Water temperatures (F) and temperature units for Upper Pond-Spring Complex @ Sekokini Springs, MT (July 28, 1997 to March 31, 1998)[a].

Date	Julian day	N	Mean	SD	SE	Min	Max	Range	TUs	Cum TUs
970904	247	12	62.6	0.33	0.09	62.2	63.4	1.2	30.6	1235
970905	248	12	62.3	0.33	0.10	62.2	63.4	1.2	30.3	1266
970906	249	12	62.4	0.40	0.11	62.2	63.4	1.2	30.4	1296
970907	250	12	62.3	0.43	0.12	61.9	63.4	1.4	30.3	1326
970908	251	12	62.4	0.46	0.13	62.2	63.6	1.4	30.4	1357
970909	252	12	62.2	0.52	0.15	61.9	63.6	1.7	30.2	1387
970910	253	12	62.0	0.13	0.04	61.9	62.2	0.3	30.0	1417
970911	254	12	62.0	0.15	0.04	61.9	62.2	0.3	30.0	1447
970912	255	12	62.0	0.13	0.04	61.9	62.2	0.3	30.0	1477
970913	256	12	62.0	0.43	0.12	61.6	63.4	1.7	30.0	1507
970914	257	12	61.9	0.08	0.02	61.6	61.9	0.3	29.9	1537
970915	258	12	61.7	0.11	0.03	61.6	61.9	0.3	29.7	1567
970916	259	12	61.7	0.08	0.02	61.6	61.9	0.3	29.7	1596
970917	260	12	61.6	0.17	0.05	61.4	61.9	0.6	29.6	1626
970918	261	12	61.4	0.00	0.00	61.4	61.4	0.0	29.4	1655
970919	262	12	61.2	0.26	0.07	61.1	61.9	0.9	29.2	1685
970920	263	12	61.2	0.33	0.10	61.1	62.2	1.1	29.2	1714
970921	264	12	60.9	0.25	0.07	60.8	61.6	0.9	28.9	1743
970922	265	12	60.7	0.16	0.05	60.5	61.1	0.6	28.7	1771
970923	266	12	60.6	0.17	0.05	60.5	61.1	0.6	28.6	1800
970924	267	12	60.5	0.17	0.05	60.2	60.8	0.6	28.5	1828
970925	268	12	60.2	0.17	0.05	59.9	60.5	0.6	28.2	1857
970926	269	12	59.9	0.00	0.00	59.9	59.9	0.0	27.9	1884
970927	270	12	59.9	0.13	0.04	59.6	59.9	0.3	27.9	1912
970928	271	12	59.6	0.00	0.00	59.6	59.6	0.0	27.6	1940
970929	272	12	59.7	0.23	0.07	59.4	60.2	0.9	27.7	1968
970930	273	12	59.4	0.18	0.05	59.4	59.9	0.6	27.4	1995
971001	274	12	59.4	0.08	0.02	59.4	59.6	0.3	27.4	2022
971002	275	12	59.2	0.19	0.05	59.1	59.6	0.6	27.2	2050
971003	276	12	59.1	0.00	0.00	59.1	59.1	0.0	27.1	2077
971004	277	12	59.0	0.14	0.04	58.8	59.1	0.3	27.0	2104
971005	278	12	58.8	0.08	0.02	58.5	58.8	0.3	26.8	2130
971006	279	12	58.6	0.14	0.04	58.5	58.8	0.3	26.6	2157
971007	280	12	58.5	0.08	0.02	58.5	58.8	0.3	26.5	2184
971008	281	12	58.3	0.19	0.05	58.2	58.8	0.6	26.3	2210
971009	282	12	58.2	0.00	0.00	58.2	58.2	0.0	26.2	2236
971010	283	12	58.2	0.13	0.04	57.9	58.2	0.3	26.2	2262
971011	284	12	58.0	0.08	0.02	57.9	58.2	0.3	26.0	2288
971012	285	12	57.9	0.17	0.05	57.7	58.2	0.6	25.9	2314
971013	286	12	57.7	0.00	0.00	57.7	57.7	0.0	25.7	2340
971014	287	12	57.6	0.13	0.04	57.4	57.7	0.3	25.6	2365
971015	288	12	57.4	0.11	0.03	57.4	57.7	0.3	25.4	2391
971016	289	12	57.2	0.14	0.04	57.1	57.4	0.3	25.2	2416

Appendix Table 2.—Water temperatures (F) and temperature units for Upper Pond-Spring Complex @ Sekokini Springs, MT (July 28, 1997 to March 31, 1998)[a].

Date	Julian day	N	Mean	SD	SE	Min	Max	Range	TUs	Cum TUs
971017	290	12	57.1	0.11	0.03	57.1	57.4	0.3	25.1	2441
971018	291	12	56.9	0.14	0.04	56.8	57.1	0.3	24.9	2466
971019	292	12	56.5	0.14	0.04	56.3	56.8	0.6	24.5	2491
971020	293	12	56.5	0.17	0.05	56.3	56.8	0.6	24.5	2515
971021	294	12	56.3	0.11	0.03	56.3	56.6	0.3	24.3	2539
971022	295	12	56.0	0.08	0.02	56.0	56.3	0.3	24.0	2563
971023	296	12	55.9	0.13	0.04	55.7	56.0	0.3	23.9	2587
971024	297	12	55.7	0.08	0.02	55.7	56.0	0.3	23.7	2611
971025	298	12	55.5	0.14	0.04	55.4	55.7	0.3	23.5	2635
971026	299	12	55.4	0.00	0.00	55.4	55.4	0.0	23.4	2658
971027	300	12	55.4	0.13	0.04	55.2	55.4	0.3	23.4	2681
971028	301	12	55.1	0.08	0.02	54.9	55.2	0.3	23.1	2705
971029	302	12	54.9	0.00	0.00	54.9	54.9	0.0	22.9	2727
971030	303	12	54.7	0.14	0.04	54.6	54.9	0.3	22.7	2750
971031	304	12	54.5	0.17	0.05	54.3	54.9	0.6	22.5	2773
971101	305	12	54.5	0.15	0.04	54.3	54.6	0.3	22.5	2795
971102	306	12	54.3	0.00	0.00	54.3	54.3	0.0	22.3	2818
971103	307	12	54.3	0.00	0.00	54.3	54.3	0.0	22.3	2840
971104	308	12	54.3	0.13	0.04	54.0	54.3	0.3	22.3	2862
971105	309	12	54.1	0.11	0.03	54.0	54.3	0.3	22.1	2884
971106	310	12	54.0	0.00	0.00	54.0	54.0	0.0	22.0	2906
971107	311	12	53.9	0.14	0.04	53.8	54.0	0.3	21.9	2928
971108	312	12	53.7	0.13	0.04	53.5	53.8	0.3	21.7	2950
971109	313	12	53.5	0.11	0.03	53.5	53.8	0.3	21.5	2971
971110	314	12	53.2	0.08	0.02	53.2	53.5	0.3	21.2	2993
971111	315	12	53.2	0.12	0.03	52.9	53.5	0.6	21.2	3014
971112	316	12	53.0	0.14	0.04	52.9	53.2	0.3	21.0	3035
971113	317	12	52.9	0.14	0.04	52.6	53.2	0.6	20.9	3056
971114	318	12	52.8	0.28	0.08	52.6	53.5	0.8	20.8	3076
971115	319	12	52.7	0.25	0.07	52.6	53.5	0.8	20.7	3097
971116	320	12	52.6	0.22	0.06	52.4	53.2	0.8	20.6	3118
971117	321	12	52.4	0.00	0.00	52.4	52.4	0.0	20.4	3138
971118	322	12	52.3	0.12	0.04	52.1	52.4	0.3	20.3	3158
971119	323	12	52.0	0.14	0.04	51.8	52.1	0.3	20.0	3178
971120	324	12	51.8	0.00	0.00	51.8	51.8	0.0	19.8	3198
971121	325	12	51.6	0.13	0.04	51.5	51.8	0.3	19.6	3218
971122	326	12	51.4	0.19	0.05	51.3	51.8	0.6	19.4	3237
971123	327	12	51.2	0.13	0.04	51.0	51.3	0.3	19.2	3256
971124	328	12	51.0	0.00	0.00	51.0	51.0	0.0	19.0	3275
971125	329	12	50.8	0.13	0.04	50.7	51.0	0.3	18.8	3294
971126	330	12	50.7	0.17	0.05	50.4	51.0	0.6	18.7	3313
971127	331	12	50.4	0.12	0.03	50.1	50.7	0.6	18.4	3331
971128	332	12	50.2	0.08	0.02	50.1	50.4	0.3	18.2	3349
971129	333	12	50.1	0.13	0.04	49.8	50.1	0.3	18.1	3367

Appendix Table 2.—Water temperatures (F) and temperature units for Upper Pond-Spring Complex @ Sekokini Springs, MT (July 28, 1997 to March 31, 1998)[a].

Date	Julian day	N	Mean	SD	SE	Min	Max	Range	TUs	Cum TUs
971130	334	12	49.9	0.08	0.02	49.8	50.1	0.3	17.9	3385
971201	335	12	49.8	0.24	0.07	49.6	50.4	0.9	17.8	3403
971202	336	12	49.6	0.08	0.02	49.6	49.8	0.3	17.6	3421
971203	337	12	49.4	0.14	0.04	49.3	49.6	0.3	17.4	3438
971204	338	12	49.3	0.00	0.00	49.3	49.3	0.0	17.3	3455
971205	339	12	49.3	0.08	0.02	49.3	49.6	0.3	17.3	3473
971206	340	12	49.3	0.00	0.00	49.3	49.3	0.0	17.3	3490
971207	341	12	49.3	0.08	0.02	49.0	49.3	0.3	17.3	3507
971208	342	12	49.0	0.08	0.02	49.0	49.3	0.3	17.0	3524
971209	343	12	49.0	0.00	0.00	49.0	49.0	0.0	17.0	3541
971210	344	12	49.0	0.08	0.02	49.0	49.3	0.3	17.0	3558
971211	345	12	48.9	0.14	0.04	48.7	49.0	0.3	16.9	3575
971212	346	12	48.7	0.14	0.04	48.5	49.0	0.6	16.7	3592
971213	347	12	48.5	0.11	0.03	48.5	48.7	0.3	16.5	3608
971214	348	12	48.4	0.13	0.04	48.2	48.5	0.3	16.4	3625
971215	349	12	48.2	0.11	0.03	48.2	48.5	0.3	16.2	3641
971216	350	12	48.2	0.00	0.00	48.2	48.2	0.0	16.2	3657
971217	351	12	48.2	0.12	0.03	47.9	48.5	0.6	16.2	3673
971218	352	12	47.9	0.00	0.00	47.9	47.9	0.0	15.9	3689
971219	353	12	47.8	0.17	0.05	47.6	48.2	0.6	15.8	3705
971220	354	12	47.8	0.14	0.04	47.6	47.9	0.3	15.8	3721
971221	355	12	47.6	0.08	0.02	47.6	47.9	0.3	15.6	3736
971222	356	12	47.6	0.21	0.06	47.4	47.9	0.6	15.6	3752
971223	357	12	47.4	0.00	0.00	47.4	47.4	0.0	15.4	3767
971224	358	12	47.2	0.14	0.04	47.1	47.4	0.3	15.2	3783
971225	359	12	47.2	0.14	0.04	47.1	47.4	0.3	15.2	3798
971226	360	12	47.1	0.00	0.00	47.1	47.1	0.0	15.1	3813
971227	361	12	47.1	0.00	0.00	47.1	47.1	0.0	15.1	3828
971228	362	12	46.9	0.14	0.04	46.8	47.1	0.3	14.9	3843
971229	363	12	46.8	0.00	0.00	46.8	46.8	0.0	14.8	3858
971230	364	12	46.7	0.14	0.04	46.5	46.8	0.3	14.7	3872
971231	365	12	46.5	0.00	0.00	46.5	46.5	0.0	14.5	3887
980101	1	12	46.5	0.00	0.00	46.5	46.5	0.0	14.5	3901
980102	2	12	46.2	0.16	0.05	46.0	46.5	0.6	14.2	3915
980103	3	12	46.0	0.00	0.00	46.0	46.0	0.0	14.0	3929
980104	4	12	45.8	0.15	0.04	45.7	46.0	0.3	13.8	3943
980105	5	12	45.7	0.08	0.02	45.7	46.0	0.3	13.7	3957
980106	6	12	45.7	0.00	0.00	45.7	45.7	0.0	13.7	3971
980107	7	12	45.6	0.14	0.04	45.4	45.7	0.3	13.6	3984
980108	8	12	45.3	0.13	0.04	45.1	45.4	0.3	13.3	3997
980109	9	12	45.4	0.11	0.03	45.4	45.7	0.3	13.4	4011
980110	10	12	45.4	0.00	0.00	45.4	45.4	0.0	13.4	4024
980111	11	12	45.4	0.25	0.07	45.1	46.0	0.8	13.4	4038
980112	12	12	45.2	0.11	0.03	45.1	45.4	0.3	13.2	4051

Appendix Table 2.—Water temperatures (F) and temperature units for Upper Pond-Spring Complex @ Sekokini Springs, MT (July 28, 1997 to March 31, 1998)[a].

Date	Julian day	N	Mean	SD	SE	Min	Max	Range	TUs	Cum TUs
980113	13	12	45.1	0.08	0.02	45.1	45.4	0.3	13.1	4064
980114	14	12	45.1	0.11	0.03	44.8	45.1	0.3	13.1	4077
980115	15	12	44.7	0.14	0.04	44.6	44.8	0.3	12.7	4090
980116	16	12	44.4	0.19	0.05	44.3	44.8	0.6	12.4	4102
980117	17	12	44.3	0.11	0.03	44.3	44.6	0.3	12.3	4115
980118	18	12	44.2	0.24	0.07	44.0	44.8	0.8	12.2	4127
980119	19	12	44.0	0.12	0.03	43.7	44.3	0.6	12.0	4139
980120	20	12	43.8	0.14	0.04	43.7	44.0	0.3	11.8	4151
980121	21	12	43.7	0.08	0.02	43.7	44.0	0.3	11.7	4162
980122	22	12	43.7	0.00	0.00	43.7	43.7	0.0	11.7	4174
980123	23	12	43.7	0.08	0.02	43.4	43.7	0.3	11.7	4186
980124	24	12	43.7	0.00	0.00	43.7	43.7	0.0	11.7	4197
980125	25	12	43.6	0.14	0.04	43.4	43.7	0.3	11.6	4209
980126	26	12	43.6	0.15	0.04	43.4	43.7	0.3	11.6	4221
980127	27	12	43.6	0.14	0.04	43.4	43.7	0.3	11.6	4232
980128	28	12	43.7	0.24	0.07	43.4	44.3	0.8	11.7	4244
980129	29	12	43.7	0.16	0.05	43.4	44.0	0.6	11.7	4256
980130	30	12	43.5	0.13	0.04	43.4	43.7	0.3	11.5	4267
980131	31	12	43.5	0.25	0.07	43.4	44.3	0.8	11.5	4279
980201	32	12	43.4	0.11	0.03	43.2	43.4	0.3	11.4	4290
980202	33	12	43.3	0.14	0.04	43.2	43.4	0.3	11.3	4301
980203	34	12	43.3	0.14	0.04	43.2	43.4	0.3	11.3	4313
980204	35	12	43.4	0.31	0.09	43.2	44.0	0.8	11.4	4324
980205	36	12	43.3	0.22	0.06	43.2	43.7	0.6	11.3	4335
980206	37	12	43.2	0.08	0.02	43.2	43.4	0.3	11.2	4347
980207	38	12	43.2	0.11	0.03	43.2	43.4	0.3	11.2	4358
980208	39	12	43.2	0.00	0.00	43.2	43.2	0.0	11.2	4369
980209	40	12	43.0	0.15	0.04	42.9	43.2	0.3	11.0	4380
980210	41	12	43.0	0.23	0.07	42.9	43.4	0.6	11.0	4391
980211	42	12	42.9	0.11	0.03	42.9	43.2	0.3	10.9	4402
980212	43	12	42.9	0.11	0.03	42.9	43.2	0.3	10.9	4413
980213	44	12	42.9	0.08	0.02	42.9	43.2	0.3	10.9	4424
980214	45	12	43.1	0.39	0.11	42.9	44.0	1.1	11.1	4435
980215	46	12	43.1	0.28	0.08	42.9	43.7	0.9	11.1	4446
980216	47	12	43.3	0.19	0.05	43.2	43.7	0.6	11.3	4457
980217	48	12	43.4	0.36	0.10	43.2	44.3	1.1	11.4	4469
980218	49	12	43.4	0.32	0.09	43.2	44.3	1.1	11.4	4480
980219	50	12	43.5	0.45	0.13	43.2	44.6	1.4	11.5	4492
980220	51	12	43.4	0.35	0.10	43.2	44.3	1.1	11.4	4503
980221	52	12	43.2	0.13	0.04	43.2	43.4	0.3	11.2	4514
980222	53	12	43.2	0.11	0.03	43.2	43.4	0.3	11.2	4526
980223	54	12	43.3	0.25	0.07	43.2	44.0	0.8	11.3	4537
980224	55	12	43.3	0.14	0.04	43.2	43.4	0.3	11.3	4548
980225	56	12	43.3	0.19	0.05	43.2	43.7	0.6	11.3	4559

Appendix Table 2.—Water temperatures (F) and temperature units for Upper Pond-Spring Complex @ Sekokini Springs, MT (July 28, 1997 to March 31, 1998)[a].

Date	Julian day	N	Mean	SD	SE	Min	Max	Range	TUs	Cum TUs
980226	57	12	43.3	0.22	0.06	43.2	43.7	0.6	11.3	4571
980227	58	12	43.3	0.18	0.05	43.2	43.7	0.6	11.3	4582
980228	59	12	43.2	0.40	0.12	42.9	44.3	1.4	11.2	4593
980301	60	12	43.0	0.19	0.06	42.9	43.4	0.6	11.0	4604
980302	61	12	43.2	0.43	0.12	42.9	44.3	1.4	11.2	4615
980303	62	12	43.0	0.15	0.04	42.9	43.2	0.3	11.0	4626
980304	63	12	43.0	0.19	0.06	42.9	43.4	0.6	11.0	4637
980305	64	12	43.0	0.23	0.07	42.9	43.4	0.6	11.0	4648
980306	65	12	43.1	0.49	0.14	42.9	44.3	1.4	11.1	4659
980307	66	12	43.0	0.14	0.04	42.9	43.2	0.3	11.0	4670
980308	67	12	43.0	0.33	0.10	42.9	44.0	1.1	11.0	4681
980309	68	12	42.8	0.36	0.10	42.6	43.7	1.1	10.8	4692
980310	69	12	42.6	0.47	0.14	42.3	43.7	1.4	10.6	4703
980311	70	12	42.8	0.47	0.14	42.3	43.7	1.4	10.8	4714
980312	71	12	43.1	0.47	0.14	42.6	44.0	1.4	11.1	4725
980313	72	0								
980314	73	0								
980315	74	0								
980316	75	0								
980317	76	0								
980318	77	0								
980319	78	0								
980320	79	0								
980321	80	0								
980322	81	0								
980323	82	0								
980324	83	0								
980325	84	0								
980326	85	0								
980327	86	0								
980328	87	0								
980329	88	0								
980330	89	0								
980331	90	0								

a The Optic StowAway thermometer did not function properly from March 13-31, 1998, so no temperatures were recorded during that time.

Appendix Table 3.—Water temperatures (F) and temperature units for Egg Trough Spring @ Sekokini Springs, MT (July 23, 1997 to March 31, 1998).

Date	Julian day	N	Mean	SD	SE	Min	Max	Range	TUs	Cum TUs
970723	204	5	52.5	0.23	0.10	52.2	52.7	0.6	20.5	0020
970724	205	12	52.4	0.28	0.08	51.9	52.7	0.8	20.4	0041
970725	206	12	52.4	0.32	0.09	51.9	53.0	1.1	20.4	0061
970726	207	12	52.3	0.30	0.09	51.9	52.7	0.8	20.3	0082
970727	208	12	52.3	0.34	0.10	51.9	52.7	0.8	20.3	0102
970728	209	12	52.5	0.34	0.10	52.2	53.0	0.8	20.5	0122
970729	210	12	52.5	0.25	0.07	52.2	53.0	0.8	20.5	0143
970730	211	12	52.5	0.16	0.05	52.2	52.7	0.6	20.5	0163
970731	212	12	52.4	0.30	0.09	52.2	53.0	0.8	20.4	0184
970801	213	12	52.5	0.25	0.07	52.2	52.7	0.6	20.5	0204
970802	214	12	52.4	0.25	0.07	52.2	52.7	0.6	20.4	0225
970803	215	12	52.3	0.32	0.09	51.9	52.7	0.8	20.3	0245
970804	216	12	52.3	0.34	0.10	51.9	52.7	0.8	20.3	0265
970805	217	12	52.4	0.21	0.06	52.2	52.7	0.6	20.4	0286
970806	218	12	52.3	0.30	0.09	51.9	52.7	0.8	20.3	0306
970807	219	12	52.2	0.23	0.07	51.9	52.4	0.6	20.2	0326
970808	220	12	52.0	0.21	0.06	51.6	52.4	0.8	20.0	0346
970809	221	12	51.7	0.23	0.07	51.3	51.9	0.6	19.7	0366
970810	222	12	51.6	0.45	0.13	51.1	52.2	1.1	19.6	0385
970811	223	12	51.7	0.46	0.13	51.1	52.2	1.1	19.7	0405
970812	224	12	51.8	0.34	0.10	51.3	52.2	0.8	19.8	0425
970813	225	12	51.8	0.24	0.07	51.6	52.2	0.6	19.8	0445
970814	226	11	51.9	0.32	0.10	51.6	52.4	0.8	19.9	0465
970815	227	12	51.7	0.27	0.08	51.3	52.2	0.8	19.7	0484
970816	228	12	51.5	0.14	0.04	51.3	51.6	0.3	19.5	0504
970817	229	12	51.5	0.30	0.09	51.1	51.9	0.8	19.5	0523
970818	230	12	51.3	0.39	0.11	50.8	51.9	1.1	19.3	0543
970819	231	12	51.4	0.24	0.07	51.1	51.9	0.8	19.4	0562
970820	232	12	51.3	0.43	0.12	50.8	51.9	1.1	19.3	0581
970821	233	12	51.4	0.34	0.10	51.1	51.9	0.8	19.4	0601
970822	234	12	51.3	0.46	0.13	50.5	51.9	1.4	19.3	0620
970823	235	12	51.1	0.40	0.11	50.5	51.6	1.1	19.1	0639
970824	236	12	51.1	0.11	0.03	51.1	51.3	0.3	19.1	0658
970825	237	12	51.1	0.29	0.08	50.8	51.6	0.8	19.1	0677
970826	238	12	51.0	0.36	0.10	50.5	51.3	0.8	19.0	0696
970827	239	12	50.9	0.33	0.09	50.5	51.3	0.8	18.9	0715
970828	240	12	50.6	0.33	0.09	50.2	51.1	0.8	18.6	0734
970829	241	12	50.7	0.27	0.08	50.5	51.1	0.6	18.7	0753
970830	242	12	50.5	0.45	0.13	49.9	51.1	1.1	18.5	0771
970831	243	12	50.7	0.39	0.11	49.9	51.1	1.1	18.7	0790
970901	244	12	50.8	0.32	0.09	50.5	51.3	0.8	18.8	0809
970902	245	12	50.8	0.40	0.12	50.2	51.3	1.1	18.8	0827
970903	246	12	50.9	0.22	0.06	50.8	51.3	0.6	18.9	0846

Appendix Table 3.—Water temperatures (F) and temperature units for Egg Trough Spring @ Sekokini Springs, MT (July 23, 1997 to March 31, 1998).

Date	Julian day	N	Mean	SD	SE	Min	Max	Range	TUs	Cum TUs
970904	247	12	50.8	0.27	0.08	50.5	51.3	0.8	18.8	0865
970905	248	12	50.5	0.42	0.12	49.9	51.1	1.1	18.5	0884
970906	249	12	50.6	0.25	0.07	50.2	51.1	0.8	18.6	0902
970907	250	12	50.3	0.46	0.13	49.7	50.8	1.1	18.3	0920
970908	251	12	50.5	0.35	0.10	49.9	51.1	1.1	18.5	0939
970909	252	12	50.3	0.48	0.14	49.7	50.8	1.1	18.3	0957
970910	253	12	50.3	0.39	0.11	49.7	50.8	1.1	18.3	0975
970911	254	12	50.3	0.29	0.08	49.9	50.5	0.6	18.3	0994
970912	255	12	50.4	0.18	0.05	49.9	50.5	0.6	18.4	1012
970913	256	12	50.1	0.56	0.16	49.4	50.8	1.4	18.1	1030
970914	257	12	50.4	0.15	0.04	50.2	50.5	0.3	18.4	1049
970915	258	12	50.2	0.12	0.03	49.9	50.5	0.6	18.2	1067
970916	259	12	50.1	0.18	0.05	49.9	50.5	0.6	18.1	1085
970917	260	12	50.1	0.19	0.05	49.9	50.5	0.6	18.1	1103
970918	261	12	49.9	0.08	0.02	49.7	49.9	0.3	17.9	1121
970919	262	12	49.8	0.28	0.08	49.4	50.2	0.8	17.8	1139
970920	263	12	49.8	0.37	0.11	49.4	50.2	0.8	17.8	1157
970921	264	12	49.9	0.42	0.12	49.4	50.5	1.1	17.9	1174
970922	265	12	49.8	0.44	0.13	49.4	50.5	1.1	17.8	1192
970923	266	12	49.9	0.52	0.15	49.4	50.5	1.1	17.9	1210
970924	267	12	50.0	0.48	0.14	49.4	50.8	1.4	18.0	1228
970925	268	12	50.1	0.53	0.15	49.4	50.8	1.4	18.1	1246
970926	269	12	50.3	0.21	0.06	49.9	50.5	0.6	18.3	1265
970927	270	12	50.2	0.11	0.03	49.9	50.2	0.3	18.2	1283
970928	271	12	50.3	0.14	0.04	50.2	50.5	0.3	18.3	1301
970929	272	12	50.3	0.41	0.12	49.7	50.8	1.1	18.3	1319
970930	273	12	50.3	0.51	0.15	49.7	50.8	1.1	18.3	1338
971001	274	12	50.5	0.24	0.07	50.2	50.8	0.6	18.5	1356
971002	275	12	50.4	0.14	0.04	50.2	50.5	0.3	18.4	1374
971003	276	12	50.2	0.11	0.03	49.9	50.2	0.3	18.2	1393
971004	277	12	50.3	0.23	0.07	49.9	50.8	0.8	18.3	1411
971005	278	12	50.2	0.16	0.05	49.9	50.5	0.6	18.2	1429
971006	279	12	50.0	0.30	0.09	49.7	50.5	0.8	18.0	1447
971007	280	12	49.8	0.32	0.09	49.4	50.5	1.1	17.8	1465
971008	281	12	49.6	0.36	0.11	49.1	50.2	1.1	17.6	1482
971009	282	12	49.5	0.22	0.06	49.4	49.9	0.6	17.5	1500
971010	283	12	49.7	0.29	0.08	49.4	50.2	0.8	17.7	1518
971011	284	12	49.5	0.22	0.06	49.4	49.9	0.6	17.5	1535
971012	285	12	49.5	0.19	0.05	49.4	49.9	0.6	17.5	1553
971013	286	12	49.7	0.26	0.08	49.4	49.9	0.6	17.7	1570
971014	287	12	49.8	0.22	0.06	49.4	50.2	0.8	17.8	1588
971015	288	12	49.9	0.28	0.08	49.7	50.5	0.8	17.9	1606
971016	289	12	49.6	0.48	0.14	49.1	50.5	1.4	17.6	1624

Appendix Table 3.—Water temperatures (F) and temperature units for Egg Trough Spring @ Sekokini Springs, MT (July 23, 1997 to March 31, 1998).

Date	Julian day	N	Mean	SD	SE	Min	Max	Range	TUs	Cum TUs
971017	290	12	49.6	0.61	0.18	48.8	50.5	1.7	17.6	1641
971018	291	12	49.8	0.39	0.11	49.1	50.5	1.4	17.8	1659
971019	292	12	49.4	0.40	0.11	48.8	49.9	1.1	17.4	1676
971020	293	12	49.1	0.55	0.16	48.5	49.9	1.4	17.1	1694
971021	294	12	49.1	0.57	0.16	48.5	49.9	1.4	17.1	1711
971022	295	12	49.2	0.44	0.13	48.5	49.7	1.1	17.2	1728
971023	296	12	49.2	0.40	0.12	48.8	49.9	1.1	17.2	1745
971024	297	12	48.8	0.41	0.12	48.3	49.4	1.1	16.8	1762
971025	298	12	49.0	0.40	0.12	48.3	49.4	1.1	17.0	1779
971026	299	12	49.5	0.30	0.09	49.1	49.9	0.8	17.5	1796
971027	300	12	49.4	0.35	0.10	48.8	49.9	1.1	17.4	1814
971028	301	12	49.2	0.34	0.10	48.8	49.7	0.8	17.2	1831
971029	302	12	49.5	0.14	0.04	49.4	49.7	0.3	17.5	1848
971030	303	12	49.4	0.13	0.04	49.4	49.7	0.3	17.4	1866
971031	304	12	49.4	0.08	0.02	49.4	49.7	0.3	17.4	1883
971101	305	12	49.3	0.33	0.09	48.8	49.9	1.1	17.3	1901
971102	306	12	48.8	0.37	0.11	48.5	49.4	0.8	16.8	1917
971103	307	12	48.9	0.52	0.15	48.3	49.4	1.1	16.9	1934
971104	308	12	49.3	0.30	0.09	48.8	49.9	1.1	17.3	1952
971105	309	12	48.9	0.41	0.12	48.5	49.7	1.1	16.9	1968
971106	310	12	49.0	0.44	0.13	48.5	49.7	1.1	17.0	1985
971107	311	12	49.1	0.21	0.06	48.8	49.4	0.6	17.1	2002
971108	312	12	48.8	0.25	0.07	48.3	49.1	0.8	16.8	2019
971109	313	12	48.3	0.41	0.12	47.7	49.1	1.4	16.3	2036
971110	314	12	48.2	0.33	0.09	48.0	48.8	0.8	16.2	2052
971111	315	12	47.9	0.44	0.13	47.4	48.5	1.1	15.9	2068
971112	316	12	48.1	0.43	0.12	47.7	48.8	1.1	16.1	2084
971113	317	12	48.0	0.48	0.14	47.4	48.8	1.4	16.0	2100
971114	318	11	47.7	0.54	0.16	47.1	48.5	1.4	15.7	2115
971115	319	12	47.5	0.50	0.15	46.9	48.3	1.4	15.5	2131
971116	320	12	47.5	0.55	0.16	46.9	48.3	1.4	15.5	2146
971117	321	12	48.3	0.18	0.05	48.0	48.5	0.6	16.3	2163
971118	322	12	48.6	0.14	0.04	48.5	48.8	0.3	16.6	2179
971119	323	12	48.7	0.15	0.04	48.5	48.8	0.3	16.7	2196
971120	324	12	48.6	0.24	0.07	48.0	48.8	0.8	16.6	2213
971121	325	12	48.8	0.14	0.04	48.5	49.1	0.6	16.8	2229
971122	326	12	48.3	0.38	0.11	47.7	48.8	1.1	16.3	2246
971123	327	12	48.1	0.36	0.10	47.7	48.5	0.8	16.1	2262
971124	328	12	48.7	0.22	0.06	48.3	49.1	0.8	16.7	2279
971125	329	12	48.3	0.21	0.06	48.0	48.5	0.6	16.3	2295
971126	330	12	48.1	0.25	0.07	47.7	48.5	0.8	16.1	2311
971127	331	12	48.2	0.38	0.11	47.4	48.5	1.1	16.2	2327
971128	332	12	48.7	0.22	0.06	48.5	49.1	0.6	16.7	2344

Appendix Table 3.—Water temperatures (F) and temperature units for Egg Trough Spring @ Sekokini Springs, MT (July 23, 1997 to March 31, 1998).

Date	Julian day	N	Mean	SD	SE	Min	Max	Range	TUs	Cum TUs
971129	333	12	48.4	0.28	0.08	48.0	48.8	0.8	16.4	2360
971130	334	12	48.5	0.26	0.08	48.0	48.8	0.8	16.5	2377
971201	335	12	48.4	0.33	0.09	47.7	48.8	1.1	16.4	2393
971202	336	12	47.7	0.31	0.09	47.4	48.3	0.8	15.7	2409
971203	337	12	47.9	0.18	0.05	47.7	48.3	0.6	15.9	2425
971204	338	12	47.9	0.21	0.06	47.4	48.3	0.8	15.9	2441
971205	339	12	47.6	0.22	0.06	47.1	48.0	0.8	15.6	2457
971206	340	12	47.5	0.20	0.06	47.1	47.7	0.6	15.5	2472
971207	341	12	47.4	0.23	0.07	47.1	47.7	0.6	15.4	2487
971208	342	12	47.6	0.25	0.07	47.1	48.0	0.8	15.6	2503
971209	343	12	48.0	0.18	0.05	47.7	48.3	0.6	16.0	2519
971210	344	12	47.6	0.41	0.12	46.9	48.0	1.1	15.6	2535
971211	345	12	47.9	0.25	0.07	47.7	48.3	0.6	15.9	2550
971212	346	12	47.2	0.30	0.09	46.9	47.7	0.8	15.2	2566
971213	347	12	47.4	0.19	0.05	47.1	47.7	0.6	15.4	2581
971214	348	12	47.4	0.25	0.07	47.1	47.7	0.6	15.4	2597
971215	349	12	48.0	0.18	0.05	47.7	48.3	0.6	16.0	2613
971216	350	12	48.1	0.15	0.04	48.0	48.3	0.3	16.1	2629
971217	351	12	48.2	0.08	0.02	48.0	48.3	0.3	16.2	2645
971218	352	12	47.9	0.13	0.04	47.7	48.0	0.3	15.9	2661
971219	353	12	47.6	0.22	0.06	47.1	47.7	0.6	15.6	2676
971220	354	12	47.5	0.20	0.06	47.1	47.7	0.6	15.5	2692
971221	355	12	47.7	0.17	0.05	47.4	48.0	0.6	15.7	2708
971222	356	12	47.2	0.18	0.05	46.9	47.4	0.6	15.2	2723
971223	357	12	47.2	0.22	0.06	46.9	47.4	0.6	15.2	2738
971224	358	12	46.8	0.31	0.09	46.3	47.1	0.8	14.8	2753
971225	359	12	47.0	0.19	0.05	46.9	47.4	0.6	15.0	2768
971226	360	12	47.2	0.13	0.04	47.1	47.4	0.3	15.2	2783
971227	361	12	47.2	0.28	0.08	46.9	47.7	0.8	15.2	2798
971228	362	12	47.5	0.13	0.04	47.4	47.7	0.3	15.5	2814
971229	363	12	47.6	0.31	0.09	47.1	48.0	0.8	15.6	2829
971230	364	12	47.8	0.13	0.04	47.7	48.0	0.3	15.8	2845
971231	365	12	47.6	0.14	0.04	47.4	47.7	0.3	15.6	2861
980101	1	12	47.9	0.17	0.05	47.7	48.3	0.6	15.9	2877
980102	2	12	47.0	0.81	0.24	46.0	48.0	1.9	15.0	2892
980103	3	12	46.0	0.29	0.08	45.5	46.3	0.8	14.0	2906
980104	4	12	46.5	0.21	0.06	46.3	46.9	0.6	14.5	2920
980105	5	12	47.0	0.22	0.06	46.6	47.4	0.8	15.0	2935
980106	6	12	47.3	0.15	0.04	47.1	47.4	0.3	15.3	2950
980107	7	12	47.1	0.14	0.04	46.9	47.4	0.6	15.1	2965
980108	8	12	46.2	0.51	0.15	45.2	47.1	1.9	14.2	2980
980109	9	12	45.1	0.51	0.15	44.4	45.8	1.4	13.1	2993
980110	10	12	45.2	0.12	0.03	44.9	45.5	0.6	13.2	3006

Appendix Table 3.—Water temperatures (F) and temperature units for Egg Trough Spring @ Sekokini Springs, MT (July 23, 1997 to March 31, 1998).

Date	Julian day	N	Mean	SD	SE	Min	Max	Range	TUs	Cum TUs
980111	11	12	44.6	0.39	0.11	44.1	45.2	1.1	12.6	3019
980112	12	12	44.5	0.69	0.20	43.8	45.5	1.7	12.5	3031
980113	13	12	45.6	0.32	0.09	45.2	46.0	0.8	13.6	3045
980114	14	12	46.5	0.24	0.07	46.3	46.9	0.6	14.5	3059
980115	15	12	47.1	0.08	0.02	46.9	47.1	0.3	15.1	3074
980116	16	12	47.1	0.12	0.03	46.9	47.4	0.6	15.1	3089
980117	17	12	47.1	0.20	0.06	46.9	47.4	0.6	15.1	3104
980118	18	12	47.2	0.14	0.04	46.9	47.4	0.6	15.2	3120
980119	19	12	47.0	0.19	0.05	46.9	47.4	0.6	15.0	3135
980120	20	12	47.2	0.08	0.02	47.1	47.4	0.3	15.2	3150
980121	21	12	47.0	0.14	0.04	46.9	47.1	0.3	15.0	3165
980122	22	12	46.8	0.17	0.05	46.6	47.1	0.6	14.8	3180
980123	23	12	46.4	0.23	0.07	46.0	46.6	0.6	14.4	3194
980124	24	12	46.8	0.20	0.06	46.6	47.1	0.6	14.8	3209
980125	25	12	46.9	0.20	0.06	46.6	47.1	0.6	14.9	3224
980126	26	12	46.8	0.21	0.06	46.6	47.1	0.6	14.8	3238
980127	27	12	46.9	0.00	0.00	46.9	46.9	0.0	14.9	3253
980128	28	12	46.6	0.20	0.06	46.3	46.9	0.6	14.6	3268
980129	29	12	46.4	0.14	0.04	46.3	46.6	0.3	14.4	3282
980130	30	12	46.6	0.26	0.07	46.3	47.1	0.8	14.6	3297
980131	31	12	46.4	0.29	0.08	46.0	46.9	0.8	14.4	3311
980201	32	12	46.1	0.19	0.05	46.0	46.6	0.6	14.1	3325
980202	33	12	46.1	0.14	0.04	46.0	46.3	0.3	14.1	3340
980203	34	12	45.7	0.51	0.15	44.9	46.3	1.4	13.7	3353
980204	35	12	46.1	0.28	0.08	45.8	46.6	0.8	14.1	3367
980205	36	12	46.1	0.45	0.13	45.5	46.9	1.4	14.1	3381
980206	37	12	46.0	0.44	0.13	45.5	46.6	1.1	14.0	3395
980207	38	12	46.5	0.24	0.07	46.3	46.9	0.6	14.5	3410
980208	39	12	46.3	0.25	0.07	46.0	46.6	0.6	14.3	3424
980209	40	12	46.4	0.14	0.04	46.3	46.6	0.3	14.4	3439
980210	41	12	46.3	0.19	0.05	46.0	46.6	0.6	14.3	3453
980211	42	12	46.3	0.23	0.07	46.0	46.6	0.6	14.3	3467
980212	43	12	46.3	0.32	0.09	46.0	46.9	0.8	14.3	3482
980213	44	12	46.3	0.22	0.06	46.0	46.6	0.6	14.3	3496
980214	45	12	46.1	0.30	0.09	45.5	46.6	1.1	14.1	3510
980215	46	12	46.3	0.28	0.08	46.0	46.9	0.8	14.3	3524
980216	47	12	46.3	0.23	0.07	46.0	46.6	0.6	14.3	3538
980217	48	12	45.6	0.49	0.14	44.9	46.3	1.4	13.6	3552
980218	49	12	45.9	0.36	0.11	45.5	46.6	1.1	13.9	3566
980219	50	12	45.7	0.46	0.13	44.9	46.3	1.4	13.7	3580
980220	51	12	45.8	0.49	0.14	45.2	46.6	1.4	13.8	3593
980221	52	12	46.1	0.24	0.07	45.8	46.3	0.6	14.1	3608
980222	53	12	46.1	0.14	0.04	46.0	46.3	0.3	14.1	3622

Appendix Table 3.—Water temperatures (F) and temperature units for Egg Trough Spring @ Sekokini Springs, MT (July 23, 1997 to March 31, 1998).

Date	Julian day	N	Mean	SD	SE	Min	Max	Range	TUs	Cum TUs
980223	54	12	46.1	0.19	0.05	46.0	46.6	0.6	14.1	3636
980224	55	12	45.6	0.34	0.10	45.2	46.0	0.8	13.6	3649
980225	56	12	45.8	0.23	0.07	45.5	46.3	0.8	13.8	3663
980226	57	12	45.3	0.42	0.12	44.6	46.0	1.4	13.3	3677
980227	58	12	45.5	0.31	0.09	45.2	46.0	0.8	13.5	3690
980228	59	12	45.2	0.33	0.10	44.9	45.8	0.8	13.2	3703
980301	60	12	45.8	0.36	0.10	45.5	46.3	0.8	13.8	3717
980302	61	12	45.8	0.38	0.11	45.2	46.3	1.1	13.8	3731
980303	62	12	45.8	0.20	0.06	45.5	46.0	0.6	13.8	3745
980304	63	12	45.3	0.25	0.07	44.9	45.8	0.8	13.3	3758
980305	64	12	44.6	0.40	0.11	44.1	45.2	1.1	12.6	3771
980306	65	12	44.6	0.35	0.10	44.1	45.2	1.1	12.6	3783
980307	66	12	44.3	0.61	0.18	43.5	45.2	1.7	12.3	3796
980308	67	12	44.8	0.25	0.07	44.4	45.2	0.8	12.8	3808
980309	68	12	44.9	0.26	0.08	44.6	45.2	0.6	12.9	3821
980310	69	12	44.9	0.40	0.11	44.1	45.5	1.4	12.9	3834
980311	70	12	45.4	0.26	0.07	45.2	45.8	0.6	13.4	3848
980312	71	12	45.7	0.31	0.09	45.5	46.3	0.8	13.7	3861
980313	72	12	45.6	0.57	0.17	44.9	46.3	1.4	13.6	3875
980314	73	12	45.6	0.48	0.14	44.9	46.3	1.4	13.6	3888
980315	74	12	45.8	0.50	0.14	45.2	46.6	1.4	13.8	3902
980316	75	12	45.8	0.17	0.05	45.5	46.0	0.6	13.8	3916
980317	76	12	45.5	0.16	0.05	45.2	45.8	0.6	13.5	3930
980318	77	12	45.3	0.32	0.09	44.9	45.8	0.8	13.3	3943
980319	78	12	45.1	0.45	0.13	44.4	45.8	1.4	13.1	3956
980320	79	12	45.3	0.51	0.15	44.6	46.0	1.4	13.3	3969
980321	80	12	45.3	0.25	0.07	44.9	45.8	0.8	13.3	3983
980322	81	12	45.5	0.00	0.00	45.5	45.5	0.0	13.5	3996
980323	82	12	45.5	0.16	0.05	45.2	45.8	0.6	13.5	4010
980324	83	12	45.4	0.17	0.05	45.2	45.8	0.6	13.4	4023
980325	84	12	45.2	0.26	0.08	44.9	45.5	0.6	13.2	4036
980326	85	12	45.2	0.12	0.03	44.9	45.5	0.6	13.2	4049
980327	86	12	45.1	0.14	0.04	44.9	45.2	0.3	13.1	4062
980328	87	12	45.1	0.22	0.06	44.9	45.5	0.6	13.1	4076
980329	88	12	45.2	0.30	0.09	44.9	45.8	0.8	13.2	4089
980330	89	12	45.2	0.30	0.09	44.9	45.8	0.8	13.2	4102
980331	90	6	45.1	0.34	0.14	44.9	45.8	0.8	13.1	4115

Appendix Table 4.—Water temperatures (F) and temperature units for Cold Spring @ Sekokini Springs, MT (July 23,1997 to March 31, 1998).

Date	Julian day	N	Mean	SD	SE	Min	Max	Range	TUs	Cum TUs
970723	204	4	42.9	0.40	0.20	42.6	43.5	0.8	10.9	0011
970724	205	12	42.7	0.17	0.05	42.6	43.2	0.6	10.7	0022
970725	206	12	42.6	0.08	0.02	42.6	42.9	0.3	10.6	0032
970726	207	12	42.7	0.13	0.04	42.6	42.9	0.3	10.7	0043
970727	208	12	42.7	0.18	0.05	42.6	43.2	0.6	10.7	0054
970728	209	12	42.7	0.18	0.05	42.6	43.2	0.6	10.7	0064
970729	210	12	42.7	0.11	0.03	42.6	42.9	0.3	10.7	0075
970730	211	12	42.7	0.11	0.03	42.6	42.9	0.3	10.7	0086
970731	212	12	42.7	0.22	0.06	42.6	43.2	0.6	10.7	0096
970801	213	12	42.8	0.22	0.06	42.6	43.2	0.6	10.8	0107
970802	214	12	42.8	0.19	0.05	42.6	43.2	0.6	10.8	0118
970803	215	12	42.8	0.22	0.06	42.6	43.2	0.6	10.8	0129
970804	216	12	42.8	0.25	0.07	42.6	43.2	0.6	10.8	0139
970805	217	12	42.8	0.22	0.06	42.6	43.2	0.6	10.8	0150
970806	218	12	42.8	0.24	0.07	42.6	43.2	0.6	10.8	0161
970807	219	12	42.7	0.14	0.04	42.6	42.9	0.3	10.7	0172
970808	220	12	42.7	0.13	0.04	42.6	42.9	0.3	10.7	0182
970809	221	12	42.7	0.14	0.04	42.6	42.9	0.3	10.7	0193
970810	222	12	42.8	0.25	0.07	42.6	43.2	0.6	10.8	0204
970811	223	12	42.9	0.33	0.09	42.6	43.5	0.8	10.9	0215
970812	224	12	42.9	0.33	0.09	42.6	43.5	0.8	10.9	0226
970813	225	12	42.8	0.14	0.04	42.6	42.9	0.3	10.8	0236
970814	226	12	42.9	0.14	0.04	42.6	43.2	0.6	10.9	0247
970815	227	12	42.9	0.14	0.04	42.6	43.2	0.6	10.9	0258
970816	228	12	42.8	0.13	0.04	42.6	42.9	0.3	10.8	0269
970817	229	12	42.8	0.23	0.07	42.6	43.2	0.6	10.8	0280
970818	230	12	42.9	0.21	0.06	42.6	43.2	0.6	10.9	0291
970819	231	12	43.0	0.13	0.04	42.9	43.2	0.3	11.0	0302
970820	232	12	43.0	0.14	0.04	42.9	43.2	0.3	11.0	0313
970821	233	12	43.0	0.14	0.04	42.9	43.2	0.3	11.0	0324
970822	234	12	43.1	0.22	0.06	42.9	43.5	0.6	11.1	0335
970823	235	12	43.1	0.22	0.06	42.9	43.5	0.6	11.1	0346
970824	236	12	43.0	0.14	0.04	42.9	43.2	0.3	11.0	0357
970825	237	12	43.0	0.14	0.04	42.9	43.2	0.3	11.0	0368
970826	238	12	43.1	0.24	0.07	42.9	43.5	0.6	11.1	0379
970827	239	12	43.1	0.20	0.06	42.9	43.5	0.6	11.1	0390
970828	240	12	43.1	0.14	0.04	42.9	43.2	0.3	11.1	0401
970829	241	12	43.1	0.14	0.04	42.9	43.2	0.3	11.1	0412
970830	242	12	43.1	0.23	0.07	42.9	43.5	0.6	11.1	0423
970831	243	12	43.2	0.21	0.06	42.9	43.5	0.6	11.2	0434
970901	244	12	43.2	0.13	0.04	43.2	43.5	0.3	11.2	0446
970902	245	12	43.3	0.22	0.06	43.2	43.7	0.6	11.3	0457
970903	246	12	43.3	0.14	0.04	43.2	43.5	0.3	11.3	0468

Appendix Table 4.—Water temperatures (F) and temperature units for Cold Spring @ Sekokini Springs, MT (July 23,1997 to March 31, 1998).

Date	Julian day	N	Mean	SD	SE	Min	Max	Range	TUs	Cum TUs
970904	247	12	43.3	0.22	0.06	43.2	43.7	0.6	11.3	0480
970905	248	12	43.3	0.19	0.05	43.2	43.7	0.6	11.3	0491
970906	249	12	43.3	0.25	0.07	43.2	43.7	0.6	11.3	0502
970907	250	12	43.3	0.22	0.06	43.2	43.7	0.6	11.3	0513
970908	251	12	43.4	0.25	0.07	43.2	43.7	0.6	11.4	0525
970909	252	12	43.4	0.25	0.07	43.2	43.7	0.6	11.4	0536
970910	253	12	43.3	0.14	0.04	43.2	43.5	0.3	11.3	0548
970911	254	12	43.3	0.14	0.04	43.2	43.5	0.3	11.3	0559
970912	255	12	43.4	0.13	0.04	43.2	43.5	0.3	11.4	0570
970913	256	12	43.5	0.40	0.12	43.2	44.6	1.4	11.5	0582
970914	257	12	43.4	0.19	0.05	43.2	43.7	0.6	11.4	0593
970915	258	12	43.4	0.08	0.02	43.2	43.5	0.3	11.4	0605
970916	259	12	43.4	0.18	0.05	43.2	43.7	0.6	11.4	0616
970917	260	12	43.5	0.00	0.00	43.5	43.5	0.0	11.5	0627
970918	261	12	43.5	0.00	0.00	43.5	43.5	0.0	11.5	0639
970919	262	12	43.5	0.08	0.02	43.5	43.7	0.3	11.5	0650
970920	263	12	43.5	0.22	0.06	43.2	44.0	0.8	11.5	0662
970921	264	12	43.6	0.28	0.08	43.5	44.3	0.8	11.6	0673
970922	265	12	43.7	0.24	0.07	43.5	44.0	0.6	11.7	0685
970923	266	12	43.8	0.43	0.12	43.5	44.8	1.4	11.8	0697
970924	267	12	43.9	0.49	0.14	43.5	44.8	1.4	11.9	0709
970925	268	12	44.0	0.45	0.13	43.7	45.1	1.4	12.0	0721
970926	269	12	43.8	0.11	0.03	43.7	44.0	0.3	11.8	0733
970927	270	12	43.7	0.00	0.00	43.7	43.7	0.0	11.7	0744
970928	271	12	43.8	0.14	0.04	43.7	44.0	0.3	11.8	0756
970929	272	12	43.9	0.25	0.07	43.7	44.3	0.6	11.9	0768
970930	273	12	43.9	0.22	0.06	43.7	44.3	0.6	11.9	0780
971001	274	12	44.0	0.17	0.05	43.7	44.3	0.6	12.0	0792
971002	275	12	44.0	0.00	0.00	44.0	44.0	0.0	12.0	0804
971003	276	12	43.8	0.14	0.04	43.7	44.0	0.3	11.8	0816
971004	277	12	43.9	0.19	0.05	43.7	44.3	0.6	11.9	0828
971005	278	12	43.9	0.15	0.04	43.7	44.0	0.3	11.9	0840
971006	279	12	43.8	0.14	0.04	43.7	44.0	0.3	11.8	0851
971007	280	12	43.8	0.14	0.04	43.7	44.0	0.3	11.8	0863
971008	281	12	43.8	0.13	0.04	43.7	44.0	0.3	11.8	0875
971009	282	12	43.8	0.08	0.02	43.7	44.0	0.3	11.8	0887
971010	283	12	43.8	0.14	0.04	43.7	44.0	0.3	11.8	0899
971011	284	12	43.8	0.13	0.04	43.7	44.0	0.3	11.8	0910
971012	285	12	43.8	0.11	0.03	43.7	44.0	0.3	11.8	0922
971013	286	12	43.9	0.14	0.04	43.7	44.0	0.3	11.9	0934
971014	287	12	44.0	0.11	0.03	43.7	44.0	0.3	12.0	0946
971015	288	12	44.1	0.18	0.05	44.0	44.6	0.6	12.1	0958
971016	289	12	44.0	0.28	0.08	43.7	44.6	0.8	12.0	0970

Appendix Table 4.—Water temperatures (F) and temperature units for Cold Spring @ Sekokini Springs, MT (July 23,1997 to March 31, 1998).

Date	Julian day	N	Mean	SD	SE	Min	Max	Range	TUs	Cum TUs
971017	290	12	44.0	0.28	0.08	43.7	44.6	0.8	12.0	0982
971018	291	12	44.1	0.19	0.05	44.0	44.6	0.6	12.1	0994
971019	292	12	44.0	0.25	0.07	43.7	44.6	0.8	12.0	1006
971020	293	12	44.0	0.29	0.08	43.7	44.6	0.8	12.0	1018
971021	294	12	44.0	0.23	0.07	43.7	44.3	0.6	12.0	1030
971022	295	12	44.0	0.22	0.06	43.7	44.3	0.6	12.0	1042
971023	296	12	44.1	0.13	0.04	44.0	44.3	0.3	12.1	1054
971024	297	12	43.9	0.21	0.06	43.7	44.3	0.6	11.9	1066
971025	298	12	43.9	0.21	0.06	43.7	44.3	0.6	11.9	1078
971026	299	12	44.2	0.14	0.04	44.0	44.3	0.3	12.2	1090
971027	300	12	44.2	0.14	0.04	44.0	44.3	0.3	12.2	1103
971028	301	12	44.1	0.17	0.05	43.7	44.3	0.6	12.1	1115
971029	302	12	44.3	0.08	0.02	44.0	44.3	0.3	12.3	1127
971030	303	12	44.2	0.11	0.03	44.0	44.3	0.3	12.2	1139
971031	304	12	44.0	0.00	0.00	44.0	44.0	0.0	12.0	1151
971101	305	12	44.0	0.14	0.04	43.7	44.3	0.6	12.0	1163
971102	306	12	43.8	0.14	0.04	43.7	44.0	0.3	11.8	1175
971103	307	12	43.9	0.22	0.06	43.7	44.3	0.6	11.9	1187
971104	308	12	44.2	0.19	0.05	44.0	44.6	0.6	12.2	1199
971105	309	12	44.2	0.19	0.05	44.0	44.6	0.6	12.2	1211
971106	310	12	44.2	0.22	0.06	44.0	44.6	0.6	12.2	1223
971107	311	12	44.3	0.00	0.00	44.3	44.3	0.0	12.3	1236
971108	312	12	44.3	0.14	0.04	44.0	44.6	0.6	12.3	1248
971109	313	12	44.1	0.19	0.05	44.0	44.6	0.6	12.1	1260
971110	314	12	44.1	0.19	0.05	44.0	44.6	0.6	12.1	1272
971111	315	12	44.0	0.25	0.07	43.7	44.6	0.8	12.0	1284
971112	316	12	44.1	0.17	0.05	43.7	44.3	0.6	12.1	1296
971113	317	12	44.0	0.27	0.08	43.7	44.6	0.8	12.0	1308
971114	318	12	43.9	0.22	0.06	43.7	44.3	0.6	11.9	1320
971115	319	12	43.8	0.30	0.09	43.5	44.3	0.8	11.8	1332
971116	320	12	43.8	0.33	0.09	43.5	44.3	0.8	11.8	1344
971117	321	12	44.0	0.16	0.05	43.7	44.3	0.6	12.0	1356
971118	322	12	44.1	0.14	0.04	44.0	44.3	0.3	12.1	1368
971119	323	12	44.2	0.13	0.04	44.0	44.3	0.3	12.2	1380
971120	324	12	44.3	0.14	0.04	44.0	44.6	0.6	12.3	1392
971121	325	12	44.5	0.14	0.04	44.3	44.6	0.3	12.5	1405
971122	326	12	44.4	0.19	0.05	44.3	44.8	0.6	12.4	1417
971123	327	12	44.3	0.17	0.05	44.0	44.6	0.6	12.3	1430
971124	328	12	44.6	0.11	0.03	44.6	44.8	0.3	12.6	1442
971125	329	12	44.5	0.14	0.04	44.3	44.6	0.3	12.5	1455
971126	330	12	44.4	0.14	0.04	44.3	44.6	0.3	12.4	1467
971127	331	12	44.3	0.14	0.04	44.0	44.6	0.6	12.3	1479
971128	332	12	44.5	0.18	0.05	44.3	44.8	0.6	12.5	1492

Appendix Table 4.—Water temperatures (F) and temperature units for Cold Spring @ Sekokini Springs, MT (July 23,1997 to March 31, 1998).

Date	Julian day	N	Mean	SD	SE	Min	Max	Range	TUs	Cum TUs
971129	333	12	44.4	0.14	0.04	44.3	44.6	0.3	12.4	1504
971130	334	12	44.4	0.13	0.04	44.3	44.6	0.3	12.4	1517
971201	335	12	44.4	0.13	0.04	44.3	44.6	0.3	12.4	1529
971202	336	12	44.1	0.19	0.05	44.0	44.6	0.6	12.1	1541
971203	337	12	44.1	0.13	0.04	44.0	44.3	0.3	12.1	1553
971204	338	12	44.0	0.12	0.03	43.7	44.3	0.6	12.0	1565
971205	339	12	43.8	0.13	0.04	43.7	44.0	0.3	11.8	1577
971206	340	12	43.8	0.13	0.04	43.7	44.0	0.3	11.8	1589
971207	341	12	43.8	0.11	0.03	43.7	44.0	0.3	11.8	1600
971208	342	12	43.9	0.15	0.04	43.7	44.0	0.3	11.9	1612
971209	343	12	44.1	0.13	0.04	44.0	44.3	0.3	12.1	1624
971210	344	12	44.0	0.16	0.05	43.7	44.3	0.6	12.0	1636
971211	345	12	44.1	0.14	0.04	44.0	44.3	0.3	12.1	1648
971212	346	12	43.8	0.25	0.07	43.5	44.3	0.8	11.8	1660
971213	347	12	43.8	0.08	0.02	43.7	44.0	0.3	11.8	1672
971214	348	12	43.8	0.21	0.06	43.5	44.0	0.6	11.8	1684
971215	349	12	44.2	0.16	0.05	44.0	44.6	0.6	12.2	1696
971216	350	12	44.3	0.08	0.02	44.0	44.3	0.3	12.3	1708
971217	351	12	44.3	0.08	0.02	44.3	44.6	0.3	12.3	1721
971218	352	12	44.3	0.11	0.03	44.3	44.6	0.3	12.3	1733
971219	353	12	44.0	0.17	0.05	43.7	44.3	0.6	12.0	1745
971220	354	12	43.9	0.15	0.04	43.7	44.0	0.3	11.9	1757
971221	355	12	44.1	0.18	0.05	44.0	44.6	0.6	12.1	1769
971222	356	12	43.9	0.14	0.04	43.7	44.0	0.3	11.9	1781
971223	357	12	43.9	0.14	0.04	43.7	44.0	0.3	11.9	1793
971224	358	12	43.7	0.14	0.04	43.5	44.0	0.6	11.7	1804
971225	359	12	43.8	0.14	0.04	43.7	44.0	0.3	11.8	1816
971226	360	12	43.9	0.15	0.04	43.7	44.0	0.3	11.9	1828
971227	361	12	44.0	0.17	0.05	43.7	44.3	0.6	12.0	1840
971228	362	12	44.1	0.14	0.04	44.0	44.3	0.3	12.1	1852
971229	363	12	44.2	0.14	0.04	44.0	44.3	0.3	12.2	1864
971230	364	12	44.4	0.13	0.04	44.3	44.6	0.3	12.4	1877
971231	365	12	44.3	0.00	0.00	44.3	44.3	0.0	12.3	1889
980101	1	12	44.5	0.13	0.04	44.3	44.6	0.3	12.5	1902
980102	2	12	44.0	0.33	0.10	43.5	44.6	1.1	12.0	1914
980103	3	12	43.5	0.00	0.00	43.5	43.5	0.0	11.5	1925
980104	4	12	43.5	0.11	0.03	43.5	43.7	0.3	11.5	1936
980105	5	12	43.7	0.00	0.00	43.7	43.7	0.0	11.7	1948
980106	6	12	43.7	0.08	0.02	43.5	43.7	0.3	11.7	1960
980107	7	12	43.7	0.00	0.00	43.7	43.7	0.0	11.7	1972
980108	8	12	43.4	0.22	0.06	42.9	43.7	0.8	11.4	1983
980109	9	12	43.0	0.30	0.09	42.6	43.5	0.8	11.0	1994
980110	10	12	43.1	0.14	0.04	42.9	43.2	0.3	11.1	2005

Appendix Table 4.—Water temperatures (F) and temperature units for Cold Spring @ Sekokini Springs, MT (July 23,1997 to March 31, 1998).

Date	Julian day	N	Mean	SD	SE	Min	Max	Range	TUs	Cum TUs
980111	11	12	42.8	0.19	0.05	42.6	43.2	0.6	10.8	2016
980112	12	12	42.6	0.28	0.08	42.3	42.9	0.6	10.6	2026
980113	13	12	43.1	0.14	0.04	42.9	43.2	0.3	11.1	2037
980114	14	12	43.4	0.11	0.03	43.2	43.5	0.3	11.4	2049
980115	15	12	43.5	0.11	0.03	43.5	43.7	0.3	11.5	2060
980116	16	12	43.5	0.14	0.04	43.5	43.7	0.3	11.5	2072
980117	17	12	43.6	0.14	0.04	43.5	43.7	0.3	11.6	2083
980118	18	12	43.7	0.16	0.05	43.5	44.0	0.6	11.7	2095
980119	19	12	43.6	0.19	0.05	43.5	44.0	0.6	11.6	2107
980120	20	12	43.7	0.19	0.05	43.5	44.0	0.6	11.7	2118
980121	21	12	43.5	0.14	0.04	43.5	43.7	0.3	11.5	2130
980122	22	12	43.5	0.13	0.04	43.5	43.7	0.3	11.5	2142
980123	23	12	43.2	0.21	0.06	42.9	43.5	0.6	11.2	2153
980124	24	12	43.5	0.14	0.04	43.5	43.7	0.3	11.5	2164
980125	25	12	43.5	0.14	0.04	43.5	43.7	0.3	11.5	2176
980126	26	12	43.6	0.19	0.05	43.5	44.0	0.6	11.6	2187
980127	27	12	43.7	0.13	0.04	43.5	43.7	0.3	11.7	2199
980128	28	12	43.6	0.19	0.05	43.5	44.0	0.6	11.6	2211
980129	29	12	43.5	0.17	0.05	43.5	44.0	0.6	11.5	2222
980130	30	12	43.6	0.28	0.08	43.5	44.3	0.8	11.6	2234
980131	31	12	43.5	0.33	0.10	43.2	44.3	1.1	11.5	2245
980201	32	12	43.3	0.18	0.05	43.2	43.7	0.6	11.3	2257
980202	33	12	43.2	0.13	0.04	43.2	43.5	0.3	11.2	2268
980203	34	12	43.0	0.30	0.09	42.6	43.5	0.8	11.0	2279
980204	35	12	43.4	0.35	0.10	43.2	44.3	1.1	11.4	2290
980205	36	12	43.5	0.40	0.12	42.9	44.3	1.4	11.5	2302
980206	37	12	43.4	0.28	0.08	42.9	43.7	0.8	11.4	2313
980207	38	12	43.7	0.23	0.07	43.5	44.0	0.6	11.7	2325
980208	39	12	43.6	0.14	0.04	43.5	43.7	0.3	11.6	2336
980209	40	12	43.7	0.08	0.02	43.5	43.7	0.3	11.7	2348
980210	41	12	43.6	0.28	0.08	43.5	44.3	0.8	11.6	2360
980211	42	12	43.6	0.22	0.06	43.5	44.0	0.6	11.6	2371
980212	43	12	43.7	0.30	0.09	43.5	44.3	0.8	11.7	2383
980213	44	12	43.7	0.16	0.05	43.5	44.0	0.6	11.7	2395
980214	45	12	43.7	0.27	0.08	43.5	44.3	0.8	11.7	2406
980215	46	12	43.8	0.14	0.04	43.5	44.0	0.6	11.8	2418
980216	47	12	43.8	0.14	0.04	43.5	44.0	0.6	11.8	2430
980217	48	12	43.5	0.26	0.08	43.2	44.0	0.8	11.5	2441
980218	49	12	43.6	0.22	0.06	43.5	44.0	0.6	11.6	2453
980219	50	12	43.4	0.28	0.08	43.2	44.0	0.8	11.4	2464
980220	51	12	43.5	0.30	0.09	43.2	44.0	0.8	11.5	2476
980221	52	12	43.5	0.13	0.04	43.5	43.7	0.3	11.5	2487
980222	53	12	43.5	0.13	0.04	43.5	43.7	0.3	11.5	2499

Appendix Table 4.—Water temperatures (F) and temperature units for Cold Spring @ Sekokini Springs, MT (July 23,1997 to March 31, 1998).

Date	Julian day	N	Mean	SD	SE	Min	Max	Range	TUs	Cum TUs
980223	54	12	43.6	0.28	0.08	43.5	44.3	0.8	11.6	2510
980224	55	12	43.3	0.19	0.05	43.2	43.7	0.6	11.3	2522
980225	56	12	43.3	0.28	0.08	43.2	44.0	0.8	11.3	2533
980226	57	12	43.1	0.23	0.07	42.9	43.7	0.8	11.1	2544
980227	58	12	43.2	0.24	0.07	42.9	43.7	0.8	11.2	2555
980228	59	12	43.1	0.29	0.08	42.9	43.7	0.8	11.1	2567
980301	60	12	43.3	0.19	0.05	43.2	43.7	0.6	11.3	2578
980302	61	12	43.4	0.39	0.11	42.9	44.0	1.1	11.4	2589
980303	62	12	43.2	0.08	0.02	43.2	43.5	0.3	11.2	2600
980304	63	12	43.2	0.19	0.05	42.9	43.5	0.6	11.2	2612
980305	64	12	42.9	0.25	0.07	42.6	43.2	0.6	10.9	2623
980306	65	12	42.8	0.21	0.06	42.6	43.2	0.6	10.8	2633
980307	66	12	42.8	0.30	0.09	42.3	43.2	0.8	10.8	2644
980308	67	12	42.9	0.17	0.05	42.6	43.2	0.6	10.9	2655
980309	68	12	43.0	0.15	0.04	42.9	43.2	0.3	11.0	2666
980310	69	12	43.0	0.22	0.06	42.6	43.5	0.8	11.0	2677
980311	70	12	43.2	0.21	0.06	42.9	43.5	0.6	11.2	2688
980312	71	12	43.4	0.39	0.11	43.2	44.3	1.1	11.4	2700
980313	72	12	43.3	0.44	0.13	42.9	44.0	1.1	11.3	2711
980314	73	12	43.3	0.39	0.11	42.9	44.0	1.1	11.3	2722
980315	74	12	43.4	0.31	0.09	43.2	44.0	0.8	11.4	2734
980316	75	12	43.3	0.19	0.05	43.2	43.7	0.6	11.3	2745
980317	76	12	43.2	0.16	0.05	42.9	43.5	0.6	11.2	2756
980318	77	12	43.0	0.22	0.06	42.9	43.5	0.6	11.0	2767
980319	78	12	43.0	0.22	0.06	42.9	43.5	0.6	11.0	2778
980320	79	12	43.0	0.19	0.05	42.9	43.5	0.6	11.0	2789
980321	80	12	43.0	0.14	0.04	42.9	43.2	0.3	11.0	2800
980322	81	12	42.9	0.11	0.03	42.9	43.2	0.3	10.9	2811
980323	82	12	42.9	0.00	0.00	42.9	42.9	0.0	10.9	2822
980324	83	12	42.6	0.14	0.04	42.3	42.9	0.6	10.6	2833
980325	84	12	42.4	0.14	0.04	42.3	42.6	0.3	10.4	2843
980326	85	12	42.3	0.14	0.04	42.1	42.6	0.6	10.3	2853
980327	86	12	42.1	0.00	0.00	42.1	42.1	0.0	10.1	2863
980328	87	12	41.9	0.19	0.05	41.8	42.3	0.6	09.9	2873
980329	88	12	41.7	0.20	0.06	41.5	42.1	0.6	09.7	2883
980330	89	12	41.6	0.22	0.06	41.5	42.1	0.6	09.6	2893
980331	90	6	41.5	0.11	0.05	41.5	41.8	0.3	09.5	2902

APPENDIX F

Piping diagram for the
Sekokini Springs site.

848-100-14

No.

3209.935 Elevation

6" Diameter PVC to hatchery

Spring # 1 collector

8" Diameter overflow pipe

Pond 10

New 30" Diameter PVC

Pond 11

3195

12" Diameter PVC drain line

50'X 80' Hatchery Building

Spring #2 collector

8" Diameter overflow

3205

6" Diameter PVC to hatchery

Control point
SEK3
9024.472 East
9624.702 North
5198.400 Elevation

Pond 8

3150

6" Diameter PVC to hatchery

Spring #3 collector

8" Diameter overflow

N

PLAN

20 0 20 40 60
SCALE OF FEET

ALWAYS THINK SAFETY

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SEKOKINI SPRINGS – MONTANA FISH WILDLIFE AND PARKS – MONTANA
FISH PASSAGE AND PROTECTIVE FACILITIES

SEKOKINI SPRINGS
SPRING COLLECTOR PIPING
AS BUILT PIPING PLAN

DESIGNED	CHECKED
DRAWN J.Ware	TECH. APPROVAL
	PROGRAM MANAGER
CADD SYSTEM AutoCAD Rel. 15.05	CADD FILENAME 1848-100-14.DWG
DATE AND TIME PLOTTED NOVEMBER 16, 2001 18:21	
BOISE, IDAHO FEBRUARY 1, 2000	1848-100-14

APPENDIX G

Existing special use permit for use
of the Sekokini Springs site by
Montana Fish, Wildlife & Parks

FS - 2700-4 (9/96)
OMB No. 0596-0082)

U.S. DEPARTMENT OF AGRICULTURE Forest Service **SPECIAL-USE PERMIT** Authority: Act of June 4, 1897	Holder No. 1954-03	Issue Date	Expir. Date 12/31/2007
	Type Site(s) 216	Authority 002	Auth. Type 20
	Region/Forest/District 01/10/06		State/County 30/029
	Cong. Dist. 01	Latitude 48-27-22	Longitude 114-02-57

MONTANA DEPT. OF FISH, WILDLIFE, AND PARKS	of	**P.O. BOX 200701**	
(Holder Name)		(Billing Address - 1)	
	HELENA	**MT**	**59620**
(Billing Address - 2)	(City)	(State)	(Zip Code)

(hereinafter called the Holder) is hereby authorized to use or occupy National Forest System lands, to use subject to the conditions set out below, on the **Flathead** National Forest.

This permit covers **10.446** acres and is described as **NE 1/4, Section 17, T. 31 N., R. 19 W., P.M.M.** as shown on the location map (Exhibit A) attached to and hereby made a part of this permit, and is issued for the purpose of: **Maintaining and operating a fish hatchery with the necessary approved buildings: including the residence contained within the hatchery building, water transmission lines, and internal road system. See Exhibit B for additional operating requirements.**

The above described or defined area shall be referred to herein as the "permit area.

MS AND CONDITIONS

I. AUTHORITY AND GENERAL TERMS OF THE PERMIT

A. **Authority**. This permit is issued pursuant to the authorities enumerated at Title 36, Code of Federal Regulations, Section 251 Subpart B, as amended. This permit, and the activities or use authorized, shall be subject to the terms and conditions of the Secretary's regulations and any subsequent amendment to them.

B. **Authorized Officer.** The authorized officer is the Forest Supervisor or a delegated subordinate officer.

C. **License.** This permit is a license for the use of federally owned land and does not grant any permanent, possessory interest in real property, nor shall this permit constitute a contract for purposes of the Contract Disputes Act of 1978 (41 U.S.C. 611). Loss of the privileges granted by this permit by revocation, termination, or suspension is not compensable to the holder.

D. **Amendment.** This permit may be amended in whole or in part by the Forest Service when, at the discretion of the authorized officer, such action is deemed necessary or desirable to incorporate new terms, conditions, and stipulations as may be required by law, regulation, land management plans, or other management decisions.

E. **Existing Rights.** This permit is subject to all valid rights and claims of third parties. The United States is not liable to the holder for the exercise of any such right or claim.

F. **Nonexclusive Use and Public Access.** Unless expressly provided in additional terms, use of the permit area is not exclusive. The Forest Service reserves the right to use or allow others to use any part of the permit area, including roads, for any purpose, provided, such use does not materially interfere with the holder's authorized use. A final determination of conflicting uses is reserved to the Forest Service.

G. **Forest Service Right of Entry and Inspection.** The Forest Service has the right of unrestricted access of the permitted area or facility to ensure compliance with laws, regulations, and ordinances and the terms and conditions of this permit.

H. Assignability. This permit is not assignable or transferable. If the holder through death, voluntary sale or transfer, enforcement of contract, foreclosure, or other valid legal proceeding shall cease to be the owner of the improvements, this permit shall terminate.

I. Permit Limitations. Nothing in this permit allows or implies permission to build or maintain any structure or facility, or to conduct any activity unless specifically provided for in this permit. Any use not specifically identified in this permit must be approved by the authorized officer in the form of a new permit or permit amendment.

II. TENURE AND ISSUANCE OF A NEW PERMIT

A. Expiration at the End of the Authorized Period. This permit will expire at midnight on December 31, 2007. Expiration shall occur by operation of law and shall not require notice, any decision document, or any environmental analysis or other documentation.

B. Minimum Use or Occupancy of the Permit Area. Use or occupancy of the permit area shall be exercised at least 365 days each year, unless otherwise authorized in writing under additional terms of this permit.

C. Notification to Authorized Officer. If the holder desires issuance of a new permit after expiration, the holder shall notify the authorized officer in writing not less than six (6) months prior to the expiration date of this permit.

D. Conditions for Issuance of a New Permit. At the expiration or termination of an existing permit, a new permit may be issued to the holder of the previous permit or to a new holder subject to the following conditions:

1. The authorized use is compatible with the land use allocation in the Forest Land and Resource Management Plan.

2. The permit area is being used for the purposes previously authorized.

3. The permit area is being operated and maintained in accordance with the provisions of the permit.

4. The holder has shown previous good faith compliance with the terms and conditions of all prior or other existing permits, and has not engaged in any activity or transaction contrary to Federal contracts, permits, laws, or regulation.

E. Discretion of Forest Service. Notwithstanding any provisions of any prior or other permit, the authorized officer may prescribe new terms, conditions, and stipulations when a new permit is issued. The decision whether to issue a new permit to a holder or successor in interest is at the absolute discretion of the Forest Service.

III. RESPONSIBILITIES OF THE HOLDER

A. Compliance with Laws, Regulations, and other Legal Requirements. The holder shall comply with all applicable Federal, state, and local laws and regulations, and standards, including but not limited to, the Federal Water Pollution Control Act, 33 U.S.C. 1251 et seq, the Resource Conservation and Recovery Act, 42 U.S.C. 6901 et seq, and the Comprehensive Environmental Response, Control, and Liability Act, 42 U.S.C. 9601 et seq, and other relevant environmental laws, as well as public health and safety laws and other laws relating to the siting, construction, operation, and maintenance of any facility, improvement, or equipment on the property.

B. Plans. Plans for development, layout, construction, reconstruction, or alteration of improvements on the permit area, as well as revisions of such plans, must be prepared by a qualified individual acceptable to the authorized officer and shall be approved in writing prior to commencement of work. The holder may be required to furnish as-built plans, maps, or surveys, or other similar information, upon completion of construction.

C. Maintenance. The holder shall maintain the improvements and permit area to standards of repair, orderliness, neatness, sanitation, and safety acceptable to the authorized officer, and consistent with other provisions of this authorization. If requested, the holder shall comply with inspection requirements deemed appropriate by the authorized officer.

D. Hazard Analysis. The holder has a continuing responsibility to identify all hazardous conditions on the permit area which could affect the improvements, resources, or pose a risk of injury to individuals. Any non-emergency actions to abate such hazards shall be performed after consultation with the authorized officer. In emergency situations, the holder shall notify the authorized officer of its actions as soon as possible, but not more than 48 hours, after such actions have been taken.

E. Change of Address. The holder shall immediately notify the authorized officer of a change in address.

F. Change in Ownership. This permit is not assignable and terminates upon change of ownership of the improvements or control of the business entity. The holder shall immediately notify the authorized officer when a change in ownership or control of business entity is pending. Notification by the present holder and potential owner shall be executed using Form FS-2700-3, Special Use Application and Report, or Form FS-2700-3a, Request for Termination of and Application for Special-Use Permit. Upon receipt of the proper documentation, the authorized officer may issue a permit to the party who acquires ownership of, or a controlling interest in, the improvements or business entity.

IV. LIABILITY

For purposes of this section, "holder" includes the holder's heirs, assigns, agents, employees, and contractors.

A. The holder assumes all risk of loss to the authorized improvements.

B. The holder shall indemnify, defend, and hold the United States harmless for any violations incurred under any such laws and regulations or for judgments, claims, or demands assessed against the United States in connection with the holder's use or occupancy of the property. The holder's indemnification of the United States shall include any loss by personal injury, loss of life or damage to property in connection with the occupancy or use of the property during the term of this permit. Indemnification shall include, but is not limited to, the value of resources damaged or destroyed; the costs of restoration, cleanup, or other mitigation; fire suppression or other types of abatement costs; third party claims and judgments; and all administrative, interest, and other legal costs. This paragraph shall survive the termination or revocation of this authorization, regardless of cause.

C. The holder has an affirmative duty to protect from damage the land, property, and interests of the United States.

D. In the event of any breach of the conditions of this authorization by the holder, the Authorized Officer may, on reasonable notice, cure the breach for the account at the expense of the holder. If the Forest Service at any time pays any sum of money or does any act which will require payment of money, or incurs any expense, including reasonable attorney's fees, in instituting, prosecuting, and/or defending any action or proceeding to enforce the United States rights hereunder, the sum or sums so paid by the United States, with all interests, costs and damages shall, at the election of the Forest Service, be deemed to be additional fees hereunder and shall be due from the holder to the Forest Service on the first day of the month following such election.

E. With respect to roads, the holder shall be proportionally liable for damages to all roads and trails of the United States open to public use caused by the holder's use to the same extent as provided above, except that liability shall not include reasonable and ordinary wear and tear.

F. The Forest Service has no duty to inspect the permit area or to warn of hazards and, if the Forest Service does inspect the permit area, it shall incur no additional duty nor liability for identified or non-identified hazards. This covenant may be enforced by the United States in a court of competent jurisdiction.

V. TERMINATION, REVOCATION, AND SUSPENSION

A. General. For purposes of this permit, "termination", "revocation", and "suspension" refer to the cessation of uses and privileges under the permit.

"Termination" refers to the cessation of the permit under its own terms without the necessity for any decision or action by the authorized officer. Termination occurs automatically when, by the terms of the permit, a fixed or agreed upon condition, event, or time occurs. For example, the permit terminates at expiration. Terminations are not appealable.

"Revocation" refers to an action by the authorized officer to end the permit because of noncompliance with any of the prescribed terms, or for reasons in the public interest. Revocations are appealable.

"Suspension" refers to a revocation which is temporary and the privileges may be restored upon the occurrence of prescribed actions or conditions. Suspensions are appealable.

B. Revocation or Suspension. The Forest Service may suspend or revoke this permit in whole or part for:

1. Noncompliance with Federal, State, or local laws and regulations.
2. Noncompliance with the terms and conditions of this permit.
3. Reasons in the public interest.
4. Abandonment or other failure of the holder to otherwise exercise the privileges granted.

C. Opportunity to Take Corrective Action. Prior to revocation or suspension for cause pursuant to Section V (B), the authorized officer shall give the holder written notice of the grounds for each action and a reasonable time, not to exceed 90 days, to complete the corrective action prescribed by the authorized officer.

D. Removal of Improvements. Prior to abandonment of the improvements or within a reasonable time following revocation or termination of this authorization, the holder shall prepare, for approval by the authorized officer, an abandonment plan for the permit area. The abandonment plan shall address removal of improvements and restoration of the permit area and prescribed time frames for these actions. If the holder fails to remove the improvements or restore the site within the prescribed time period, they become the property of the United States and may be sold, destroyed or otherwise disposed of without any liability to the United States. However, the holder shall remain liable for all cost associated with their removal, including costs of sale and impoundment, cleanup, and restoration of the site.

VI. FEES

A. Termination for Nonpayment. This permit shall automatically terminate without the necessity of prior notice when land use rental fees are 90 calendar days from the due date in arrears.

B. The holder shall pay an annually in advance a sum determined by the Forest Service to be the fair market value of the use granted by this authorization. The initial payment is set at ($2,000.00) for the period from January 1,1998, to December 31, 1998. Subsequent payments shall be determined by the use of an annual fee schedule. The Forest Service may adjust the amount of payment annually by an appropriate indexing factor to reflect more nearly the fair market value of the use. At certain intervals the Forest Service shall review the fee and adjust the fee as necessary to assure that it is commensurate with the fair market value of the authorized rights and privileges, as determined by appraisal or other sound business management principles.

C. Payment Due Date. The payment due date shall be the close of business on **JANUARY 1** of each calendar year payment is due. Payments due the United States for this use shall be deposited at **Unit Collection Officer, Northern Region, File #51653, P.O. Box 60,000, San Francisco, CA 91460-1653** in the form of a check, draft, or money order payable to **"Forest Service, USDA."** Payments shall be credited on the date received by the designated Forest Service collection officer or deposit location. If the due date for the fee or fee calculation statement falls on a non workday, the charges shall not apply until close of business on the next workday.

D. Late Payment Interest. Pursuant to 31 USC 3717, and regulations at 7 CFR Part 3, Subpart B, and 4 CFR Part 102, an interest charge shall be assessed on any payment or financial statement not received by the due date. Interest shall be assessed using the most current rate prescribed by the United States Department of Treasury's Fiscal Requirements Manual (TFRM-6-8020). Interest shall accrue from the date the payment or financial statement was due. In the event that two or more billings are required for delinquent accounts, administrative costs to cover processing and handling of the delinquent debt will be assessed.

E. **Additional Penalties.** In the event of permit termination pursuant to provisions VI (A), and prior to the issuance of a new permit, a penalty of 6 percent per year shall be assessed on any fee amount overdue in excess of 90 days from the payment due date. This penalty shall accrue from the due date of the first billing or the date the fee calculation financial statement was due. The penalty is in addition to interest and any other charges specified in the above paragraph.

F. **Disputed Fees.** Disputed fees are due and payable by the due date. No appeal of fees will be considered by the Forest Service without full payment of the disputed amount. Adjustments, if necessary, will be made in accordance with settlement terms or appeal decision.

G. **Delinquent Fees.**

1. Delinquent fees and other charges shall be subject to all rights and remedies afforded the United States pursuant to Federal law and implementing regulations (31 U.S.C. 3711 et seq.).

2. The authorized officer shall require payment of fees owed the United States under any Forest Service authorization before issuance of a new permit.

VII. OTHER PROVISIONS

A. **Members of Congress.** No Member of or Delegate to Congress or Resident Commissioner shall benefit from this permit either directly or indirectly, except when the authorized use provides a general benefit to a corporation.

B. **Appeals and Remedies.** Any discretionary decisions or determinations by the authorized officer are subject to the appeal regulations at 36 CFR 251, Subpart C, or revisions thereto.

C. **Superior Clauses.** In the event of any conflict between any of the preceding printed clauses or any provision thereof and any of the following clauses or any provision thereof, the preceding printed clauses shall control.

VIII. SPECIAL PROVISIONS

A. **Nondiscrimination (Employment and Services).** During the performance of this authorization, the holder agrees:

1. In connection with the performance of work under this authorization, including construction, maintenance, and operation of the facility, the holder shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, national origin, age or disability. (Re: Title VII of the Civil Rights Act of 1964, as amended).

2. The holder and employees shall not discriminate by segregation or otherwise against any person on the basis of race, color, religion, sex, national origin, age or disability, by curtailing or refusing to furnish accommodation, facilities, services, or use privileges offered to the public generally. (Re: Title VI of the Civil Rights Act of 1964, as amended, Section 504 of the Rehabilitation Act of 1973, Title IX of the Education Amendments, and the Age Discrimination Act of 1975).

3. The holder shall include and require compliance with the above nondiscrimination provisions in any subcontract made with respect to the operations under this authorization.

4. When furnished by the Forest Service, signs setting forth this policy of nondiscrimination will be conspicuously displayed at the public entrance to the premises, and at other exterior or interior locations as directed by the Forest Service.

5. That the Forest Service shall have the right to enforce the foregoing nondiscrimination provisions by suit for specific performance or by any other available remedy under the laws of the United States or the State in which the breach or violation occurs. (B-1)

B. **Removal and Planting of Vegetation and Other Resources.** The holder shall obtain prior written approval from the authorized officer before removing or altering vegetation or other resources. The holder shall obtain prior written approval from the authorized officer before planting trees, shrubs, or other vegetation with in the authorized area. (D-5)

C. Noxious Weed/Exotic Plant Prevention and Control. The holder shall be responsible for the prevention and control of noxious weeds and/or exotic plants of concern on the area authorized by this authorization and shall provide prevention and control measures prescribed by the Forest Service. Noxious weeds/exotic plants of concern are defined as those species recognized by (county weed authority/national forest) in which the authorized use is located.

The holder shall also be responsible for prevention and control of noxious weed/exotic plant infestations which are not within the authorized area, but which are determined by the Forest Service to have originated with the authorized area.

When determined to be necessary by the authorized officer, the holder shall develop a site-specific plan for noxious weed/exotic plant prevention and control. Such plan shall be subject to Forest Service approval. Upon Forest service approval, the noxious weed/exotic plant prevention and control plan shall become a part of this authorization. (R1_D4)

D. Fire Equipment. The holder shall install fire extinguishers and firefighting apparatus of types, of capacities, in numbers, and at locations approved by the authorized officer. This equipment shall be in readiness at all times for immediate use, and shall be tested each year, at such times as may be required by the authorized officer. (F-7)

E. Improvement Relocation. This authorization is granted with the express understanding that should future location of United states Government-owned improvements or road rights-of-way require relocation of the holder's improvements, such relocation will be done by, and at the expense of, the holder within a reasonable time as specified by the authorized officer. (X33)

F. Water Rights. This authorization does not convey any legal interest in water rights as defined by applicable State Law. (X-74)

G. Archaeological-Paleontological Discoveries. The holder shall immediately notify the authorized officer of any and all antiquities or other objects of historic or scientific interest. These include, but are not limited to, historic or prehistoric ruins, fossils, or artifacts discovered as the result of operations under this permit, and shall leave such discoveries intact until authorized to proceed by the authorized officer. Protective and mitigative measures specified by the authorized officer shall be the responsibility of the permit holder. (X17)

H. Historical-Archaeological-Paleontological Discoveries: If during activities conducted under this authorization, items of significant historical, archaeological or paleontological interest, or human skeletal remains are discovered, or a known or unknown deposit of such items may be or is disturbed, the holder will immediately cease activities in the area so affected. The holder will then notify the Forest Service and will not resume activities until written approval is given by the authorized officer. (R1_X8)

I. Protection of Habitat of Endangered, Threatened, and Sensitive Species. Location of areas needing special measures for protection of plants or animals listed as threatened or endangered under the Endangered Species Act (ESA) of l973, as amended, or listed as sensitive by the Regional Forester under authority of FSM 2670, derived from ESA Section 7 consultation, may be shown on a separate map, hereby made a part of this permit, or identified on the ground. Protective and mitigative measures specified by the authorized officer shall be the responsibility of the permit holder.

If protection measures prove inadequate, if other such areas are discovered, or if new species are listed as Federally threatened or endangered or as sensitive by the Regional Forester, the authorized officer may specify additional protection regardless of when such facts become known. Discovery of such areas by either party shall be promptly reported to the other party. (X8)

J. Surveys, Land Corners. The holder shall protect, in place, all public land survey monuments, private property corners, and Forest boundary markers. In the event that any such land markers or monuments are destroyed in the exercise of the privileges authorized by this permit, depending on the type of monument destroyed, the holder shall see that they are reestablished or referenced in accordance with (1) the procedures outlined in the "Manual of Instructions for the Survey of the Public Land of the United States," (2) the specifications of the county surveyor, or (3) the specifications of the Forest Service.

Further, the holder shall cause such official survey records as are affected to be amended as provided by law. Nothing in this clause shall relieve the holder's liability for the willful destruction or modification of any Government survey marker as provided at 18 U.S.C. 1858. (D-4)

K. Superseded Permit. This permit supersedes a special-use permit designated: Vinson C. King on 12/31/97 . (X-18)

According to the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0596-0082.

This information is needed by the Forest Service to evaluate requests to use National Forest System lands and manage those lands to protect natural resources, administer the use, and ensure public health and safety. This information is required to obtain or retain a benefit. The authority for that requirement is provided by the Organic Act of 1897 and the Federal Land Policy and Management Act of 1976, which authorize the Secretary of Agriculture to promulgate rules and regulations for authorizing and managing National Forest System lands. These statutes, along with the Term Permit Act, National Forest Ski Area Permit Act, Granger-Thye Act, Mineral Leasing Act, Alaska Term Permit Act, Act of September 3, 1954, Wilderness Act, National Forest Roads and Trails Act, Act of November 16, 1973, Archeological Resources Protection Act, and Alaska National Interest Lands Conservation Act, authorize the Secretary of Agriculture to issue authorizations for the use and occupancy of National Forest System lands. The Secretary of Agriculture's regulations at 36 CFR Part 251, Subpart B, establish procedures for issuing those authorizations.

The Privacy Act of 1974 (5 U.S.C. 552a) and the Freedom of Information Act (5 U.S.C. 552) govern the confidentiality to be provided for information received by the Forest Service.

Public reporting burden for collection of information, if requested, is estimated to average 1 hour per response for annual financial information; average 1 hour per response to prepare or update operation and/or maintenance plan; average 1 hour per response for inspection reports; and an average of 1 hour for each request that may include such things as reports, logs, facility and user information, sublease information, and other similar miscellaneous information requests. This includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Agriculture, Clearance Officer, OIRM, AG Box 7630, Washington D.C. 20250; and to the Office of Management and Budget, Paperwork Reduction Project (OMB #0596-0082) Washington, D.C. 20503.

This permit is accepted subject to the conditions set out above.

HOLDER NAME: **MONTANA DEPARTMENT OF FISH WILDLIFE AND PARKS**

By: _____
PAT J. GRAHAM

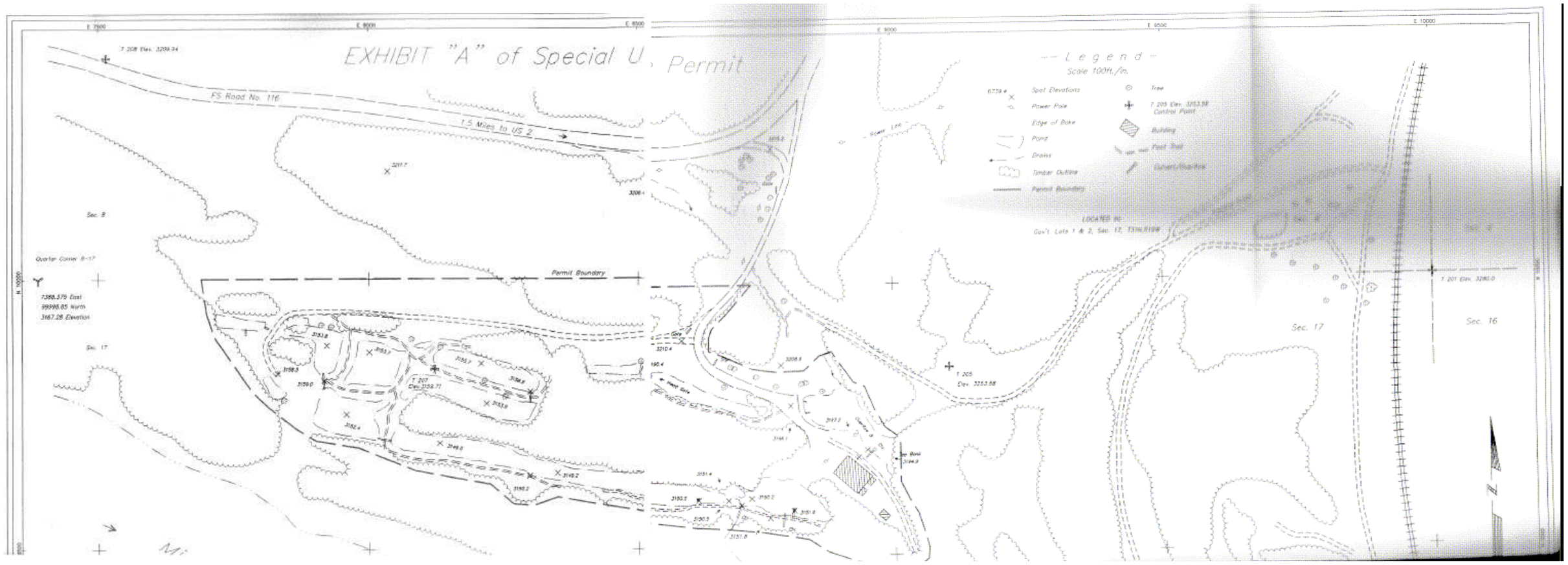
Date: _____

U.S. DEPARTMENT OF AGRICULTURE, Forest Service

By: _____
CATHY BARBOULETOS, Forest Supervisor
Flathead National Forest

Date: _____

EXHIBIT "A" of Special U[illegible] Permit



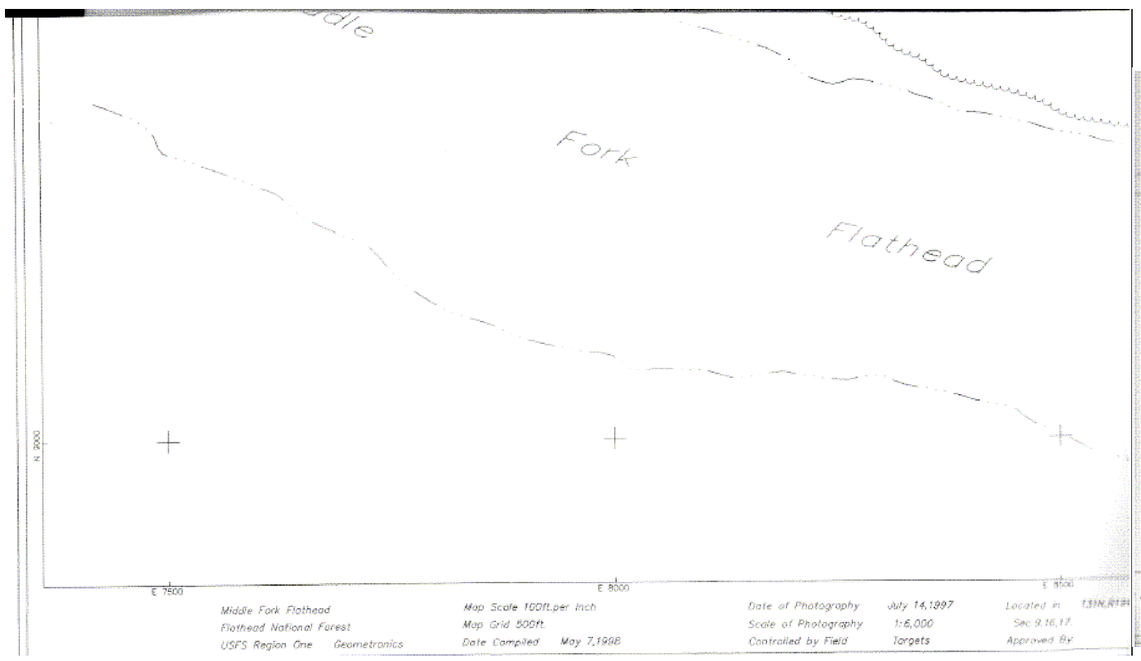


EXHIBIT B

ADDITIONAL OPERATING REQUIREMENTS

General

1. The privileges granted by this permit must be exercised by the holder. The use and occupancy of the premises, improvements, and activities herein authorized shall not be sublet by the holder to third parties. The residence can not be rented out for any purpose.

2. In an attempt to maintain the genetic structure of westslope cutthroat trout within the Flathead River and Lake System, that is to maintain the genetic variance within and between local populations, westslope cutthroat trout should not be stocked in water bodies that are on Flathead National Forest or that are tributary to these lands that could compromise the genetic structure of native wild trout. Stocking of closed basin lakes on these lands is acceptable and encouraged. A review of the stocking plan from the hatchery is requested on an annual basis by both agencies.

Grizzly Bear Protection

This special-use authorization includes land which is part of the habitat of the grizzly bear. Therefore, in compliance with Forest Service responsibilities under the Endangered Species Act of 1973, 16 U.S.C.G. 1531, the following conditions apply to this special-use authorization:

a. The authorized officer may order an immediate temporary suspension of all human activities permitted by this authorization, and if needed, revoke or terminate the special-use authorization when, in his/her judgement, such action is necessary in order to prevent confrontation or conflict between humans and grizzly bears. The holder shall immediately comply with such order. The United States shall not be liable for any consequences from such a suspension, revocation or termination. Such suspension, revocation, or termination may be appealed to the next higher level as provided in 36 CFR 251, Subpart C.

b. The holder, his/her agents, employees, contractors and subcontractors will comply with the requirements of the attached Special Order #F10-016L98 in the conduct of any and all activities authorized. In addition to the order, all attractants must be stored so it is unattainable by bears at all times. (definition for "attended camp does not apply).

c. The holder assumes full responsibility and shall hold the United States harmless from any and all claims by him/her or by third parties for any damages to life or property arising from the activities authorized by this special-use authorization and encounters with grizzly bears, or from suspension, revocation or termination of activities authorized by this special-use authorization.

d. Intentional or negligent acts by the holder, his/her agents, employees, contractors and subcontractors that result in injury or death of a grizzly bear will be cause for revocation or termination of this authorization in whole or in part.

e. Failure to comply with provisions a, b or c may result in suspension, revocation or termination of this authorization in whole or in part, and may cause criminal action to be taken against the holder under provisions of the Endangered Species Act of 1973, as amended, or other applicable authority.

EXHIBIT B

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General

1. The privileges granted by this permit must be exercised by the holder. The use and occupancy of the premises, improvements, and activities herein authorized shall not be sublet by the holder to third parties. The residence can not be rented out for any purpose.

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b. The holder, his/her agents, employees, contractors and subcontractors will comply with the requirements of the attached Special Order #F10-016L98 in the conduct of any and all activities authorized. In addition to the order, all attractants must be stored so it is unattainable by bears at all times. (definition for "attended camp does not apply).

c. The holder assumes full responsibility and shall hold the United States harmless from any and all claims by him/her or by third parties for any damages to life or property arising from the activities authorized by this special-use authorization and encounters with grizzly bears, or from suspension, revocation or termination of activities authorized by this special-use authorization.

d. Intentional or negligent acts by the holder, his/her agents, employees, contractors and subcontractors that result in injury or death of a grizzly bear will be cause for revocation or termination of this authorization in whole or in part.

e. Failure to comply with provisions a, b or c may result in suspension, revocation or termination of this authorization in whole or in part, and may cause criminal action to be taken against the holder under provisions of the Endangered Species Act of 1973, as amended, or other applicable authority.

SPECIAL ORDER #F10-016L98

OCCUPANCY AND USE RESTRICTIONS

NORTHERN CONTINENTAL DIVIDE ECOSYSTEM
FLATHEAD, LEWIS AND CLARK, LOLO, AND HELENA NATIONAL FORESTS
REGION ONE

Pursuant to 36 Code of Federal Regulations 261.50 (a) and (b), the following restrictions are in effect on the Flathead, Lewis and Clark, Lolo, and Helena National Forests, Montana within the Northern Continental Divide Ecosystem (NCDE). These restriction are in addition to those enumerated in Subpart A, Part 261, Title 36, Code of Federal Regulations and become effective when signed, and shall remain in effect until rescinded or revoked.

1. Possessing or storing any food or refuse, as specified in the order from April 1 to December 1, annually. [36 CFR 261.58(cc)]

2. Possessing, storing or transporting any bird, fish or other animal, or parts thereof as specified in the order from April 1 to December 1, annually. [36 CFR 261.58(s)]

The Northern Continental Divide Ecosystem consists of National Forest System lands included within the boundaries of the Flathead, Lewis and Clark, Lolo and Helena National Forests and is further defined on the attached map, (Exhibit A) and hereby made part of this order. Also attached and hereby made part of this order is Food Storage Special Order Information and Definitions, (Exhibit B).

UNDER THIS ORDER IT IS REQUIRED THAT:

1. Human, pet and livestock food (except baled or cubed hay without additives), garbage, and other attractants shall be attended or stored in a bear resistant manner.

2. Wildlife carcasses that are within 1/2-mile of any camp or sleeping area shall be stored in a bear resistant manner during nighttime hours.

3. Burnable attractants (such as food leftovers or bacon grease) shall not be buried, discarded, or burned in an open campfire.

4. The responsible party shall report the death and location of livestock to a Forest Service official within 24 hours of death.

Pursuant to 36 CFR 261.50(e) the following persons maybe exempt from this order (Flathead, Lolo, Lewis & Clark, or Helena Forest Supervisors are delegated the authority to grant the exemption in writing):

1. Persons with a permit specifically authorizing the prohibited act or omission.

2. Any Federal, State, or local officer, or member of an organized rescue or firefighting force in the performance of an official duty.

Done this 15 day of April, 1998.

ALLEN CHRISTOPHERSEN
Acting Forest Supervisor
Flathead National Forest

GLORIA FLORA
Forest Supervisor
Lewis & Clark National Forest

CHUCK C. WILDES
Forest Supervisor
Lolo National Forest

THOMAS J. CLIFFORD
Forest Supervisor
Helena National Forest

The purpose of these restrictions are to minimize grizzly bear/human conflicts and, thereby, provide for visitor safety and recovery of the grizzly bear within the Northern Continental Divide Ecosystem.

Violations of these restrictions or the conditions of any permit issued thereunder is punishable by a fine of up to $5000.00 or imprisonment of 6 months or both [7 USC 1011(f), 16 USC 551, and 13 USC 3571].

EXHIBIT "A"

SPECIAL ORDER - FOOD STORAGE
NORTHERN CONTINENTAL DIVIDE GRIZZLY BEAR ECOSYSTEM
Northern Region - Flathead, Lewis & Clark, Lolo and Helena National Forests

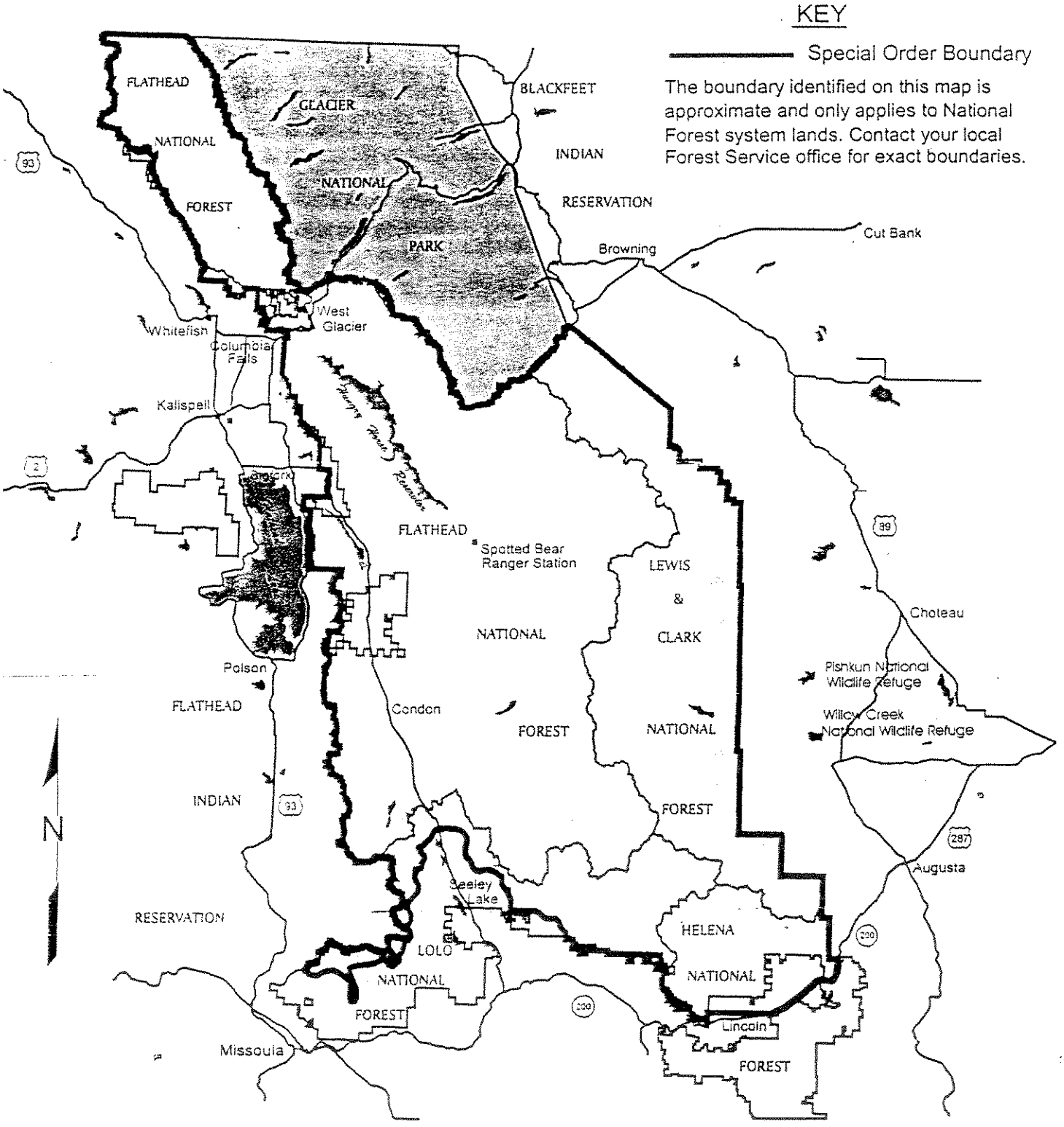

EXHIBIT "B"

FOOD STORAGE SPECIAL ORDER INFORMATION AND DEFINITIONS

INFORMATION

IT IS REQUIRED THAT:

1. **Human, pet and livestock food (except baled or cubed hay without additives), garbage, and other attractants shall be attended or stored in a bear resistant manner.** Food, garbage and other attractants (includes all livestock grain and pellets) shall be stored in an approved storage technique when camp is unattended.

2. **Wildlife carcasses, birds, fish or other animal parts that are within 1/2-mile of any camp or sleeping area shall be stored in a bear resistant manner during night time hours.** If a wildlife carcass is within an attended camp during daytime hours it may be on the ground.

3. **Attractants (such as food leftovers or bacon grease) shall not be buried, discarded, or burned in an open campfires.**
   A. Leftover food or other attractants may be burned in a contained stove fire.
   B. Leftover food or food waste products may be placed in an appropriate, sealed container and packed out with garbage.
   C. Attractants may be placed into a suitable container (i.e. tin can), to prevent leaching into ground, and burned over an open campfire.
   D. Any remaining attractants unconsumed by burning shall be placed with other garbage and packed out.

4. **The responsible party shall report the death and location of any livestock to a Forest Service Official within 24 hours of death.** In some very remote areas, it may not be possible to meet the 24-hour requirement. In these special cases, the responsible party shall report to a Forest Official the death of any livestock within 48 hours.

5. **Bear resistant container:** A securable container constructed of solid non-pliable material capable of withstanding 200 foot-pounds of energy applied by direct impact. The USFS Missoula Technology and Development Center (MDT) has an impact testing machine available to evaluate containers for strength.

DEFINITIONS:

1. **Attended (occupied) camp:** at least one adult person (attendee) is physically present in camp during daytime hours. During the nighttime hours all attractants must be within 50' of the attendee, or attractants must be stored in a bear resistant manner.

2. **Attractant:** any substance with an odor that may attract bears.

3. **Attendee:** An adult (18 years or older) in control of campsite.

4. **Bear resistant container:** a securable container constructed of solid non-pliable material capable of withstanding 200 foot-pounds of energy applied by direct impact. The container when secured and under stress, will not have any cracks, openings, or hinges that would allow a bear to gain entry by biting or pulling with its claws.

5. **Bear resistant manner** means any food items, including canned foods, garbage, and attractants, must be stored in one of the following ways if camp is unattended:

   a. secured in a hard-sided camper or vehicle trunk or cab;

   b. suspended at least 10 feet up (from the bottom of the suspended item) and 4 feet out from any upright support, i.e. tree, pole;

   c. stored in bear-resistant containers;

   d. stored within an approved and operating electric fence;

   e. or stored in any combination of these methods;

   f. stored by methods other than those described in this Section #5 a-e that shall be approved in writing by an NCDE Forest Supervisor.

6. **Contained fire stove:** a metal stove that completely encloses the fire.

7. **Daytime:** 1/2-hour before sunrise until 1/2-hour after sunset.

8. **Food:** any nourishing substance, including human food (canned, solid or liquid), livestock feed (except baled or cubed hay without additives) and pet food, and garbage from human, livestock or pet foods.

9. **Livestock:** a domesticated animal, such a mule, horse, or llama etc.

10. **Nighttime:** 1/2-hour after sunset until 1/2-hour before sunrise.

11. **Wildlife carcass:** the body, or any parts thereof, of any deceased wild animal, bird, or fish.

12. **Approved electric fence: will meet, as a minimum, the following specifications. Refer to Forest Service publication 9623-2850-MTDC for more description of fence specifications and set-up.**

a. Minimum fence height.....4 feet.

b. Minimum post height.....5 feet.

c. Maximum spacing between posts.....8 feet.

d. Conductors (wire): Minimum of 7 wires, with 6-10 inch spacing between wires. Bottom wire must be within 2" of the ground. All wire must be smooth metal fence wire of at least 16 gauge or poly wire, except the top wire which may be poly tape of at least six strand stainless steel.

e. The system will be set-up to operate both as a ground wire return and a grounded system.The 2 top wires will be hot, with all other wires alternating hot and ground. The minimum length ground rod is 2 feet.

f. Fence charger: Minimum (1) stored energy of 0.7 joules, (2) tested peak output of 5000 volts, (3) shocks per minute 40. User must be able to test electrical output in the field.

g. The fence will be set-up as a "tight wire" fence. The wire will be tight and under tension, not loose or sagging.

h. Minimum distance between fence and items inside.....3 feet.