



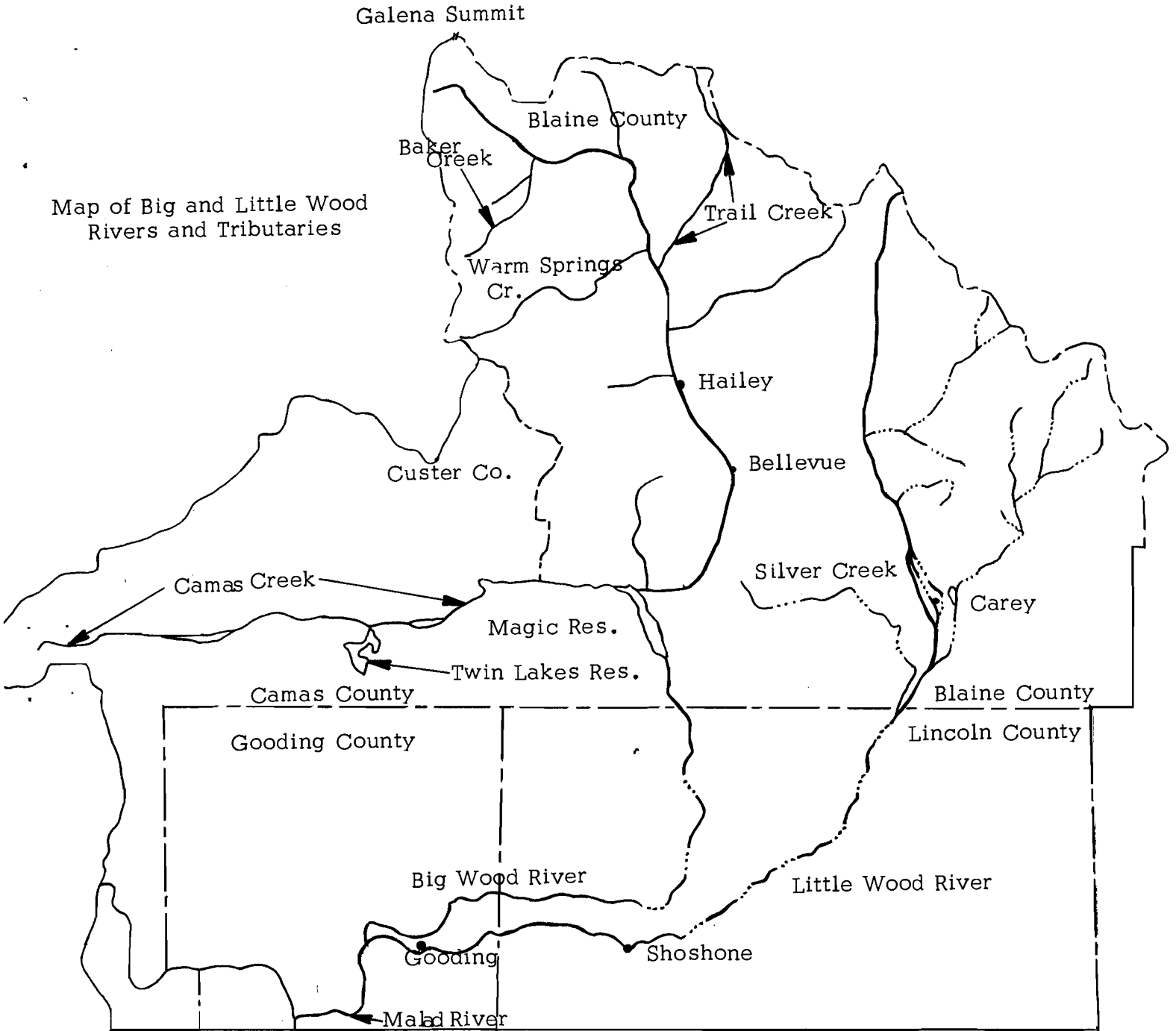
AN ENVIRONMENTAL SURVEY OF THE BIG AND LITTLE WOOD RIVERS IN IDAHO

Conducted for the Walla Walla District of the
U.S. CORPS OF ENGINEERS

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Map of Big and Little Wood Rivers and Tributaries



A REPORT OF A PRELIMINARY ECOLOGICAL SURVEY
OF THE BIG WOOD RIVER AND LITTLE WOOD RIVER BASINS

Conducted for the Walla Walla District of the
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I. GENERAL ECOLOGICAL CONSIDERATIONS

Historically the all too frequent pattern of land and water use has been to exploit to the fullest these natural resources. Little or no concern for their protection or restoration has been shown until a crisis stage is reached. In the Big and Little Wood River Basins we see no deviation from this pattern. The frequency with which floods occur has been increasing over the last fifty years and is in part a reflection of the extent of disturbance within the watershed. Legitimate local concern over the problems of flooding and supply of irrigation water often fails to appreciate the relationship outlined above.

One of the attractions which brings thousands of people into the area as tourists, summer residents, and as permanent residents is the natural beauty and aesthetic appeal of the area. These people bring in hundreds of thousands of dollars annually. It therefore seems shortsighted to destroy the natural beauty by removing vegetation and making a mockery of the streams through channeling, polluting, diverting, and straightening.

In the past ecologists have been unsuccessful in their attempts to warn and alert the public to dangers inherent in thoughtless resource use. Today their voices are beginning to be heard, and there is hope that through careful planning and cooperation of both governmental agencies and the general public we can avoid repeating past mistakes. Frequently, recommendations for remedial action in an ecosystem are unpopular with certain interest groups who fail to see or who reject long term benefits of the recommendations to the entire region. We anticipate that some of our own recommendations and observations will meet with rejection, but we point out that they are based on consideration of and for a livable environment for this and future generations.

II. INTRODUCTION

This preliminary survey was conducted at the request of the U.S. Corps of Engineers to assess the present ecological conditions in the watershed drained by the Big and Little Wood Rivers and their tributaries. Special note was made of particular problem areas which in some instances are clearly related to various kinds of land and water abuse. The area surveyed extended from Galena Summit on the north, the headwaters of Camas Creek on the west, Carey Marsh on the east, and the lower reaches of the streams in the vicinity of Shoshone and Gooding, Idaho, on the south. First impressions were gained during a six-hour flight over the major streams comprising the drainage. Subsequent to the aerial inspection selected areas were visited by vehicle and on foot to examine more closely those portions of the watershed which appeared from the air to have suffered particular abuse. Short visits were made to the offices of the U.S. Forest Service District Rangers in both Ketchum and Hailey and to the Soil Conservation Service office in Hailey. Time limitations under which the survey was performed precluded any in-depth study of problem areas. A more detailed assessment of the ecological effects of any proposed changes involving these streams or their tributaries should be made prior to any actual construction or watershed modification.

III. PRESENT CONDITIONS AND DISTURBANCES

Background

There appeared to be little public concern for the rivers except for the ways that they could be used for sewage removal, irrigation, building sites, and to meet other private interests. Relatively few signs were seen indicating a desire to slow down river flow, to increase scenic or wildlife values, and to maintain a permanent game fish population. It is ironic that people come to the area for the latter purposes and the monies and considerations are spent on the former. We therefore want to call attention to the more obvious

disturbances and their effects on the ecology of the area. The watershed has an extremely high and low peak hydrograph, which means that under natural conditions there are extensive annual changes in the amount of water runoff. Anything man does in or near the water will probably have adverse effects at some time of the year, especially in downstream reaches of the streams.

Road Building and Channel Straightening

One earlier modification for which ecological costs must still be paid is the recent channel straightening between Ketchum and Galena Summit for the purpose of road building. The natural meanders in the old river channel tended to slow down the flow of water, reduce erosion, and provide excellent trout habitat. As a result of the roadwork and due to the high cost of numerous bridges, the channel was relocated and straightened, resulting in the same vertical drop of stream over a much shorter horizontal distance. This action returns the stream to a more youthful stage in a geologic sense and results in faster runoff, increased erosion, and decreased trout habitat. In this instance, as in many others, it appears that the welfare of the stream was not given sufficient consideration during planning of road construction.

The shifting stream channel of the lower regions of the Big Wood River appears to be a natural phenomenon. This condition was probably enhanced by man-made changes of the type just discussed. More recently the Corps of Engineers with the support of local representatives of other federal and state agencies undertook considerable channel modification on the Big Wood River in the vicinity of Hailey and Bellevue. Examination of one such area north of Hailey near the mouth of Deer Creek showed dramatically that the work had been completed at considerable biological cost. Bulldozer tracks leading into the river indicated that some of the fill material had come from the river bed. This work had been done during the summer of 1969, but there was ample evidence that the river had not recovered in a biological sense. Loose stones resulting from the disturbance and abundant in this portion of the river continue to grind against each other in fast moving water and prevent the development of

plant and animal populations. Mayflies are one of the staple items in the diet of trout and were approximately 100 times less dense in the disturbed areas than in undisturbed portions of the same river. This is only a gross indication but reflects the recent observation by the Idaho Fish and Game Commission that rivers do not recover for ten years after such supposed stream improvement. The apparent "improvement" results in a biological cost requiring years to repay. As a result of the long-term deleterious effects on aquatic habitat, which may go unnoticed, bulldozers should be kept out of the stream channels and fill material should be brought in from elsewhere when it is needed.

Levees

Since the lower portions of the Big Wood River are unstable, a wide stretch should be set aside for the river to select its own course, and in which flood waters could be retained. Thus levee material may be required in certain areas and should be placed far enough from the river to allow natural stream flow when possible. Present dike structures were frequently constructed immediately adjacent to the stream, giving the appearance of an irrigation canal rather than a trout stream.

Irrigation

Diversion of both the Big and Little Wood Rivers for the purpose of irrigation is in some places complete, with no flow occurring immediately below these structures. There have been as many as thirty such diversion points on the Big Wood alone. It appears that water rights on both rivers are in excess of the stream flow during part of the summer and that almost every year the Big Wood dries up in the vicinity of Bellevue. The same situation was already existing at the time of this survey immediately below Magic Valley Reservoir. Above Carey the entire flow of the Little Wood was also diverted into irrigation canals. This intermittent flow treatment is disastrous to all stream organisms and essentially results in a stream being used as a storm sewer to remove excess water during the non-growing season. The question which must receive detailed attention, therefore, is whether or not we can afford to eliminate a natural and productive stream environment in order to irrigate agricultural land having only marginal value. The

increased voices of recreation and environmental consideration in the area should critically explore these stream management policies.

Building on Flood Plains

The flood plain of a river provides a flat and fertile place on which to build and farm, but one of the drawbacks of such an area is that there are periodic floods. This is especially true of a geologically young area like the watersheds of the Big and Little Wood Rivers. In this basin there are numerous instances of both private and commercial development situated only a few feet above mean water levels of the streams. Specific examples were noted in and above Ketchum, on Warm Springs Creek, and on and over Trail Creek. Several problems are associated with construction or development in such areas. Septic tanks and connected drain fields present problems at times of high water and can result in contamination of drinking water supplies. Property owners frequently request assistance from public agencies if they have suffered flood damage. All too frequently, if action is taken, only the objective of flood control is considered, and biological and aesthetic values of the stream are ignored.

Sewage

At the present time the Big and Little Wood Rivers receive directly or indirectly almost the entire sewage load of the populace. At Sun Valley the overloaded and inadequate primary treatment plant is soon to be replaced by a larger and more efficient primary treatment plan which will also receive the sewage from the town of Ketchum. It is unfortunate, however, that the sewer system is of the combined type including both sanitary and storm sewers. Under such a system there will inevitably be periods when the treatment facility will be overloaded, with subsequent dumping of untreated sewage into the Big Wood River. Downstream there are occasional places where raw sewage is presently dumped into the river. Throughout the flood plain, septic tanks are common and in areas having a high water table there occur periodic problems of inadequate sewer drainage. A related factor and one which must be of considerable magnitude at certain times of the year is the presence of cattle feed lots. Numerous feed lots were noted in the region between

Magic Valley Reservoir and Shoshone and also along Silver Creek. Drainage from most of these lots was directly into the adjacent stream, contributing a significant pollution load which the stream must handle. The magnitude of this contribution may be appreciated when it is known that a cow or steer daily produces an amount of sewage equivalent to that of 25-30 people. Accordingly, a feed lot of 500 cattle would daily produce sewage equivalent to that of 12,500-15,000 people.

There are indications that Silver Creek is beginning to show signs of this kind of pollution. In a distance of a few miles the creek changes from a clear, spring-fed stream to one which is murky and covered with scum.

Sheep Trail

The sheep trail was created by the driving of sheep onto the high ranges for summer grazing. During the early 1950's as many as 80,000 sheep used this trail as much as four times annually. The sheep were herded to the range in the spring and brought back to Ketchum for sorting prior to shipment to market. Remaining animals were trailed back to the range and only returned in time to escape the onset of winter. The result of such intensive use was almost complete denuding of up to a 200 yard wide belt along the Big Wood River. At least two consequences followed this insult to the landscape. Tons of soil eroded from the slopes and contaminated the river and impoundments. Secondly, a more subtle effect was that the land lost its capability of holding water. This meant that the water from spring melt or rains immediately flowed into the river, often contributing to or causing floods.

The conditions have now been largely remedied, but at considerable cost to the taxpayer and not to the owners of the sheep which caused the problem. The Forest Service has terraced the steep slopes which would not stabilize by reseeding alone. In areas where slopes were not so steep, reseeding was sufficient to bring about stabilization. Moreover, the Forest Service is to be complimented for disallowing any use of the trail in the spring of the year and for reducing grazing allotments in the Sawtooth National Forest. Sheep are now trucked into the summer range and some trailed out in the fall. Numbers of sheep using the trail have decreased from a peak of 80,000 to approximately 15,000.

Logging

Logging may be profitable to the logger and may be preferred over allowing timber to become aged, disease ridden, or burned, but careful practices must be followed if destruction of portions of the watershed is to be avoided. Without this caution logging can result in silt-clogged streams, increased in water temperatures, removal of protective mulch layers from the soil surface, and slope erosion, all of which require extensive periods of time for nature to overcome. When property managed, logging can increase food and cover for game, minimize soil erosion and stream disruption, help control disease or spread of plant pests, and provide employment and income to local residents. The logged portions of Baker Creek which we observed showed signs of good timber management practices. Stabilization was nearly complete, erosion was minimal, and young trees had been planted to ensure a gradual replacement of the forest. Thus in this watershed logging does not appear to have been a significant factor in the decline of water quality.

Wildlife

The Camas Prairie area south and west of Fairfield was observed only from the air, but it appeared to have many springs and a very high water table. The entire area along the southern part of Camas Creek looked marginal for farming, with the exception of grazing. One possibility which should be pursued for this drainage is the establishment of a wetland wildlife refuge. The area appears to have potential for waterfowl breeding and with proper management could produce significant numbers of birds. Extreme caution should be taken when providing drainage structures for existing farms in the area to ensure that the wetland habitat is not destroyed.

There is a large breeding colony of California and Ring-billed gulls on islands in Magic Valley Reservoir which should be considered when the water level of the impoundment is raised. The gulls are not only aesthetically pleasing, but they help farmers by preying heavily on insects and mice. These birds frequently begin nesting before the reservoir reaches its maximum capacity, and many nests may currently be destroyed before irrigation needs result in the stabilization of water levels. Thought should be given also to fencing their mainland breeding

colony and posting the island to keep people out during this critical stage of their life cycle.

With regard to the fishery in the Big Wood River, we were disturbed to see so much effort spent on put-and-take methods rather than maintenance of a healthy and permanent trout population. The survival of stocked trout is probably very low, and without proper stream management few natural populations are self-sustaining. There was evidence of good trout habitat in the beaver ponds on Trail Creek, Warm Springs Creek, and of course on Silver Creek, but from the standpoint of fisheries there is much room for general stream improvement throughout the watershed. The use of K-dams, gabions, and snags to create slack water should be encouraged, and perhaps riprap could be placed in the channel when alteration is required. Although this violates the principle of rapid removal of water, it should be noted that alterations which speed water in its downstream path also violate biological productivity. Consequently, a compromise has to be reached and consideration of the biological aspects must be included if we are to have viable streams.

Population Growth Effects

The area within this watershed will see continued growth in population, particularly in the resort areas of Sun Valley and Ketchum. Population growth on the remainder of the watershed will most likely be limited. Although many of the people coming into the resort areas will not be permanent residents, some long-range projections indicate that temporary peak populations may reach as high as ten thousand occupants. Even with improved and expanded sewage treatment facilities capable of removing most organic matter, the increased population can only result in larger amounts of nutrients getting into the streams. These nutrients will include phosphates and nitrates which are not removed from the effluents of secondary sewage treatment installations. These materials plus the same and other nutrients leached from agricultural lands stimulate the growth of nuisance algae, particularly in downstream reservoirs. Such algal "blooms" are aesthetically repulsive and markedly diminish recreational use of the lake or impoundment. Biologists recognize these changes in a body of water to be part of a natural

pattern termed eutrophication, a process which normally occurs over centuries. But under the influence of man's activities, this process is rapidly accelerated.

IV. EVALUATION OF POSSIBLE CHANGES

Zoning

Disadvantages

1. Sacrifices freedom to choose building sites in some instances. Present owners of streamside property could suffer economic loss.

Advantages

1. Protects individual property rights from undesirable adjacent construction.
2. Provides area for stream overflow.
3. Will permit more public access to the river, which is the drawing card to the area.
4. Will limit construction of types of homes and businesses which would be vulnerable on a flood plain.
5. Will save the taxpayer money in that public agencies will not be called upon to rescue or prevent further damage to structures that should not have been built on a flood plain in the first place.
6. Will save the river from ecological insults such as straightening, levees, impoundments, etc. Such projects will not be needed in zoned areas.
7. Will ensure minimal property damage from periodic flooding because zoning prohibits unsuitable structures on the flood plain.

Dams and Large Impoundments

Disadvantages

1. Will destroy wildlife habitat.
2. Will destroy natural, aesthetically pleasing, free-flowing streams.
3. Will become filled with silt.
4. May become eutrophic due to pollution.

5. May result in shoreline erosion where steep slopes form the banks of impoundments.
6. Frequently become filled with trash fish which are difficult to control.
7. May raise water temperatures above levels game fish can tolerate.
8. Will expose wide expanses of exposed, unsightly, biologically sterile mudflats for extended periods during drawdown.
9. Will hinder fish migration, especially during spawning.
10. Will engender conflicting interests between flood, agricultural (irrigation), and recreation proponents concerning drawdown practices.
11. Will destroy winter range and migration routes for game.
12. May flood valuable bottom land which has agricultural, grazing, or building potential.

Advantages

1. Provide recreation in the form of boating, waterskiing, and a type of fishing different from stream fishing.
2. Provide water for irrigation.
3. Provide flood control by regulating flow regimes.
4. Due to increased area of water surface, provide more people with fishing potential.

Streamside Levees or Channel Straightening

Disadvantages

1. Contributes to erosion downstream by increasing flow rate.
2. Destroys game fish habitat.
3. Destroys game fish food--invertebrates and algae.
4. Is aesthetically displeasing.
5. Destroys stream bottom which may require 10 years or more to regain its productive nature.

Advantages

1. Prevents local erosion and flooding.
2. Controls the river path.
3. Protects farm land and property.

Small Tributary Flood Control Dams

Disadvantages

1. May silt in quickly.
2. Destroy game habitat.
3. Result in periodic flooding which destroys native vegetation but does not sustain aquatic plants. The consequence is periodic exposure of ugly mud flats and weeds.

Advantages

1. Provide slack water for game fish habitat, thus providing good fly fishing areas.
2. Do not inundate vast areas in any one locality.
3. Provide constant water source for game on intermittent streams.
4. Retain water during times of peak flow.
5. Provide many scattered recreation spots rather than one central spot as do large dams.
6. Provide more edge effect which is conducive to raising wild ducks and geese broods than do large dams.

Off Levees

Disadvantages

1. Require land which may have agricultural value.
2. Are expensive if materials must be hauled in from elsewhere.

Advantages

1. Contain or control flooding.

2. Do not disturb natural flow of the stream.
3. Do not destroy aesthetics of the stream by creating an artificial channel.
4. Leave the stream productive, thus providing good game fish habitats.
5. Prevent the destruction of property such as buildings and the erosion of good agricultural land.
6. Do not disturb the river because materials are taken a sufficient distance from the river.
7. Provide a green belt between the off levee and the stream which stabilizes the existing banks, shades the water, provides wildlife habitat, and provides a barrier between cattle and the stream. The green belt also slows down the flood water during periods of high water, yet contains it, allowing water downstream sufficient time to flow away.
8. Trap silt from agricultural areas and prevent its entrance into the stream.

Diversion Floodways

Disadvantages

1. Are costly because some land must be taken out of production where the diversion floodway is constructed.
2. Appear useless to the unknowing public because they are used only during the time of flooding.
3. Need to be maintained.
4. May destroy a portion of the stream bottom in areas of the diversion floodway due to removal of construction materials.

Advantages

1. Prevent downstream flooding and damages resulting from flooding.
2. Recharge the water table, which may be significant in areas where the water table has been lowered by irrigation wells.
3. Destroy the least amount of game habitat when compared to large dams, streamside levees, channeling, or tributary dams.

4. From an ecological standpoint, this method of flood control results in the least disturbance to stream productivity and aesthetic beauty while at the same time achieving the objective sought.

Building Leakproof Irrigation Canals or Waterproofing Existing Canals

Disadvantages

1. Is an expensive long-term investment.
2. May lower water table in the immediate area, which destroys game-producing marshlands and necessitates deepening present wells.

Advantages

1. Will reduce water loss through seepage.
2. Makes more water available for recreational use.
3. May lower water table in the immediate area, thus making more land useful for building and agriculture.

Tertiary Sewage Treatment Plants

Disadvantages

1. Are expensive to construct.
2. In this area many of the people who contribute sewage are there only temporarily; their purchases then must help pay for the plant.

Advantages

1. Prevent pollution of local wells and streams during time of flooding when septic tanks currently overflow.
2. Remove the nitrates and phosphates from sewage effluent. This removal would minimize the danger of eutrophication in the impoundments and the pollution of the streams which are the attractive agents for tourists to bring money into the area.
3. Will prevent nitrates currently released by septic tanks from going into the ground water. If continued long enough, and by enough septic tanks, the nitrate in the ground water can become a health hazard.

V. SPECIFIC RECOMMENDATIONS

1. One of the more important and beneficial changes which we support in this watershed has been described by Idaho State Reclamation Engineer R. Keith Higginson: "In the past the method of preventing damage to life and property has been the construction of works. Billions have been spent on dikes, dams and levees. The Federal government has recognized, and the states are recognizing, that this is not the solution. State or local governments should be permitted to institute flood plain zoning in flood-prone areas. As structures already built were damaged or destroyed by floods they could be destroyed and the land purchased by the government and made available for public use." To accomplish this will probably require flood plain management or legislation or zoning.

2. The practice of installing septic tanks for private dwellings should be discouraged whenever other collection and treatment processes are feasible.

3. Further channel straightening should be avoided and off-levees encouraged so that channels might be free to shift or change within the area delimited by the off-levees. Construction of the off-levees should not involve removal of material from the adjacent streambed.

4. In conjunction with the off-levees, a green belt is advocated along existing stream channels. Width of this green belt may vary as conditions dictate, but it should extend at least 100 feet back from the present stream banks.

5. Construction of diversion canals seems advisable. The purpose would be to divert portions of the stream flow during periods of high water. If this water could be fed into the abundant lava flows, it would serve to recharge the underlying aquifer.

6. The engineering possibilities should be investigated concerning the construction of several small check dams on Trail Creek and other tributaries. If feasible, they might serve the dual purposes of slowing runoff and removing part of the silt load.

7. One of the strongest recommendations we make is that there be established a guaranteed minimum flow in both the Big and Little Wood Rivers. To attain this it might be necessary to reduce all water rights by some fixed percentage in order to achieve the desired flow.

8. The portion of Camas Prairie south and west of Fairfield should be considered for a wildlife refuge. Numerous ducks and geese as well as egrets, black crowned herons, and avocets were seen in this area.

9. The economic values of recreation in this entire watershed should be given careful consideration. If they are found to be as significant as they appear, then much more weight should be given them than is presently the case. It seems likely that such information might make easier the decisions required to bring environmental values into proper perspective. In this connection the demand for irrigation water should not entirely dictate impoundment management; rather, recreation values should receive equal consideration.

10. Methods of irrigation other than flooding should be investigated. If found feasible, a change to other methods could substantially help in resolving some of the problems in the watershed.

11. Some routine determinations of the water chemistry should be made along the entire length of both the Big and Little Wood Rivers and repeated at different times of the year. Particular attention should be given to dissolved oxygen, total phosphates, nitrates, organic matter, turbidity, and silt loads.

12. The stream is one of the most valuable resources of the region. Therefore, all adjacent construction (roads or buildings) should conform with the existing stream bed rather than changing the stream bed to conform with the particular project.

13. A more detailed assessment of the ecological effects of any proposed changes involving these streams or their tributaries should be made prior to any actual construction or watershed modification.

APPENDIX

A Synopsis of Present Ecological Disturbances Seen in the Watershed

Agricultural Practices

1. Evidence of overgrazing was observed on several parcels of private land. Detrimental effects of such practices include increased rates of erosion and loss of winter habitat for game birds and animals. When overgrazing is allowed to take place on lands having marginal utility because of environmental conditions, recovery is protracted.
2. Location of cattle feed lots on the banks of adjacent streams. Although there are several economic reasons why farmers choose these locations, the practice should be vigorously discouraged. The resultant drainage of manure poses a significant pollution load on the receiving stream and is most likely to occur during periods of low flow.
3. Absence of fencing along streams. Although this practice provides a water supply for grazing cattle, it can and frequently does result in severe damage to riparian vegetation and contributes to increased erosion of stream banks. Depending upon soil conditions, considerable siltation and turbidity can result from large numbers of cattle simply wading in the stream.
4. Construction of temporary diversion structures by private individuals. These hastily built devices to divert irrigation water are not expected to last more than a season or two, but the equipment necessary to do the work can substantially damage the stream bed in the immediate vicinity.
5. Removal of native vegetation. Spraying or other means of rapidly eradicating sagebrush, rabbitbrush, and bitterbrush may result in rapid runoff and contribute to the severity of flooding in downstream areas.

6. Irrigation problems.

The practice of flood irrigating is extremely inefficient in terms of wise water use. This practice in conjunction with land of only marginal agricultural benefit makes doubly important the evaluation of impoundments for the purposes of providing irrigation water. When water rights for irrigation regularly exceed the average minimum flows, it is time for some serious reflections, particularly in these times when we pride ourselves in justifying expenditures of government funds by gaining multiple benefits. Presently the water lost enroute to the fields means that more water must be diverted from the rivers than would be necessary if canals were constructed or treated to eliminate this significant loss. Soil Conservation Service figures indicate that up to 25% loss occurs in a three-mile section of some canals and 100% loss regularly takes place within 15 miles. Where stream diversion is complete there are disastrous effects on the organisms residing immediately below the diversion.

7. Drainage of spring areas and wetlands.

It is ironic that in an area where irrigation is a necessity to profitably farm marginal land, some areas also exist where surface water is so abundant that draining is considered. The regions of Silver Creek and portions of Camas Creek fall into this category. These areas should receive careful consideration before extensive drainage is established, as they might more profitably be left in their natural state and utilized as wildlife habitat.

River Channel and Flood Plain Modifications

1. Channel straightening.

This practice creates problems as well as alleviating others. Downstream movement of flood waters is speeded in the section of stream that is straightened but in lower reaches of the stream this may be reflected in more severe flooding. If the streambed

is disturbed significantly during the straightening process, then the biological productivity will be greatly depressed. Recovery of such areas may require a number of years. Game fish surviving the construction period no longer find suitable habitat and quickly leave the disturbed stretch of the river. Aesthetics involve particular problems, but to a growing number of people undisturbed streams have greater aesthetic appeal than do concrete, riprap, and the scars of heavy equipment.

2. Removal of riparian vegetation from portions of the flood plain. Cottonwoods and willows are the dominant vegetation types found on the banks of streams in this area, and in some locations they have largely been removed. When present in large numbers they exert a stabilizing influence by anchoring soil and retarding the flow of flood waters.

Sewage Problems

1. In the entire watershed only Ketchum and Sun Valley are planning even secondary sewage treatment. Remaining areas either dump raw sewage into streams or depend upon septic tanks. During periods of flooding these septic tanks may overflow and present the possibility of drinking water contamination. Subtle or delayed effects reflecting this form of pollution may be seen in the increase of nuisance algae in downstream reservoirs.
2. Pollution of a similar nature resulting from the location of cattle feed lots has already been discussed.

Miscellaneous Disturbances

1. Clear cut logging.
During and immediately after logging there is danger of increased erosion and subsequent stream siltation. Careful forest management practices and follow-up after logging appear to have kept this problem minimal. However, following logging there inevitably occurs a decrease in moisture retention in the denuded area. So long as only limited portions of the watershed are subjected to this kind of disturbance, its significance may be questioned.

2. Mining operations.

Even though numerous mines are located in the mountains west of Bellevue, no serious instances of stream pollution were noted. However, because the types of pollution problems involving mine operation can be so serious when they do occur, this possibility must be kept in mind.

3. Geologic considerations.

Because of the geological instability of the Trail Creek area, it presents special problems. Frequent slides and avalanches present considerable amounts of soil and substrate which may rapidly be eroded by stream action. Any changes or modifications involving this tributary are apt to be difficult and expensive.

4. Impoundments.

Magic Valley Reservoir at times experiences extensive growths of algae which may markedly reduce water quality. In addition, there are periods during peak flow or runoff when considerable siltation occurs in this impoundment.

5. Private construction.

Several instances were seen in which individuals modified a stream as a result of construction or in attempting to enhance the setting of private homes. In the Silver Creek area a few fences were noted spanning the stream, thus preventing use of canoes or other small boats by fishermen. It was also noted that public access to this famous trout stream is becoming increasingly difficult.